



5-in-1

MATHEMATICS

I TERM

UNIT

1

NUMBER SYSTEM

Try These

B.P.No. 1

- Write the following integers in ascending order:
-5, 0, 2, 4, -6, 10, -10
- If the integers -15, 12, -17, 5, -1, -5, 6 are marked on the number line then the integer on the extreme left is _____.
- Complete the following pattern:
____, -40, ____, ____, -10, 0, ____, 20, 30, ____, 50.
- Compare the given numbers and write "<", ">" or "=" in the boxes.
(a) -65 65 (b) 0 1000 (c) -2018 -2018
- Write the given integers in descending order :
-27, 19, 0, 12, -4, -22, 47, 3, -9, -35

Solution:

- 10, -6, -5, 0, 2, 4, 10
- 17
- 50, -40, -30, -20, -10, 0, 10, 20, 30, 40, 50
- (a) -65 65 (b) 0 1000 (c) -2018 -2018
- 47, 19, 12, 3, 0, -4, -9, -22, -27, -35

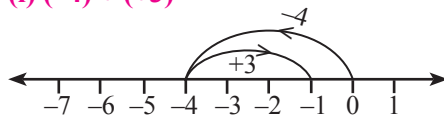
Addition of Integers

Try This

B.P.No. 3

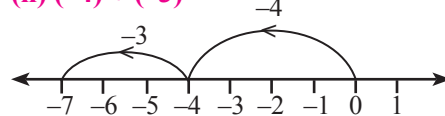
Find the value of the following using the number line activity:

(i) $(-4) + (+3)$



$$-4 + (+3) = -1$$

(ii) $(-4) + (-3)$



$$(-4) + (-3) = -7$$

(iii) $(+4) + (-3)$ 

$$(+4) + (-3) = +1$$

Example 1.1

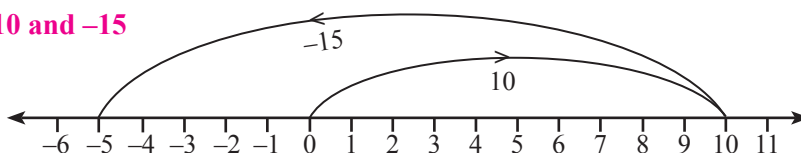
B.P.No. 4

Add the following integers using number line (i) 10 and -15 (ii) -7 and -9

Solution:

Let us add the integers using number line

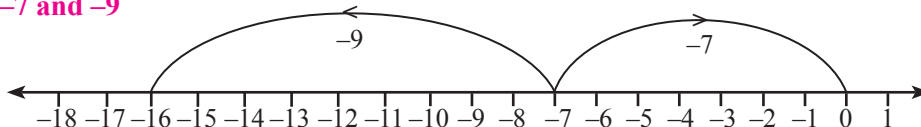
(i) 10 and -15



On the number line we first start at zero facing positive direction and move 10 steps forward, reaching 10. Then we move 15 steps backward to represent -15 and reach at -5.

Thus, we get $10 + (-15) = -5$.

(ii) -7 and -9



On the number line we first start at zero facing positive direction and move 7 steps backward, reaching -7. Then we move 9 steps backward to represent -9 and reach at -16.

Thus, we get $(-7) + (-9) = -16$.

Example 1.2

B.P.No. 5

Add (i) (-40) and (30)

(ii) 60 and (-50)

Solution:

(i) (-40) and (30)

$$-40 + 30 = -10$$

(ii) 60 and (-50)

$$60 + (-50) = 60 - 50 = 10$$

Example 1.3

B.P.No. 5

Add: (i) (-70) and (-12)

(ii) 103 and 39.

Solution:(i) $(-70) + (-12) = -70 - 12 = -82$ (ii) $103 + 39 = 142$

Example 1.4

B.P.No. 5

A submarine is at 32 feet below the sea level. Then it moves up 8 feet. Find the depth of the submarine.

Solution:

A submarine is 32 feet below sea level.

Therefore, it is represented by -32

Next it moves up 8 feet.

Moves above is represented as $+8$

The depth of the submarine $= -32 + 8 = -24$

Therefore, the submarine is located at 24 feet below the sea level.

Example 1.5

B.P.No. 5

Sita saved ₹ 225.00 and she has spent ₹ 400 on credit basis for the purchase of stationery. Find her due amount.

Solution:

The amount Sita has ₹ 225

The amount spent for stationery on credit $= ₹ 400$

The due amount to be paid $= 225 - 400 = -175$

Therefore, Sita has to pay ₹ 175

Example 1.6

B.P.No. 5

From the ground floor a man went up six floors and came down six floors. In which floor is he now?

Solution:

Starting point $=$ Ground floor

Number of floors climbed up $= +6$

Number of floors climbed down $= -6$

Now the landing point $= +6 - 6 = 0$ (ground floor)

Try These

B.P.No. 7

1. Fill in the blanks:

(i) $20 + (-11) = \underline{(-11)} + 20$

(ii) $(-5) + (-8) = (-8) + \underline{(-5)}$

(iii) $(-3) + 12 = \underline{12} + (-3)$

2. Say true or false.

- (i) $(-11) + (-8) = (-8) + (-11)$ **True**
 (ii) $-7 + 2 = 2 + (-7)$ **True**
 (iii) $(-33) + 8 = 8 + (-33)$ **True**

3. Verify the following:

(i) $[(-2) + (-9)] + 6 = (-2) + [(-9) + 6]$

Solution:

$$\begin{aligned} [(-2) + (-9)] + 6 &= (-2) + [(-9) + 6] \\ [-11] + 6 &= -2 + (-3) \\ -5 &= -5 \end{aligned}$$

$\therefore [(-2) + (-9)] + 6 = (-2) + [(-9) + 6]$

(iii) $[(-11) + 5] + (-14) = (-11) + [5 + (-14)]$

Solution:

$$\begin{aligned} [(-11) + 5] + (-14) &= (-11) + [5 + (-14)] \\ (-6) + (-14) &= (-11) + (-9) \\ -20 &= -20 \end{aligned}$$

$\therefore [(-11) + 5] + (-14) = (-11) + [5 + (-14)]$

(ii) $[7 + (-8)] + (-5) = 7 + [(-8) + (-5)]$

Solution:

$$\begin{aligned} [7 + (-8)] + (-5) &= 7 + [(-8) + (-5)] \\ (-1) + (-5) &= 7 + (-13) \\ -6 &= -6 \end{aligned}$$

$\therefore [7 + (-8)] + (-5) = 7 + [(-8) + (-5)]$

(iv) $(-5) + [(-32) + (-2)] = [(-5) + (-32)] + (-2)$

Solution:

$$\begin{aligned} (-5) + [(-32) + (-2)] &= [(-5) + (-32)] + (-2) \\ (-5) + (-34) &= (-37) + (-2) \\ -39 &= -39 \end{aligned}$$

$\therefore (-5) + [(-32) + (-2)] = [(-5) + (-32)] + (-2)$

4. Find the missing integers:

- (i) $0 + (-95) = \underline{-95}$ (ii) $-611 + \underline{0} = -611$
 (iii) $\underline{-60} + 0 = \underline{-60}$ (iv) $0 + (-140) = \underline{-140}$

5. Complete the following:

- (i) $-603 + 603 = \underline{0}$ (ii) $9847 + (-9847) = \underline{0}$ (iii) $1652 + \underline{(-1652)} = 0$
 (iv) $-777 + \underline{777} = 0$ (v) $\underline{(-5281)} + 5281 = 0$

Example 1.7

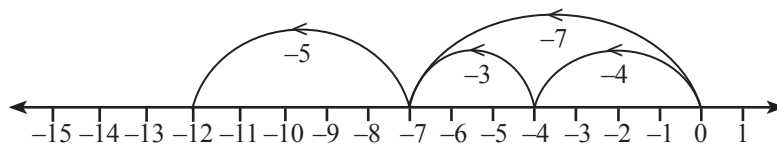
B.P.No. 8

(i) Are $120 + 51$ and $51 + 120$ equal?(ii) Are $(-5) + [(-4) + (-3)]$ and $[(-5) + (-4)] + (-3)$ equal?**Solution:**(i) When we add, $120 + 51 = 171$; $51 + 120 = 171$

In both the cases we get same answer. This means that integers can be added in any order. Hence, addition of integers is commutative.

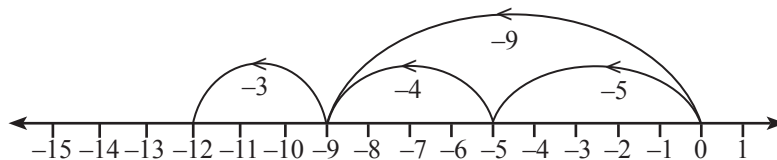
(ii) $(-5) + [(-4) + (-3)]$ and $[(-5) + (-4)] + (-3)$

In $(-5) + [(-4) + (-3)]$, (-4) and (-3) are added first and their result is then added with (-5) .



$$(-5) + [(-4) + (-3)] = -12$$

Whereas in $[(-5) + (-4)] + (-3)$, (-4) and (-3) are added first and then the result is added with (-5)



$$[(-5) + (-4)] + (-3) = -12$$

In both the cases, we get -12

That is $(-5) + [(-4) + (-3)] = [(-5) + (-4)] + (-3)$

So, addition is associative.

Example 1.8

B.P.No. 8

Find the missing integers (i) $0 + (-2345) = \underline{\hspace{2cm}}$ (ii) $23479 + \underline{\hspace{2cm}} = 0$

Solution:

(i) $0 + (-2345) = -2345$

(ii) $23479 + (-23479) = 0$

Therefore, additive inverse of 23479 is -23479

Example 1.9

B.P.No. 9

Mention the property for the following equations:

(i) $(-45) + (-12) = -57$

(ii) $(-15) + 7 = (7) + (-15)$

(iii) $-10 + 3 = -7$

(iv) $(-7) + (-5) = (-5) + (-7)$

(v) $(-7) + [(-4) + (-3)] = [(-7) + (-4)] + (-3)$

(vi) $0 + (-7245) = -7245$

Solution:

(i) Closure Property

(ii) Commutative Property

(iii) Closure Property

(iv) Commutative Property

(v) Associative Property

(vi) Additive Identity

Exercise 1.1

B.P.No. 9

1. Fill in the blanks.

Solution:

(i) $(-30) + 90 = 60$

(ii) $(-5) + (-95) = -100$

(iii) $(-52) + (-52) = -104$

(iv) $22 + (-22) = 0$

(v) $140 + (-70) = 70$

(vi) $20 + 80 + (-100) = 0$

(vii) $75 + (-25) = 50$

(viii) $171 + (-171) = 0$

(ix) $[(-3) + (-12)] + (-77) = -3 + [(-12) + (-77)]$

(x) $(-42) + [15 + (-23)] = [(-42) + 15] + (-23)$

2. Say true or false.

(i) The additive inverse of (-32) is (-32)

False

(ii) $(-90) + (-30) = 60$

False

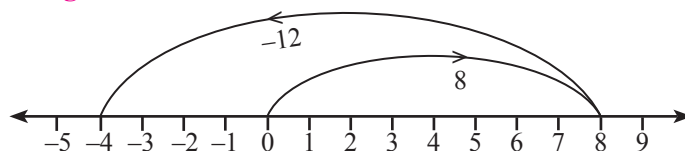
(iii) $(-125) + 25 = -100$

True

3. Add the following

(i) 8 and -12 using number line

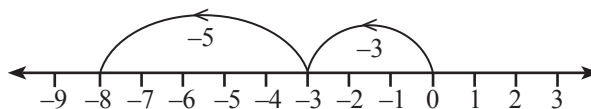
Solution:



$$8 + (-12) = 8 - 12 = -4$$

(ii) (-3) and (-5) using number line

Solution:



$$(-3) + (-5) = -8$$

(iii) $(-100) + (-10)$

Solution:

$$(-100) + (-10) = -100 - 10 = -110$$

(iv) $20 + (-72)$

Solution:

$$20 + (-72) = 20 - 72 = -52$$

(v) $82 + (-75)$

Solution:

$$82 + (-75) = 82 - 75 = 7$$

(vi) $-48 + (-15)$

Solution:

$$-48 + (-15) = -48 - 15 = -63$$

(vii) $-225 + (-63)$

Solution:

$$-225 + (-63) = -225 - 63 = -288$$

4. Thenmalar appeared for competitive exam which has negative scoring of 1 mark for each incorrect answer. In paper I she answered 25 questions incorrectly and in paper II, 13 questions incorrectly. Find the total reduction of marks.

Solution:

$$\begin{aligned}
 \text{Number of incorrect question in Paper I} &= 25 \\
 \text{Number of incorrect question in Paper II} &= 13 \\
 \text{reduction mark Paper I} &= -25 \\
 \text{reduction mark Paper II} &= -13 \\
 \text{Total reduction mark} &= -25 + (-13) \\
 &= -38
 \end{aligned}$$

5. In a quiz competition, Team A scored +30, -20, 0 and team B scored -20, 0, +30 in three successive rounds. Which team will win? Can we say that we can add integers in any order?

Solution:

$$\begin{aligned}
 \text{Total mark of Team A} &= 30 + (-20) + 0 \\
 &= 10
 \end{aligned}$$

$$\begin{aligned}
 \text{Total mark of Team B} &= -20 + 30 + 0 \\
 &= 10
 \end{aligned}$$

$$\text{Team A} = \text{Team B}$$

Yes, it can be added in any order.

6. Are $(11+7)+10$ and $11+(7+10)$ equal? Mention the property.

Solution:

$$(11+7) + 10 = 18 + 10 = 28$$

$$11 + (7+10) = 11 + 17 = 28$$

$$(11+7) + 10 = 11 + (7+10)$$

So addition is associative.

7. Find 5 pairs of integers that add up to 2.

Solution:

$$0+2 = 2; 1+1 = 2; -1+3 = 2; -3+5 = 2; -4+6 = 2;$$

The 5 pairs are: (0,2), (1,1), (-1,3), (-3,5), (-4,6)

Objective Type Questions

8. The temperature at 12 noon at a certain place was 18° above zero. If it decreases at the rate of 3° per hour at what time it would be 12° below zero?

i) 12 mid night

ii) 12 noon

iii) 10 am

iv) 10 pm

Ans: iv) 10 pm

9. Identify the problem with negative numbers as its answer:

- i) $-9 + (-5) + 6$ ii) $18 + (-12) - 6$ iii) $-4 + 2 + 10$ iv) $10 + (-4) + 8$

Ans: i) $-9 + (-5) + 6$

10. $(-10) + (+7) = \underline{\hspace{2cm}}$

- i) $+3$ ii) -3 iii) -17 iv) $+17$ **Ans: ii) -3**

11. $(-8) + 10 + (-2) = \underline{\hspace{2cm}}$

- i) 2 ii) 8 iii) 0 iv) 20 **Ans: iii) 0**

12. $20 + (-9) + 9 = \underline{\hspace{2cm}}$

- i) 20 ii) 29 iii) 11 iv) 38 **Ans: i) 20**

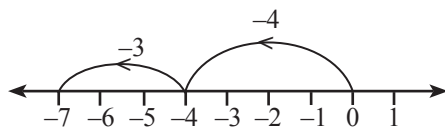
Subtraction of Integers

Try These

B.P.No. 11

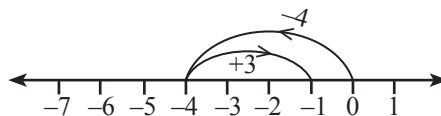
1. Do the following by using number line.

(i) $(-4) - (+3)$



$(-4) - (+3) = -7$

(ii) $(-4) - (-3)$



$(-4) - (-3) = -1$

2. Find the values and compare the answers.

(i) $(-6) - (-2)$ and $(-6) + 2$

Solution:

$$(-6) - (-2) = (-6) + 2 = -4$$

$$-6 + 2 = -4$$

$$\therefore (-6) - (-2) = (-6) + 2$$

(iii) $26 - (+10)$ and $26 + (-10)$

Solution:

$$26 - (+10) = 26 - 10 = 16$$

$$26 + (-10) = 26 - 10 = 16$$

$$\therefore 26 - (+10) = 26 + (-10)$$

(ii) $35 - (-7)$ and $35 + 7$

Solution:

$$35 - (-7) = 35 + 7 = 42$$

$$35 + 7 = 42$$

$$\therefore 35 - (-7) = 35 + 7$$

3. Put the suitable symbol $<$, $>$ or $=$ in the boxes.

(i) $-10 - 8 \boxed{<} -10 + 8$

(ii) $(-20) + 10 \boxed{=} (-20) - (-10)$

(iii) $(-70) - (-50) \boxed{>} (-70) - 50$

(iv) $100 - (+100) \boxed{<} 100 - (-100)$

(v) $(-50) - 30 \boxed{=} -100 + 20$

Example 1.10

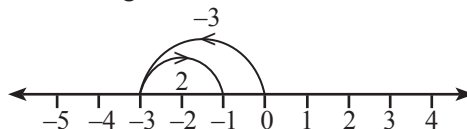
B.P.No.12

Subtract the following using the number line.

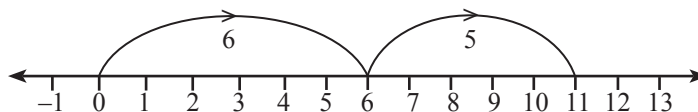
(i) $-3 - (-2)$ (ii) $+6 - (-5)$

Solution:

(i) $-3 - (-2)$

To subtract -2 from -3 using number line,Therefore, $-3 - (-2) = -3 + 2 = -1$

(ii) $+6 - (-5)$

To subtract -5 from 6 using number line,Therefore, $+6 - (-5) = +6 + 5 = 11$.

Now, let us see how to subtract negative integers using additive inverse.

Example 1.11

B.P.No.12

(i) Subtract (-40) from 70 (ii) Subtract (-12) from (-20)

Solution:

(i) $70 - (-40)$

$= 70 + (\text{additive inverse of } -40)$

$= 70 + 40$

$= 110.$

(ii) $(-20) - (-12)$

$= (-20) + (\text{additive inverse of } (-12))$

$= (-20) + 12$

$= -8$

Example 1.12

B.P.No.12

Find the value of : (i) $(-11) - (-33)$ (ii) $(-90) - (-50)$

Solution:

(i) $(-11) - (-33)$

$= (-11) + (+33)$

$= 22$

(ii) $(-90) - (-50)$

$= -90 - (-50)$

$= -90 + 50$

$= -40$

Example 1.13

B.P.No.13

Chitra has ₹ 150. She wanted to buy a bag which costs ₹ 225. How much money does she need to borrow from her friend?

Solution:

$$\begin{aligned}\text{Amount with Chitra} &= ₹ 150 \\ \text{Cost of bag} &= ₹ 225 \\ \text{Amount to be borrowed} &= 225 - 150 \\ &= ₹ 75\end{aligned}$$

Example 1.14

B.P.No.13

What is the balance in Chezhiyan's account as a result of a purchase for ₹ 1079, if he had an opening balance of ₹ 5000 in his account?

Solution

$$\begin{aligned}\text{Opening balance} &= ₹ 5000 \\ \text{Debit amount} &= ₹ 1079 (-) \\ \text{Balance amount} &= ₹ 3921\end{aligned}$$

Example 1.15

B.P.No.13

The temperature at Srinagar was -3°C on Friday. If the temperature decreases by 1°C next day, then what is the temperature on that day?

Solution:

The temperature at Srinagar was -3°C on Friday. If the temperature decreases by 1°C then, temperature on the next day $= -3^{\circ}\text{C} - 1^{\circ}\text{C} = -4^{\circ}\text{C}$

Example 1.16

B.P.No.13

A submarine is at 300 feet below the sea level. If it ascends to 175 feet, what is its new position?

Solution:

$$\begin{aligned}\text{Initial position of submarine} &= 300 \text{ feet below} \\ &= -300 \text{ feet} \\ \text{Distance ascended by submarine} &= 175 \text{ feet} \\ &= +175 \text{ feet} \\ \text{New position of submarine} &= (-300) + (+175) \\ &= -125\end{aligned}$$

That is, the submarine is 125 feet below the sea level.

Try These

B.P.No. 14

1. Fill in the blanks.

$$(i) (-7) - (-15) = +8 \quad (ii) 12 - (-7) = 19 \quad (iii) (-4) - (-5) = 1$$

2. Find the values and compare the answers.

(i) $15 - 12$ and $12 - 15$

Solution:

$15 - 12 = 3$

$12 - 15 = -3$

$15 - 12 \geq 12 - 15$

(ii) $-21 - 32$ and $-32 - (-21)$

Solution:

$-21 - 32 = -53$

$-32 - (-21) = -32 + 21 = -11$

$-21 - 32 \leq -32 - (-21)$

Think

B.P.No. 14

Is associative property true for subtraction of integers?**Take any three examples and check.****Solution:**

Associative property is not true for subtraction.

Example: 1

$4 - (5 - 8) \text{ and } (4 - 5) - 8$

$4 - (5 - 8) = 4 - (-3)$

$= 4 + 3 = 7$

$(4 - 5) - 8 = (-1) - 8 = -9$

$\therefore 4 - (5 - 8) \neq (4 - 5) - 8$

Example: 2

$7 - [(-3) - 5] \text{ and } [7 - (-3)] - 5$

$7 - [(-3) - 5] = 7 - (-8)$

$= 7 + 8 = 15$

$[7 - (-3)] - 5 = (7 + 3) - 5$

$= 10 - 5 = 5$

$\therefore 7 - [(-3) - 5] \neq [7 - (-3)] - 5$

Example: 3

$(-5) - [(-4) - (-3)] \text{ and } [(-5) - (-4)] - (-3)$

$(-5) - [(-4) - (-3)] = (-5) - (-4 + 3)$

$= -5 - (-1)$

$= -5 + 1 = -4$

$[(-5) - (-4)] - (-3) = (-5 + 4) + 3$

$= -1 + 3 = 2$

$\therefore (-5) - [(-4) - (-3)] \neq [(-5) - (-4)] - (-3)$

From Examples 1, 2, 3 associative property is not true for subtraction.

Exercise 1.2

B.P.No. 14

1. Fill in the blanks.

Solution:

$$(i) -44 + (-44) = -88 \quad (ii) 30 - 75 = -45 \quad (iii) -30 - (+50) = -80$$

2. Say true or false.

$$(i) (-675) - (-400) = -1075 \quad \text{False}$$

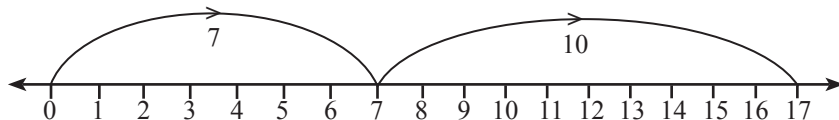
$$(ii) 15 - (-18) \text{ is the same as } 15 + 18 \quad \text{True}$$

$$(iii) (-45) - (-8) = (-8) - (-45) \quad \text{True}$$

3. Find the value of the following.

Solution:(i) $-3 - (-4)$ using number line

$$-3 - (-4) = -3 + 4 = 1$$

(ii) $7 - (-10)$ using number line

$$+7 + 10 = 17$$

(iii) $35 - (-64)$

$$35 - (-64) = 35 + 64 = 99$$

(iv) $-200 - (+100)$

$$-200 - (+100) = -200 - 100 = -300$$

4. Kabilan was having 10 pencils with him. He gave 2 pencils to Senthil and 3 to Karthik. Next day his father gave him 6 more pencils, from that he gave 8 to his sister. How many pencils are left with him?

Solution:

$$\text{Total number of pencils} = 10 + 16$$

$$\text{Total number of pencil he gave} = 2 + 3 + 8$$

$$= 13$$

$$\text{left pencils} = 16 - 13 = 3$$

5. A lift is on the ground floor. If it goes 5 floors down and then moves up to 10 floors from there. Then in which floor will the lift be?

Solution:

Lift 5 floor down (5-)

Lift 10 floor up (10+)

The lift be $-5+10 = 5$

5th floor (above the ground floor)

6. When Kala woke up, her body temperature was 102°F . She took medicine for fever. After 2 hours it was 2°F lower. What was her temperature then?

Solution:

Kala body Temperature was 102°F

After 2 hours 2°F lower.

Then her temperature = $102^{\circ}\text{F} - 2^{\circ}\text{F}$
 $= 100^{\circ}\text{F}$

7. What number should be added to (-17) to get (-19) ?

Solution:

$$(-17) + \underline{\quad} = -19$$

$$(-17) + (-2) = -19$$

(-2) be added.

8. A student was asked to subtract (-12) from (-47) . He got -30 . Is he correct? Justify.

Solution:

$$\begin{aligned} (-47) - (-12) &= -47+12 \\ &= -35 \end{aligned}$$

It is wrong (-35) is the correct answer.

Objective Type Questions

9. $(-5) - (-18) = \underline{\quad}$

i) 23

ii) -13

iii) 13

iv) -23

Ans: iii) 13

10. $(-100) - 0 + 100 = \underline{\quad}$

i) 200

ii) 0

iii) 100

iv) -200

Ans: ii) 0

Multiplication of Integers

Try These

B.P.No. 16

1. Find the product of the following.

(i) $(-20) \times (-45) = \underline{900}$

(ii) $(-9) \times (-8) = \underline{72}$

(iii) $(-30) \times 40 \times (-1) = \underline{1200}$

(iv) $(+50) \times 2 \times (-10) = \underline{-1000}$

2. Complete the following table by multiplying the integers in the corresponding row and column headers.

×	-3	-2	-1	0	1	2	3
-3	9	6	3	0	-3	-6	-9
-2	6	4	2	0	-2	-4	-6
-1	3	2	1	0	-1	-2	-3
0	0	0	0	0	0	0	0
1	-3	-2	-1	0	1	2	3
2	-6	-4	-2	0	2	4	6
3	-9	-6	-3	0	3	6	9

3. Which of the following is incorrect?

- | | |
|---|-----------|
| (i) $(-55) \times (22) \times (33) < 0$ | correct |
| (ii) $(-1521) \times 2511 < 0$ | correct |
| (iii) $2512 - 1252 < 0$ | incorrect |
| (iv) $(+1981) \times (+2000) < 0$ | incorrect |

Example 1.17

B.P.No.16

- | | | |
|--------------------------|------------------------|------------------------|
| (i) $(-35) \times (-11)$ | (ii) $96 \times (-20)$ | (iii) $(-5) \times 12$ |
| (iv) 15×5 | (v) 999×0 | |

Solution:

- | | | |
|--------------------------------|--------------------------------|------------------------------|
| (i) $(-35) \times (-11) = 385$ | (ii) $96 \times (-20) = -1920$ | (iii) $(-5) \times 12 = -60$ |
| (iv) $15 \times 5 = 75$ | (v) $999 \times 0 = 0$ | |

Example 1.18

B.P.No.17

A fruit seller sold 5kg of mangoes at a profit of ₹ 15 per kg and 3kg of apples at a loss of ₹ 30 per kg. Find whether it is a profit or loss.

Solution:

$$\begin{aligned}
 \text{Profit of 1kg mangoes} &= ₹15 \\
 \text{Profit of 5kg mangoes} &= 15 \times 5 \\
 &= ₹75 \\
 \text{Loss of 1kg apples} &= ₹30 \\
 \text{Loss of 3kg apples} &= 30 \times 3 \\
 &= ₹90 \\
 \text{Loss} &= 90 - 75 \\
 &= ₹15
 \end{aligned}$$

Example 1.19

B.P.No.17

Browsing rates in an internet centre is ₹ 15 per hour. Nila works on the internet for 2 hours in a day for 5 days in a week. How much does she pay?

Solution:

$$\text{Number of hours spent on an internet for a day} = 2 \text{ hrs}$$

$$\begin{aligned} \text{Therefore, number of hours spent on the internet for 5 days} &= 5 \times 2 \\ &= 10 \text{ hrs} \end{aligned}$$

$$\text{Cost of browsing per hour} = ₹ 15$$

$$\text{Cost of browsing for 10 hours} = 15 \times 10$$

$$\text{Therefore, the amount paid by Nila for 5 days} = ₹ 150$$

Try These

B.P.No. 18

1. Find the product and check for equality :

(i) $18 \times (-5)$ and $(-5) \times 18$

Solution:

$$18 \times -5 = -90$$

$$-5 \times 18 = -90$$

$$\therefore 18 \times (-5) = (-5) \times 18$$

(ii) $31 \times (-6)$ and $(-6) \times 31$

Solution:

$$31 \times -6 = -186$$

$$-6 \times 31 = -186$$

$$\therefore 31 \times (-6) = (-6) \times 31$$

(iii) 4×51 and 51×4

Solution:

$$4 \times 51 = 204$$

$$51 \times 4 = 204$$

$$\therefore 4 \times 51 = 51 \times 4$$

2. Prove the following :

(i) $(-20) \times (13 \times 4) = [(-20) \times 13] \times 4$

Solution:

$$\begin{aligned} (-20) \times (13 \times 4) &= (-20) \times 52 \\ &= -1040 \end{aligned}$$

$$\begin{aligned} [(-20) \times 13] \times 4 &= -260 \times 4 \\ &= -1040 \end{aligned}$$

$$(-20) \times (13 \times 4) = [(-20) \times 13] \times 4$$

Hence proved

$$(ii) [(-50) \times (-2)] \times (-3) = (-50) \times [(-2) \times (-3)]$$

Solution:

$$\begin{aligned} [(-50) \times (-2)] \times (-3) &= (50 \times 2) \times (-3) \\ &= 100 \times -3 = -300 \end{aligned}$$

$$\begin{aligned} (-50) \times [(-2) \times (-3)] &= (-50) \times (2 \times 3) \\ &= -50 \times 6 \\ &= -300 \end{aligned}$$

$$(-20) \times (13 \times 4) = [(-20) \times 13] \times 4$$

$$[(-50) (-2)] \times (-3) = (-50) \times [(-2) \times (-3)]$$

Hence proved

$$(iii) [(-4) \times (-3)] \times (-5) = (-4) \times [(-3) \times (-5)]$$

Solution:

$$\begin{aligned} [(-4) \times (-3)] \times (-5) &= (4 \times 3) \times (-5) \\ &= 12 \times -5 = -60 \end{aligned}$$

$$\begin{aligned} (-4) \times [(-3) \times (-5)] &= (-4) \times (3 \times 5) \\ &= -4 \times 15 = -60 \end{aligned}$$

$$[(-4) \times (-3)] \times (-5) = (-4) \times [(-3) \times (-5)]$$

Hence proved

Try These

B.P.No. 19

1. Find the values of the following and check for equality:

$$(i) (-6) \times (4 + (-5)) \text{ and } ((-6) \times 4) + ((-6) \times (-5))$$

Solution:

$$(-6) \times [4 + (-5)] = -6 \times -1 = 6$$

$$[(-6) \times 4] + [(-6) \times (-5)] = (-24) + (30) = 6$$

$$\therefore (-6) \times [4 + (-5)] = [(-6) \times 4] + [(-6) \times (-5)]$$

$$(ii) (-3) \times [2 + (-8)] \text{ and } [(-3) \times 2] + [(-3) \times 8]$$

Solution:

$$(-3) \times [2 + (-8)] = (-3) \times (2 - 8) = (-3) \times (-6) = 18$$

$$[(-3) \times 2] + [(-3) \times 8] = (-6) + (-24) = -30$$

$$\therefore (-3) \times [2 + (-8)] \neq [(-3) \times 2] + [(-3) \times 8]$$

2. Prove the following:

(i) $(-5) \times [(-76)+8] = [(-5) \times (-76)] + [(-5) \times 8]$

Solution:

$$(-5) \times [(-76)+8] = (-5) \times (-68) = 340$$

$$[(-5) \times (-76)] + [(-5) \times 8] = [380 + (-40)] = 340$$

$$(-5) \times [(-76)+8] = [(-5) \times (-76)] + [(-5) \times 8]$$

Hence proved

(ii) $42 \times [7+(-3)] = (42 \times 7) + [42 \times (-3)]$

Solution:

$$42 \times [7+(-3)] = 42 \times 4 = 168$$

$$(42 \times 7) + [42 \times (-3)] = (294) + (-126) = 168$$

$$42 \times [7+(-3)] = [42 \times 7] + [42 \times (-3)]$$

Hence proved

(iii) $(-3) \times [(-4)+(-5)] = ((-3) \times (-4)) + [(-3) \times (-5)]$

Solution:

$$(-3) \times [(-4)+(-5)] = (-3) \times (-9) = 27$$

$$[(-3) \times (-4)] + [(-3) \times (-5)] = 12 + (15) = 27$$

$$(-3) \times [(-4)+(-5)] = ((-3) \times (-4)) + [(-3) \times (-5)]$$

Hence proved

(iv) $103 \times 25 = (100+3) \times 25 = (100 \times 25) + (3 \times 25)$

Solution:

$$103 \times 25 = 2575$$

$$(100+3) \times 25 = 103 \times 25 = 2575$$

$$(100 \times 25) + (3 \times 25) = 2500 + 75 = 2575$$

$$103 \times 25 = (100+3) \times 25 = (100 \times 25) + (3 \times 25)$$

Hence proved

Example 1.20

B.P.No.19

Prove that $(-7) \times (+8)$ is an integer and mention the property.**Solution:**

$$(-7) \times (+8) = (-56)$$

Hence, -56 is an integer.Therefore, $(-7) \times (+8)$ is closed under multiplication.

Example 1.21

B.P.No.19

Are $(-42) \times (-7)$ and $(-7) \times (-42)$ equal? Mention the property.

Solution:

Consider, $(-42) \times (-7)$,

$$(-42) \times (-7) = +294$$

Consider, $(-7) \times (-42)$,

$$(-7) \times (-42) = +294$$

Therefore, $(-42) \times (-7)$ and $(-7) \times (-42)$ are equal.

It is commutative.

Example 1.22

B.P.No.20

Prove that $[(-2) \times 3] \times (-4) = (-2) \times [3 \times (-4)]$.

Solution:

In the first case (-2) and (3) are grouped together and in the second case (3) and (-4) are grouped together

$$\text{L.H.S} = [(-2) \times 3] \times (-4)$$

$$= (-6) \times (-4) = 24$$

$$\text{R.H.S} = (-2) \times [3 \times (-4)]$$

$$= (-2) \times (-12) = 24$$

Therefore, L.H.S. = R.H.S.

$[(-2) \times 3] \times (-4) = (-2) \times [3 \times (-4)]$ Hence it is proved.

Example 1.23

B.P.No.20

Are $(-81) \times [5 \times (-2)]$ and $[(-81) \times 5] \times (-2)$ equal? Mention the property.

Solution:

Consider, $(-81) \times [5 \times (-2)]$,

$$(-81) \times [5 \times (-2)] = (-81) \times (-10) = 810$$

Consider, $[(-81) \times 5] \times (-2)$,

$$[(-81) \times 5] \times (-2) = (-405) \times (-2) = 810$$

Therefore, $(-81) \times [5 \times (-2)]$ and $[(-81) \times 5] \times (-2)$ are equal.

It is associative.

Example 1.24

B.P.No.20

Are $3 \times [(-4)+6]$ and $[3 \times (-4)]+(3 \times 6)$ equal? Mention the property.

Solution:

Consider, $3 \times [(-4)+6]$,

$$3 \times [(-4)+6] = 3 \times 2 = 6$$

Consider, $[3 \times (-4)] + [3 \times 6]$,

$$[3 \times (-4)] + [3 \times 6] = -12 + 18 = 6$$

Therefore, $3 \times [(-4) + 6]$ and $[3 \times (-4)] + 3 \times 6$ are equal.

It is the distributive property of multiplication over addition.

Exercise 1.3

B.P.No. 21

1. Fill in the blanks

Solution:

(i) $-80 \times \underline{1} = -80$

(iv) $\underline{5} \times (-9) = -45$

(ii) $(-10) \times \underline{-2} = 20$

(v) $\underline{0} \times 75 = 0$

(iii) $(100) \times \underline{-5} = -500$

2. Say true or false

(i) $(-15) \times 5 = 75$

False

(ii) $(-100) \times 0 \times 20 = 0$

True

(iii) $8 \times (-4) = 32$

False

3. What will be the sign of the product of the following.

(i) 16 times of negative integer.

Ans: (+) Positive

(ii) 29 times of negative integer.

Ans: (-) negative

4. Find the product of

(i) $(-35) \times 22$

(ii) $(-10) \times 12 \times (-9)$

(iii) $(-9) \times (-8) \times (-7) \times (-6)$

(iv) $(-25) \times 0 \times 45 \times 90$

(v) $(-2) \times (+50) \times (-25) \times 4$

Solution:

i) $(-35) \times 22 = -770$

ii) $(-10) \times 12 \times (-9) = (-120) \times (-9) = 1080$

iii) $(-9) \times (-8) \times (-7) \times (-6) = 72 \times 42 = 3024$

iv) $(-25) \times 0 \times 45 \times 95 = 0 \times 45 \times 95 = 0$

v) $(-2) \times 50 \times (-25) \times 4 = -100 \times -100 = 10000$

5. Check the following for equality and if they are equal, mention the property.

(i) $(8 - 13) \times 7$ and $8 - (13 \times 7)$

Solution:

$$\begin{aligned} (8 - 13) \times 7 &= -5 \times 7 \\ &= -35 \quad \text{————— (1)} \end{aligned}$$

$$\begin{aligned} 8 - (13 \times 7) &= 8 - 91 \\ &= -83 \quad \text{————— (2)} \end{aligned}$$

From (1) and (2) we get

$$(8 - 13) \times 7 \neq 8 - (13 \times 7)$$

(ii) $[(-6)-(+8)] \times (-4)$ and $(-6)-[8 \times (-4)]$

Solution:

$$\begin{aligned}
 [-6-(+8)] \times -4 &= (-6-8) \times -4 \\
 &= -14 \times -4 \\
 &= 56 \text{ ————— (1)} \\
 (-6)-[8 \times (-4)] &= (-6) - (-32) \\
 &= -6 + 32 \\
 &= 26 \text{ ————— (2)}
 \end{aligned}$$

From (1) and (2) we get

$$[-6-(+8)] \times -4 \neq (-6)-[8 \times (-4)]$$

(iii) $3 \times [(-4)+(-10)]$ and $[3 \times (-4)+ 3 \times (-10)]$

Solution:

$$\begin{aligned}
 3 \times [(-4)+(-10)] &= 3 \times [-4-10] \\
 &= 3 \times (-14) \\
 &= -42 \text{ ————— (1)} \\
 [3 \times (-4)+(-3) \times -10] &= -12-30 \\
 &= -42 \text{ ————— (2)}
 \end{aligned}$$

From (1) and (2) We get

$$3 \times [(-4)+(-10)] = [3 \times (-4) + (-3) \times -10]$$

It is distributive property of multiplication over addition.

6. During summer, the level of the water in a pond decreases by 2 inches every week due to evaporation. What is the change in the level of the water over a period of 6 weeks?

Solution:

$$\begin{aligned}
 \text{Pond decreasing by every week} &= 2 \text{ inches} \\
 \text{decreasing by 6 weeks} &= 2 \times 6 \text{ week} \\
 &= 12 \text{ inch}
 \end{aligned}$$

decreasing of 12 inches

7. Find all possible pairs of integers that give a product of -50 .

Solution:

All possible pair of product (-50)

$$\begin{aligned}
 -5 \times 10 &= -50 \\
 -10 \times 5 &= -50 \\
 -2 \times 25 &= -50 \\
 -1 \times 50 &= -50 \\
 -50 \times 1 &= -50
 \end{aligned}$$

Objective Type Questions

8. Which of the following expressions is equal to -30 .

- i) $-20 - (-5 \times 2)$ ii) $(6 \times 10) - (6 \times 5)$ iii) $(2 \times 5) + (4 \times 5)$ iv) $(-6) \times (+5)$

Ans: iv) $(-6) \times (+5)$

9. Which property is illustrated by the equation: $(5 \times 2) + (5 \times 5) = 5 \times (2 + 5)$

- i) commutative ii) closure iii) distributive iv) associative

Ans: iii) distributive

10. $11 \times (-1) = \underline{\hspace{2cm}}$

- i) -1 ii) 0 iii) $+1$ iv) -11 **Ans: iv) -11**

11. $(-12) \times (-9) = \underline{\hspace{2cm}}$

- i) 108 ii) -108 iii) $+1$ iv) -1 **Ans: i) 108**

Division of Integers

Try These

B.P.No. 16

(i) $(-32) \div 4 = \underline{-8}$

(ii) $(-50) \div 50 = \underline{-1}$

(iii) $30 \div 15 = \underline{2}$

(iv) $-200 \div 10 = \underline{-20}$

(v) $-48 \div 6 = \underline{-8}$

Example 1.25

B.P.No.22

Divide: (i) (-85) by 5

(ii) (-250) by (-25)

(iii) 120 by (-6)

(iv) 182 by (-2)

Solution:

(i) $(-85) \div 5 = -17$

(ii) $(-250) \div (-25) = +10$

(iii) $120 \div (-6) = -20$

(iv) $182 \div (-2) = -91$

Example 1.26

B.P.No.22

In a competitive exam 4 marks are given for every correct answer and (-2) marks are given for every incorrect answer, kalaivizhi attended the exam and answered all the questions and scored 20 marks only even though she got 10 correct answers. How many questions did she answer incorrectly?

Solution:

Marks given for one correct answer = 4

Marks given for 10 correct answers = $10 \times 4 = 40$

Kalaivizhi's final score = 20

Marks reduced for incorrect answers = $40 - 20 = 20$

Therefore, number of questions answered incorrectly = $20 \div 2 = 10$

Example 1.27

B.P.No.23

A shopkeeper earns a profit of ₹ 5 by selling one notebook and incurs a loss of ₹ 2 per pen while selling of his old stock. In a particular day he earns neither profit nor loss. If he sold 20 notebooks, how many pens did he sell?

Solution:

Since neither profit nor loss

$$\text{Profit} + \text{Loss} = 0$$

(ie) profit = -Loss

$$\text{Profit earned from 1 notebook} = ₹ 5$$

$$\text{Profit earned from 20 notebooks} = 20 \times ₹ 5$$

$$= ₹ 100$$

$$\text{Loss incurred by selling pens} = ₹ 100 \text{ Loss}$$

$$= -100$$

$$\text{Loss for 1 pen} = ₹ 2$$

$$\text{loss} = -2$$

$$\text{Total number of pens sold} = (-100) \div (-2)$$

$$= 50 \text{ pens.}$$

Exercise 1.4

B.P.No. 24

1. Fill in the blanks.**Solution:**

(i) $(-40) \div \underline{-1} = 40$

(ii) $25 \div \underline{-5} = -5$

(iii) $\underline{-36} \div (-4) = 9$

(iv) $(-62) \div (-62) = \underline{1}$

2. Say true or false.

(i) $(-30) \div (-6) = -6$

False

(ii) $(-64) \div (-64)$ is 0

False**3. Find the values of the following.**

(i) $(-75) \div 5$

(ii) $(-100) \div (-20)$

(iii) $45 \div (-9)$

(iv) $(-82) \div 82$

Solution:

i) $-75 \div 5 = -15$

ii) $(-100) \div (-20) = 5$

iii) $45 \div (-9) = -5$

iv) $(-82) \div 82 = -1$

4. The product of two integers is -135. If one number is -15, Find the other integer.**Solution:**

Let x, y are two integers.

x is one number.

$$\begin{aligned}
 x \times y &= -135 \\
 (-15) \times y &= -135 \\
 y &= -135 \div -15 \\
 y &= 9
 \end{aligned}$$

Therefore, other integer is 9.

5. In 8 hours duration, with uniform decrease in temperature, the temperature dropped 24° . How many degrees did the temperature drop each hour?

Solution:

The temperature decreasing in 8 hours = 24°

The temperature drop one hour = $24 \div 8 = 3$

6. An elevator descends into a mine shaft at the rate of 5 m/min. If the descent starts from 15 m above the ground level, how long will it take to reach -250 m?

Solution:

The descent starts from 15m. (-15)

$$\begin{aligned}
 \text{Total length} &= -250 - 15 \\
 &= -265 \text{ m}
 \end{aligned}$$

mine shaft at the rate 5m/min.

$$\begin{aligned}
 \text{it will long to reach} &= \frac{-265}{-5} \\
 &= 53 \text{ min}
 \end{aligned}$$

7. A person lost 4800 calories in 30 days. If the calory loss is uniform, calculate the loss of calory per day.

Solution:

The loss of Calories in 30 days = 4800

$$\begin{aligned}
 \text{Loss of calory in one day} &= 4800 \div 30 \\
 &= 160
 \end{aligned}$$

160 calories lost per day.

8. Given $168 \times 32 = 5376$ then, find $(-5376) \div (-32)$.

Solution:

$$(-5376) \div (-32) = 168$$

9. How many (-4) 's are there in (-20) ?

Solution:

$$\frac{-20}{-4} = +5$$

10. (-400) divided into 10 equal parts gives ____.

Solution:

$$\frac{-400}{10} = -40$$

Objective Type Questions

11. Which of the following does not represent an Integer?

- i) $0 \div (-7)$ ii) $20 \div (-4)$ iii) $(-9) \div 3$ iv) $(12) \div 5$

Ans: iv) $(12) \div 5$

12. $(-16) \div 4$ is the same as

- i) $-(-16 \div 4)$ ii) $-(16) \div (-4)$ iii) $16 \div (-4)$ iv) $-4 \div 16$

Ans: iii) $16 \div (-4)$

13. $(-200) \div 10$ is

- i) 20 ii) -20 iii) -190 iv) 210 **Ans:** ii) -20

14. The set of integers is not closed under

- i) Addition ii) Subtraction iii) Multiplication iv) Division

Ans: iv) Division

Example 1.28

B.P.No.27

Ferozkhan collects ₹ 1150 at the rate of ₹ 25 per head from his classmates on account of the 'Flag Day' in his school and returns ₹ 8 to each one of them, as instructed by his teacher. Find the amount handed over by him to his teacher.

Solution:

Ferozkhan collects ₹ 1150 at the rate of ₹ 25 per head from his classmates on account of the 'Flag Day'

$$\text{Total amount collected} = ₹ 1150$$

$$\text{Amount per head} = ₹ 25$$

$$\text{Number of students} = 1150 \div 25 = 46$$

Amount returned to each student is ₹ 8

$$\text{Amount returned to 46 students} = 46 \times 8 = ₹ 368$$

$$\text{Amount handed over to the class teacher} = ₹ 1150$$

$$₹ 368 (-)$$

$$₹ 782$$

$$\text{Amount handed over to the class teacher} = ₹ 782$$

$$\begin{array}{r} 46 \\ 25 \overline{) 1150} \\ \underline{100} \\ 150 \\ \underline{150} \\ 0 \end{array}$$

Example 1.29

B.P.No.27

Each day, the workers drill down 22 feet further until they hit a pool of water. If the water is at 110 feet, on which day will they hit the pool of water?

Solution:

Depth drilled in one day = -22 feet

Depth of water = -110 feet

Number of days required = $-110 \div -22 = 5$

Hence the workers will reach resource in 5 days.

$$\begin{array}{r} 5 \\ 22 \overline{) 110} \\ \underline{110} \\ 0 \end{array}$$

Example 1.30

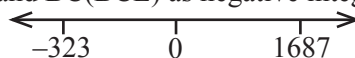
B.P.No.28

How many years are between 323 BC(BCE) and 1687 AD(CE)?

Solution:

Years in AD(CE) are taken as positive integers and BC(BCE) as negative integers.

Therefore, the difference is



$$= 1687 - (-323)$$

$$= 1687 + 323 = 2010 \text{ years}$$

Exercise 1.5

B.P.No.28

1. One night in Kashmir, the temperature is -5°C . Next day the temperature is 9°C . What is the increase in temperature?

Solution:

First day temperature = -5°C

Next day temperature = 9°C

Increases in temperature = $9 - (-5)$

$$= 9 + 5$$

$$= 14^{\circ}\text{C}$$

2. An atom can contain protons which have a positive charge (+) and electrons which have a negative charge (-). When an electron and a proton pair up, they become neutral (0) and cancel the charge out. Now, Determine the net charge:

Solution:

(i) 5 electrons and 3 protons $\rightarrow -5 + 3 = -2$ that is 2 electrons

(ii) 6 Protons and 6 electrons $\rightarrow 6 + (-6) = 0$

(iii) 9 protons and 12 electrons $\rightarrow 9 + (-12) = -3$ that is 3 electrons $\ominus \ominus \ominus$

(iv) 4 protons and 8 electrons $\rightarrow 4 + (-8) = -4$ that is 4 electrons $\ominus \ominus \ominus \ominus$

(v) 7 protons and 6 electrons $\rightarrow 7 + (-6) = 1$ that is 1 proton $\oplus$



3. Scientists use the Kelvin Scale (K) as an alternative temperature scale to degrees Celsius ($^{\circ}\text{C}$) by the relation $T^{\circ}\text{C} = (T + 273) \text{ K}$.

Convert the following to kelvin:

- (i) -275°C (ii) 45°C (iii) -400°C (iv) -273°C

Solution:

$$\begin{aligned} \text{i) } T^{\circ}\text{C} &= (T+273)\text{K} \\ &= (-275+273) \text{ K} \\ &= -2\text{K} \end{aligned}$$

$$\begin{aligned} \text{iii) } T^{\circ}\text{C} &= (T+273)\text{K} \\ &= (-400+273) \text{ K} \\ &= -127\text{K} \end{aligned}$$

$$\begin{aligned} \text{ii) } T^{\circ}\text{C} &= (T+273)\text{K} \\ &= (45+273) \text{ K} \\ &= 318\text{K} \end{aligned}$$

$$\begin{aligned} \text{iv) } T^{\circ}\text{C} &= (T+273)\text{K} \\ &= (-273+273) \text{ K} \\ &= 0\text{K} \end{aligned}$$

4. Find the amount that is left in the student's bank account, if he has made the following transaction in a month. His initial balance is ₹ 690.

Solution:

- (i) Deposit (+) of ₹ 485

$$\text{amount} = 690 + 485 = ₹1175$$

- (ii) Withdrawal (-) of ₹ 500

$$\text{i.e } ₹1175 - 500 = ₹675$$

- (iii) Withdrawal (-) of ₹ 350

$$\text{i.e } ₹675 - 350 = ₹325$$

- (iv) Deposit (+) of ₹ 89

$$\text{i.e } ₹325 - 89 = ₹414$$

- (v) If another ₹ 300 was withdrawn, what would the balance be?

$$\text{i.e } ₹414 - 300 = ₹114$$

5. A poet Tamizh Nambi lost 35 pages of his 'lyrics' when his file had got wet in the rain. Use integers, to determine the following:

- (i) If Tamizh Nambi wrote 5 page per day, how many day's work did he lose?

Solution:

$$\text{Number of page Tamizh Nambi lost} = 35$$

$$\text{Number of page Tamizh Nambi wrote per day} = 5 \text{ page}$$

$$\text{Number of days work did he lost} = 35 \div 5 = 7 \text{ days}$$

- (ii) If four pages contained 1800 characters, (letters) how many characters were lost?

Solution:

four page contained 1800 characters

$$\text{One page contained } \frac{1800}{4} \text{ character} = 450 \text{ characters}$$

$$\begin{aligned}\text{Were lost the characters} &= 450 \times 35 \\ &= 15750 \text{ characters}\end{aligned}$$

(iii) If Tamizh Nambi is paid ₹250 for each page produced, how much money did he lose?

Solution:

Tamizh Nambi paid ₹250 for each page.

$$\begin{aligned}\text{The cost of 335 page produced} &= ₹250 \times 35 \\ &= ₹8750\end{aligned}$$

(iv) If Kavimaan helps Tamizh Nambi and they are able to produce 7 pages per day, how many days will it take to recreate the work lost?

Solution:

$$\text{Number of days will it take to recreate the work lost} = \frac{35}{7} = 5 \text{ days}$$

(v) Tamizh Nambi pays kavimaan ₹ 100 per page for his help. How much money does kavimaan receive?

Solution:

$$\begin{aligned}\text{Tamizh Nambi pays Kavimaan} &= ₹100 \text{ per page} \\ \text{Total amount} &= ₹100 \times 35 \text{ page} \\ &= ₹3500\end{aligned}$$

6. Add 2 to me. Then multiply by 5 and subtract 10 and divide now by 4 and I will give you 15! Who am I?

Solution:

Let I is x .

Add 2 $\rightarrow x+2$

and multiply 5 $\rightarrow (x+2) \times 5$

subtract 10 $\rightarrow [(x+2)5] - 10$

divided 4 $\rightarrow \frac{[(x+2) \times 5] - 10}{4}$

I will give 15

$$\text{i.e. } \frac{[(x+2) \times 5] - 10}{4} = 15$$

$$[(x+2) \times 5] - 10 = 15 \times 4 = 60$$

$$(x+2) \times 5 = 60 + 10 = 70$$

$$x+2 = 14$$

$$x = 14 - 2 = 12$$

I am 12

7. Kamatchi, a fruit vendor sells 30 apples and 50 pomegranates. If she makes a profit of ₹ 8 per apple and loss ₹ 5 per pomegranate, what will be her overall profit(or)loss?

Solution:

$$\text{Profit of 1 apple} = ₹8$$

$$\text{Profit of 30 apple} = 30 \times 8$$

$$= ₹240$$

$$\text{Loss of 1 pomegranates} = ₹5$$

$$\text{Loss of 50 pomegranates} = 50 \times ₹5$$

$$= ₹250$$

$$\text{Loss of Pomegranates} = ₹250$$

$$\text{Profit of apples} = ₹240$$

$$\text{Overall Loss} = ₹250 - ₹240 = ₹10$$

8. During a drought, the water level in a dam fell 3 inches per week for 6 consecutive weeks. What was the change in the water level in the dam at the end of this period?

Solution:

$$\text{Water level down 1 week} = 3 \text{ inches}$$

$$\text{Water level down 6 week} = 3 \times 6$$

$$= 18 \text{ inches}$$

decrease of 18 inches.

9. Buddha was born in 563 BC(BCE) and died in 483 BC(BCE). Was he alive in 500 BC(BCE)? and find his life time. (Source: Compton's Encyclopedia)

Solution:

$$\text{Buddha born} = 563 \text{ BC}$$

$$\text{died} = 483 \text{ BC}$$

$$\text{his life time} = 563 - 483$$

$$= 80 \text{ years}$$

yes he alive in 500 B.C

Buddha's life time is 80 years.

Exercise 1.6

B.P.No.29

Miscellaneous Practice Problems

1. What Should be added to -1 to get 10?

Solution:

Let x be one number

$$x - 1 = 0$$

$$x = 10+1$$

$$x = 11$$

We should 11 be added to -1 to get 10.

2. $-70 + 20 = \square - 10$

Solution:

$$-70 + 20 = -50$$

$$\square - 10 = -50$$

$$-70+20 = \square - 10$$

3. Subtract 94860 from (-86945)

Solution:

$$\begin{aligned} (-86945) - (94860) &= -86945 - 94860 \\ &= -86945 - 94860 \\ &= 181805 \end{aligned}$$

4. Find the value of $(-25)+60+(-95)+(-385)$

Solution:

$$\begin{aligned} (-25)+60-95-385 &= 60-25-95-385 \\ &= 60-505 \\ &= -445 \end{aligned}$$

5. Find the sum of (-9999) (-2001) and (-5999)

Solution:

$$\begin{aligned} (-9999)+(-2001)+(-5999) &= -9999 - 2001 - 5999 \\ &= -17,999 \end{aligned}$$

6. Find the product of $(-30) \times (-70) \times 15$

Solution:

$$\begin{aligned} (-30) \times (-70) \times 15 &= 30 \times 70 \times 15 \\ &= 2100 \times 15 \\ &= 31500 \end{aligned}$$

7. Divide (-72) by 8

Solution:

$$-72 \div 8 = -9$$

8. Find two pairs of integers whose product is $+15$.

Solution:

Two pairs $(-, -5)$

i.e. $-3 \times -5 = +15$

9. Check the following for equality

(i) $(11+7)+10$ and $11+(7+10)$ **Solution:**

$$(11+7) + 10 = 18+10 = 28$$

$$11+(7+10) = 11+17 = 28$$

$(11+7)+10$ and $11+(7+10)$ are equal.

(ii) $(8-13) \times 7$ and $8-(13 \times 7)$ **Solution:**

$$(8-13) \times 7 = -5 \times 7 = -35$$

$$8-(13 \times 7) = 8-91 = -83$$

i.e $(8-13) \times 7$ and $8-(13 \times 7)$ are not equal.

(iii) $[(-6)-(+8)] \times (-4)$ and $(-6)-[8 \times (-4)]$ **Solution:**

$$[(-6) - (+8)] \times (-4) = [(-6) - 8] \times (-4)$$

$$= -14 \times -4 = +56$$

$$(-6) - [8 \times (-4)] = (-6) - (-32)$$

$$= -6 + 32 = 26$$

i.e $[(-6) - (+8)] \times (-4)$ and $(-6) - [8 \times (-4)]$ are not equal.

(iv) $3 \times [(-4)+(-10)]$ and $[3 \times (-4)+ 3 \times (-10)]$ **Solution:**

$$3 \times [(-4)+(-10)] = 3 \times (-4-10)$$

$$= 3 \times -14 = -42$$

$$[3 \times (-4)+3 \times (-10)] = (-12) + (-30)$$

$$= -12 - 30 = -42$$

$3 \times [(-4)+(-10)]$ and $[3 \times (-4)+3 \times (-10)]$ are equal.

10. Kalaivani had ₹ 5000 in her bank account on 01.01.2018. She deposited ₹ 2000 in January and withdrew ₹ 700 in February. What was Kalaivani's bank balance on 01.04.2018, if she deposited ₹ 1000 and withdrew ₹ 500 in March?

Solution:

$$\text{Bank account on 01-01-2018} = ₹ 5000$$

$$\text{deposited in January} = ₹ 2000$$

$$\text{Total} = ₹ 7000$$

$$\text{withdrew in January} = ₹ 7000 - 700$$

$$= ₹ 6300$$



$$\begin{aligned}
 \text{The deposit in March} &= ₹1000 \\
 &= ₹6300 + ₹1000 \\
 &= ₹7300 \\
 \text{withdrew in March} &= ₹500 \\
 \text{Balance on 01-04-2018} &= ₹7300 - ₹500 \\
 &= ₹6800
 \end{aligned}$$

11. The price of an item x increases by ₹ 10 every year and an item y decreases by ₹ 15 every year. If in 2018, the price of x is ₹ 50 and y is ₹ 90, then which item will be costlier in the year 2020.

Solution:

x increase by 10 every year.

y decrease by 15 every year.

In 2018, x is 50, y is 90

In 2020, $x = 50 + 2(10)$

$$= 50 + 20$$

$$= 70$$

$$y = 90 - 2(15)$$

$$= 90 - 30$$

$$= 60$$

Therefore, the item x will be costlier in 2020.

12. Match the statements in column A and column B.

S.No.	A	B
1.	For any two integers 72 and 108, $72+108$ is an also an integer.	(a) Distributive property of multiplication over addition.
2.	For any three integers 68, 25 and 99 $68 \times (25+99) = (68 \times 25) + (68 \times 99)$	(b) Multiplicative identity.
3.	$0 + (-138) = (-138) = (-138) + 0$	(c) Commutative property under multiplication.
4.	For any two integers (-5) and $10(-5) \times 10 = 10 \times (-5)$	(d) Closed under addition.
5.	$1 \times (-1098) = (-1098) = (-1098) \times 1$	(e) Additive identity.

Ans: 1 – (d), 2 – (a), 3 – (e), 4 – (c), 5 – (b)

Challenge Problems

13. Say true or false.

- (i) The sum of a positive integer and a negative integer is always a positive integer. **False**
(ii) The sum of two integers can never be zero. **False**

- (iii) The product of two negative integers is a positive integer.
 (iv) The quotient of two integers having opposite sign is a negative integer.
 (v) The smallest negative integer is -1 .

True
 True
 False

14. An integer divided by 7 gives a quotient -3 . What is that integer?

Solution:

Let x be the integer.

$$\begin{aligned}\frac{x}{7} &= -3 \\ x &= -3 \times 7 \\ x &= -21\end{aligned}$$

The integer is -21 .

15. Replace the question mark with suitable integer in the equation $72 + (-5) - \boxed{?} = 72$.

Solution:

$$72 + (-5) - \boxed{-5} = 72$$

16. Can you give 5 pairs of single digit integers whose sum is zero?

Solution:

$$(-1) + 1 + (-2) + 2 + (-3) + (3) + (-4) + (4) + (-5) + 5 = 0$$

17. If $P = -15$ and $Q = 5$ find $(P - Q) \div (P + Q)$

Solution:

$$P - Q = (-15 - 5) = -20$$

$$P + Q = (-15 + 5) = -10$$

$$\begin{aligned}(P - Q) \div (P + Q) &= (-20) \div (-10) \\ &= \frac{-20}{-10} = 2\end{aligned}$$

18. If the letters in the English alphabets A to M represent the number from 1 to 13 respectively and N represents 0 and the letters O to Z correspond from -1 to -12 , find the sum of integers for the names given below.

For example,

$$\text{MATH} \rightarrow \text{sum} \rightarrow 13 + 1 - 6 + 8 = 16$$

(i) YOUR NAME

(ii) SUCCESS

Solution:

$$\begin{aligned}\text{i) YOUR NAME} \rightarrow \text{sum} &\rightarrow -11 - 1 - 7 - 4 + 0 + 1 + 13 + 5 \\ &= -23 + 19 = -4\end{aligned}$$

$$\begin{aligned}\text{ii) SUCCESS} \rightarrow \text{sum} &\rightarrow -11 - 1 - 7 - 4 + 0 + 1 + 13 + 5 \\ &= -22 + 11 = -11\end{aligned}$$

19. From a water tank 100 litres of water is used every day. After 10 days there is 2000 litres of water in the tank. How much water was there in the tank before 10 days? 20. A dog is climbing down in to a well to drink water. In each jump it goes down 4 steps. The water level is in 20th step. How many jumps does the dog take to reach the water level?

Solution:

$$\begin{aligned}
 \text{Everyday water is used} &= 100 \text{ l} \\
 \text{After some days water in the tank} &= 2000 \text{ l} \\
 \text{10 day used water} &= 100 \times 10 = 1000 \\
 \text{Water in the tank before 10 day} &= 1000 + 2000 \\
 &= 3000 \text{ l}
 \end{aligned}$$

20. A dog is climbing down in to a well to drink water. In each jump it goes down 4 steps. The water level is in 20th step. How many jumps does the dog take to reach the water level?

Solution:

$$\begin{aligned}
 \text{In each jump} &= 4 \text{ step} \\
 \text{The dog to reach the water level} &= 20 \div 4 \\
 &= 5 \text{ jumps} \\
 \text{The dog to reach the water level in 5 jumps.}
 \end{aligned}$$

21. Kannan has a fruit shop. He sells 1 dozen banana at a loss of Rs.2 each because it may get rotten next day. What is his loss?

Solution:

$$\begin{aligned}
 1 \text{ dozen} &= 12 \\
 1 \text{ dozen banana} &= 12 \text{ banana} \\
 \text{each loss ₹2} \\
 12 \text{ banana loss} &= 12 \times 2 \\
 &= ₹24
 \end{aligned}$$

22. A submarine was situated at 650 feet below the sea level. If it descends 200 feet, what is its new position?

Solution:

$$\begin{aligned}
 \text{A submarine was situated at 650 feet. } &(-650) \\
 \text{It is descends } &(-200) \text{ feet.} \\
 \text{New position} &= (-650) + (-200) = -850 \\
 \text{New position is 850 feet below the sea level.}
 \end{aligned}$$

23. In a magic square given below each row, column and diagonal should have the same sum, Find the values of x, y and z.

1	-10	x
y	-3	-2
-6	4	z

Solution:

each row and column and diagonal have the same sum.

$$1+y-6 = -10-3+4$$

$$y-5 = -9$$

$$y = -9+5$$

$$\boxed{y = -4}$$

$$1-10+x = 1+y-6$$

$$-9+x = 1-4-6$$

$$-9+x = -9$$

$$x = -9+9$$

$$\boxed{x = 0}$$

$$-10-3+4 = -2+z$$

$$-9 = 0-2+z$$

$$z = -9+2$$

$$\boxed{z = -7}$$

$$x = 0, y = -4, z = -7$$

**UNIT TEST**

Time: 30 mins.

1. Number System

Marks: 20

I. Fill in the blanks.**4×1=4**

1. $(-30) + \underline{\hspace{2cm}} = 40$

2. $171 + \underline{\hspace{2cm}} = 0$

3. $\underline{\hspace{2cm}} - (+50)$

4. $(-5) \times 12 = \underline{\hspace{2cm}}$

II. Answer all the questions.**4×2=8**

5. Add 8 and -12 Using number line.

6. Chithra has ₹150. She wanted to buy a bag which costs ₹225. How much she need to borrow from her friend?

7. Are $3 \times [(-4)+6]$ and $[3 \times (-4) + (3 \times 6)]$ equal? Mention the properly.

8. If $P = -15$ and $Q = 5$. Find $(P-Q) \div (P+Q)$

III. Answer any two of the following.**2×4=8**

9. The price of an item x increases by ₹10 every year and an item y decreases by 15 every year. If in 2018, the price of x is ₹50 and y is ₹90, then which item will be costlier in the year 2020.

10. Ferozkhan collects ₹1150 at the rate of ₹25 per head from his classmates on account the 'Flag Day' in his school and returned 8 to each one of them, as instructed by his teacher. Find the amount handed over by him to his teacher.

11. From a water tank 100 litres of water is used everyday. After 10 days there is 2000 litres of water in the tank. How much water was there in the tank before 10 days?



UNIT

2

MEASUREMENTS

Try These

B.P.No. 33

Find the missing values for the following:

S.No.	Length	Breadth	Area	Perimeter	Hint:
(i)	12 m	8 m	96 sq.m	40 m	The perimeter of a rectangle = $2 \times (l + b)$ units. Area of a rectangle = $l \times b$ square units. (l and b are length and breadth of a rectangle).
(ii)	15 cm	6 cm	90 sq.cm	42 cm	
(iii)	100 m	50 mm	5000 sq.mm	300 mm	
(iv)	12 cm	10 cm	120 sq. cm	44 cm	

S.No.	Side	Area	Perimeter	Hint:
(i)	60 cm	3600 sq.cm	240 cm	Perimeter of a square = $4 \times a$ units. Area of a square = $a \times a$ square units. (‘a’ is the side of the square)
(ii)	8 m	64 sq.m	32 m	
(iii)	25 mm	625 sq.mm	100 mm	

S.No.	base	height	Area	Hint:
(i)	13 m	5 m	32.5 sq.m	Area of the right angled triangle = $\frac{1}{2} (b \times h)$ square units (‘b’ is the base and ‘h’ is the height of the triangle)
(ii)	16 cm	30 cm	240 sq.cm	
(iii)	28 mm	6 mm	84 sq.mm	

Parallelogram:

Think

B.P.No. 35

1. Explain the area of the parallelogram as sum of the areas of the two triangles.

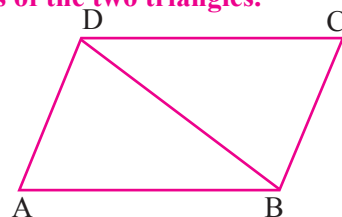
Solution:

ABCD is a parallelogram

ABD, BDC are triangle

Area of $\triangle ABD$ + Area of $\triangle BDC$ = Area of ABCD

$\therefore$ the area of the parallelogram as sum of the area of the two triangles.



2. A rectangle is a parallelogram but a parallelogram is not a rectangle. Why?

Solution:

In parallelogram opposite sides are parallel and behind sides are acute and obtuse angle.

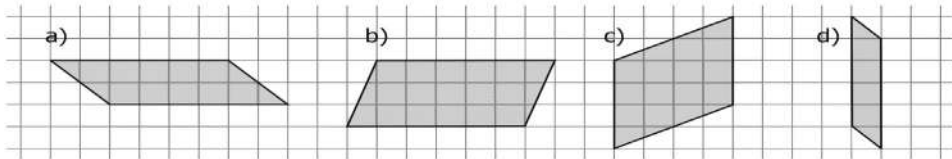
In rectangle opposite sides are parallel and behind sides are right angled triangle only.

∴ A rectangle is a parallelogram but a parallelogram is not a rectangle.

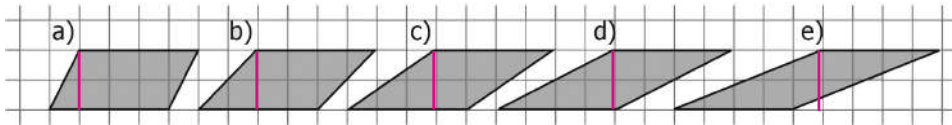
Try These

B.P.No. 36

1. Count the squares and find the area of the following parallelograms by converting those into rectangles of the same area (without changing the base and height).

a. 12 sq.unitsb. 18 sq.unitsc. 16 sq.unitsd. 5 sq.units

2. Draw the heights for the given parallelograms and mark the measure of their bases and find the area. Analyse your result.



Solution:

a) Area of Parallelogram = $b \times h = 4 \times 2 = 8$ sq. units

b) Area of Parallelogram = $b \times h = 4 \times 2 = 8$ sq. units

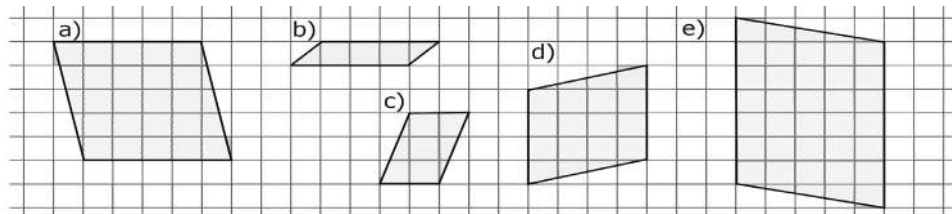
c) Area of Parallelogram = $b \times h = 4 \times 2 = 8$ sq. units

d) Area of Parallelogram = $b \times h = 4 \times 2 = 8$ sq. units

e) Area of Parallelogram = $b \times h = 4 \times 2 = 8$ sq. units

In all parallelogram analyse all area are same. All parallelogram are different size but same area.

3. Find the area of the following parallelograms by measuring their base and height, using formula.

a. 25 sq. unitsb. 4 sq. unitsc. 6 sq. unitsd. 16 sq. unitse. 35 sq. units

a) $l \times b = 5 \times 5 = 25$ sq. units

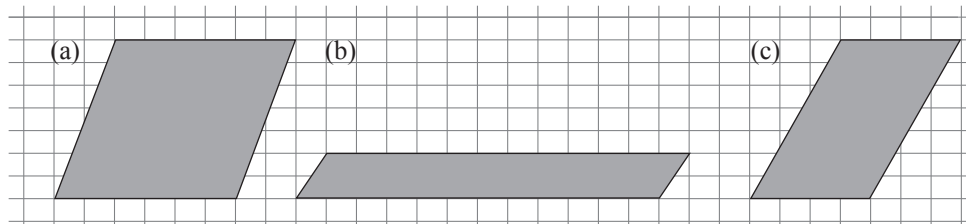
b) $l \times b = 4 \times 1 = 4$ sq. units

c) $l \times b = 2 \times 3 = 6$ sq. units

d) $l \times b = 4 \times 4 = 16$ sq. units

e) $l \times b = 5 \times 7 = 35$ sq. units

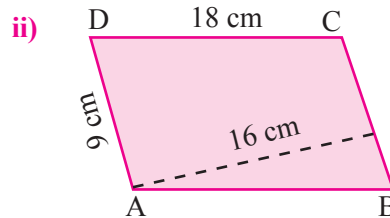
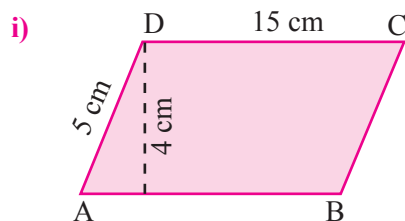
4. Draw as many parallelograms as possible in a grid sheet with the area 20 square units each.



Example 2.1

B.P.No. 36

Find the area and perimeter of the parallelogram given in the figures.



Solution:

- (i) From the Fig. (i)

Base of a parallelogram (b) = 15 cm, Height of a parallelogram (h) = 4 cm

Area of a parallelogram = $b \times h$ sq. units. Therefore, Area = $15 \times 4 = 60$ sq. cm.

Thus, area of the parallelogram is 60 sq. cm.

Perimeter of the parallelogram = sum of the length of the four sides.

$$= (15+5+15+5) = 40 \text{ cm.}$$

- (ii) From the Fig (ii)

Base of a parallelogram (b) = 9 cm, Height of a parallelogram (h) = 16 cm.

Area of a parallelogram = $b \times h$ sq. units. Therefore, Area = $9 \times 16 = 144$ sq. cm

Thus, area of the parallelogram is 144 sq. cm.

Perimeter of the parallelogram = sum of the length of the four sides.

$$= (18+9+18+9) = 54 \text{ cm.}$$

Example 2.2

B.P.No.37

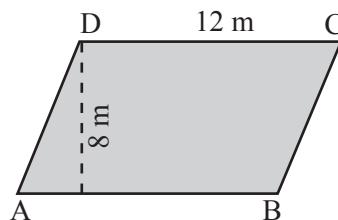
One of the sides and the corresponding height of the parallelogram are 12 m and 8 m respectively. Find the area of the parallelogram.

Solution:

Given: $b = 12$ m, $h = 8$ m

$$\begin{aligned}\text{Area of the parallelogram} &= b \times h \text{ sq. units} \\ &= 12 \times 8 = 96 \text{ sq. m}\end{aligned}$$

Therefore, Area of the parallelogram = 96 sq. m.

**Example 2.3**

B.P.No.37

Find the height 'h' of the parallelogram whose area and base are 368 sq. cm and 23 cm respectively.

Solution:

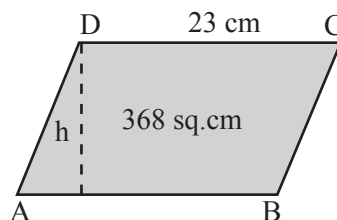
Given: Area = 368 sq. cm, base $b = 23$ cm

$$\text{Area of the parallelogram} = 368 \text{ sq. cm}$$

$$b \times h = 368$$

$$23 \times h = 368$$

$$h = \frac{368}{23} = 16 \text{ cm}$$



Thus, the height of the parallelogram = 16 cm.

Example 2.4

B.P.No.37

A parallelogram has adjacent sides 12 cm and 9 cm. If the distance between its shorter sides is 8 cm, find the distance between its longer side.

Solution:

Given that the adjacent sides of parallelogram are 12 cm and 9 cm

If we choose the shorter side as base, that is $b = 9$ cm then distance between the shorter sides is height, that is $h = 8$ cm

$$\text{Area of parallelogram} = b \times h \text{ sq. units} = 9 \times 8 = 72 \text{ sq. cm.}$$

Again, if we choose longer side as base, that is $b = 12$ cm then distance between longer sides is height. Let it be 'h' units.

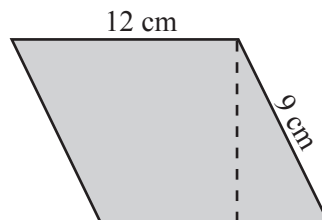
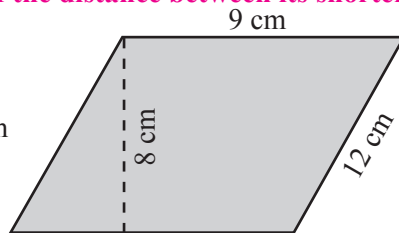
We know that, the area of the parallelogram = 72 sq. cm

$$b \times h = 72$$

$$12 \times h = 72$$

$$h = \frac{72}{12} = 6 \text{ cm}$$

Therefore, the distance between the longer sides = 6 cm.



Example 2.5

B.P.No.37

The base of the parallelogram is thrice its height. If the area is 192 sq. cm, find the base and height.

Solution:

Let the height of the parallelogram = h cm

Then the base of the parallelogram = $3h$ cm

Area of the parallelogram = 192 sq. cm

$$b \times h = 192$$

$$3h \times h = 192$$

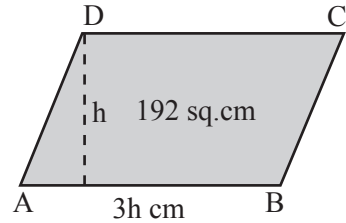
$$3h^2 = 192$$

$$h^2 = 64$$

$$h \times h = 8 \times 8$$

$$h = 8 \text{ cm}$$

$$\text{base} = 3h = 3 \times 8 = 24 \text{ cm}$$

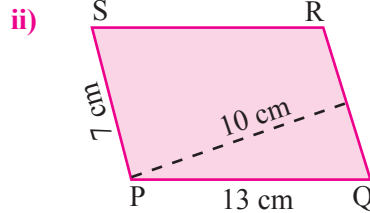
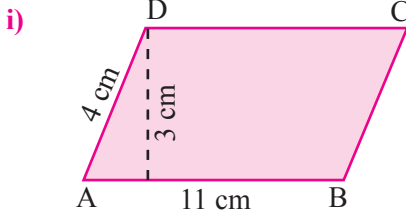


Therefore, base of the parallelogram is 24 cm and height is 8 cm.

Exercise 2.1

B.P.No. 38

1. Find the area and perimeter of the following parallelograms:



Solution:

From figure (i)

base (b) = 11 cm

height (h) = 3 cm

Area of Parallelogram = $b \times h$ sq. units

$$\text{Area} = 11 \times 3 \text{ sq. cm}$$

$$= 33 \text{ sq. cm}$$

Perimeter = Sum of the length of the four sides

$$= (11+4+11+4)$$

$$= 30 \text{ cm}$$

From figure (ii)

base (b) = 7cm

height (h) = 10 cm

$$\text{Area of Parallelogram} = b \times h \text{ sq. units}$$

$$\text{Area} = 7 \times 10 \text{ sq. cm}$$

$$= 70 \text{ sq. cm}$$

$$\text{Perimeter} = \text{Sum of the length of the four sides}$$

$$= (13+7+13+7)$$

$$= 40 \text{ cm}$$

2. Find the missing values.

S.No.	Base	Height	area
(i)	18 cm	5 cm	
(ii)	8 m		56 sq.m
(iii)		17 mm	221 sq.mm

Solution:

i) Base (b) = 18cm

Height (h) = 5 cm

$$\text{Area of Parallelogram} = b \times h$$

$$= 18 \times 5 = 90$$

$$\text{Area} = 90 \text{ sq.cm}$$

ii) Base (b) = 8 m

Area (A) = 56 sq. m

$$\text{Area} = b \times h = 56$$

$$8 \times h = 56$$

$$h = \frac{56}{8}$$

$$h = 7 \text{ m}$$

height = 7m

iii) Height (h) = 17 mm

Area (A) = 221 sq. mm

$$\text{Area} = b \times h$$

$$b \times h = 221$$

$$b \times 17 = 221$$

$$b = \frac{221}{17}$$

$$b = 13 \text{ mm}$$

base = 13 mm

3. Suresh won a parallelogram-shaped trophy in a state level Chess tournament. He knows that the area of the trophy is 735 sq. cm and its base is 21 cm. What is the height of that trophy?

Solution:

$$\text{Area of trophy} = 735 \text{ sq. cm}$$

$$\text{base (b)} = 21 \text{ cm}$$

$$\text{Area of trophy} = b \times h$$

$$b \times h = 735$$

$$21 \times h = 735$$

$$h = \frac{735}{21}$$

$$h = 35 \text{ cm}$$

$$\text{height of the trophy} = 35 \text{ cm}$$



4. Janaki has a piece of fabric in the shape of a parallelogram. Its height is 12 m and its base is 18 m. She cuts the fabric into four equal parallelograms by cutting the parallel sides through its mid-points. Find the area of each new parallelogram.

Solution:

$$\text{Height of fabric} = 12 \text{ m}$$

$$\text{base of fabric} = 18 \text{ m}$$

She cut the fabric into four equal parallelogram.

$$\text{Height of new parallelogram (h)} = 6 \text{ m}$$

$$\text{base of new parallelogram (b)} = 9 \text{ m}$$

$$\text{Area} = b \times h = 9 \times 6 = 54 \text{ m}$$

$$\text{Area of each new parallelogram} = 54 \text{ sq.m.}$$

5. A ground is in the shape of parallelogram. The height of the parallelogram is 14 metres and the corresponding base is 8 metres longer than its height. Find the cost of levelling the ground at the rate of ₹ 15 per sq. m.

Solution:

$$\text{height (h)} = 14 \text{ m}$$

$$\text{base (b)} = \text{height} + 8 \text{ m}$$

$$= 14 + 8 \text{ m}$$

$$= 22 \text{ m}$$

$$\text{Area} = b \times h$$

$$= 22 \times 14$$

$$= 308 \text{ sq.m}$$

$$\text{The cost of leveling the ground in 1 sq.m} = ₹ 15$$

$$\text{The cost of leveling the ground in 308 sq. m} = 308 \times 15$$

$$= ₹ 4620$$

Objective Type Questions

6. The perimeter of a parallelogram whose adjacent sides are 6 cm and 5 cm is

i) 12 cm

ii) 10 cm

iii) 24 cm

iv) 22 cm

Ans: iv) 22 cm

7. The area of a parallelogram whose base 10 m and height 7 m is

i) 70 sq. m

ii) 35 sq. m

iii) 7 sq. m

iv) 10 sq. m

Ans: i) 70 sq. m

8. The base of the parallelogram with area is 52 sq. cm and height 4 cm is

i) 48 cm

ii) 104 cm

iii) 13 cm

iv) 26 cm

Ans: iii) 13 cm

9. What happens to the area of the parallelogram, if the base is increased 2 times and the height is halved?

i) Decreases to half

ii) Remains the same

iii) Increases by two times

iv) none

Ans: ii) Remains the same

10. In a parallelogram the base is three times its height. If the height is 8 cm then the area is

i) 64 sq. cm

ii) 192 sq. cm

iii) 32 sq. cm

iv) 72 sq. cm

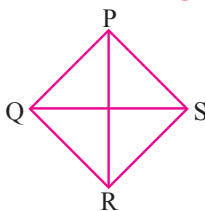
Ans: ii) 192 sq. cm

Rhombus:

Try These

B.P.No. 41

1. Observe the Fig. 2.14 and answer the following questions.



(i) Name two pairs of opposite sides.

PQ, RS and QR, PS.

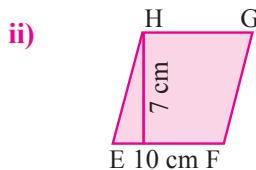
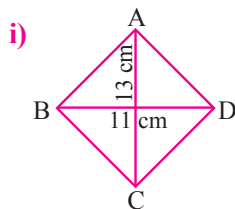
(ii) Name two pairs of adjacent sides.

PQ, QR, RS and SP.

(iii) Name the two diagonals.

PR and QS.

2. Find the area of the rhombus given in Fig. 2.15 and Fig. 2.16



Solution:

i) $d_1 = 13\text{ cm}, d_2 = 11\text{ cm}$

$$\text{Area of rhombus} = \frac{1}{2}(d_1 \times d_2) \text{ sq. units}$$

$$= \frac{1}{2} \times (13 \times 11)$$

$$= \frac{1}{2} \times 143$$

$$= 71.5 \text{ sq. units}$$

ii) Sides $b = 10\text{ cm}$ $h = 7\text{ cm}$

$$\text{Area} = b \times h = 10 \times 7 = 70 \text{ sq. units}$$

Example 2.6

B.P.No. 41

Find the area of the rhombus whose side is 17 cm and the height is 8 cm.

Solution:

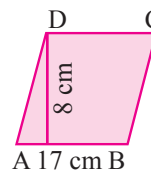
Given:

$$\text{Base} = 17\text{ cm}, \text{ height} = 8\text{ cm}$$

$$\text{Area of the rhombus} = b \times h \text{ sq. units}$$

$$= 17 \times 8 = 136$$

$$\text{Therefore, area of the rhombus} = 136 \text{ sq. cm.}$$



Think

B.P.No. 35

1. Can you find the perimeter of the rhombus?

Ans: Yes, find the perimeter of the rhombus

2. Can diagonals of a rhombus be of the same length?

Ans: Yes, diagonals of a rhombus be of the same length.

3. A square is a rhombus but a rhombus is not a square. Why?

Ans: Diagonals of a rhombus is not equal and behind sides angles are not right angle therefore a square is a rhombus is not square.

4. Can you draw a rhombus in such a way that the side is equal to the diagonal.

Ans: Not able to draw.

Example 2.7

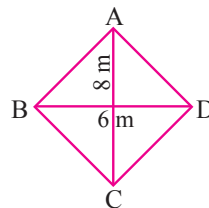
B.P.No. 41

Calculate the area of the rhombus having diagonals equal to 6 m and 8 m.

Solution:

Given: $d_1 = 6$ m, $d_2 = 8$ m

$$\begin{aligned}\text{Area of the rhombus} &= \frac{1}{2} \times (d_1 \times d_2) \text{ sq. units} \\ &= \frac{1}{2} \times (6 \times 8) \\ &= \frac{48}{2} \\ &= 24 \text{ sq.m}\end{aligned}$$



Hence, area of the rhombus is 24 sq.m.

Example 2.8

B.P.No. 42

If the area of the rhombus is 60 sq. cm and one of the diagonals is 8 cm, find the length of the other diagonal.

Solution:

Given, the length of one diagonal (d_1) = 8 cm

Let, the length of the other diagonal be d_2 cm

Area of the rhombus = 60 sq. cm (given)

$$\frac{1}{2} \times (d_1 \times d_2) = 60$$

$$\frac{1}{2} \times (8 \times d_2) = 60$$

$$8 \times d_2 = 60 \times 2$$

$$\begin{aligned}d_2 &= \frac{120}{8} \\ &= 15\end{aligned}$$

Therefore, length of the other diagonal is 15 cm.

Example 2.9

B.P.No. 42

The floor of an office building consists of 200 rhombus shaped tiles and each of its length of the diagonals are 40 cm and 25 cm. Find the total cost of polishing the floor at ₹ 45 per sq.m.

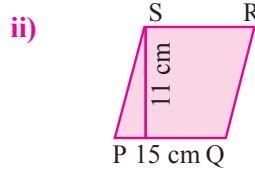
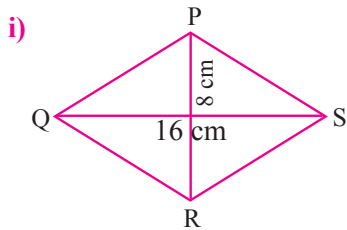
Solution:

Given, the length of the diagonals of a rhombus shaped tile are 40 cm and 25 cm

$$\begin{aligned}\text{The area of one tile} &= \frac{1}{2} \times (d_1 \times d_2) \text{ sq. units} \\ &= \frac{1}{2} \times 40 \times 25 \\ &= 500 \text{ sq. cm}\end{aligned}$$

$$\begin{aligned}\text{Therefore, the area of 200 such tiles} &= 200 \times 500 \\ &= 100000 \text{ sq. cm} \\ &= \frac{100000}{10000} (1 \text{ sq. m} = 10000 \text{ sq. cm}) \\ &= 10 \text{ sq. m}\end{aligned}$$

Therefore, the cost of polishing 200 such tiles at the rate of ₹ 45 per sq. m
 $= 10 \times 45 = ₹ 450.$

Exercise 2.2**B.P.No. 43****1. Find the area of rhombus PQRS shown in the following figures.****Solution:**

i) Given: $d_1 = 16 \text{ cm}$, $d_2 = 8 \text{ cm}$

$$\begin{aligned}\text{Area of rhombus} &= \frac{1}{2} \times (d_1 \times d_2) \text{ sq. units} \\ &= \frac{1}{2} \times (16 \times 8) \\ &= 8 \times 8 \\ &= 64 \text{ sq. cm}\end{aligned}$$

ii) height (h) = 11 cm

base (b) = 15 cm

$$\begin{aligned}\text{Area of rhombus} &= b \times h \\ &= 15 \times 11 \\ &= 165 \text{ sq. cm} \\ \text{Area} &= 165 \text{ sq. cm}\end{aligned}$$

2. Find the area of a rhombus whose base is 14 cm and height is 9 cm.

Solution:

Given base = 14 cm; height = 9 cm

$$\begin{aligned}\text{Area of rhombus} &= b \times h \\ &= 14 \times 9 \\ &= 126 \text{ sq. cm}\end{aligned}$$

3. Find the missing value.

S.No.	Diagonal (d_1)	Diagonal (d_2)	Area
(i)	19 cm	16 cm	
(ii)	26 m		468 sq. m
(iii)		12 mm	180 sq. mm

Solution:

i) Given diagonal (d_1) = 19 cm

diagonal (d_2) = 16 cm

$$\begin{aligned}\text{Area of Rhombus} &= \frac{1}{2} \times (d_1 \times d_2) \text{ sq. units} \\ &= \frac{1}{2} \times 19 \times 16 \\ &= 152 \text{ sq. cm}\end{aligned}$$

ii) diagonal (d_1) = 26 cm

Area = 468 sq. m

$$\frac{1}{2} \times (d_1 \times d_2) = 468$$

$$\frac{1}{2} \times 26 \times d_2 = 468$$

$$d_2 = \frac{468}{13}$$

$$= 36 \text{ m}$$

diagonal (d_2) = 36 m

ii) diagonal (d_2) = 12 mm

Area = 180 sq. mm

$$\frac{1}{2} \times (d_1 \times d_2) = 180$$

$$\frac{1}{2} \times d_1 \times 12 = 180$$

$$d_1 = \frac{180}{6}$$

$$= 30 \text{ mm}$$

diagonal (d_1) = 30 mm

4. The area of a rhombus is 100 sq. cm and length of one of its diagonals is 8 cm. Find the length of the other diagonal.

Solution:

Given: diagonal (d_1) = 8 cm

Area of rhombus = 100

$$\frac{1}{2} \times (d_1 \times d_2) = 100$$

$$\frac{1}{2} \times 8 \times d_2 = 100$$

$$d_2 = \frac{100}{4}$$

$$d_2 = 25 \text{ cm}$$

Other diagonal = 25 cm

5. A sweet is in the shape of rhombus whose diagonals are given as 4 cm and 5 cm. The surface of the sweet should be covered by an aluminum foil. Find the cost of aluminum foil used for 400 such sweets at the rate of ₹ 7 per 100 sq. cm.

Solution:

Given: diagonal (d_1) = 4 cm

diagonal (d_2) = 5 cm

$$\text{Area of rhombus} = \frac{1}{2} \times (d_1 \times d_2) \text{ sq. units}$$

$$= \frac{1}{2} \times (4 \times 5)$$

$$= 10 \text{ sq. cm}$$

$$\text{The area of 400 such sweet} = 10 \times 400$$

$$= ₹4000$$

The rate of ₹7 per 100 sq. cm

$$4000 \text{ sq. cm} = \frac{4000}{100}$$

$$= 40$$

$$\text{The rate of 40 such sweet} = 40 \times 7$$

$$= ₹280$$

The cost of aluminium foil = ₹280

Objective Type Questions

6. The area of the rhombus with side 4 cm and height 3 cm is

i) 7 sq. cm

ii) 24 sq. cm

iii) 12 sq. cm

iv) 10 sq. cm

Ans: iii) 12 sq. cm

7. The area of the rhombus when both diagonals measuring 8 cm is

- i) 64 sq. cm ii) 32 sq. cm
iii) 30 sq. cm iv) 16 sq. cm

Ans: ii) 32 sq. cm

8. The area of the rhombus is 128 sq. cm and the length of one diagonal is 32 cm. The length of the other diagonal is

- i) 12 cm ii) 8 cm
iii) 4 cm iv) 20 cm

Ans: ii) 8 cm

9. The height of the rhombus whose area 96 sq. m and side 24 m is

- i) 8 m ii) 10 m
iii) 2 m iv) 4 m

Ans: iv) 4m

10. The angle between the diagonals of a rhombus is

- i) 120°
ii) 180°
iii) 90°
iv) 100°

Ans: iii) 90°

Trapezium:

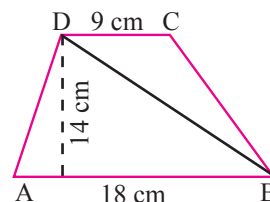
Example 2.10

B.P.No. 44

Find the area of the trapezium whose height is 14 cm and the parallel sides are 18 cm and 9 cm of length.

Solution:

Given, height (h) = 14 cm
parallel sides are (a) = 18 cm and (b) = 9 cm
Area of the trapezium = $\frac{1}{2} \times h (a+b)$
= $\frac{1}{2} \times 14 (18+9)$
= 7(27)
= 189 sq. cm



Therefore, area of the trapezium is 189 sq. cm.

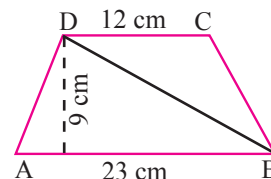
Example 2.11

B.P.No. 45

The parallel sides of a trapezium are 23 cm and 12 cm. The distance between the parallel sides is 9 cm. Find the area of the trapezium.

Solution:

Given, height (h) = 9 cm
Parallel sides are (a) = 23 cm and (b) = 12 cm
Area of the trapezium = $\frac{1}{2} \times h (a+b)$



$$\begin{aligned}
 &= 12 \times 9 (23+12) \\
 &= 12 \times 9 (35) \\
 &= 157.5 \text{ sq. cm}
 \end{aligned}$$

Therefore, Area of the trapezium is 157.5 sq. cm.

Example 2.12

B.P.No. 45

The area of a trapezium is 828 sq. cm. If the lengths of its parallel sides are 19.6 cm and 16.4 cm, find the distance between them.

Solution:

Given, Area of the Trapezium = 828 cm²

$$\frac{1}{2} \times h (a+b) = 828$$

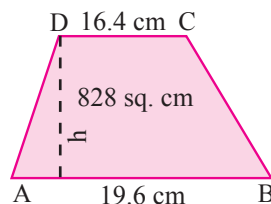
$$\frac{1}{2} \times h (19.6+16.4) = 828$$

$$\frac{1}{2} \times h (36) = 828$$

$$h (18) = 828$$

$$h = \frac{828}{18}$$

$$h = 46 \text{ cm}$$



Therefore, distance between the parallel sides = 46 cm

Example 2.13

B.P.No. 45

The area of The area of a trapezium is 352 sq. cm and the distance between its parallel sides is 16 cm. If one of the parallel sides is of length 25 cm then find the length of the other side.

Solution:

Let, the length of the required side be 'x' cm.

$$\text{Then, area of the trapezium} = \frac{1}{2} \times h (a+b) \text{ sq. units}$$

$$= \frac{1}{2} \times 16 (25+x)$$

$$= 200+8x$$

$$\text{But, the area of the trapezium} = 352 \text{ sq. cm (given)}$$

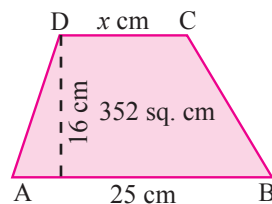
$$\text{Therefore, } 200 + 8x = 352$$

$$\Rightarrow 8x = 352 - 200$$

$$\Rightarrow 8x = 152$$

$$\Rightarrow x = 152 \div 8$$

$$\Rightarrow x = 19$$



Therefore, the length of the other side is 19 cm.

Think

B.P.No. 46

1. Can you find the perimeter of the trapezium? Discuss.

Four sides are known then find the perimeter of the trapezium.

2. Mention any three life situations where the isosceles trapeziums are used.

- ◆ The collar of a shirt.
- ◆ Isosceles trapezium shape window.
- ◆ Trapezium shape field.

Example 2.14

B.P.No. 45

The collar of a shirt is in the form of isosceles trapezium whose parallel sides are 17 cm and 14 cm and the distance between them is 4 cm. Find the area of canvas that will be used to stitch the collar.

Solution:

Given height (h) = 4 cm

Parallel sides are (a) = 17 cm and (b) = 14 cm

Area of the trapezium = $\frac{1}{2} \times h (a+b)$ sq. units

$$= \frac{1}{2} \times 4 (17+14)$$

$$= \frac{1}{2} \times 4 (31)$$

$$= 62 \text{ sq. cm}$$

Therefore, the area of canvas used is 62 sq. cm.



Exercise 2.3

B.P.No. 47

1. Find the missing values.

S.No.	Height 'h'	Parallel side 'a'	Parallel side 'b'	Area
(i)	10 m	12 m	20 m	
(ii)		13 cm	28 cm	492 sq. cm
(iii)	19 m		16 m	323 sq. m
(iv)	16 cm	15 cm		360 sq. cm

Solution:

i) Given height (h) = 10 m

parallel sides are (a) = 12 m, (b) = 20 m

$$\text{Area of trapezium} = \frac{1}{2} \times h (a+b) \text{ sq. units}$$



$$\begin{aligned} &= \frac{1}{2} \times 10 (12+20) \\ &= \frac{1}{2} \times 10 \times 32 \\ &= 160 \text{ sq. m} \end{aligned}$$

Area = 160 sq. m

- ii) Given parallel sides are (a) = 13 cm, (b) = 28 cm

$$\begin{aligned} \text{Area} &= 492 \text{ sq. cm} \\ \frac{1}{2} \times h (a+b) &= 492 \\ \frac{1}{2} \times h (13+28) &= 492 \\ \frac{1}{2} \times h (41) &= 492 \\ h &= \frac{492 \times 2}{41} \text{ sq. m} \\ &= 12 \times 2 \\ &= 24 \text{ cm} \end{aligned}$$

height (h) = 24 cm

- iii) Given height (h) = 19 m
parallel side (b) = 16 m

$$\begin{aligned} \text{Area} &= 323 \text{ sq. cm} \\ \frac{1}{2} \times h (a+b) &= 323 \\ \frac{1}{2} \times 19 (a+16) &= 323 \\ a+16 &= \frac{323 \times 2}{19} \\ a+16 &= 17 \times 2 \\ a+16 &= 34 \\ a &= 34-16 \\ a &= 18 \text{ m} \end{aligned}$$

Parallel side (a) = 18 m

- iv) Given height (h) = 16 cm
parallel side (a) = 15 cm

$$\begin{aligned} \text{Area} &= 360 \text{ sq. cm} \\ \frac{1}{2} \times h (a+b) &= 360 \\ \frac{1}{2} \times 16 (15+b) &= 360 \\ 15+b &= \frac{360 \times 2}{16} \end{aligned}$$

$$\begin{aligned}
 15+b &= 45 \\
 b &= 45 - 15 \\
 b &= 30 \text{ cm}
 \end{aligned}$$

Parallel side (b) = 30 cm

2. Find the area of a trapezium whose parallel sides are 24 cm and 20 cm and the distance between them is 15 cm.

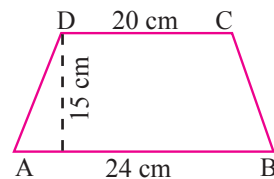
Solution:

Given height (h) = 15 cm

Parallel sides are (a) = 24 cm, (b) = 20 cm

$$\begin{aligned}
 \text{Area of trapezium} &= \frac{1}{2} \times h (a+b) \text{ sq. units} \\
 &= \frac{1}{2} \times 15 (24+20) \\
 &= \frac{1}{2} \times 15 \times 44 \\
 &= 330 \text{ sq. cm}
 \end{aligned}$$

Area of a trapezium = 330 sq. cm

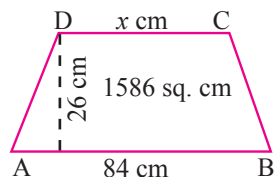


3. The area of a trapezium is 1586 sq. cm. The distance between its parallel sides is 26 cm. If one of the parallel sides is 84 cm then, find the other side.

Solution:

Let the length of the required side be 'x' cm.

$$\begin{aligned}
 \text{Then area of the trapezium} &= \frac{1}{2} \times h (a+b) \text{ sq. units} \\
 &= \frac{1}{2} \times 26 (84+x) \\
 &= 1092 + 13x
 \end{aligned}$$



But the area of trapezium = 1586 sq. cm

$$\begin{aligned}
 1092+13x &= 1586 \\
 13x &= 1586 - 1092 \\
 13x &= 494 \\
 x &= \frac{494}{13} = 38 \\
 x &= 38 \text{ cm}
 \end{aligned}$$

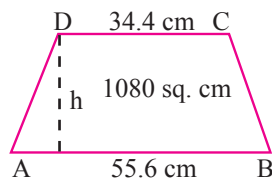
length of the other side is 38 cm.

4. The area of a trapezium is 1080 sq. cm. If the lengths of its parallel sides are 55.6 cm and 34.4 cm, find the distance between them.

Solution:

Given: Area = 1080 sq. cm

$$\frac{1}{2} \times h (a+b) = 1080$$



$$\frac{1}{2} \times h (56.6 + 34.4) = 1080$$

$$\frac{1}{2} \times h (90) = 1080$$

$$h (45) = 1080$$

$$h = \frac{1080}{45}$$

$$h = 24 \text{ cm}$$

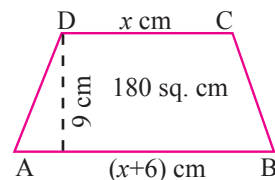
height of trapezium = 24 cm

5. The area of a trapezium is 180 sq. cm and its height is 9 cm. If one of the parallel sides is longer than the other by 6 cm, find the length of the parallel sides.

Solution:

Let the length of the required side be x cm and another side is $(x+6)$ cm.

$$\begin{aligned} \text{Area} &= \frac{1}{2} \times h (a+b) \\ &= \frac{1}{2} \times 9 (x+(x+6)) \text{ sq. cm} \\ &= \frac{1}{2} \times 9 (2x+6) \\ &= \frac{18x+54}{2} \\ &= 9x+27 \end{aligned}$$



The area of trapezium = 180 sq. cm

$$9x+27 = 180$$

$$9x = 180 - 27$$

$$9x = 163$$

$$x = \frac{163}{9}$$

$$x = 17 \text{ cm}$$

$$x+6 = 17+6 = 23 \text{ cm}$$

length of the parallel sides

$$a = 17 \text{ cm}, b = 23 \text{ cm}$$

6. The sunshade of a window is in the form of isosceles trapezium whose parallel sides are 81 cm and 64 cm and the distance between them is 6 cm. Find the cost of painting the surface at the rate of ₹ 2 per sq. cm.

Solution:

Given: height (h) = 6 cm

Parallel sides are $a = 81$ cm, $b = 64$ cm

$$\text{Area of trapezium} = \frac{1}{2} \times h (a+b)$$

$$= \frac{1}{2} \times 6 (81+64)$$

$$= 3 \times (145)$$

$$= 435 \text{ sq. cm}$$

Cost of painting 1 sq. cm = ₹2

Cost of painting 435 sq. cm = $435 \times 2 = ₹870$

The cost of painting surface area is ₹870.

7. A window is in the form of trapezium whose parallel sides are 105 cm and 50 cm respectively and the distance between the parallel sides is 60 cm. Find the cost of the glass used to cover the window at the rate of ₹ 15 per 100 sq. cm.

Solution:

Parallel sides are $a = 105 \text{ cm}$, $b = 50 \text{ cm}$

$$h = 60 \text{ cm}$$

$$\text{Area} = \frac{1}{2} \times h (a+b)$$

$$= \frac{1}{2} \times 60 (105+50) \text{ sq. cm}$$

$$= \frac{1}{2} \times 60 (155)$$

$$= 4650 \text{ sq. cm}$$

Cost of cover the window 100 sq. cm = ₹15

$$\begin{aligned} \text{Therefore cost of cover the window 4650 sq. cm} &= \frac{4650}{100} \times 15 \\ &= ₹697.50 \end{aligned}$$

Rate of glass used to cover the window is ₹697.50.

Objective Type Questions

8. The area of the trapezium, if the parallel sides are measuring 8 cm and 10 cm and the height 5 cm is

i) 45 sq. cm

ii) 40 sq. cm

iii) 18 sq. cm

iv) 50 sq. cm

Ans: i) 45 sq. cm

9. In a trapezium if the sum of the parallel sides is 10 cm and the area is 140 sq. cm, then the height is

i) 7cm

ii) 40 cm

iii) 14 cm

iv) 28 cm

Ans: iv) 28 cm

10. when the non-parallel sides of a trapezium are equal then it is known as

i) a square

ii) a rectangle

iii) an isosceles trapezium

iv) a parallelogram

Ans: iii) an isosceles trapezium

Exercise 2.4**B.P.No. 48****Miscellaneous Practice Problems**

1. The base of the parallelogram is 16 cm and the height is 7 cm less than its base. Find the area of the parallelogram.

Solution:

Given: $b = 16$ cm, $h = 16 - 7 = 9$ cm

$$\begin{aligned}\text{Area of parallelogram} &= b \times h \text{ sq. units} \\ &= 16 \times 9 \text{ sq. cm} \\ &= 144 \text{ sq. cm}\end{aligned}$$

Area of the parallelogram = 144 sq. cm

2. An agricultural field is in the form of a parallelogram, whose area is 68.75 sq. hm. The distance between the parallel sides is 6.25 hm. Find the length of the base.

Solution:

Given $h = 6.25$

$$\begin{aligned}\text{Area of parallelogram} &= 68.75 \\ b \times h &= 68.75 \\ b \times 6.25 &= 68.75 \\ b &= \frac{68.75}{6.25} \\ b &= 11 \text{ hm}\end{aligned}$$

base of the parallelogram = 11 hm

3. A square and a parallelogram have the same area. If the side of the square is 48 m and the height of the parallelogram is 18 m, find the length of the base of the parallelogram.

Solution:

Given: Side of square (a) = 48 m

$$\begin{aligned}\text{Area of square} &= a^2 \\ &= 48^2 \\ &= 48 \times 48 \\ &= 2304 \text{ sq. m}\end{aligned}$$

Given:

$$\begin{aligned}\text{Area of square} &= \text{Area of parallelogram} \\ 2304 &= b \times h \\ 2304 &= b \times 18\end{aligned}$$

$$b = \frac{2304}{18}$$

$$b = 128 \text{ m}$$

4. The height of the parallelogram is one fourth of its base. If the area of the parallelogram is 676 sq. cm, find the height and the base.

Solution:

Given: $h = \frac{b}{4}$; $b = 4h$

Area of parallelogram = 676 sq. cm

$$b \times h = 676$$

$$(4h) \times h = 676$$

$$4h^2 = 676$$

$$h^2 = \frac{676}{4}$$

$$h^2 = 169$$

$$h = 13 \text{ cm}$$

$$b = 4h$$

$$b = 4(13)$$

$$b = 52 \text{ cm}$$

height of the base = 52 cm

5. The area of the rhombus is 576 sq. cm and the length of one of its diagonal is half of the length of the other diagonal then find the length of the diagonals.

Solution:

Given:

Length of the diagonal = half of the length of the other diagonal

i.e $d_2 = \frac{1}{2} d_1$

Area of rhombus = $\frac{1}{2} \times (d_1 \times d_2)$

$$\frac{1}{2} \times (d_1 \times d_2) = 576$$

$$\frac{1}{2} \times (d_1 \times \frac{d_1}{2}) = 576$$

$$\frac{d_1^2}{2} = 576$$

$$d_1^2 = 576 \times 2$$

$$d_1 = 24 \times 2$$

$$= 48$$

$$d_2 = \frac{d_1}{2} = \frac{48}{2} = 24 \text{ cm}$$

Length of the diagonals $d_1 = 48 \text{ cm}$, $d_2 = 24 \text{ cm}$

6. A ground is in the form of isosceles trapezium with parallel sides measuring 42 m and 36 m long. The distance between the parallel sides is 30 m. Find the cost of levelling it at the rate of ₹135 per sq.m.

Solution:

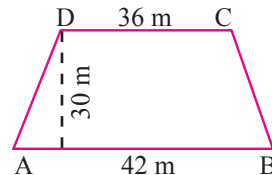
Given: height (h) = 30 m

Parallel sides are a = 42 m, b = 36 m

$$\begin{aligned}\text{Area of trapezium} &= \frac{1}{2} \times h (a+b) \\ &= \frac{1}{2} \times 30 (42 + 36) \\ &= \frac{1}{2} \times 30 (78) \\ &= 1170 \text{ sq. m}\end{aligned}$$

The cost of levelling 1 sq.m = ₹135

The cost of levelling 1170 sq. m = 1170×135
= ₹1,57,950



Challenge Problems

7. In a parallelogram PQRS (see the diagram) PM and PN are the heights corresponding to the sides QR and RS respectively. If the area of the parallelogram is 900 sq. cm and the length of PM and PN are 20 cm and 36 cm respectively, find the length of the sides QR and SR.

Solution:

Given:

height (h) = 20 m

Area of parallelogram = 900 sq. cm

$$b \times h = 900$$

$$b \times (20) = 900$$

$$b = \frac{900}{20}$$

$$b = 45 \text{ m}$$

Given:

height (h) = 36 m

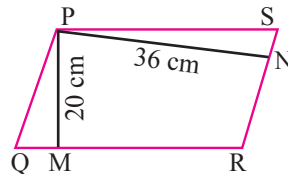
Area of parallelogram = 900 sq. m

$$b \times h = 900$$

$$b \times (36) = 900$$

$$b = \frac{900}{36}$$

$$b = 25 \text{ m}$$



length of QM = 45 m

length of SR = 25 cm

8. If the base and height of a parallelogram are in the ratio 7:3 and the height is 45 cm then, find the area of the parallelogram.

Solution:

ratio of base and height = 7 : 3

Let base = $7x$, height = $3x$

Given height (h) = 45

$$3x = 45$$

$$x = 15$$

base (b) = $7x$

$$= 7(15)$$

$$= 105$$

Area of parallelogram = (b × h) sq. unit

$$= 105 \times 45$$

$$= 4725 \text{ sq. units}$$

Area of parallelogram = 4725 sq. units

9. Find the area of the parallelogram ABCD, if AC is 24 cm and BE = DF = 8 cm.

Solution:

d = 24 cm, $h_1 = 8$ cm, $h_2 = 8$ cm

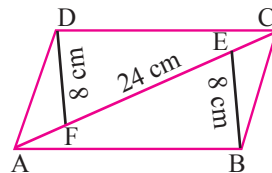
Area of parallelogram = $\frac{1}{2} \times d (h_1 + h_2)$

$$= \frac{1}{2} \times 24 (8 + 8)$$

$$= \frac{1}{2} \times 24 \times 16$$

$$= 192 \text{ sq. cm}$$

Area of parallelogram = 192 sq. cm



10. The area of the parallelogram ABCD is 1470 sq cm. If AB = 49 cm and AD = 35 cm then, find the heights DF and BE.

Solution:

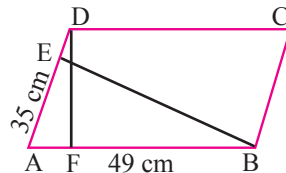
Given: base (b) = 49 cm

Area of parallelogram = 1470 sq. cm

$$b \times h = 1470$$

$$49 \times h = 1470$$

$$h = \frac{1470}{49}$$



$$h = 30 \text{ cm}$$

$$DF = 30 \text{ cm}$$

Given: base (b) = 35 cm

$$\text{Area of parallelogram} = 1470$$

$$b \times h = 1470$$

$$35 \times h = 1470$$

$$h = \frac{1470}{35}$$

$$h = 42 \text{ cm}$$

$$BE = 42 \text{ cm}$$

$$\text{height (DF)} = 30 \text{ cm}$$

$$\text{height (BE)} = 42 \text{ cm}$$

- 11. One of the diagonals of a rhombus is thrice as the other. If the sum of the length of the diagonals is 24 cm, then find the area of the rhombus.**

Solution:

$$\text{diagonal of rhombus} = d_1$$

$$\text{other diagonal} = 3d_1$$

$$\text{Sum of diagonals} = 24 \text{ cm}$$

$$\text{i.e. } d_1 + 3d_1 = 24$$

$$4d_1 = 24$$

$$d_1 = \frac{24}{4}$$

$$d_1 = 6 \text{ cm}$$

$$d_2 = 3(d_1)$$

$$= 3(6)$$

$$= 18 \text{ cm}$$

$$\text{Area of the rhombus} = \frac{1}{2} \times (d_1 \times d_2)$$

$$= \frac{1}{2} \times (6 \times 18)$$

$$= 54 \text{ sq. cm}$$

- 12. A man has to build a rhombus shaped swimming pool. One of the diagonal is 13 m and the other is twice the first one. Then find the area of the swimming pool and also find the cost of cementing the floor at the rate of ₹ 15 per sq.cm.**

Solution:

$$\text{One of the diagonal} = 13 \text{ m}$$

$$\text{Other diagonal} = 2(13) = 26 \text{ m}$$

$$\text{Area of rhombus} = \frac{1}{2} \times (d_1 \times d_2)$$

$$= \frac{1}{2} \times 13 \times 26$$

$$= 169 \text{ sq. cm}$$

The cost of cementing the rate of 1 sq.cm = ₹15

$$\text{Cost of 169 sq. cm} = 169 \times ₹15$$

$$= ₹2535$$

Area of swimming pool is 169 sq. cm

Cost of cementing the floor is ₹2535.

13. Find the height of the parallelogram whose base is four times the height and whose area is 576 sq. cm.

Solution:

$$\text{base (b)} = 4 \times \text{height (h)}$$

$$\text{i.e. } b = 4h$$

$$\text{Area of parallelogram} = 576$$

$$b \times h = 576$$

$$4h \times h = 576$$

$$4h^2 = 576$$

$$h^2 = \frac{576}{4}$$

$$h^2 = 144$$

$$h = 12 \text{ cm}$$

height of parallelogram is 12 cm.

14. The table top is in the shape of trapezium with measurements given in the figure. Find the cost of the glass used to cover the table at the rate of ₹6 per 10 sq. cm.

Solution:

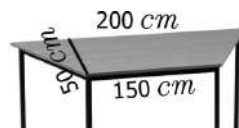
Given: height (h) = 50 cm

Parallel sides are a = 150 cm, b = 200 cm

$$\begin{aligned} \text{Area of trapezium} &= \frac{1}{2} \times h (a+b) \\ &= \frac{1}{2} \times 50 (150+200) \\ &= \frac{1}{2} \times 50 (350) \\ &= 8750 \text{ sq. cm} \end{aligned}$$

The cost of glass rate of 10 sq. cm = ₹6

$$\begin{aligned} \text{rate of 8750 sq. cm} &= \frac{8750}{10} \times 6 \\ &= 875 \times 6 \\ &= ₹5250 \end{aligned}$$



The cost of glass is ₹5250



15. Arivu has a land ABCD with the measurements given in the figure. If a portion ABED is used for cultivation (where E is the mid-point of DC), find the cultivated area.

Solution:

$$\text{Area of } ABCD = b \times h$$

$$\text{Given } b = 24, h = 18$$

$$\begin{aligned} \text{Area of } ABCD &= 24 \times 18 \\ &= 432 \text{ sq. m} \end{aligned}$$

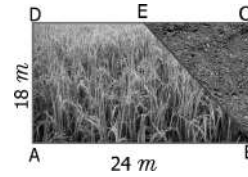
$$\text{Area of } \triangle ECB$$

$$b = 12 \text{ m}, h = 18 \text{ m}$$

$$\begin{aligned} \text{Area of } \triangle ECB &= \frac{1}{2} b h \\ &= \frac{1}{2} 12 \times 18 \end{aligned}$$

$$= 108 \text{ sq. m}$$

$$\begin{aligned} \text{Area of cultivated} &= 432 - 108 \\ &= 324 \text{ sq. m} \end{aligned}$$



Unit Test

Time: 30 mins.

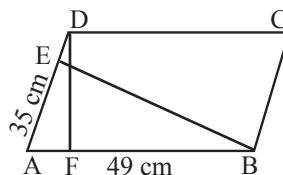
2. Measurements

Marks: 20

I. Answer any four questions.

4×5=20

1. A ground is in the shape of parallelogram. The height of the parallelogram is 14 m and corresponding base is 8m longer than its height. Find the cost of levelling the ground at the rate of ₹15 per sq. m.
2. If the area of the rhombus is 60 sq. m and one of the diagonals is 8m. Find the length of the other diagonal.
3. The parallel sides of a trapezium are 23 cm and 12 cm. The distance between the parallel sides is 9 cm. Find the area of the trapezium.
4. A window is in the form of trapezium whose parallel sides are 105 cm and 50 cm respectively. and distance between the parallel side is 60cm. Find the cost of glass used to cover the window at the rate of ₹15 per 100 sq. cm
5. The area of the parallelogram ABCD is 1470 sq. cm. If AB = 49 cm and AD = 35 cm then find the height DF and BE.



UNIT

3

ALGEBRA

Try These

B.P.No. 51

1. Identify the variables and constants among the following terms:

a, $11 - 3x$, xy , -89 , $-m$, $-n$, 5 , $5ab$, -5 , $3y$, $8pqr$, 18 , $-9t$, -1 , -8

Solution:

Variable: a, $11 - 3x$, xy , $-m$, $-n$, $5ab$, $3y$, $8pqr$, $-9t$

Constant: -89 , 5 , -5 , 18 , -1 , -8

2. Complete the following table:

S.No.	Verbal statements	Algebraic statements
1.	12 more than x	$x + 12$
2.	7 less than m	$m - 7$
3.	1 more than product of 2 and p	$2p + 1$
4.	Twice the sum of y and z.	$2(y + z)$
5.	3 is reduce then product of 2 and k	$2k - 3$
6.	5 is reduced from the product of x and y	$xy - 5$

Terms and Co-efficients:

Think

B.P.No. 53

Can we use the operations multiplication and division to combine terms?

Solution:

Yes, we use the operation multiplication and division to combine terms.

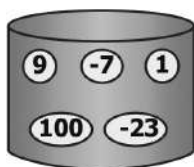
Activity

B.P.No. 54

To further strengthen the understanding of variables and constants, let us do the following activity.

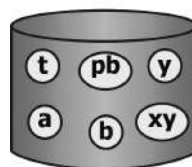
Consider, two baskets of cards. One containing constants and the other containing variables. Pick a constant from the first basket and a variable from the second basket and form a term by expressing it as a product. Write all the possible terms that can be constructed using the given constants and variables.

CONSTANTS



(Basket - 1)

VARIABLES



(Basket - 2)

 $-7a$ $+100t$ $-23y$ $9b$ $-7xy$ $1pb$ $1xy$ $-7t$ $100y$ $9xy$ $-23b$ $100a$

Try This

B.P.No. 54

Complete the following table by forming expressions using the terms given. One is done for you.

Terms	Algebraic Expressions			
$7x, 2y, -5z$	$7x - 2y$	$2y - 5z$	$7x - 5z$	$7x + 2y - 5z$
$3p, 4q, 5r$	$3p - 4q$	$3p + 5r$	$4q + 5r$	$3p + 4q + 5r$
$9m, n, -8k$	$9m + n$	$9m - 8k$	$n - 8k$	$9m + n - 8k$
$a, -6b, 3c$	$a - 6b$	$a + 3c$	$-6b + 3c$	$a + 6b + 3c$
$12xy, 9x, -y$	$12xy - 9x$	$12xy - y$	$9y - y$	$12xy + 9x - y$

Example 3.1

B.P.No. 54

Identify the variables, terms and number of terms in each of the following expressions:

(i) $12 - x$ (ii) $7 + 2y$ (iii) $29 + 3x + 5y$ (iv) $3x - 5 + 7z$

Solution:

S.No.	Expressions	Variables	Terms	No. of terms
(i)	$12 - x$	x	$12, -x$	2
(ii)	$7 + 2y$	y	$7, 2y$	2
(iii)	$29 + 3x + 5y$	x, y	$29, 3x, 5y$	3
(iv)	$3x - 5 + 7z$	x, z	$3x, -5, 7z$	3

Example 3.2

B.P.No. 55

Identify Find the numerical co-efficient of the following terms. Also, find the co efficient of x and y in each of the term: $3x, -5xy, -yz, 7xyz, y, 16yx$.

Solution:

Term	Numerical co-efficient	Co-efficient of x	Co-efficient of y
3x	3	3	Not possible
-5xy	-5	-5y	-5x
-yz	-1	Not possible	-z
7xyz	7	7yz	7xz
y	1	Not possible	1
16yx	16	16y	16x

Try This

B.P.No. 56

Identify the like terms among the following and group them:

7xy, 19x, 1, 5y, x, 3yx, 15, -13y, 6x, 12xy, -5, 16y, -9x, 15xy, 23, 45y, -8y, 23x, -y, 11.

Solution:**xy terms:** 7xy, 3xy, 12xy, 15xy**x terms:** 19x, x, 6x, -9x, 23x**y terms:** 5y, 16y, 45y, -8y, -y, -13y**Constant:** 1, 15, -5, 23, 11**Try This**

B.P.No. 57

Try to find the value of the following expressions, if $p = 5$ and $q = 6$.**i) $p + q$** **Solution:**

$$p+q = 5+6 = 11$$

ii) $q - p$:**Solution:**

$$q-p = 6-5 = 1$$

iii) $2p + 3q$:**Solution:**

$$2(5)+3(6) = 10+18 = 28$$

iv) $pq - p - q$:**Solution:**

$$\begin{aligned} pq-p-q &= (5)(6) - 5 - 6 \\ &= 30 - 11 = 19 \end{aligned}$$

v) $5pq - 1$ **Solution:**

$$\begin{aligned} 5pq-1 &= 5(5)(6) - 1 \\ &= 150 - 1 = 149 \end{aligned}$$

Example 3.3

B.P.No. 57

If $x = 3$, $y = 2$ find the value of (i) $4x + 7y$ (ii) $3x + 2y - 5$ (iii) $x - y$ **Solution:**

$$\text{i) } 4x + 7y = 4(3) + 7(2) = 12 + 14 = 26$$

$$\text{ii) } 3x + 2y - 5 = 3(3) + 2(2) - 5 = 9 + 4 - 5 = 8$$

$$\text{iii) } x - y = 3 - 2 = 1$$

Example 3.4

B.P.No. 57

Find the value of (i) $3m + 2n$ (ii) $2m - n$ (iii) $mn - 1$, given that $m = 2$, $n = -1$.

Solution:

i) $3m + 2n = 3(2) + 2(-1) = 6 - 2 = 4$

ii) $2m - n = 2(2) - (-1) = 4 + 1 = 5$

iii) $mn - 1 = (2)(-1) - 1 = -2 - 1 = -3$

Exercise 3.1

B.P.No. 57

1. Fill in the blanks:

(i) The variable in the expression $16x - 7$ is _____.

Ans: x

(ii) The constant term of the expression $2y - 6$ is _____.

Ans: -6

(iii) In the expression $25m + 14n$, the type of the terms are _____ terms.

Ans: unlike

(iv) The number of terms in the expression $3ab + 4c - 9$ is _____.

Ans: 3

(v) The numerical co-efficient of the term $-xy$ is _____.

Ans: -1

2. Say True or False.

(i) $x + (-x) = 0$

True

(ii) The co-efficient of ab in the term $15abc$ is 15.

False

(iii) $2pq$ and $-7qp$ are like terms

True

(iv) When $y = -1$, the value of the expression $2y - 1$ is 3

False

3. Find the numerical coefficient of each of the following terms:

$-3yx$, $12k$, y , $121bc$, $-x$, $9pq$, $2ab$

Solution:

Term	Numerical Coefficient
$-3yx$	-3
$12k$	12
y	1
$121bc$	121
$-x$	-1
$9pq$	9
$2ab$	2

4. Write the variables, constants and terms of the following expressions.

(i) $18 + x - y$ (ii) $7p - 4q + 5$ (iii) $29x + 13y$ (iv) $b + 2$

Solution:

S.No.	Expression	Variable	Constant	Terms
(i)	$18 + x - y$	x, y	18	$18, x - y$
(ii)	$7p - 49 + 5$	p, q	5	$7p, -49, 5$
(iii)	$29x + 13y$	x, y	0	$29x, 13y$
(iv)	$b + 2$	b	2	$b, 2$

5. Identify the like terms among the following : $7x, 5y, -8x, 12y, 6z, z, -12x, -9y, 11z$.

Solution:

x terms $\rightarrow 7x, -8x, -12x$

y terms $\rightarrow 5y, 12y, -9y$

z terms $\rightarrow 6z, z, 11z$

6. If $x = 2$ and $y = 3$, then find the value of the following expressions

(i) $2x - 3y$

(ii) $x + y$

(iii) $4y - x$

(iv) $x + 1 - y$

Solution:

$$\begin{aligned} \text{i) } 2x - 3y &= 2(2) - 3(3) \\ &= 4 - 9 = -5 \end{aligned}$$

$$\text{ii) } x + y = 2 + 3 = 5$$

$$\begin{aligned} \text{iii) } 4y - x &= 4(3) - 2 \\ &= 12 - 2 = 10 \end{aligned}$$

$$\begin{aligned} \text{iv) } x + 1 - y &= 2 + 1 - 3 \\ &= 3 - 3 = 0 \end{aligned}$$

Objective Type Questions

7. An algebraic expressions which is equivalent to the verbal statement “Three times the sum of x and y ” is

i) $3(x + y)$

ii) $3 + x + y$

iii) $3x + y$

iv) $3 + xy$

Ans: i) $3(x + y)$

8. The numerical co-efficient of $-7mn$ is

i) 7

ii) -7

iii) p

iv) $-p$

Ans: ii) -7

9. Choose the pair of like terms

i) $7p, 7x$

ii) $7r, 7x$

iii) $-4x, 4$

iv) $-4x, 7x$

Ans: iv) $-4x, 7x$

10. The value of $7a - 4b$ when $a = 3, b = 2$ is

i) 21

ii) 13

iii) 8

iv) 32

Ans: ii) 13

Try This

B.P.No. 59

Add the terms: i) $3p, 14p$ ii) $m, 12m, 21m$ iii) $11abc, 5abc$ iv) $12y, -y$
v) $4x, 2x, -7x$

Solution:

- i) $3p + 14p = 17p$ ii) $m + 12m + 21m = (1 + 12 + 21)m = 34m$
iii) $11abc + 5abc = (11 + 5)abc = 16abc$ iv) $12y + (-y) = (12 + (-1))y = 11y$
v) $4x + 2x - 7x = (4 + 2 - 7)x = (-1)x = -x$

Example 3.5

B.P.No. 59

Add the expressions: (i) $pq - 1$ and $3pq + 2$ (ii) $8x + 3$ and $1 - 7x$

Solution:

- i) $(pq - 1) + (3pq + 2) = (pq + 3pq) + (-1 + 2)$
 $= (1 + 3)pq + 1$
 $= 4pq + 1$
ii) $(8x + 3) + (1 - 7x) = 8x + 3 + 1 - 7x$
 $= (8x - 7x) + (3 + 1)$
 $= (8 - 7)x + 4$
 $= x + 4$

Example 3.6

B.P.No. 60

Subtract: i) $7pq$ from $11pq$ ii) $-a$ from a iii) $5x + 7$ from $21x + 9$

Solution:

- i) $11pq - 7pq$. Additive inverse of $7pq$ is $-7pq$
 $11pq + (-7pq) = 11pq - 7pq = (11 - 7)pq = 4pq$
ii) $a - (-a)$. Additive inverse of $-a$ is a .
So, $a + a = 2a$
iii) $21x + 9 - (5x + 7)$. Additive inverse of $5x + 7$ is $-(5x + 7)$.
 $(21x + 9) + [-(5x + 7)] = (21x + 9) - (5x + 7)$
 $= 21x + 9 - 5x - 7$
 $= (21 - 5)x + (9 - 7)$
 $= 16x + 2$

Think

B.P.No. 60

$3x + (y - x) = 3x + y - x$. But, $3x - (y - x) \neq 3x - y - x$. Why?

Solution:

$$3x + (y - x) = 3x + y - x$$

Additional inverse is subtraction.

then Addition is equal same equation subtraction is not equal

Example 3.7

B.P.No. 60

Simplify: $100x + 99y - 98z + 10x + 10y + 10z - x - y + z$

Solution:

In the given algebraic expression, x, y, z are the variables.

Let us group the like terms.

$$\begin{aligned} 100x + 99y - 98z + 10x + 10y + 10z - x - y + z \\ &= (100x + 10x - x) + (99y + 10y - y) + (-98z + 10z + z) \\ &= (100 + 10 - 1)x + (99 + 10 - 1)y + (-98 + 10 + 1)z \\ &= (110 - 1)x + (109 - 1)y + (-98 + 11)z \\ &= 109x + 108y + (-87)z \\ &= 109x + 108y - 87z \end{aligned}$$

Example 3.8

B.P.No. 61

i) Add: $3x - 4y + z$ and $2x - z + 3y$

ii) Subtract $2x - 5y$ from $4x + 3y$

Solution:

$$\begin{aligned} \text{i) } (3x - 4y + z) + (2x - z + 3y) \\ &= (3x + 2x) + (-4y + 3y) + (z - z) \\ &= (3 + 2)x + (-4 + 3)y + (1 - 1)z \\ &= 5x - 1y + 0z \\ &= 5x - y \end{aligned}$$

$$\begin{array}{r} \text{Alter: } 3x \quad -4y \quad +z \\ (+) \quad 2x \quad +3y \quad -z \\ \hline 5x \quad -y \quad +0 \end{array}$$

$$\begin{aligned} \text{ii) } (4x + 3y) - (2x - 5y) \\ &= (4x + 3y) + (-2x + 5y) \\ &= (4x - 2x) + (3y + 5y) \\ &= (4 - 2)x + (3 + 5)y \\ &= 2x + 8y \end{aligned}$$

$$\begin{array}{r} \text{Alter: } 4x \quad +3y \\ (-) \quad +2x \quad -5y \\ \hline (-) \quad (+) \\ \hline +2x \quad +8y \end{array}$$

Think

B.P.No. 61

What will you get if twice a number is subtracted from thrice the same number?

Solution:

Let a number is x .

its thrice is $3x$.

its twice is $2x$.

then $3x - 2x = x$

$\therefore$ twice a number is subtracted from thrice the same number.

Example 3.9

B.P.No. 61

Mani and his friend Mohamed went to a hotel for dinner. Mani had 2 idlies and 2 dosas whereas Mohamed had 4 idlies and 1 dosa. If the price of each idly and dosa is x and y respectively, then find the bill amount in x and y .

Solution:

Given that, the price of one idly is ' x ' rupees and the price of one dosa is ' y ' rupees

So, Mani's bill amount: $(2 \times x) + (2 \times y) = (2x + 2y)$

Mohamed's bill amount: $(4 \times x) + (1 \times y) = 4x + y$

Therefore, the total bill amount $= (2x + 2y) + (4x + y)$
 $= (2 + 4)x + (2 + 1)y = 6x + 3y$.

Example 3.10

B.P.No. 62

Rani earns ₹ 200 on the first day and spends some amount in the evening. She earns ₹300 on the second day and spends double the amount as she spends on the first day. She earns ₹ 400 on the third day and spends 4 times the amount as she spends on the first day. Can you give an algebraic expression of the total amount with her, at the end of the third day.

Solution:

The amount earned on the first day is ₹ 200.

Let the amount spent on the first day be ₹ x . Amount with her at the end of the first day is $(200 - x)$.

Amount earned on the second day is ₹ 300 and the amount spent on the second day is ₹ $2x$. The amount left on the second day is $300 - 2x$.

Similarly, the net amount that she would have on the third day is $400 - 4x$. Therefore, the total amount that she would have at the end of three days is $(200 - x) + (300 - 2x) + (400 - 4x)$.

That is, $200 + 300 + 400 + (-1 - 2 - 4)x = 900 + (-7)x$

Thus the required algebraic expression is $900 - 7x$.

Exercise 3.2

B.P.No. 57

1. Fill in the blanks.

(i) The addition of $-7b$ and $2b$ is _____.Ans: $-5b$ (ii) The subtraction of $5m$ from $-3m$ is _____.Ans: $-8m$ (iii) The additive inverse of $-37xyz$ is _____.Ans: $37xyz$

2. Say True or False.

(i) The expressions $8x + 3y$ and $7x + 2y$ can not be added.

False

(ii) If x is a natural number, then $x + 1$ is its predecessor.

False

(iii) Sum of $a - b + c$ and $-a + b - c$ is zero.

True

3. Add: (i) $8x, 3x$ (ii) $7mn, 5mn$ (iii) $-9y, 11y, 2y$

Solution:

i) $8x, 3x = (8+3)x = 11x$

ii) $7mn + 5mn = (7+5)mn = 12mn$

iii) $(-9y + 11y + 2y) = (-9+11+2)y = 4y$

4. Subtract:

(i) $4k$ from $12k$ (ii) $15q$ from $25q$ (iii) $7xyz$ from $17xyz$.

Solution:

i) $12k - 4k = (12 - 4)k = 8k$

ii) $25q - 15q = (25 - 15)q = 10q$

iii) $(17xyz - 7xyz) = (17 - 7)xyz = 10xyz$

5. Find the sum of the following expressions

(i) $7p + 6q, 5p - q, q + 16p$

Solution:

$$\begin{aligned}
 (7p+6q) + (5p-q) + (9+16p) &= (7p+5p+16p) + (6q-q+q) \\
 &= (7+5+16)p + (6-1+1)q \\
 &= 28p + 6q
 \end{aligned}$$

(ii) $a + 5b + 7c, 2a + 10b + 9c$

Solution:

$$\begin{aligned}
 (a+5b+7c) + (2a+10b+9c) &= (a+2a) + (5b+10b) + (7c+9c) \\
 &= (1+2)a + (5+10)b + (7+9)c \\
 &= 3a + 15b + 16c
 \end{aligned}$$

(iii) $mn + t, 2mn - 2t, -3t + 3mn$

Solution:

$$\begin{aligned}
 (mn+t) + (2mn-2t) + (-3t+3mn) &= (mn+2mn+3mn) + (t-2t-3t) \\
 &= (1+2+3)mn + (1-2-3)t \\
 &= 6mn - 4t
 \end{aligned}$$

(iv) $u + v, u - v, 2u + 5v, 2u - 5v$.

Solution:

$$\begin{aligned}(u+v) + (u-v) + (2u+5v) + (2u-5v) &= (u+u+2u+2u) + (v-v+5v-5v) \\ &= (1+1+2+2)u + (1-1+5-5)v \\ &= 6u + 0v \\ &= 6u\end{aligned}$$

(v) $5xyz - 3xy, 3zxy - 5yx$

Solution:

$$\begin{aligned}(5xyz - 3xy) + (2zxy - 5yx) &= (5xyz + 3xyz) + (-3xy - 5xy) \\ &= (5+3)xyz + (-3-5)xy \\ &= 8xyz - 8xy\end{aligned}$$

6. Subtract

(i) $3x + 12y - 5$ from $27x + 5y - 43$

Solution:

$$\begin{aligned}(27x+5y-43) - (13x+12y-5) &= (27x + 5y - 43) + (-13x - 12y + 5) \\ &= (27x - 13x) + (5y - 12y) + (-43 + 5) \\ &= (27 - 13)x + (5 - 12)y + (-43 + 5) \\ &= 14x - 7y - 38\end{aligned}$$

(ii) $3p + 5$ from $p - 2q + 7$

Solution:

$$\begin{aligned}(p - 2q + 7) - (3p + 5) &= (p - 2q + 7) + (-3p - 5) \\ &= (p - 3p) + (-2q) + (7 - 5) \\ &= (1 - 3)p + (-2q) + (2) \\ &= -2p - 2q + 2\end{aligned}$$

(iii) $m + n$ from $3m - 7n$.

Solution:

$$\begin{aligned}(3m - 7n) - (m+n) &= (3m - 7n) + (-m - n) \\ &= (3m - m) + (-7n - n) \\ &= (3 - 1)m + (-7 - 1)n \\ &= 2m + (-8)n \\ &= 2m + (-8)n \\ &= 2m - 8n\end{aligned}$$

(iv) $2y + z$ from $6z - 5y$.**Solution:**

$$\begin{aligned}
 (6z - 5y) - (2y + z) &= (6z - 5y) + (-z - 2y) \\
 &= (6z - z) + (-5y - 2y) \\
 &= 5z + (-7y) \\
 &= 5z - 7y
 \end{aligned}$$

7. Simplify(i) $(x + y - z) + (3x - 5y + 7z) - (14x + 7y - 6z)$ **Solution:**

$$\begin{aligned}
 (x+y-z) + (3x-5y+7z) - (14x+7y-6z) &= (x+y-z) + (3x-5y+7z) + (-14x-7y+6z) \\
 &= (x+3x-14x) + (y-5y-7y) + (-z+7z+6z) \\
 &= (1+3-14)x + (1-5-7)y + (-1+7+6)z \\
 &= -10x + (-11)y + (12)z \\
 &= -10x - 11y + 12z
 \end{aligned}$$

(ii) $p + p + 2 + p + 3 - p - 4 - p - 5 + p + 10$ **Solution:**

$$\begin{aligned}
 p + p + 2 + p + 3 - p - 4 - p - 5 + p + 10 &= (p+p+p-p-p+p) + (2+3-4-5+10) \\
 &= (4p - 2p) + (15 - 9) \\
 &= (4 - 2)p + 6 \\
 &= 2p + 6
 \end{aligned}$$

(iii) $n + (m + 1) + (n + 2) + (m + 3) + (n + 4) + (m + 5)$ **Solution:**

$$\begin{aligned}
 n+m+1+n+2+m+3+n+4+m+5 &= (n+n+n) + (m+m+m) + (1+2+3+4+5) \\
 &= (1+1+1)n + (1+1+1)m + 15 \\
 &= 3n + 3m + 15
 \end{aligned}$$

Objective Type Questions**8. The addition of $3mn$, $-5mn$, $8mn$ and $-4mn$ is**

- i) mn ii) $-mn$ iii) $2mn$ iv) $3mn$ **Ans: iii) $2mn$**

9. When we subtract 'a' from ' $-a$ ', we get _____.

- i) 0 ii) $2a$ iii) $-2a$ iv) $-a$ **Ans: ii) $2a$**

10. In an expression, we can add or subtract only...

- i) Like terms ii) Unlike terms iii) All terms iv) None of the above
Ans: i) Like terms

Simple linear equations:

Try These

B.P.No. 65

Try to construct algebraic equations for the following verbal statements.

1. One third of a number plus 6 is 10
2. The sum of five times of x and 3 is 28.
3. Taking away 8 from y gives 11.
4. Perimeter of a square with side a is 16cm.
5. Venkat's mother's age is 7 years more than 3 times Venkat's age. His mother's age is 43 years.

Solution:

1. $\frac{x}{3} + 6 = 10$
2. $5x + 3 = 28$
3. $y - 8 = 11$
4. $4a = 16$
5. Let Venkat's age is x . Then $3x + 7 = 43$

Think

B.P.No. 65

Why should we subtract 5 and not some other number? Why don't we add 5 on both sides? Discuss.

Solution:

In example

$$\begin{aligned} x + 5 &= 12 \\ x + x - x &= 12 - 5 \\ x &= 7 \end{aligned}$$

In same times

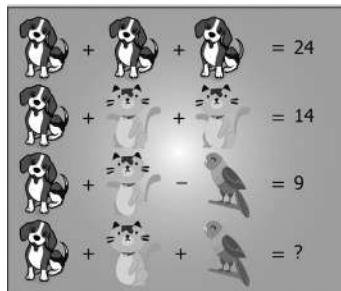
$$\begin{aligned} x + 5 + 5 &= 12 + 5 \\ x + 10 &= 17 \\ x &= 17 - 10 = 7 \\ x &= 7 \text{ same answer} \end{aligned}$$

We add 5 on both sides we get same answer.

Try This

B.P.No. 65

If the dogs, cats and parrots represent unknowns, find them. Substitute each of the values so obtained in the equations and verify the answers.



**Solution:**

$$1 \text{ dog} + 1 \text{ dog} + 1 \text{ dog} = 24$$

$$3 \text{ dog} = 24$$

$$\frac{3 \text{ dog}}{3} = \frac{24}{3}$$

$$1 \text{ dog} = 8$$

$$1 \text{ dog} + 1 \text{ cat} + 1 \text{ cat} = 14$$

$$1 \text{ dog} + 2 \text{ cat} = 14$$

$$8 + 2 \text{ cat} = 14$$

$$8 + 2 \text{ cat} - 8 = 14 - 8$$

$$2 \text{ cat} = 6$$

$$\frac{2 \text{ cat}}{2} = \frac{6}{2}$$

$$1 \text{ cat} = 3$$

$$1 \text{ dog} + 1 \text{ cat} + 1 \text{ parrot} = 9$$

$$8 + 3 - 1 \text{ parrot} = 9$$

$$11 - 1 \text{ parrot} = 9$$

$$11 - 1 \text{ parrot} - 11 = 9 - 11$$

$$-1 \text{ parrot} = -2$$

$$1 \text{ parrot} = 2$$

$$1 \text{ dog} + 1 \text{ cat} + 1 \text{ parrot} = ?$$

$$8 + 3 + 2 = 13$$

Example 3.11

B.P.No. 66

Find two consecutive natural numbers whose sum is 75.

Solution:

The numbers are natural and consecutive. Let the numbers be x and $x + 1$.

Given that,

$$x + (x + 1) = 75$$

$$2x + 1 = 75$$

$$2x + 1 - 1 = 75 - 1 \text{ [Subtract 1 on both sides]}$$

$$2x + 0 = 74$$

$$\frac{2x}{2} = \frac{74}{2} \text{ [Divide by 2 on both sides]}$$

$$x = 37 \text{ and } x + 1 = 38$$

Therefore, the required numbers are 37 and 38.

Example 3.12

B.P.No. 66

A person has ₹ 960 in denominations of ₹1, ₹5 and ₹10 notes. The number of notes in each denomination is equal. What is the total number of notes?

Solution:

Let the number of notes in each denomination be x .

$$\text{Then } x + 5x + 10x = 960$$

$$(1 + 5 + 10)x = 960$$

$$16x = 960$$

Divide by 16 on both the sides,

$$\frac{16x}{16} = \frac{960}{16}$$

$$\text{Therefore, } x = 60$$

Thus, the number of notes in each denomination is 60.

Example 3.13

B.P.No. 67

In an examination, a student scores 4 marks for every correct answer and loses one mark for every wrong answer. If he answers 60 questions in all and gets 130 marks, find the number of questions he answered correctly.

Solution:

Let the number of correct answers be x

Thus the number of wrong answers = $60 - x$

$$\text{Then, } 4x - 1(60 - x) = 130$$

$$4x - 60 + x = 130$$

$$4x + x - 60 + 60 = 130 + 60 \text{ [Add 60 on both sides]}$$

$$5x + 0 = 190$$

$$5x = 190$$

Divide by 5 on both the sides,

$$\frac{5x}{5} = \frac{190}{5}$$

$$x = 38$$

Hence, the number of correct answer is 38.

Example 3.14

B.P.No. 67

In an ex A school bus starts with full strength of 60 students. It drops some students at the first bus stop. At the second bus stop, twice the number of students get down from the bus. 6 students get down at the third bus stop and the number of students remaining in the bus is only 3. How many students got down at the first stop?

Solution:

Since we do not know the number of students who get down at the first stop, let us take the number as x . The number of students get down at the second bus stop is $2x$.

$$x + 2x + 6 + 3 = 60$$

$$(1 + 2)x + 9 = 60$$

$$3x + 9 = 60$$

$$3x + 9 - 9 = 60 - 9 \text{ [Subtract 9 on both sides]}$$

$$3x = 51$$

$$33x = 513 \text{ [Divide by 3 on both sides]}$$

$$\text{Therefore, } x = 17.$$

Thus, the number of students got down in the first bus stop is 17.

Example 3.15

B.P.No. 68

A cricket team won two matches more than they lost. If they win they get 5 points and for loss – 3 points, how many matches have they played if their total score is 50.

Solution:

Let the number of matches lost = x .

Then number of matches won = $x + 2$.

Given that, $5(x + 2) + (-3)x = 50$

$$5x + 10 - 3x = 50$$

$$2x + 10 = 50$$

$$2x + 10 - 10 = 50 - 10 \text{ (Subtract 10 on both sides)}$$

$$2x = 40$$

$$\text{Divide by 2 on both the sides, } x = 20$$

Therefore, the number of

$$\begin{aligned} \text{matches played is } x + x + 2 &= 2x + 2 \\ &= (2 \times 20) + 2 \\ &= 40 + 2 \\ &= 42 \end{aligned}$$

Try This

B.P.No. 68

Kandhan and Kavya are friends. Both of them are having some pens.

Kandhan : If you give me one pen, then we will have equal number of pens. Will you?

Kavya : But, if you give me one of your pens, then mine will become twice as yours. Will you?

Construct algebraic equations for this situation. Can you guess and find the actual number of pens, they have?

Solution:

Let n be the number of pens in Kandhan.

Let m be the number of pens in Kavya.

Kandhan said Kavya if you give me one pen, we will have equal number of pens.

$$\text{then } n+1 = m-1 \text{ ————— (1)}$$

Kavya said Kandhan if you give me one pen, then mine become twice as yours.

then $n - 1 = 2(n-1)$ —————(2)

Number of Kandhan's pens = 5 ($n = 5$)

Number of Kavya's pens = 7 ($m = 7$)

Exercise 3.3

B.P.No. 68

1. Fill in the blanks.

- (i) An expression equated to another expression is called _____ **Ans: equation**
 (ii) If $a = 5$, the value of $2a + 5$ is _____ **Ans: 15**
 (iii) The sum of twice and four times of the variable x is _____ **Ans: $6x$**

2. Say True or False.

- (i) Every algebraic expression is an equation **False**
 (ii) The expression $7x + 1$ can not be reduced without knowing the value of x . **True**
 (iii) To add two like terms, its coefficients can be added. **True**

3. Solve:

- (i) $x + 5 = 8$ (ii) $p - 3 = 7$ (iii) $2x = 30$ (iv) $\frac{m}{6} = 5$ (v) $7x + 10 = 80$

Solution:

i) $x + 5 = 8$	ii) $p - 3 = 7$	iii) $2x = 30$
$x + 5 - 5 = 8 - 5$	$p - 3 + 3 = 7 + 3$	$\frac{2x}{2} = \frac{30}{2}$
$x = 3$	$p = 10$	$x = 15$
iv) $\frac{m}{6} = 5$	v) $7x + 10 = 80$	
$\frac{m}{6} \times 6 = 5 \times 6$	$7x + 10 - 10 = 80 - 10$	
$m = 30$	$7x = 70$	
	$\frac{7x}{7} = \frac{70}{7}$	
	$x = 10$	

4. What should be added to $3x + 6y$ to get $5x + 8y$?

Solution:

Let p be the added number.

$$\begin{aligned}
 (3x + 6y) + p &= 5x + 8y \\
 p &= (5x + 8y) - (3x + 6y) \\
 p &= (5x + 8y) + (-3x - 6y) \\
 p &= (5x - 3x) + (8y - 6y) \\
 p &= 2x + 2y
 \end{aligned}$$

We should added $2x + 2y$

5. Nine added to thrice a whole number gives 45. Find the number.

Solution:

Let the whole number be x .

$$\begin{aligned}\text{Then } 9 + 3x &= 45 \\ 3x &= 45 - 9 \\ 3x &= 36 \\ x &= \frac{36}{3} \\ x &= 12\end{aligned}$$

Then the number is 12.

6. Find two consecutive odd numbers whose sum is 200.

Solution:

The numbers are odd and consecutive.

Let the number be x and $x+2$.

$$\begin{aligned}x + (x+2) &= 200 \\ 2x + 2 &= 200 \\ 2x &= 200 - 2 \\ 2x &= 198 \\ x &= \frac{198}{2} = 99\end{aligned}$$

$$x = 99, x+2 = 99 + 2 = 101$$

Then the two consecutive numbers are 99 and 101.

7. The taxi charges in a city comprise of a fixed charge of ₹100 for 5 kms and ₹16 per km for every additional km. If the amount paid at the end of the trip was ₹740 find the distance travelled.

Solution:

Let the distance be x .

fixed charge ₹100 for 5km = 100

Given that

$$\begin{aligned}5x + 16x &= 740 \\ 100 + 16x &= 740 \\ 16x &= 740 - 100 \\ 16x &= 640 \\ x &= \frac{640}{16} \\ x &= 40 \text{ km}\end{aligned}$$

$$\begin{aligned}\text{Total distance} &= 40 \text{ km} + 5 \text{ km} \\ &= 45 \text{ km}\end{aligned}$$

The distance travelled 45 km.

Objective Type Questions

8. The generalization of the number pattern 3, 6, 9, 12,... is

i) n

ii) $2n$

iii) $3n$

iv) $4n$

Ans: iii) $3n$

9. The solution of $3x + 5 = x + 9$ is

i) 2

ii) 3

iii) 5

iv) 4

Ans: i) 2

10. The equation $y + 1 = 0$ is true only when y is

i) 0

ii) -1

iii) 1

iv) -2

Ans: ii) -1

Exercise 3.4

B.P.No. 69

Miscellaneous Practice Problems

1. Subtract $-3ab - 8$ from $3ab + 8$. Also, subtract $3ab + 8$ from $-3ab - 8$.

Solution:

$$\begin{aligned}(3ab + 8) - (-3ab - 8) &= (3ab + 8) + (3ab + 8) \\ &= (3ab + 3ab) + (8 + 8) \\ &= (3 + 3)ab + 16 \\ &= 6ab + 16\end{aligned}$$

$$\begin{aligned}(-3ab - 8) - (3ab + 8) &= -3ab - 8 - 3ab - 8 \\ &= -6ab - 16\end{aligned}$$

2. Find the perimeter of a triangle whose sides are $x + 3y$, $2x + y$, $x - y$.

Solution:

$$\begin{aligned}\text{Perimeter of triangle} &= \text{sum of the sides of triangle} \\ &= (x + 3y) + (2x + y) + (x - y) \\ &= (x + 2x + x) + (3y + y - y) \\ &= (1 + 2 + 1)x + (3 + 1 - 1)y \\ &= 4x + 3y\end{aligned}$$

$$\text{Perimeter of triangle is } (4x + 3y)$$

3. Thrice a number when increased by 5 gives 44. Find the number.

Solution:

Let the number be x .

$$\begin{aligned}\text{Given } 3x + 5 &= 44 \\ 3x &= 44 - 5 \\ 3x &= 39 \\ x &= \frac{39}{3} \\ x &= 13\end{aligned}$$

4. How much smaller is $2ab + 4b - c$ than $5ab - 3b + 2c$

Solution:

$$\begin{aligned}
 (5ab - 3b + 2c) - (2ab + 4b - c) &= (5ab - 3b + 2c) + (-2ab - 4b + c) \\
 &= (5ab - 2ab) + (-3b - 4b) + (2c + c) \\
 &= 3ab + (-7b) + 3c \\
 &= 3ab - 7b + 3c
 \end{aligned}$$

5. Six times a number subtracted from 40 gives -8 . Find the number.

Let the number be x .

Given that

$$\begin{aligned}
 40 - 6x &= -8 \\
 -6x &= -8 - 40 \\
 -6x &= -48 \\
 x &= \frac{-48}{-6} \\
 x &= 8
 \end{aligned}$$

The number is 8.

Challenge Problems

6. From the sum of $5x + 7y - 12$ and $3x - 5y + 2$, subtract the sum of $2x - 7y - 1$ and $-6x + 3y + 9$.

Solution:

Sum of $(5x + 7y - 12)$ and $(3x - 5y + 2)$

$$\begin{aligned}
 (5x + 7y - 12) + (3x - 5y + 2) &= (5x + 3x) + (7y - 5y) + (-12 + 2) \\
 &= 8x + 2y - 10
 \end{aligned}$$

$$\begin{aligned}
 (2x - 7y - 1) + (-6x + 3y + 9) &= (2x - 6x) + (-7y + 3y) + (-1 + 9) \\
 &= -4x - 4y + 8
 \end{aligned}$$

Then

$$\begin{aligned}
 (8x + 2y - 10) - (-4x - 4y + 8) &= (8x + 2y - 10) + (4x + 4y - 8) \\
 &= (8x - 4x) + (2y + 4y) + (-10 - 8) \\
 &= 12x + 6y - 18
 \end{aligned}$$

7. Find the expression to be added with $5a - 3b + 2c$ to get $a - 4b - 2c$?

Solution:

Let Added number be p .

$$\begin{aligned}
 (5a - 3b + 2c) + p &= a - 4b - 2c \\
 p &= (a - 4b - 2c) - (5a - 3b + 2c)
 \end{aligned}$$



$$\begin{aligned}
 &= (a - 4b - 2c) + (-5a + 3b - 2c) \\
 &= (a - 5a) + (-4b + 3b) + (-2c - 2c) \\
 &= -4a + (-b) + (-4c) \\
 &= -4a - b - 4c
 \end{aligned}$$

Added with $(-4a - b - 4c)$

8. What should be subtracted from $2m + 8n + 10$ to get $-3m + 7n + 16$?

Solution:

Let p be the subtracted number

$$\begin{aligned}
 (2m + 8n + 10) - p &= -3m + 7n + 16 \\
 -p &= (-3m + 7n + 16) - (2m + 8n + 10) \\
 -p &= (-3m + 7n + 16) + (-2m - 8n - 10) \\
 &= (-3m - 2m) + (7n - 8n) + (16 - 10) \\
 &= (-5m) + (-n) + (6) \\
 -p &= -5m - n + 6 \\
 p &= 5m + n - 6
 \end{aligned}$$

subtracted number is $(5m + n - 6)$

9. Give an algebraic equation for the following statement:

“The difference between the area and perimeter of a rectangle is 20”

Solution:

In rectangle length = l , breadth = b .

Area of rectangle = lb

Perimeter of rectangle = $2(l+b)$

The difference between the area and perimeter of rectangle is 20.

i.e $lb - 2(l+b) = 20$

10. Add: $2a + b + 3c$ and $a + \frac{1}{3}b + \frac{2}{5}c$

Solution:

$$\begin{aligned}
 (2a + b + 3c) + (a + \frac{1}{3}b + \frac{2}{5}c) &= (2a + a) + (b + \frac{1}{3}b) + (3c + \frac{2}{5}c) \\
 &= (2+1)a + (1+\frac{1}{3})b + (3+\frac{2}{5})c \\
 &= 3a + (\frac{3+1}{3})b + (\frac{15+2}{5})c \\
 &= 3a + \frac{4}{3}b + \frac{17}{5}c
 \end{aligned}$$



Unit Test

3. Algebra

Marks: 20

Time: 30 mins.

I. Fill in the blanks.

4×1=4

1. If $a = 5$ the value of $2a+5$ is _____.
2. Sum of $a-b+c$ and $-a+b-c$ is _____.
3. Additive inverse of $-37xyz$ is _____.
4. The numerical coefficient of $-7mn$ is _____.

II. Answer all the questions.

4×2=8

5. If $x = 3$, $y = 2$ find $4x + 7y$.
6. Add $3x - 4y + z$ and $2x - z + 3y$.
7. Subtract $5x + 7$ from $21x + 9$.
8. Simplify: $(x+y-z) + (3x-5y+7z) - (14x+7y-6z)$.

III. Answer all the questions.

2×4=8

9. The taxi charges in a city comprise of a fixed charge of ₹100 for 5 km and ₹16 per km for every additional km. If the amount paid at the end of the trip was ₹740. Find the distance travelled.
10. In an examination a student score 4 mark for every correct answer and loses one mark for every wrong answer. If he answer 60 question in all and get 130 marks. Find the number of questions he answered correctly.



UNIT

4

Direct and Inverse Proportion

Ratio and Proportion:

Try These

B.P.No. 72

1. Find the ratio of the number of circles to number of squares.



Ans: 4 : 6

2. Find the ratio (i) 555 g to 5 kg (ii) 21 km to 175 m

Solution:

$$\begin{aligned} \text{i) } 555\text{g} : 5\text{kg} &= 555\text{g} : 5000\text{g} \\ &= 111 : 1000 \\ \text{ii) } 21\text{ km} : 175\text{ m} &= 21000\text{ m} : 175\text{ m} \\ &= 4200 : 35 \\ &= 840 : 35 \\ &= 120 : 1 \end{aligned}$$

3. Find the value of 'x' in the following proportions.

(i) $110 : x :: 8 : 88$ (ii) $x : 26 :: 5 : 65$

Solution:

$$\begin{aligned} \text{i) } a : b :: c : d \text{ then } bc &= ad \\ x \times 8 &= 110 \times 88 \\ x &= \frac{110 \times 88}{8} = 1210 \end{aligned}$$

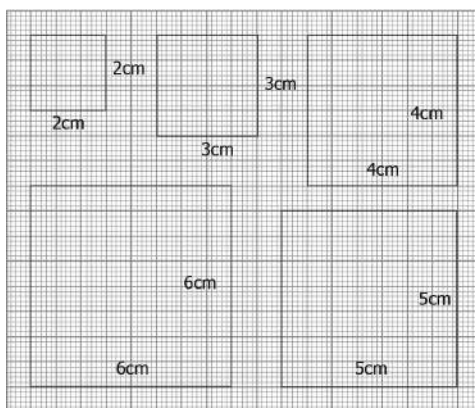
$$\begin{aligned} \text{ii) } x : 26 :: 5 : 65 \\ 26 \times 5 &= x \times 65 \\ x &= \frac{26 \times 5}{65} = 2 \end{aligned}$$

Try This

B.P.No. 74

Observe the following 5 squares of different sides given in the graph sheet.

The measures of the sides are recorded in the table given below. Find the corresponding perimeter and the ratios of each of these with the sides given and complete the table.



Side of the square (x) in cm	2	3	4	5	6
Perimeter of the square (y) in cm	8	12	16	20	24
$\frac{x}{y}$	$\frac{2}{8}$	$\frac{3}{12}$	$\frac{4}{16}$	$\frac{5}{20}$	$\frac{6}{24}$

From the information so obtained state whether the side of a square is in direct proportion to the perimeter of the square

Ans: In the table square of sides and perimeter is direct proportion.

Think

B.P.No. 75

When a fixed amount is deposited for a fixed rate of interest, the simple interest changes proportionally with the number of years, it is being deposited. Can you find any other examples of such kind.

Solution:

- ♦ If the rent of house is ₹5000 then increasing month the total rent will be increasing. In month increasing the amount will increase. It is direct proportion
- ♦ The rate of one notebook is ₹20. In 5 such note book is ₹100. that is increase number of note book the rate will be increase. It is direct proportion.

Example 4.1

B.P.No. 75

If 6 children shared 24 pencils equally, then how many pencils are required for 18 children?

Solution:

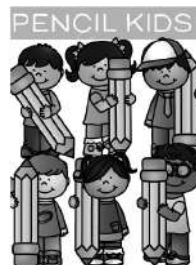
Let x be the number of pencils required for 18 children. As the number of children increases, number of pencils also increases.

Number of Children	6	18
Number of Pencils	24	x

In the case of direct proportion

$$\begin{aligned} \text{we take } \frac{x_1}{y_1} &= \frac{x_2}{y_2} \\ \frac{6}{24} &= \frac{18}{x} \\ \frac{6 \times x}{24} &= 18 \\ x &= \frac{18 \times 24}{6} = 72 \end{aligned}$$

Hence, 72 pencils are required for 18 children.



Example 4.2

B.P.No. 75

If 15 chart papers together weigh 50 grams, how many of the same type will be there in a pack of $2\frac{1}{2}$ kilogram?

Solution:

Let x be the required number of charts.

Number of chart papers	15	x
Weight in grams	50	2500



As weight increases, the number of charts also increases. So the quantities are in direct proportion.

$$\begin{aligned} \text{Hence } \frac{x_1}{y_1} &= \frac{x_2}{y_2} \\ \frac{15}{50} &= \frac{x}{2500} \\ 15 \times 2500 &= x \times 50 \\ x \times 50 &= 15 \times 2500 \\ x &= \frac{15 \times 2500}{50} = 750 \end{aligned}$$

Therefore, 750 charts will weigh $2\frac{1}{2}$ kilogram.

Example 4.3

B.P.No. 76

Anbu bought 2 notebooks for ₹ 24. How much money will be needed to buy 9 such notebooks?

Solution:

Using unitary method we can solve this as follows:

$$\text{The cost of 2 notebooks} = ₹24$$

$$\text{The cost of 1 notebook} = \frac{24}{2} = ₹12$$

$$\begin{aligned}\text{Therefore, the cost of 9 notebooks} &= 9 \times ₹12 \\ &= ₹108\end{aligned}$$

Hence, Anbu has to pay ₹108 for 9 notebooks.

Example 4.4

B.P.No. 76

A car travels 90km in 2hours 30minutes. How much time is required to cover 210km?

Solution:

$$\text{Time taken to cover 90 km} = 2\text{hrs } 30\text{mins}$$

$$= 150 \text{ minutes}$$

$$\text{Time taken to cover 1 km} = \frac{150}{90} \text{ minutes.}$$

$$\text{Time taken to cover 210 km} = \frac{150}{90} \times 210 \text{ minutes}$$

$$= 350 \text{ minutes}$$

$$= 5 \text{ hours } 50 \text{ minutes}$$

Thus, the time taken to travel 210 km is 5 hours 50 minutes

Exercise 4.1

B.P.No. 76

1. Fill in the blanks.

(i) If the cost of 8 apples is ₹ 56 then the cost of 12 apples is _____. **Ans: ₹84**

(ii) If the weight of one fruit box is $\frac{31}{2}$ kg, then the weight of 6 such boxes is _____. **Ans: 21 kg**

(iii) A car travels 60 km with 3 liters of petrol. If the car has to cover the distance of 200 km, it requires _____ liters of petrol. **Ans: 10 l**

(iv) If 7 m cloth costs ₹ 294, then the cost of 5 m of cloth is _____. **Ans: ₹210**

(v) If a machine in a cool drinks factory fills 600 bottles in 5 hrs, then it will fill _____ bottles in 3 hours. **Ans: 360**

2. Say True or False.

(i) Distance travelled by a bus and time taken are in direct proportion. **True**

(ii) Expenditure of a family to number of members of the family are in direct proportion. **True**

(iii) Number of students in a hostel and consumption of food are not in direct proportion. **False**

(iv) If Mallika walks 1 km in 20 minutes, then she can cover 3 km in 1 hour. **True**

(v) If 12 men can dig a pond in 8 days, then 18 men can dig it in 6 days. **False**

3. A dozen bananas costs ₹ 20. What is the price of 48 bananas?

Solution:

The cost of 1 dozen banana = ₹20

The cost of 4 dozen bananas = $4 \times ₹20$
= ₹80

The price of 48 banana is ₹80

1 dozen = 12 banana
48 banana = 4 dozen

4. A group of 21 students paid ₹ 840 as the entry fee for a magic show. How many students entered the magic show if the total amount paid was ₹ 1,680?

Solution:

Let x be the number of students.

Number of Student	21	x
Fees (₹)	840	1680

As fees increased, the number of students also increased. It is direct proportion.

Hence $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

$$\begin{aligned}\frac{21}{x} &= \frac{840}{1680} \\ 21 \times 1680 &= 840 \times x \\ x &= \frac{1680 \times 21}{840} \\ x &= 42\end{aligned}$$

Thus 42 students paid ₹1680

5. A birthday party is arranged in third floor of a hotel. 120 people take 8 trips in a lift to go to the party hall. If 12 trips were made how many people would have attended the party?

Solution:

Let x be peoples.

Number of People	120	x
Trip in lift	8	12

Trip in lift is increase, then people is increase.

It is direct proportion.

$$\begin{aligned}\text{Hence } \frac{x_1}{y_1} &= \frac{x_2}{y_2} \\ \frac{120}{x} &= \frac{8}{12} \\ 12 \times 120 &= 8 \times x\end{aligned}$$

$$x = \frac{12 \times 120}{8} = 180$$

180 people have attend the party.

6. The shadow of a pole with the height of 8 m is 6m. If the shadow of another pole measured at the same time is 30m, find the height of the pole?

Solution:

Let x be the height of the pole.

Height of pole	8	x
Shadow of pole	6	30

Shadow of pole is increases. then height of pole increases.

It is direct proportion.

$$\begin{aligned} \frac{x_1}{y_1} &= \frac{x_2}{y_2} \\ \frac{8}{6} &= \frac{x}{30} \\ x &= \frac{8 \times 30}{6} \\ x &= 40 \text{ m} \end{aligned}$$

40 m height of the pole.

7. A postman can sort out 738 letters in 6 hours. How many letters can be sorted in 9 hours?

Solution:

A postman sorted 6 hours = 738 letter

A postman sorted 1 hour = $\frac{738}{6}$
= 123 letter

Therefore sorted in 9 hours = 123×9
= 1107 letters

Thus 1107 letter can be sorted in 9 hours.

8. If half a meter of cloth costs ₹ 15. Find the cost of $8\frac{1}{3}$ meters of the same cloth.

Solution:

Let x be the cost of cloth.

Cost of Cloth (₹)	15	x
Cloth (meter)	$\frac{1}{2}$	$8\frac{1}{3}$



Cloth is increase, then the cost of cloth is increase.

It is direct proportion.

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{15}{\frac{1}{2}} = \frac{x}{8\frac{1}{3}}$$

$$15 \times \frac{2}{1} = x \times \frac{3}{25}$$

$$x \times \frac{3}{25} = 15 \times 2$$

$$x = \frac{15 \times 2 \times 25}{3}$$

$$= 250$$

₹250 of $8\frac{1}{3}$ meter of cloth.

9. The weight of 72 books is 9kg. what is the weight of 40 such books? (using unitary method)

Solution:

$$\begin{aligned} \text{The weight of 72 books} &= 9 \text{ kg} \\ &= (9 \times 1000) \text{ g} \\ &= 9000 \text{ g} \end{aligned}$$

$$\begin{aligned} \text{The weight of 1 book} &= \frac{9000}{72} \\ &= 125 \text{ g} \end{aligned}$$

$$\begin{aligned} \text{The wight of 40 books} &= 125 \times 40 \\ &= 5000 \text{ g} \\ &= \frac{5000}{1000} \text{ kg} \\ &= 5 \text{ kg} \end{aligned}$$

5 kg of 40 books

10. Thamarai pays ₹ 7500 as rent for 3 months. With the same rate how much does she have to pay for 1 year? (using unitary method).

Solution:

$$\text{Rent for 3 months} = ₹7500$$

$$\begin{aligned} \text{Rent for 1 month} &= ₹ \frac{7500}{3} \\ &= ₹2500 \end{aligned}$$

[1 year = 12 months]

$$\begin{aligned}\text{Rent for 12 months} &= ₹2500 \times 12 \\ &= ₹30,000\end{aligned}$$

₹30,000 for 1 year rent.

11. If 30 men can reap a field in 15 days, then in how many days can 20 men reap the same field? (using unitary method)

Solution:

$$\text{Reap a field 30 men} = 15 \text{ days}$$

$$\text{Reap a field 1 man} = \frac{15}{30} = \frac{1}{2} \text{ days}$$

$$\text{Reap a field 20 men} = \frac{1}{2} \times 20 = 10 \text{ days}$$

10 days reap a field in 20 men.

12. Valli buys 10 pens for ₹ 180 and Kamala buys 8 pens for ₹ 96. Can you say who bought the pen cheaper? (using unitary method)

Solution:

Valli:

$$\text{Rate of 10 pens} = 180$$

$$\text{Rate of 1 pen} = \frac{180}{10} = ₹18$$

Kamala:

$$\text{Rate of 8 pens} = 96$$

$$\text{Rate of 1 pen} = \frac{96}{8} = ₹12$$

13. A motorbike requires 2 litres of petrol to cover 100 kilometers. How many litres of petrol will be required to cover 250 kilometers? (using unitary method).

Solution:

$$2 \text{ litre of petrol} = 100 \text{ km}$$

$$1 \text{ litre of petrol} = \frac{100}{2} = 50 \text{ km}$$

$$\text{Petrol required 250 km} = \frac{250}{50} \text{ km} = 5\text{l}$$

5 litre petrol required to cover 250 km.

Objective Type Questions

14. If the cost of 3 books is ₹90, then find the cost of 12 books.

i) ₹ 300

ii) ₹ 320

iii) ₹ 360

iv) ₹ 400 **Ans: ii) ₹320**

15. If Mani buys 5kg of potatoes for ₹ 75 then he can buy _____ kg of potatoes for ₹ 105.
i) 6 ii) 7 iii) 8 iv) 5 **Ans: ii) 7**
16. 35 cycles were produced in 5 days by a company then _____ cycles will be produced in 21 days.
i) 150 ii) 70 iii) 100 iv) 147 **Ans: iv) 147**
17. An aircraft can accommodate 280 people in 2 trips. It can take _____ trips to take 1400 people.
i) 8 ii) 10 iii) 9 iv) 12 **Ans: ii) 10**
18. Suppose 3 kg. of sugar is used to prepare sweets for 50 members, then _____ kg. of sugar is required for 150 members.
i) 9 ii) 10 iii) 15 iv) 6 **Ans: i) 9**

Inverse Proportion:

Think

B.P.No. 78

Think of an example in real life where two variables are inversely proportional.

Solution:

If 48 men working 7 hours a day, then 28 men working 8 hours the same work.

Number of men less, then number of hours is more. Then it is inversely proportional.

Try These

B.P.No. 78

1. Complete the table given below and find the type of proportion.

No. of chocolates	1	<u>2</u>	3	4	5	<u>6</u>	1:5 proportion
Price in rupees (₹)	5	10	<u>15</u>	20	<u>25</u>	<u>30</u>	

No. of workers	1	2	4	5	<u>10</u>	<u>20</u>	_____	1:20 proportion
Time in hours	20	<u>10</u>	5	<u>4</u>	2	1	_____	

2. Read the following examples and group them in two categories

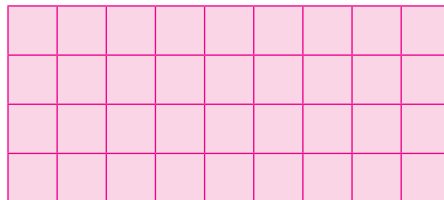
S. No.	Quantities	Direct proportion	Inverse proportion
1.	Number of note books purchased and its cost.	✓	
2.	Food shared by number of students to the fixed quantity of food.		✓
3.	Number of boxes of same size and their weight	✓	
4.	Number of uniforms to the number of students.	✓	
5.	Speed of a vehicle and the time taken to cover the fixed distance		✓

Activity

B.P.No. 79

Form all possible rectangles with area 36 sq.cm by completing the following table.

Length	36	18	<u>12</u>	9
Breadth	1	<u>2</u>	3	<u>4</u>



Observe and answer the following

- (i) When length decreases, the breadth increasing
- (ii) When breadth increases, the length decreasing
- (iii) If the length is 8 cm what will be the breadth? -Discuss.

Extend this activity and try the same with area 24 and 48 sq.units.

Example 4.5

B.P.No. 79

60 workers can spin a bale of cotton in 7 days. In how many days will 42 workers spin it?

Solution:

Let x be the required number of days. The decrease in number of workers lead to the increase in number of days. (Therefore, both are in inverse proportion)

Number of workers	60	42
Number of days	7	x

For inverse proportion $x_1 y_1 = x_2 y_2$

$$\text{Hence } 60 \times 7 = 42 \times x$$

$$42 \times x = 60 \times 7$$

$$x = \frac{60 \times 7}{42}$$

$$x = 10$$

In 10 days 42 workers can spin a bale of cotton.

Example 4.6

B.P.No. 79

The cost of 1 box of tomato is ₹ 200. Vendan had money to buy 13 boxes. If the cost of the box is increased to ₹ 260 then how many boxes will he buy with the same amount?

Solution:

$$\text{The cost of one box} = ₹ 200$$

$$\text{Increased cost of one box} = ₹ 260$$

Let x be the number of boxes bought by Vendan.

As cost of boxes increases the number of boxes decreases.

Number of boxes	13	x
Cost in ₹	200	260

This is in inverse proportion. Therefore, $x_1y_1 = x_2y_2$

$$13 \times 200 = x \times 260$$

$$x \times 260 = 13 \times 200$$

$$x = \frac{13 \times 200}{260}$$

$$x = 10$$

Therefore, he can buy 10 boxes for the same amount.

Exercise 4.2

B.P.No. 76

1. Fill in the blanks.

(i) 16 taps can fill a petrol tank in 18 minutes. The time taken for 9 taps to fill the same tank will be _____ minutes. **Ans: 32**

(ii) If 40 workers can do a project work in 8 days, then _____ workers can do it in 4 days. **Ans: 80**

2. 6 pumps are required to fill a water sump in 1 hr 30 minutes. What will be the time taken to fill the sump if one pump is switched off?

Solution:

Let x be the time taken to fill the sump.

pump	6	5
time taken	1 hr 30 min	x

Pump is decrease the time is increase.

It is inverse proportion.

$$x_1y_1 = x_2y_2$$

$$6 \times 90 = 5 \times x$$

$$5 \times x = 6 \times 90$$

$$x = \frac{6 \times 90}{5}$$

$$x = 108 \text{ min}$$

$$= 60 + 48$$

$$= 1 \text{ hr } 48 \text{ min}$$

5 pumps fill a water sump in 1 hr 48 minutes.

1hr	=	60 min
1hr 30 min	=	60+30
	=	90 min

3. A farmer has enough food for 144 ducks for 28 days. If he sells 32 ducks, how long will the food last?

Solution:

Duck is decreasing food will increases.

It is inverse proportion.

Number of Ducks	144	112
Number of Days	28	x

$$x_1 y_1 = x_2 y_2$$

$$144 \times 28 = 112 \times x$$

$$x = \frac{144 \times 28}{112}$$

$$= 36 \text{ days}$$

The food will 36 days.

4. It takes 60 days for 10 machines to dig a hole. Assuming that all machines work at the same speed, how long will it take 30 machines to dig the same hole?

Solution:

Let x be the number of days.

Increase number of machine, number of days decrease.

It is inverse proportion.

Number of Ducks	60	x
Number of Machine	10	30

$$x_1 y_1 = x_2 y_2$$

$$60 \times 10 = x \times 30$$

$$x \times 30 = 60 \times 10$$

$$x = \frac{60 \times 10}{30} = 20$$

20 days dig a hole in 30 machine

5. Forty students stay in a hostel. They had food stock for 30 days. If the students are doubled then for how many days the stock will last?

Solution:

Students increase, food decreases.

It is inverse proportion.

Number of Students	40	80
Number of Days	30	x

$$x_1 y_1 = x_2 y_2$$

$$40 \times 30 = 80 \times x$$

$$80 \times x = 40 \times 30$$

$$x = \frac{40 \times 30}{80}$$

$$x = 15 \text{ days}$$

15 days the stock will last.

6. Meena had enough money to send 8 parcels each weighing 500 grams through a courier service. What would be the weight of each parcel, if she has to send 40 parcels for the same money?

Solution:

The weight of one parcel = 500 gram

The weight of 8 parcel = 8×500
= 4000 gram

Cost of 8 parcel = Cost of 40 parcel

4000 grams = 40 parcel

$$1 \text{ parcel} = \frac{4000}{40} \text{ gm}$$

$$= 100 \text{ gms}$$

The weight of each parcel is 100 gram.

7. It takes 120 minutes to weed a garden with 6 gardeners. If the same work is to be done in 30 minutes, how many more gardeners are needed?

Solution:

Let x be the number of gardeners.

Time decreasing, then gardeners is increasing.

it is inverse proportion.

Time (min)	120	30
Number of Gardeners	6	x

$$x_1 y_1 = x_2 y_2$$

$$120 \times 6 = 30 \times x$$

$$x = \frac{120 \times 6}{30}$$

$$x = 24$$

Then 24 more gardeners are needed.

8. Neelaveni goes by bi-cycle to her school every day. Her average speed is 12km/hr and she reaches school in 20 minutes. What is the increase in speed, if she reaches the school in 15 minutes?

Solution:

Let x be the speed.

Time is decreases, then the speed is increase.

Speed (km/hr)	12	x
Time	20	15

$$x_1 y_1 = x_2 y_2$$

$$12 \times 20 = x \times 15$$

$$x = \frac{12 \times 20}{15}$$

$$= 16 \text{ km/hr}$$

Increasing in speed = $16 - 12 = 4 \text{ km/hr}$

4 km/hr increase in speed she reach the school in 15 minutes.

9. A toy company requires 36 machines to produce car toys in 54 days. How many machines would be required to produce the same number of car toys in 81 days?

Solution:

Increasing days, then machine is decreases.

It is inverse proportion.

Let x be number of machine.

Number of machine	36	x
Number of Days	54	81

$$x_1 y_1 = x_2 y_2$$

$$36 \times 54 = x \times 81$$

$$x = \frac{36 \times 54}{81}$$

$$= 24$$

24 machine work 81 days.

Objective Type Questions

10. 12 cows can graze a field for 10 days. 20 cows can graze the same field for _____ days.
 i) 15 ii) 18 iii) 6 iv) 8 **Ans: iii) 6**
11. 4 typists are employed to complete a work in 12 days. If two more typists are added, they will finish the same work in _____ days.
 i) 7 ii) 8 iii) 9 iv) 10 **Ans: ii) 8**

Exercise 4.3

B.P.No. 81

Miscellaneous Practice Problems

1. If the cost of 7kg of onions is ₹ 84 find the following:

(i) Weight of the onions bought for ₹ 180

(ii) The cost of 3 kg of onions

Solution:

- i) Let x be the weight of onion. The cost of onion is increasing, then weight of onion is increasing.

It is direct proportion.

Weight (kg)	7	x
Cost (Rs.)	84	180

$$\begin{aligned}\frac{x_1}{y_1} &= \frac{x_2}{y_2} \\ \frac{7}{84} &= \frac{x}{180} \\ 7 \times 180 &= x \times 84 \\ x &= \frac{7 \times 180}{84} = 15\end{aligned}$$

15 kg of the onion bought for ₹180.

- ii) Let x be the weight of onion. The cost of onion is increasing, then weight of onion is increasing.

It is direct proportion.

Weight (kg)	7	3
Cost (Rs.)	84	x

$$\begin{aligned}\frac{x_1}{y_1} &= \frac{x_2}{y_2} \\ \frac{7}{84} &= \frac{3}{x} \\ 7 \times x &= 3 \times 84 \\ x &= \frac{3 \times 84}{7} \\ x &= 36\end{aligned}$$

₹36 of 3 kg of onions.

2. If $C = kd$, (i) what is the relation between C and d ? (ii) find k when $C = 30$ and $d = 6$ (iii) find C , when $d = 10$.

Solution:

If $C = kd$

- i) Relation between c and d is direct proportion.

- ii) $C = kd$ $C = 30, d = 6$

$$30 = k(6)$$

$$k = \frac{30}{6}$$

$$k = 5$$

$$\begin{aligned} \text{iii) } C &= kd & d = 10 \text{ and } k = 5 \\ C &= 5(10) \\ C &= 50 \end{aligned}$$

3. Every 3 months Tamilselvan deposits ₹ 5000 as savings in his bank account. In how many years he can save ₹ 1,50,000.

Solution:

If x be the month.

Amount is increasing then year is increasing.

It is direct proportion.

month	3	x
Amount	5000	150000

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{3}{5000} = \frac{x}{150000}$$

$$3 \times 150000 = x \times 5000$$

$$x = \frac{3 \times 150000}{5000}$$

$$= 3 \times 30$$

$$= 90 \text{ months}$$

90 months he can save ₹150000

4. A printer, prints a book of 300 pages at the rate of 30 pages per minute. Then, how long will it take to print the same book if the speed of the printer is 25 pages per minute?

Solution:

A book print in 1 min = 25 pages

$$\begin{aligned} 300 \text{ pages printing time} &= \frac{300}{25} \\ &= 12 \text{ min} \end{aligned}$$

Therefore, 12 minutes to print the book if the speed is 25 page per minutes.

5. If the cost of 6 cans of juice is ₹ 210, then what will be the cost of 4 cans of juice?

Solution:

The cost of 6 cans juice = ₹210

$$\begin{aligned} \text{The cost of 1 can juice} &= \frac{210}{6} \\ &= ₹35 \end{aligned}$$

The cost of 4 cans of juice = ₹35 × 4 = ₹140

Therefore, ₹140 for 4 cans of juice.

6. x varies inversely as twice of y . Given that when $y = 6$, the value of x is 4. Find the value of x when $y = 8$.

Solution:

$$y = 6 \text{ then } x = 4$$

$$y = 8 \text{ then } x = ?$$

$$x = \frac{6}{8} \times 4 = 3$$

$$x = 3$$

7. A truck requires 108 liters of diesel for covering a distance of 594 km. How much diesel will be required to cover a distance of 1650 km?

Solution:

Let x be the litre of diesel.

The distance is increasing then needed a diesel is increase.

It is direct proportion.

Distance (km)	594	1650
Diesel (l)	108	x

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{594}{108} = \frac{1650}{x}$$

$$1550 \times 108 = 594 \times x$$

$$594 \times x = 1650 \times 108$$

$$x = \frac{1650 \times 108}{594}$$

$$= 300l$$

300 litre of diesel for covering a distance of 1650 km.

Challenge Problems

8. If the cost of a dozen soaps is ₹ 396, what will be the cost of 35 such soaps?

Solution:

$$\text{The cost of a dozen soap} = ₹ 396$$

$$\text{The cost of 1 soap} = \frac{396}{12}$$

$$= ₹ 33$$

$$\text{The cost of 35 soap} = 35 \times 33$$

$$= ₹ 1155$$

₹ 1155 of 35 such soaps.

9. In a school, there is 7 period a day each of 45 minutes duration. How long each period is, if the school has 9 periods a day assuming the number of hours to be the same?

Solution:

$$\begin{aligned}\text{Total school time in one day} &= 45 \times 7 \\ &= 315 \text{ min}\end{aligned}$$

$$\begin{aligned}\text{The school has 9 periods a day} \\ \text{Number of hours to be 315 min} &= \frac{315}{9} \\ &= 35 \text{ min}\end{aligned}$$

35 minutes duration there is 9 period a day.

10. Cost of 105 notebooks is ₹ 2415. How many notebooks can be bought for ₹ 1863?

Solution:

$$\text{Cost of 105 note book} = ₹2415$$

$$\begin{aligned}\text{Cost of 1 note book} &= \frac{2415}{105} \\ &= ₹23\end{aligned}$$

$$\begin{aligned}\text{Note book bought for ₹1863} &= \frac{1863}{23} \\ &= 81\end{aligned}$$

81 note book bought for ₹1863.

11. 10 farmers can plough a field in 21 days. Find the number of days reduced if 14 farmers ploughed the same field?

Solution:

Let x be the number of days.

Farmer is increase then number of days decrease.

It is inverse proportion.

Farmer	10	14
Number of Days	21	x

$$x_1 y_1 = x_2 y_2$$

$$10 \times 21 = 14 \times x$$

$$x = \frac{10 \times 21}{14}$$

$$x = 15$$

Reduced days = $21 - 15 = 6$ days

6 days reduced if 14 farmers ploughed the same field.

12. A flood relief camp has food stock by which 80 people can be benefited for 60 days. After 10 days 20 more people have joined the camp. Calculate the number of days of food shortage due to the addition of 20 more people?

Solution:

Let x be the number of days.

People increasing the food stock decreasing.

People	80	50
Number of Days	100	x

$$x_1 y_1 = x_2 y_2$$

$$80 \times 50 = 100 \times x$$

$$100 \times x = 80 \times 50$$

$$x = \frac{80 \times 50}{100}$$

$$= 40 \text{ days}$$

13. Six men can complete a work in 12 days. Two days later, 6 more men joined them. How many days will they take to complete the remaining work?

Solution:

Let x be number of days.

Men increase days decrease.

It is inverse proportion.

Men	6	10 (12-2)
Days	100	x

$$x_1 y_1 = x_2 y_2$$

$$6 \times 10 = x \times 12$$

$$x \times 12 = 6 \times 10$$

$$x = \frac{6 \times 10}{12}$$

$$x = 5 \text{ days}$$

Complete the work in 5 days.



Unit Test

Time: 30 mins.

4. Direct and Inverse Proportion

Marks: 20

I. Answer any four questions.

4×5=20

1. If $C = kd$.
 - i) What is the relation between c and d ?
 - ii) Find k , when $C = 30$ and $d = 6$.
 - iii) Find C , when $d = 10$.
2. Forty students stay in a hostel. They had food stock for 30 days. If the students are doubled then for how many days the stock will last?
3. 60 workers can spin a bale of cotton in 7 days. In how many days will 42 workers spin it.
4. Valli purchases 10 pens for ₹180 and Kamala buys 8 pens for ₹96. Can you say who bought the pen cheaper. (Using unitary method)
5. A toy company requires 36 machines to produce car toys in 54 days. How many machines would be required to produce the same number of car toys in 81 days?



UNIT

5

GEOMETRY

Lines:

Try These

B.P.No. 83

1. Complete the following statements.

- (i) A _____ is a straight path that goes on endlessly in two directions. **Ans: straight line**
- (ii) A _____ is a line with two end points. **Ans: line segment**
- (iii) A _____ is a straight path that begins at a point and goes on and extends endlessly in the other direction. **Ans: ray**
- (iv) The lines which intersect at right angles are _____. **Ans: intersect line**
- (v) The lines which intersect each other at a point are called _____. **Ans: intersect point**
- (vi) The lines that never intersect are called _____. **Ans: parallel lines**

2. Use a ruler or straightedge to draw each figure.

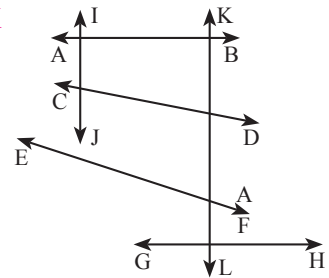
- i) line CD (ii) ray AB (iii) line segment MN

Solution:

- i)  ii)  iii) 

3. Look at the figure and answer the following questions. I K

- (i) Which line is parallel to AB
- (ii) Name a line which intersect CD
- (iii) Name the lines which are perpendicular to GH
- (iv) How many lines are parallel to IJ
- (v) Will EF intersect AB? Explain.

**Solution:**

- i) GH ii) IJ iii) KL iv) KL
- v) EF is not intersect AB. This two line are not cutting chance.

Try These

B.P.No. 85

Choose the correct answer.

1. A straight angle measures

- a) 45°
c) 180°

- b) 90°
d) 100°

Ans: c) 180° **2. An angle with measure 128° is called _____ angle.**

- a) a straight
c) an acute

- b) an obtuse
d) Right

Ans: b) an obtuse**3. The corner of the A4 paper has**

- a) an acute angle
c) straight

- b) a right angle
d) an obtuse angle

Ans: b) a right angle**4. If a perpendicular line is bisecting the given line, you would have two**

- a) right angles
c) acute angles

- b) obtuse angles
d) reflex angles

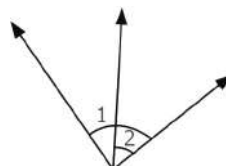
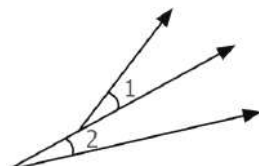
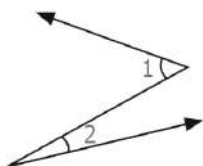
Ans: a) right angles**5. An angle that measure 0° is called _____.**

- a) right angle
c) acute angle

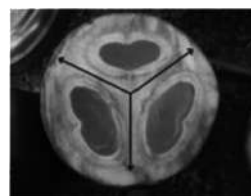
- b) obtuse angle
d) zero angle

Ans: d) zero angle**Think****B.P.No. 86**

In each of the following figures, observe the pair of angles that are marked as $\angle 1$ and $\angle 2$. Do you think that they are adjacent pairs? Justify your answer.

**Solution:**

- $\angle 1$ and $\angle 2$ are not adjacent pair. If two angles are not same inside.
- $\angle 1$ and $\angle 2$ are not adjacent pair. If $\angle 1$ and $\angle 2$ are not intersect one point.
- $\angle 1$ and $\angle 2$ are not adjacent pair. If $\angle 1$ and $\angle 2$ are not separate. $\angle 2$ is inside the $\angle 1$. Therefore not adjacent.

Try These**B.P.No. 83****1. Few real life examples depicting adjacent angles are shown below.**

Can you give three more examples of adjacent angles seen in real life?

Solution:

- i) Bus
- ii) two wheeler part of tyre
- iii) Upper side of fire stove

2. Observe the six angles marked in the picture shown (Fig 5.2). Write any four pairs of adjacent angles and that are not.

Solution:

Adjacent angles:

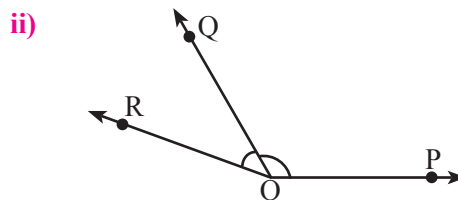
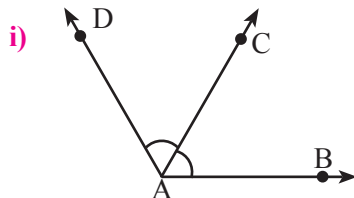
- i) $\angle A$ and $\angle B$
- ii) $\angle B$ and $\angle C$
- iii) $\angle D$ and $\angle E$
- iv) $\angle E$ and $\angle F$

Not adjacent angles:

- i) $\angle A$ and $\angle C$
- ii) $\angle B$ and $\angle D$
- iii) $\angle C$ and $\angle E$
- iv) $\angle D$ and $\angle F$



3. Identify the common arm, common vertex of the adjacent angles and shade the interior with two colours in each of the following figures.

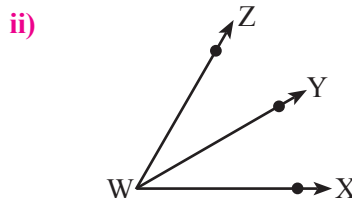
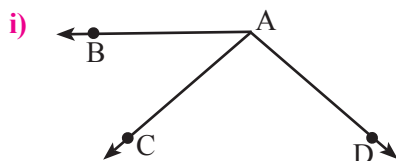


Solution:

- i) Common arm: $\overline{AC}$
Common Vertex: A

- ii) Common arm: $\overline{OQ}$
Common Vertex: O

4. Name the adjacent angles in each of the following figure.



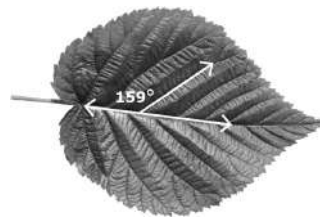
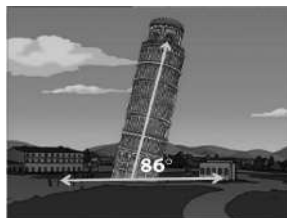
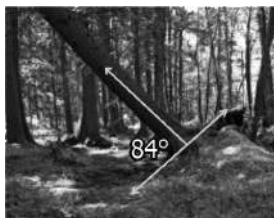
Solution:

- i) adjacent angles: $\angle BAC$, $\angle CAD$
- ii) adjacent angles: $\angle ZWY$, $\angle YWX$

Try These

B.P.No. 88

1. Observe the following pictures and find the other angle of linear pair.

**Solution:**

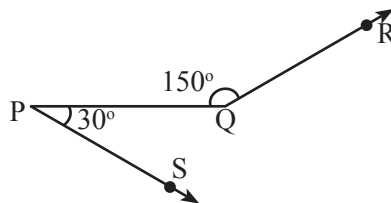
i) $180^\circ - 84^\circ = 96^\circ$

ii) $180^\circ - 86^\circ = 94^\circ$

iii) $180^\circ - 159^\circ = 21^\circ$

Think**B.P.No. 88**

Observe the figure. There are two angles namely $\angle PQR = 150^\circ$ and $\angle QPS = 30^\circ$. Is all this pair of supplementary angles a linear pair? Discuss.

**Solution:**

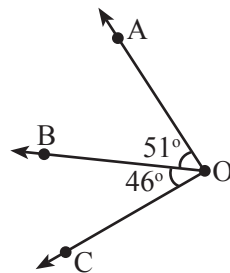
$\angle PQR$ and $\angle QPS$ are supplementary angles. All supplementary angles are linear pair.

Example 5.1**B.P.No. 88**

In Figure find $\angle AOC$.

Solution:

$$\begin{aligned}\angle AOC &= \angle AOB + \angle BOC \\ &= 51^\circ + 46^\circ \\ &= 97^\circ\end{aligned}$$

**Example 5.2****B.P.No. 88**

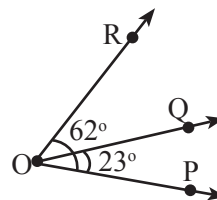
If $\angle POQ = 23^\circ$ and $\angle POR = 62^\circ$ then find $\angle QOR$

Solution:

$$\begin{aligned}\text{We know that } \angle POR &= \angle POQ + \angle QOR \\ 62^\circ &= 23^\circ + \angle QOR\end{aligned}$$

Subtracting 23° on both sides

$$\begin{aligned}62^\circ - 23^\circ &= 23^\circ + \angle QOR - 23^\circ \\ \angle QOR &= 39^\circ\end{aligned}$$



Example 5.3

B.P.No. 88

Which of the following pair of adjacent angles will make a linear pair?

- (i) $89^\circ, 91^\circ$ (ii) $105^\circ, 65^\circ$ (iii) $117^\circ, 62^\circ$ (iv) $40^\circ, 140^\circ$

Solution:

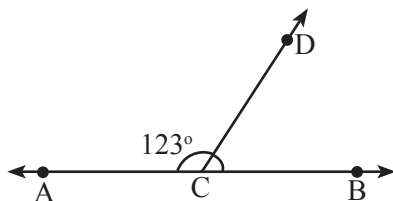
- (i) Since $89^\circ + 91^\circ = 180^\circ$, this pair will be a linear pair.
 (ii) Since $105^\circ + 65^\circ = 170^\circ \neq 180^\circ$, this pair cannot make a linear pair.
 (iii) Since $117^\circ + 62^\circ = 179^\circ \neq 180^\circ$, this pair cannot make a linear pair.
 (iv) Since $40^\circ + 140^\circ = 180^\circ$, this pair will be a linear pair.

Example 5.4

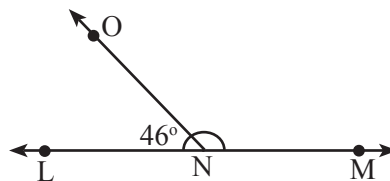
B.P.No. 88

Find the missing angle.

i)



ii)



Solution:

- (i) Since the angles are linear pair, $\angle ACD + \angle BCD = 180^\circ$
 $123^\circ + \angle BCD = 180^\circ$

Subtracting 123° on both sides

$$123^\circ + \angle BCD - 123^\circ = 180^\circ - 123^\circ$$

$$\angle BCD = 57^\circ$$

- (ii) Since the angles are linear pair, $\angle LNO + \angle MNO = 180^\circ$
 $46^\circ + \angle MNO = 180^\circ$

Subtracting 46° on both sides

$$46^\circ + \angle MNO - 46^\circ = 180^\circ - 46^\circ$$

$$\angle MNO = 134^\circ$$

Example 5.5

B.P.No. 89

Two angles are in the ratio 3:2. If they are linear pair, find them.

Solution:

Let the angles be $3x$ and $2x$

Since they are linear pair of angles, their sum is 180° .

Therefore, $3x + 2x = 180^\circ$

$$5x = 180^\circ$$

$$x = \frac{180^\circ}{5}$$

$$x = 36^\circ$$

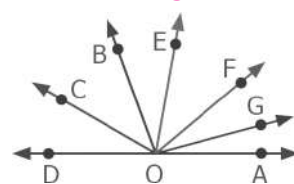
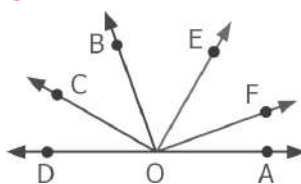
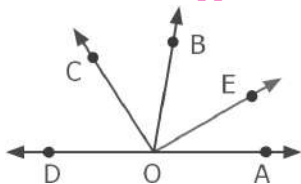
The angles are $3x = 3 \times 36 = 108^\circ$

$$2x = 2 \times 36 = 72^\circ$$

Think

B.P.No. 90

What would happen to the angles if we add 3 or 4 or 5 rays on a line as given below?

**Solution:**

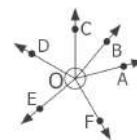
If we add 3 or 4 or 5 rays on a line it gives the sum of the angles are 180° .

Think

B.P.No. 90

Can you justify the following statement.

$$\angle AOB + \angle BOC + \angle COD + \angle DOE + \angle EOF + \angle FOA = 360^\circ?$$

Solution:

Sum of the angles at a point is 360° .

$$\therefore \angle AOB + \angle BOC + \angle COD + \angle DOE + \angle EOF + \angle FOA = 360^\circ$$

Example 5.6

B.P.No. 90

From Figure, find the measure of $\angle ROS$.

Solution:

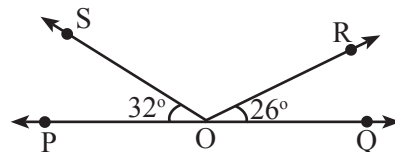
We know that $\angle QOR + \angle ROS + \angle SOP = 180^\circ$

$$26^\circ + \angle ROS + 32^\circ = 180^\circ$$

$$\angle ROS + 58^\circ = 180^\circ$$

Subtracting 58° on both sides

We get, $\angle ROS = 180^\circ - 58^\circ = 122^\circ$

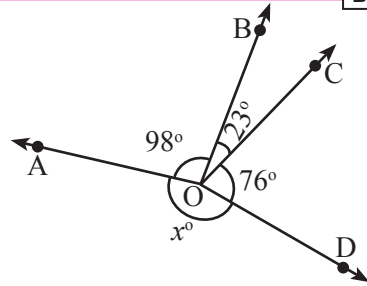


Example 5.7

B.P.No. 90

In Figure find the value of x° **Solution:**

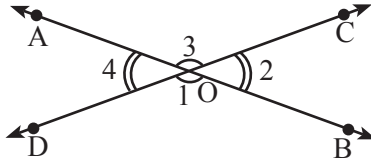
$$\begin{aligned}
 98^\circ + 23^\circ + 76^\circ + x^\circ &= 360^\circ \\
 197^\circ + x^\circ &= 360^\circ \\
 x^\circ &= 360^\circ - 197^\circ = 163^\circ
 \end{aligned}$$



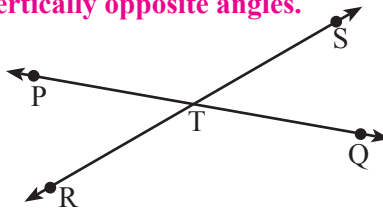
B.P.No. 91

Try These**1. Four real life examples for vertically opposite angles are given below.****Give four more examples for vertically opposite angles in your surrounding.****Solution:**

- i) Plade of mixie jar.
- ii) Gas stove barnor
- iii) egg cutter
- iv) Umbrella Rattinam

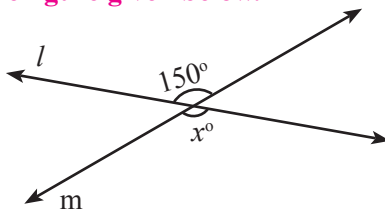
2. In the given figure, two lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect at O. Observe the pair of angles and complete the following table. One is done for you.

Pair of angles	$\angle AOC$	$\angle AOD$	$\angle BOC$	$\angle BOD$
$\angle AOC$	Same angle	Adjacent angle	Adjacent angle	Non – adjacent angle
$\angle AOD$	Adjacent angle	Same angle	Non-adjacent angle	Adjacent angle
$\angle BOC$	Adjacent angle	Non- adjacent angle	Same angle	Adjacent angle
$\angle BOD$	Non-adjacent angle	Adjacent angle	Adjacent angle	Same angle

3. Name the two pairs of vertically opposite angles.**Solution:**

- i) $\angle PTR$ and $\angle STQ$
- ii) $\angle PTS$ and $\angle RTQ$

4. Find the value of x° in the figure given below.



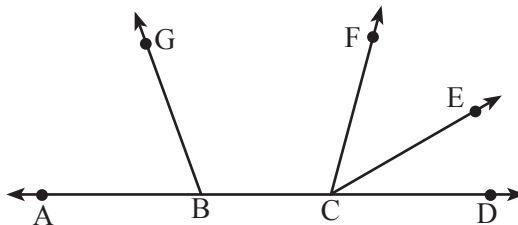
Solution:

$$x^\circ = 150^\circ \text{ (vertically opposite angles)}$$

Exercise 5.1

B.P.No. 92

1. Name the pairs of adjacent angles.



Solution:

The pair of adjacent angles

$\angle ABG$ and $\angle GBC$

$\angle BCF$ and $\angle FCE$

$\angle FCE$ and $\angle ECD$

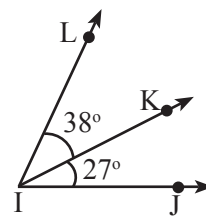
$\angle ACF$ and $\angle FCE$

$\angle ACF$ and $\angle ECD$

2. Find the angle $\angle JIL$ from the given figure.

Solution:

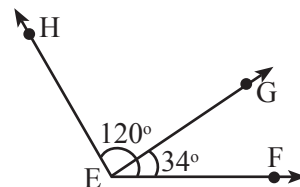
$$\begin{aligned} \angle JIL &= \angle JIK + \angle KIL \\ &= 27^\circ + 38^\circ \\ &= 65^\circ \end{aligned}$$



3. Find the angle $\angle GEH$ from the given figure.

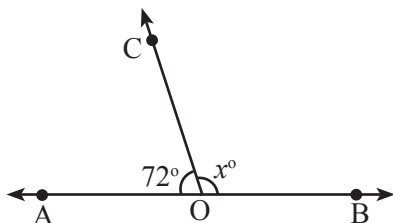
Solution:

$$\begin{aligned} \angle GEH + \angle GEF &= \angle HEF \\ \angle GEH + 34^\circ &= 120^\circ \\ \angle GEH &= 120^\circ - 34^\circ \\ &= 86^\circ \end{aligned}$$



4. Given that AB is a straight line. Calculate the value of x° in the following cases.

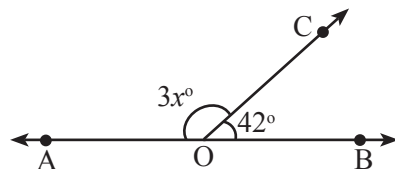
i)



Solution:

$$\begin{aligned} 72^\circ + x^\circ &= 180^\circ \\ x^\circ &= 180^\circ - 72^\circ \\ x^\circ &= 108^\circ \end{aligned}$$

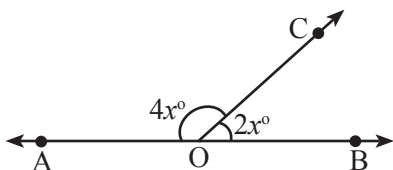
ii)



Solution:

$$\begin{aligned} 3x^\circ + 42^\circ &= 180^\circ \\ 3x^\circ &= 180^\circ - 42^\circ \\ 3x^\circ &= 138^\circ \\ x^\circ &= \frac{138^\circ}{3} \\ x^\circ &= 46^\circ \end{aligned}$$

iii)



Solution:

$$\begin{aligned} 4x^\circ + 2x^\circ &= 180^\circ \\ 6x^\circ &= 180^\circ \\ x^\circ &= \frac{180^\circ}{6} \\ x^\circ &= 30^\circ \end{aligned}$$

5. One angle of a linear pair is a right angle. What can you say about the other angle?

Solution:

One of the angle linear pair is right angle

i.e. $90^\circ + x^\circ = 180^\circ$

$$x^\circ = 180^\circ - 90^\circ$$

$$x^\circ = 90^\circ$$

The other angle is also a right angle.

6. If the three angles at a point are in the ratio 1 : 4 : 7, find the value of each angle?

Solution:

Let the angles be x , $4x$ and $7x$.

Since they are at a point their sum is 360°

$$x + 4x + 7x = 360^\circ$$

$$12x = 360^\circ$$

$$x = \frac{360^\circ}{12}$$

$$x = 30^\circ$$

$$4x = 4(30) = 120^\circ$$

$$7x = 7(30) = 210^\circ$$

The angles are 30° , 120° , 210°

7. There are six angles at a point. One of them is 45° and the other five angles are all equal. What is the measure of all the five angles?

Solution:

Sum of six angles at a point is 360°

One of them is 45° .

$$45^\circ + 5x^\circ = 360^\circ$$

$$5x^\circ = 360^\circ - 45^\circ$$

$$5x^\circ = 315^\circ$$

$$x^\circ = \frac{315^\circ}{5}$$

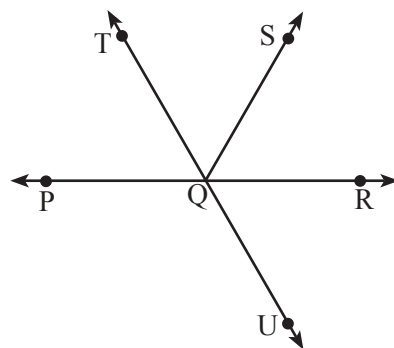
$$x^\circ = 63^\circ$$

All the five angles are 63° .

8. In the given figure, identify
- any two pairs of adjacent angles.
 - two pairs of vertically opposite angles.

Solution:

- any two pair of adjacent angles
 $\angle PQU$ and $\angle PQT$
 $\angle TQS$ and $\angle SQR$
- Two pair of vertically opposite angles
 $\angle PQU$ and $\angle TQR$
 $\angle PQT$ and $\angle UQR$



9. The angles at a point are x° , $2x^\circ$, $3x^\circ$, $4x^\circ$ and $5x^\circ$.

Find the value of the largest angle?

Solution:

Sum of a angle at a point are 360°

$$\text{i.e. } x^\circ + 2x^\circ + 3x^\circ + 4x^\circ + 5x^\circ = 360^\circ$$

$$15x^\circ = 360^\circ$$

$$x^\circ = \frac{360^\circ}{15}$$

$$x^\circ = 24^\circ$$

Largest angle $5x^\circ = 5(24^\circ) = 120^\circ$

10. From the given figure, find the missing angle.

Solution:

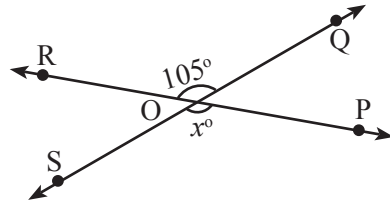
$\angle SOR$ and $\angle ROQ$ are linear pair.

$\angle QOP$ and $\angle POS$ are linear pair.

$$\angle ROQ = \angle SOP$$

$$\angle SOP = 105^\circ$$

$$x^\circ = 105^\circ$$



11. Find the angles x° and y° in the figure shown.

Solution:

$$x^\circ + 3x^\circ = 180^\circ$$

$$4x^\circ = 180^\circ$$

$$x^\circ = \frac{180^\circ}{4}$$

$$x^\circ = 45^\circ$$

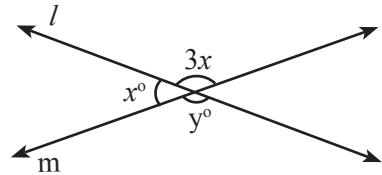
$$\text{and } x^\circ + y^\circ = 180^\circ$$

$$45^\circ + y^\circ = 180^\circ$$

$$y^\circ = 180^\circ - 45^\circ$$

$$y^\circ = 135^\circ$$

$$x^\circ = 45^\circ, y^\circ = 135^\circ$$



12. Using the figure, answer the following questions.

(i) What is the measure of angle x° ?

(ii) What is the measure of angle y° ?

Solution:

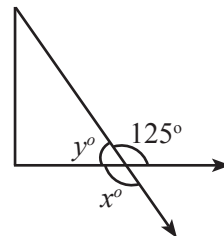
i) $x = 125^\circ$ (vertically opposite angles are equal)

ii) $y^\circ + 125^\circ = 180^\circ$

$$y^\circ = 180^\circ - 125^\circ$$

$$= 55^\circ$$

i) $x^\circ = 125^\circ$ ii) $y^\circ = 55^\circ$



Objective Type Questions

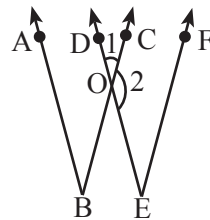
13. Adjacent angles have

- i) no common interior, no common arm, no common vertex
- ii) one common vertex, one common arm, common interior
- iii) one common arm, one common vertex, no common interior
- iv) one common arm, no common vertex, no common interior

Ans: iii) one common arm, one common vertex, no common interior

14. In the given figure the angles $\angle 1$ and $\angle 2$ are

- i) opposite angles
- ii) Adjacent angles
- iii) Linear pair
- iv) Supplementary angles



Ans: iii) Linear pair

15. Vertically opposite angles are

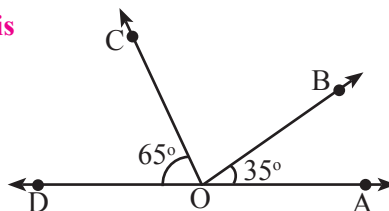
- i) not equal in measure
- ii) complementary
- iii) supplementary
- iv) equal in measure

Ans: iv) equal in measure

16. The sum of all angles at a point is

- i) 360°
- ii) 180°
- iii) 90°
- iv) 0°

Ans: i) 360°

17. The measure of $\angle BOC$ is

- i) 90°
- ii) 180°
- iii) 80°
- iv) 100°

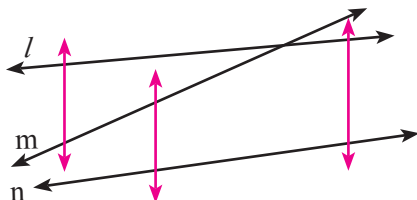
Ans: iii) 80°

Transversal:

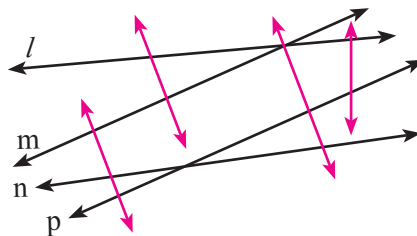
Try These

B.P.No. 94

1. Draw as many possible transversals in the given figures.



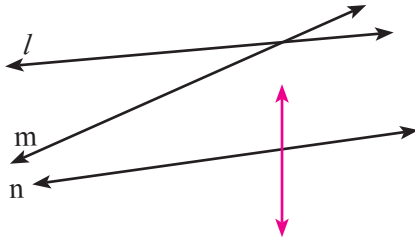
(i)



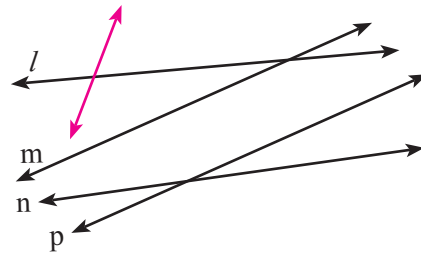
(ii)



2. Draw a line which is not the transversal to the above figures.

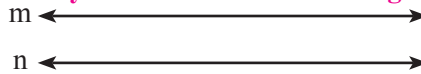


(i)



(ii)

3. How many transversals can you draw for the following two lines?



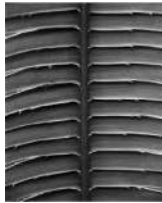
Solution:

Many more transversal.

Try These

B.P.No. 96

1. Four real life examples for transversal of parallel lines are given below.



Give four more examples for transversal of parallel lines seen in your surroundings.

Solution:

i) Coconut tyre leaf.

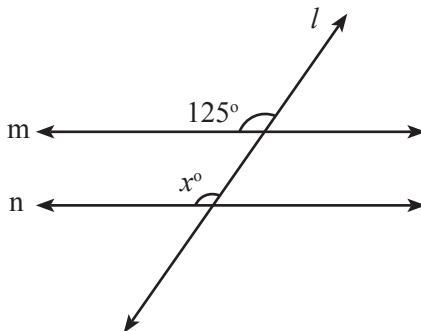
ii) Back side design in plastic chair.

iii) Window

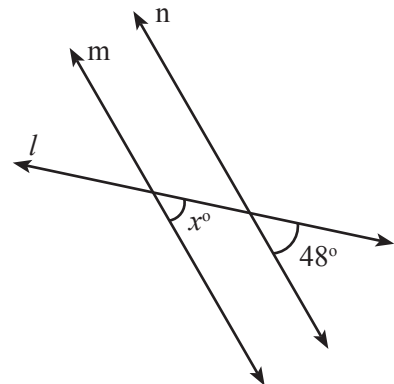
iv) Upper roof of the wooden roof.

2. Find the value of x .

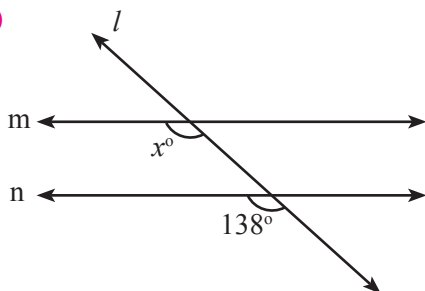
i)



ii)



iii)

**Solution:**

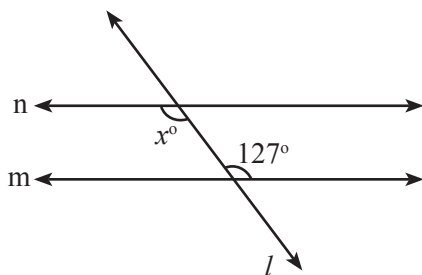
i) $x^\circ = 125^\circ$

ii) $x^\circ = 48^\circ$

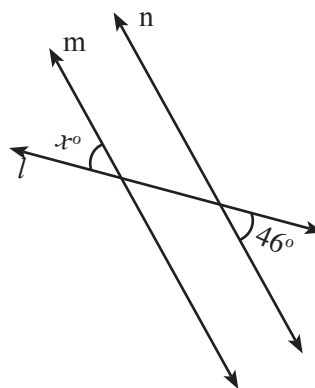
iii) $x^\circ = 138^\circ$

Try These

B.P.No. 98

Find the value of x.**Solution:**

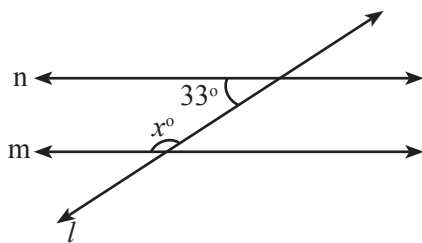
i) $x = 127^\circ$



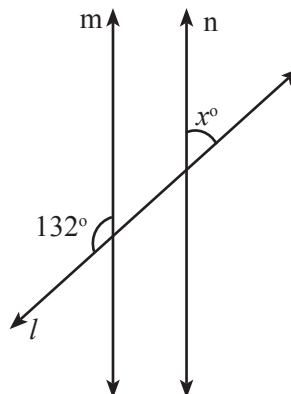
ii) $x = 46^\circ$

Try These

B.P.No. 99

Find the value of x.**Solution:**

i) $x^\circ = 180^\circ - 33^\circ = 147^\circ$



ii) $x^\circ = 180^\circ - 132^\circ = 48^\circ$

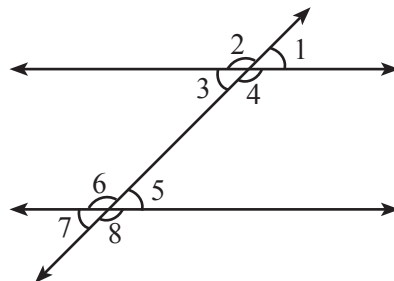
Example 5.8

B.P.No. 99

- Name the angle that corresponds to $\angle 1$.
- Name the angle that is alternate interior to $\angle 3$.
- Name the angle that is alternate exterior to $\angle 8$.
- Name the angle that corresponds to $\angle 8$.
- Name the angle that is alternate exterior to $\angle 7$.
- Name the angle that is alternate interior to $\angle 6$.

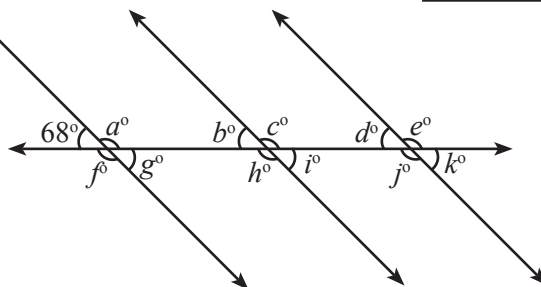
Solution:

- The angle that corresponds to $\angle 1$ is $\angle 5$
- The angle that is alternate interior to $\angle 3$ is $\angle 5$
- The angle that is alternate exterior to $\angle 8$ is $\angle 2$
- The angle that corresponds to $\angle 8$ is $\angle 4$
- The angle that is alternate exterior to $\angle 7$ is $\angle 1$
- The angle that is alternate interior to $\angle 6$ is $\angle 4$

**Example 5.9**

B.P.No. 99

- Which angles are corresponding angles to b° ?
- What is the measure of b° ?
- Which angles have the measure 68° ?
- Which angles have the measure 112° ?

**Solution:**

- The corresponding angles to b° are d° and 68° .
- The measure of b° is 68° (because b° corresponds to 68°)
- The angles having measure 68° are b° , d° , g° , i° and k° .
- The angles having measure 112° are a° , c° , e° , f° , h° and j° .

Example 5.10

B.P.No. 99

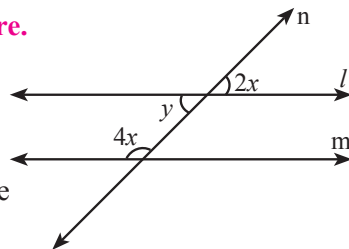
If l is parallel to m , find the measure of x and y in the figure.

Solution:

Given l is parallel to m and n is transversal to l and m .

We get, $y = 2x$ [vertically opposite angles are equal]

$y + 4x = 180^\circ$ [sum of interior angles that lie on the same side of the transversal]



$$2x + 4x = 180^\circ \text{ [since } y = 2x\text{]}$$

$$6x = 180^\circ$$

Dividing by 6 on both sides

$$\frac{x^\circ}{6} = \frac{180^\circ}{6} \text{ gives, } x = 30^\circ.$$

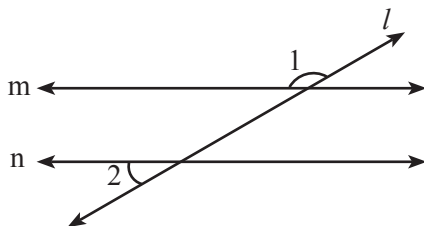
$$\text{Now, } y = 2(30^\circ) = 60^\circ.$$

Exercise 5.2

B.P.No. 100

1. From the figures name the marked pair of angles.

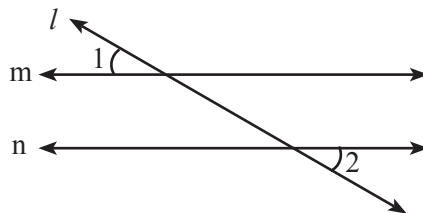
i)



Solution:

The angles are exterior angles on the same side of the transversal.

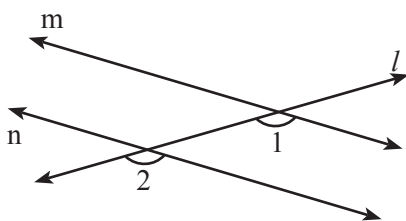
ii)



Solution:

The angles are alternate exterior angles.

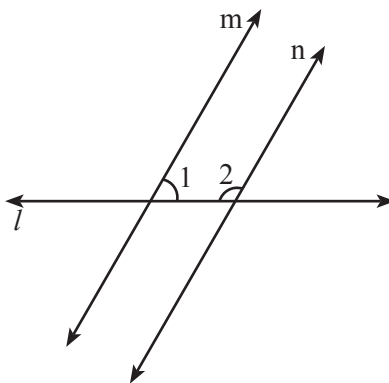
iii)



Solution:

The angles are corresponding angles.

iv)

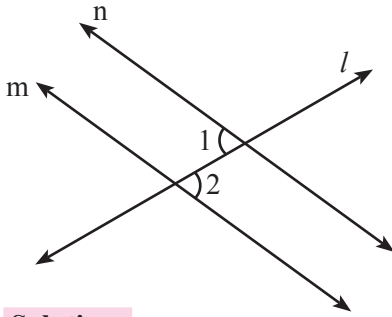


Solution:

The angles are interior angles on the same side of the transversal.

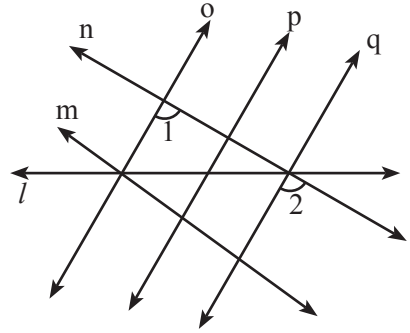


v)

**Solution:**

The angles are interior angles on the same side of the transversal.

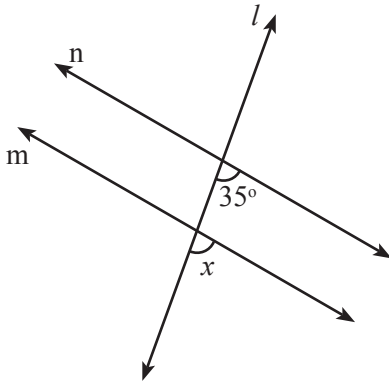
vi)

**Solution:**

The angles are interior angles on the same side of the transversal.

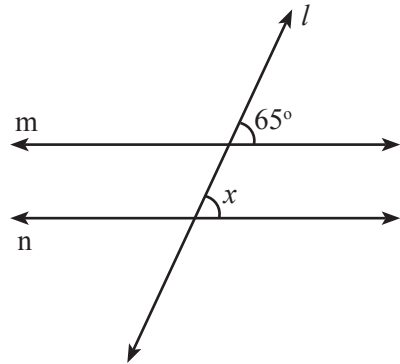
2. Find the measure of angle x in each of the following figures.

i)

**Solution:**

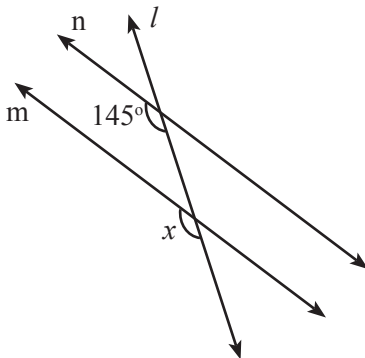
$$x^\circ = 35^\circ \text{ (corresponding angles)}$$

ii)

**Solution:**

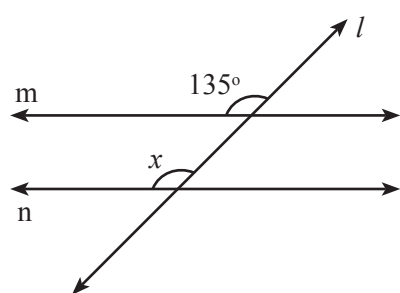
$$x^\circ = 65^\circ \text{ (corresponding angles)}$$

iii)

**Solution:**

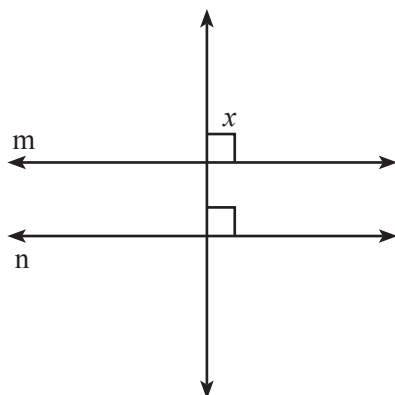
$$x = 145^\circ \text{ (corresponding angles)}$$

iv)

**Solution:**

$$x = 135^\circ \text{ (Corresponding angle)}$$

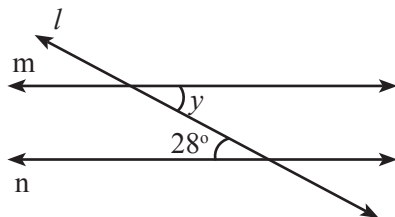
v)

**Solution:**

$$x = 90^\circ \text{ (Corresponding angle)}$$

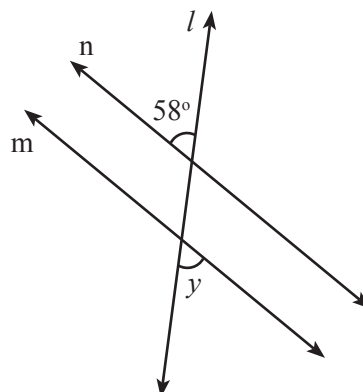
3. Find the measure of angle y in each of the following figures.

i)

**Solution:**

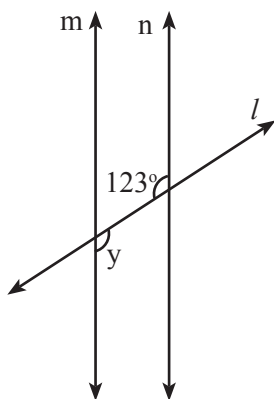
$$y = 28^\circ \text{ (alternate angles)}$$

ii)

**Solution:**

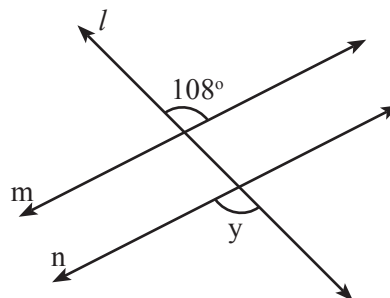
$$y = 58^\circ \text{ (alternate angles)}$$

iii)

**Solution:**

$$x = 123^\circ \text{ (alternate angles)}$$

iv)

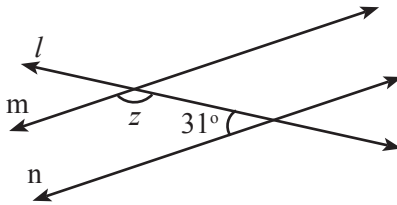
**Solution:**

$$y = 108^\circ \text{ (alternate angle)}$$



4. Find the measure of angle z in each of the following figures.

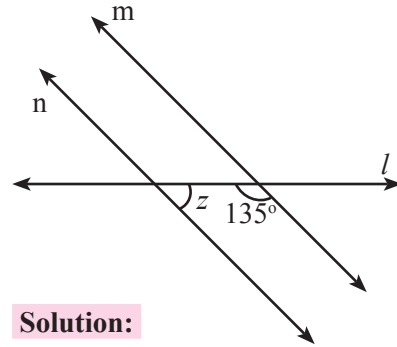
i)



Solution:

$$\begin{aligned} z + 31^\circ &= 180^\circ \\ z &= 180^\circ - 31^\circ \\ &= 149^\circ \end{aligned}$$

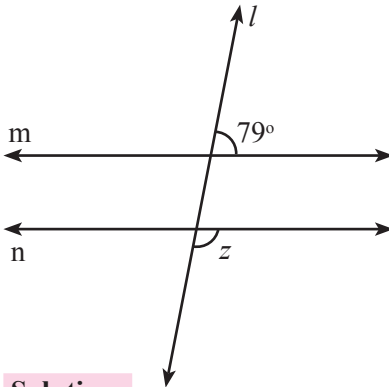
ii)



Solution:

$$\begin{aligned} z + 135^\circ &= 180^\circ \\ z &= 180^\circ - 135^\circ = 45^\circ \end{aligned}$$

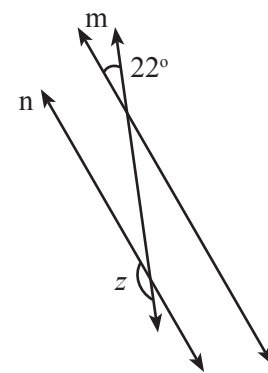
iii)



Solution:

$$\begin{aligned} z + 79^\circ &= 180^\circ \\ z &= 180^\circ - 79^\circ \\ &= 101^\circ \end{aligned}$$

iv)

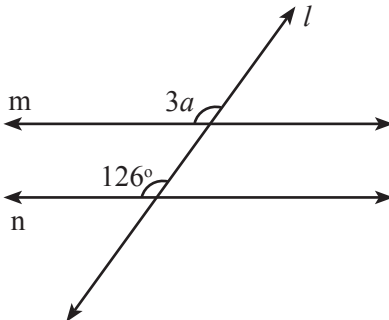


Solution:

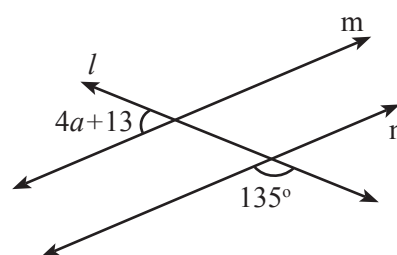
$$\begin{aligned} z + 22^\circ &= 180^\circ \\ z &= 180^\circ - 22^\circ \\ &= 158^\circ \end{aligned}$$

5. Find the value of angle a in each of the following figures.

i)



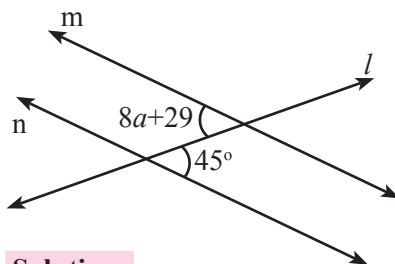
ii)



Solution:

$$\begin{aligned}
 3a &= 126^\circ \\
 a &= \frac{126^\circ}{3} \\
 &= 42^\circ
 \end{aligned}$$

iii)

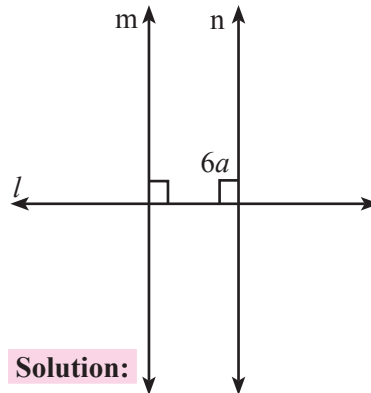
**Solution:**

$$\begin{aligned}
 8a + 29^\circ &= 45^\circ \\
 8a &= 45^\circ - 29^\circ \\
 8a &= 16^\circ \\
 a &= \frac{16}{8} \\
 a &= 2^\circ
 \end{aligned}$$

Solution:

$$\begin{aligned}
 4a + 13 + 135^\circ &= 180^\circ \\
 4a + 148^\circ &= 180^\circ \\
 4a &= 180^\circ - 148^\circ \\
 4a &= 32^\circ \\
 a &= \frac{32}{4} \\
 a &= 8^\circ
 \end{aligned}$$

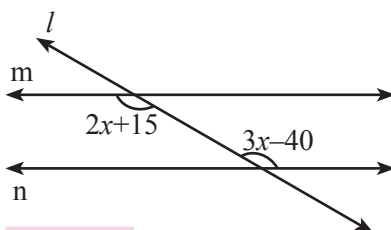
iv)

**Solution:**

$$\begin{aligned}
 6a &= 90^\circ \\
 a &= \frac{90}{6} \\
 a &= 15^\circ
 \end{aligned}$$

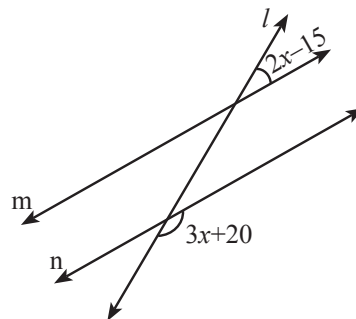
6. Find the value of angle x in both the figures.

i)

**Solution:**

$$\begin{aligned}
 2x+15 &= 3x-40 \\
 2x-3x &= -40-15 \\
 -x &= -55^\circ \\
 x &= 55^\circ
 \end{aligned}$$

ii)

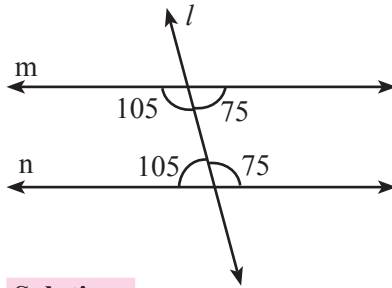
**Solution:**

$$\begin{aligned}
 (2x-15) + (3x+20) &= 180^\circ \\
 (2x-15) &= 180^\circ - 3x - 20 \\
 2x+3x &= 180^\circ - 20 + 15 \\
 5x &= 175 \\
 x &= \frac{175}{5} = 35^\circ \\
 x &= 35^\circ
 \end{aligned}$$



7. Anbu has marked the angles as shown below in (i) and (ii). Check whether both of them are correct. Give reasons.

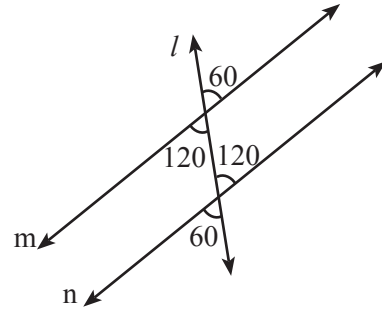
i)

**Solution:**

It is not correct.

Since, interior angles on the same side of the transversal are supplementary.

ii)

**Solution:**

It is not correct.

Since corresponding angles are equal.

8. Mention two real-life situations where we use parallel lines.

Solution:

- i) Railway track ii) two side stair handles.

9. Two parallel lines are intersected by a transversal. What is the minimum number of angles you need to know to find the remaining angles. Give reasons.

Solution:

The minimum number of angles need one.

Using concept of linear pair of angles, we can find one more angle and by the concepts of corresponding angles and alternate angles. We could find all other angles.

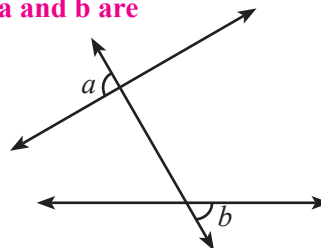
Objective Type Questions

10. A line which intersects two or more lines in different points is known as

- i) parallel lines ii) transversal
iii) non-parallel lines iv) intersecting line

Ans: i) transversal

11. In the given figure, angles a and b are



- i) alternate exterior angles ii) corresponding angles
iii) alternate interior angles iv) vertically opposite angles

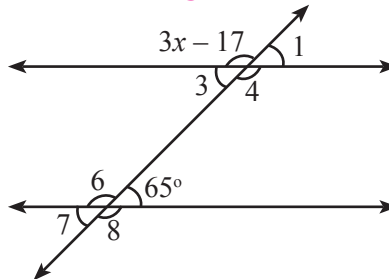
Ans: i) alternate exterior angles

12. Which of the following statements is ALWAYS TRUE when parallel lines are cut by a transversal

- i) corresponding angles are supplementary.
- ii) alternate interior angles are supplementary.
- iii) alternate exterior angles are supplementary.
- iv) interior angles on the same side of the transversal are supplementary.

Ans: iv) interior angle on the same side of the transversal are supplementary

13. In the diagram, what is the value of angle x ?



- i) 43°
- ii) 44°
- iii) 132°
- iv) 134°

Ans: ii) 44°

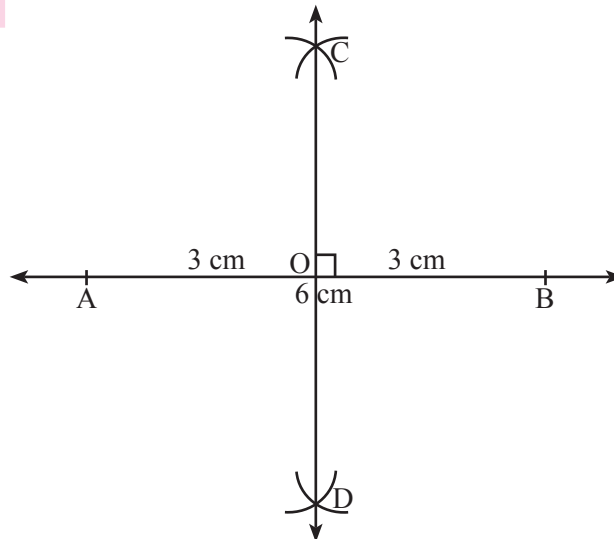
Construction of perpendicular bisector of a line segment

Example 5.11

B.P.No. 102

Construct a perpendicular bisector of the line segment $AB = 6$ cm.

Construction:



Step 1: Draw a line. Mark two points A and B on it so that $AB = 6$ cm.

Step 2: Using compass with A as center and radius more than half of the length of AB, draw two arcs of same length, one above AB and one below AB.

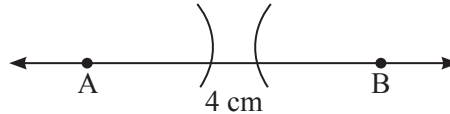
Step 3: With the same radius and B as center draw two arcs to cut the arcs drawn in step 2. Mark the points of intersection of the arcs as C and D

Step 4: Join C and D. CD will intersect AB. Mark the point of intersection as O
 CD is the required perpendicular bisector of AB.
 Measure $\angle AOC$. Measure the length of AO and OB. What do you observe?

Think

B.P.No. 103

1. What will happen if the radius of the arc is less than half of AB?



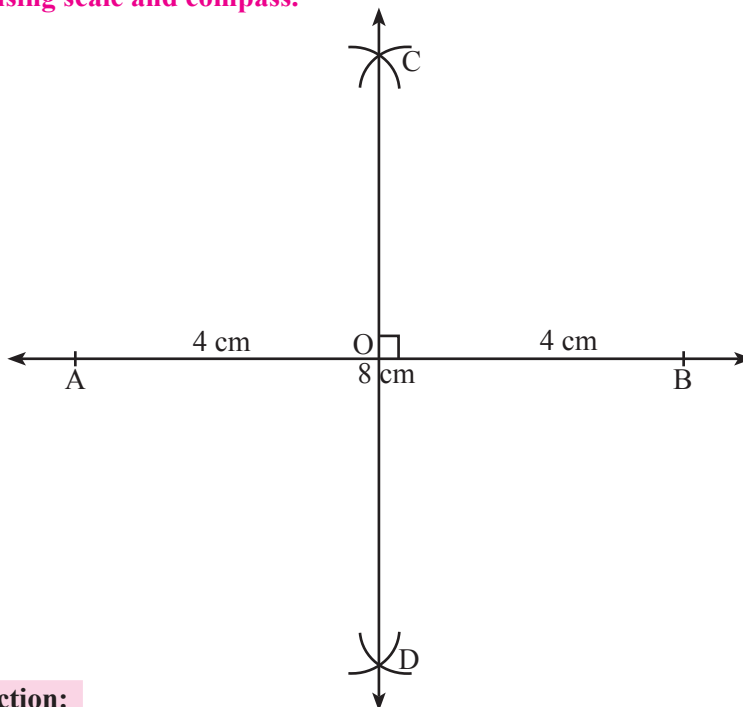
If the radius of the arc is less than half of AB, then both the arcs will not cut at a point and we can't draw perpendicular bisector.

Exercise 5.3

B.P.No. 103

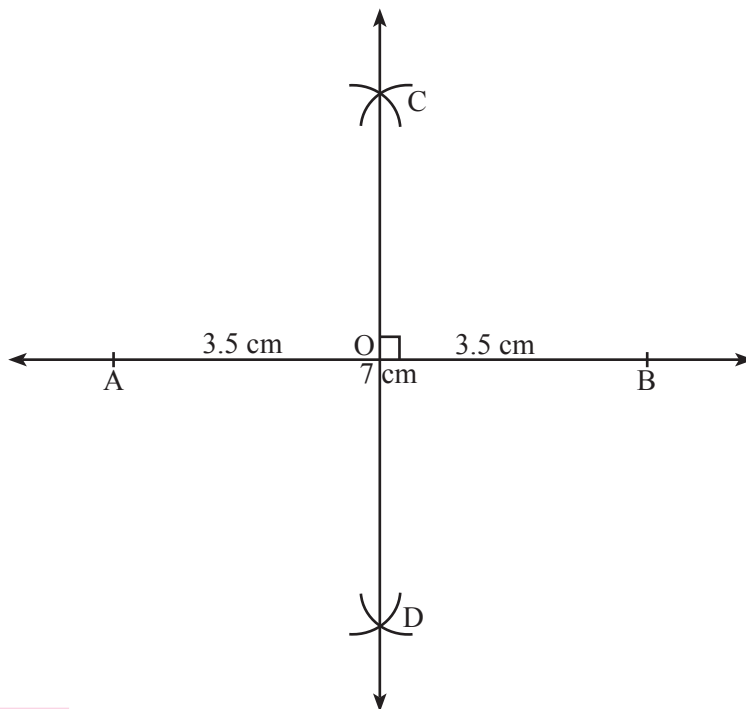
1. Draw a line segment of given length and construct a perpendicular bisector to each line segment using scale and compass.

(a) 8 cm

**Construction:**

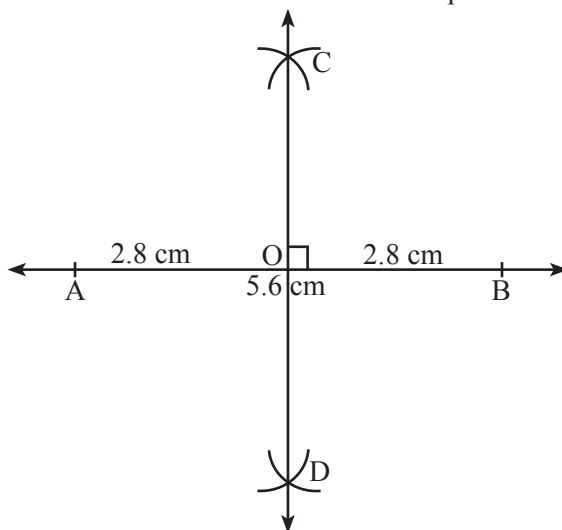
- Step 1:** Draw a line. Mark two points A and B on it so that $AB = 8$ cm.
- Step 2:** Using compass with A as center and radius more than half of the length of AB, draw two arcs of same length, one above AB and one below AB.
- Step 3:** With the same radius and B as center draw two arcs to cut the arcs drawn in step 2. Mark the points of intersection of the arcs as C and D
- Step 4:** Join C and D. CD will intersect AB. Mark the point of intersection as O

(b) 7 cm

**Construction:**

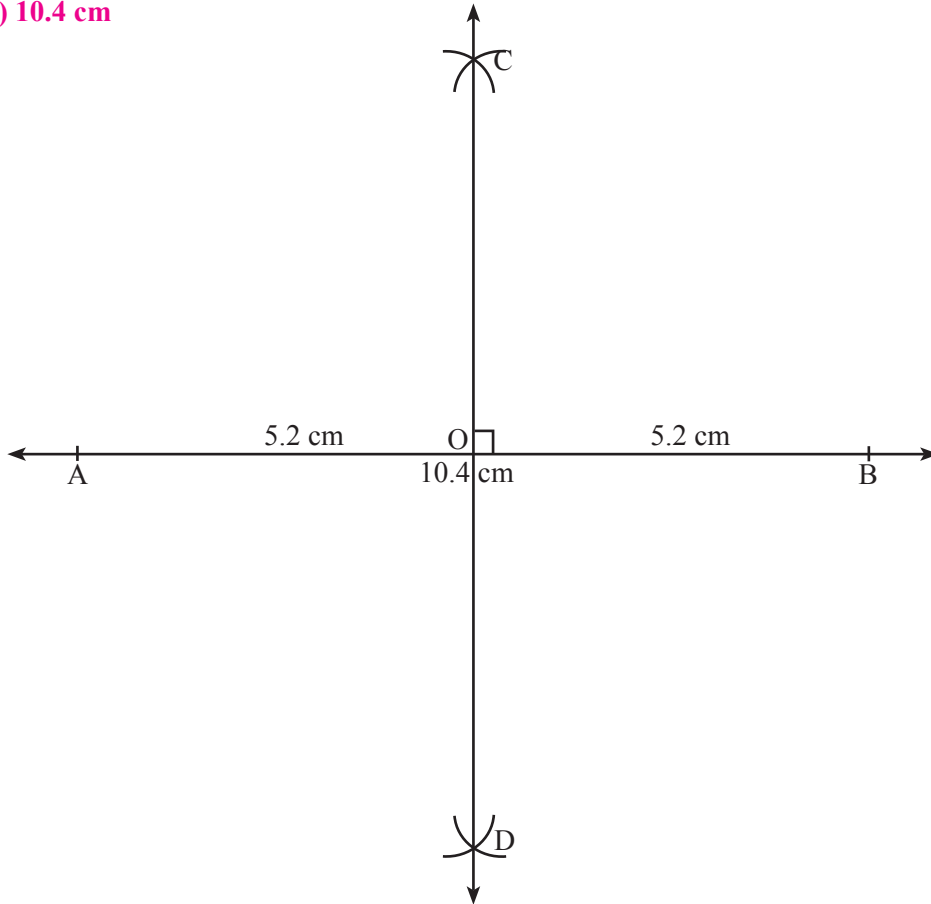
- Step 1:** Draw a line. Mark two points A and B on it so that $AB = 7$ cm.
- Step 2:** Using compass with A as center and radius more than half of the length of AB, draw two arcs of same length, one above AB and one below AB.
- Step 3:** With the same radius and B as center draw two arcs to cut the arcs drawn in step 2. Mark the points of intersection of the arcs as C and D
- Step 4:** Join C and D. CD will intersect AB. Mark the point of intersection as O

(c) 5.6 cm



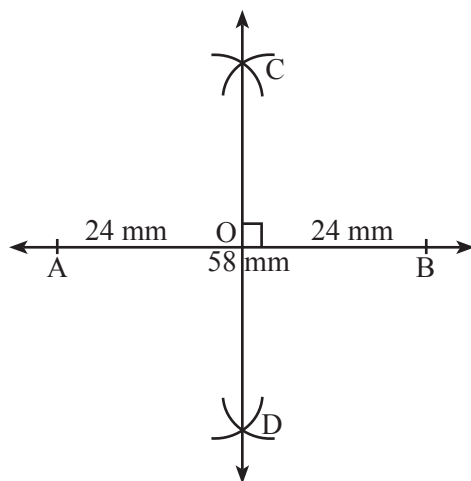
Construction:

- Step 1:** Draw a line. Mark two points A and B on it so that $AB = 5.6$ cm.
- Step 2:** Using compass with A as center and radius more than half of the length of AB, draw two arcs of same length, one above AB and one below AB.
- Step 3:** With the same radius and B as center draw two arcs to cut the arcs drawn in step 2. Mark the points of intersection of the arcs as C and D
- Step 4:** Join C and D. CD will intersect AB. Mark the point of intersection as O

(d) 10.4 cm**Construction:**

- Step 1:** Draw a line. Mark two points A and B on it so that $AB = 8$ cm.
- Step 2:** Using compass with A as center and radius more than half of the length of AB, draw two arcs of same length, one above AB and one below AB.
- Step 3:** With the same radius and B as center draw two arcs to cut the arcs drawn in step 2. Mark the points of intersection of the arcs as C and D
- Step 4:** Join C and D. CD will intersect AB. Mark the point of intersection as O

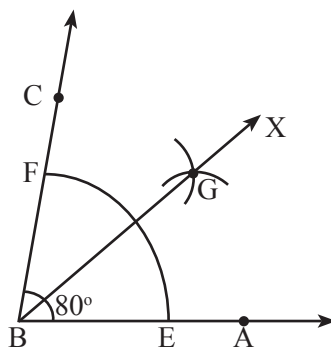
(e) 58 mm

**Construction:**

- Step 1:** Draw a line. Mark two points A and B on it so that $AB = 58$ mm.
- Step 2:** Using compass with A as center and radius more than half of the length of AB, draw two arcs of same length, one above AB and one below AB.
- Step 3:** With the same radius and B as center draw two arcs to cut the arcs drawn in step 2. Mark the points of intersection of the arcs as C and D.
- Step 4:** Join C and D. CD will intersect AB. Mark the point of intersection as O.

Construction of angle bisector of an angle.**Example 5.12**

B.P.No. 102

Construct bisector of the $\angle ABC$ with the measure 80° .**Construction:**

- Step 1:** Draw the given angle $\angle ABC$ with the measure 80° using protractor.
- Step 2:** With B as center and convenient radius, draw an arc to cut BA and BC. Mark the points of intersection as E on BA and F on BC.
- Step 3:** With the same radius and E as center, draw an arc in the interior of $\angle ABC$ and another arc of same measure with center at F to cut the previous arc.

Step 4: Mark the point of intersection as G.

Draw a ray BX through G.

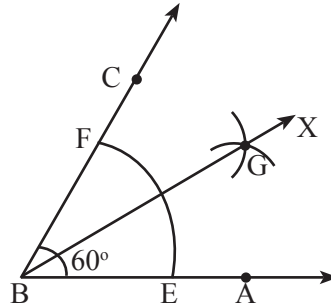
BG is the required bisector of the given angle $\angle ABC$

Exercise 5.4

B.P.No. 104

1. Construct the following angles using protractor and draw a bisector to each of the angle using ruler and compass.

(a) 60°



Construction:

Step 1: Draw the given angle $\angle ABC$ with the measure 60° using protractor.

Step 2: With B as center and convenient radius, draw an arc to cut BA and BC. Mark the points of intersection as E on BA and F on BC.

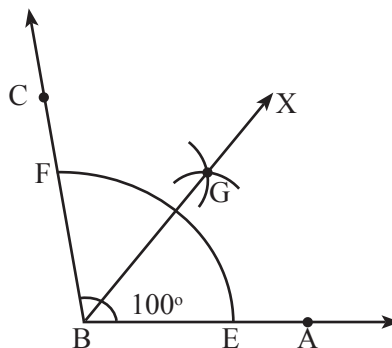
Step 3: With the same radius and E as center, draw an arc in the interior of $\angle ABC$ and another arc of same measure with center at F to cut the previous arc.

Step 4: Mark the point of intersection as G.

Draw a ray BX through G.

BG is the required bisector of the given angle $\angle ABC$

(b) 100°



Construction:

Step 1: Draw the given angle $\angle ABC$ with the measure 100° using protractor.

Step 2: With B as center and convenient radius, draw an arc to cut BA and BC. Mark the points of intersection as E on BA and F on BC.

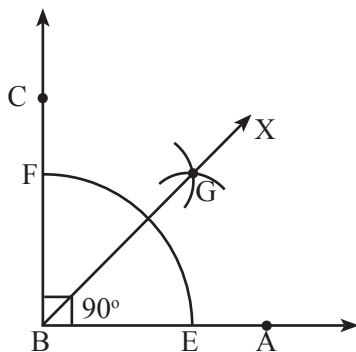
Step 3: With the same radius and E as center, draw an arc in the interior of $\angle ABC$ and another arc of same measure with center at F to cut the previous arc.

Step 4: Mark the point of intersection as G.

Draw a ray BX through G.

BG is the required bisector of the given angle $\angle ABC$

(c) 90°



Construction:

Step 1: Draw the given angle $\angle ABC$ with the measure 90° using protractor.

Step 2: With B as center and convenient radius, draw an arc to cut BA and BC. Mark the points of intersection as E on BA and F on BC.

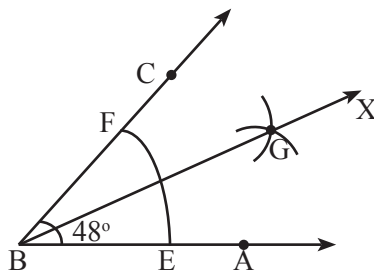
Step 3: With the same radius and E as center, draw an arc in the interior of $\angle ABC$ and another arc of same measure with center at F to cut the previous arc.

Step 4: Mark the point of intersection as G.

Draw a ray BX through G.

BG is the required bisector of the given angle $\angle ABC$

(d) 48°



Construction:

Step 1: Draw the given angle $\angle ABC$ with the measure 48° using protractor.

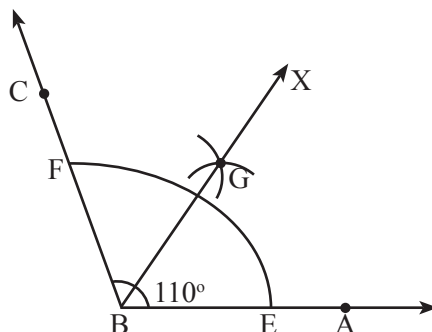
Step 2: With B as center and convenient radius, draw an arc to cut BA and BC. Mark the points of intersection as E on BA and F on BC.

Step 3: With the same radius and E as center, draw an arc in the interior of $\angle ABC$ and another arc of same measure with center at F to cut the previous arc.

Step 4: Mark the point of intersection as G.

Draw a ray BX through G.

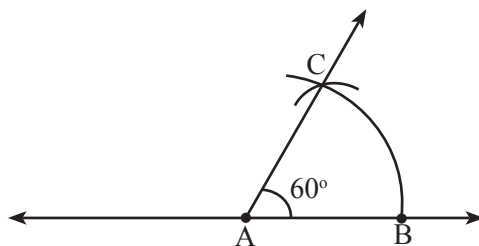
BG is the required bisector of the given angle $\angle ABC$

(e) 110° **Construction:**

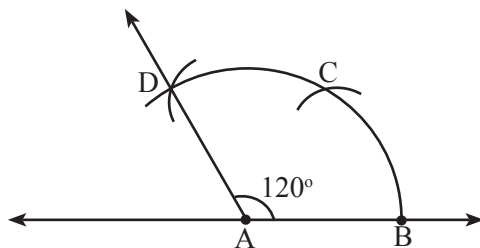
- Step 1:** Draw the given angle $\angle ABC$ with the measure 110° using protractor.
- Step 2:** With B as center and convenient radius, draw an arc to cut BA and BC. Mark the points of intersection as E on BA and F on BC.
- Step 3:** With the same radius and E as center, draw an arc in the interior of $\angle ABC$ and another arc of same measure with center at F to cut the previous arc.
- Step 4:** Mark the point of intersection as G.
Draw a ray BX through G.
BG is the required bisector of the given angle $\angle ABC$

Construction of angle bisector**Exercise 5.5****B.P.No. 105**

1. Construct the following angles using ruler and compass only.

(i) 60° **Construction:**

- Step 1:** Draw a line. Mark a point A on it.
- Step 2:** With A as center draw an arc of convenient radius to the line to meet at a point B.
- Step 3:** With the same radius and B as center draw an arc to cut the previous arc at C.
- Step 4:** Join AC. Then $\angle BAC$ is the required angle with the measure 60° .

(ii) 120° **Construction:**

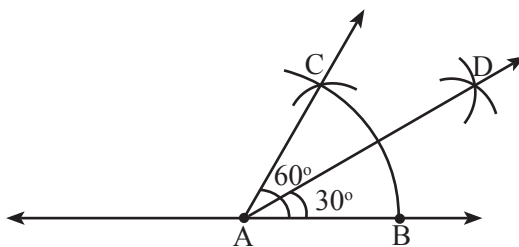
Step 1: Draw a line. Mark a point A on it.

Step 2: With A as center draw an arc of convenient radius to the line at a point B.

Step 3: With the same radius and B as center, draw an arc to cut the previous arc at C.

Step 4: With the same radius and C as center, draw an arc to cut the arc drawn in step 2 at D.

Step 5: Join AD. Then $\angle BAD$ is the required angle with measure 120° .

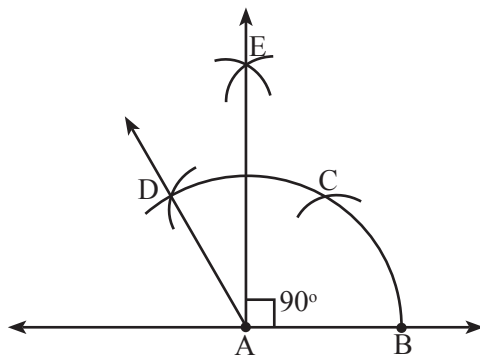
(iii) 30° **Construction:**

Step 1: Construct angle 60° [Refer Construction of angle of measure 60° (i)].

Step 2: With B as center, draw an arc of convenient radius in the interior of $\angle BAC$.

Step 3: With the same radius and C as center, draw an arc to cut the previous arc at D.

Step 4: Join AD. Then $\angle BAD$ is the required angle with measure 30° .

(iv) 90° 

Construction:

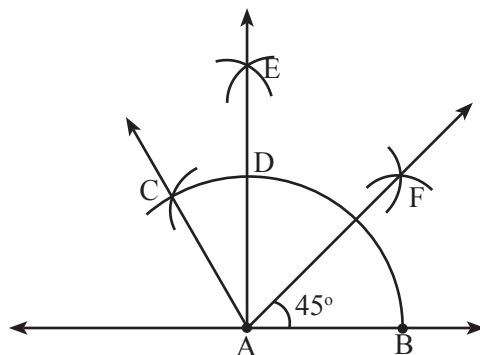
Step 1: Construct angle 120° [Refer Construction of angle of measure 120° (ii)].

Step 2: With C as center, draw an arc of convenient radius in the interior of $\angle CAD$.

Step 3: With the same radius and D as center, draw an arc to cut drawn in step 3 at E.

Step 4: Join AE. Then $\angle BAD = 90^\circ$ is the required angle

(v) 45°

**Construction:**

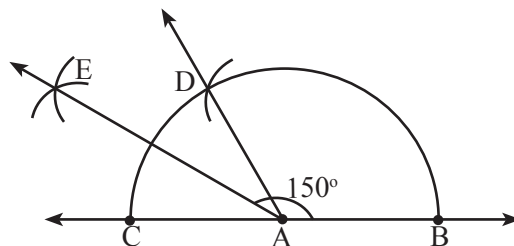
Step 1: Construct angle 90°

Step 2: With B as center, draw an arc of convenient radius in the interior of $\angle BAE$.

Step 3: With the same radius and D as center, draw an arc to cut drawn in step 3 at E.

Step 4: Join AF. Then $\angle BAF = 45^\circ$ is the required angle

(vi) 150°

**Construction:**

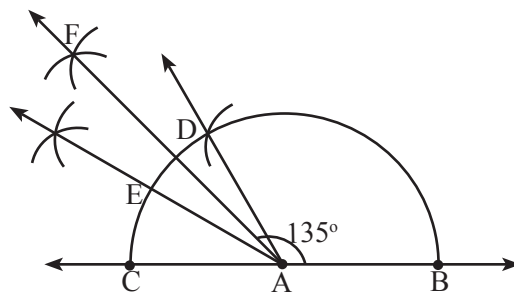
Step 1: Draw a line mark a point A on it.

Step 2: With A as center, draw an arc of convenient radius to the line to meet at a point B and meet at another side at the point C.

Step 3: With the same radius and C as center, draw an arc to cut the previous arc at D.

Step 3: With the same radius and D as the center, draw an arc to cut draw in step 3 in E.

Step 4: Join IE. Then $\angle BAE = 150^\circ$.

(vii) 135° **Construction:****Step 1:** Construct an angle 150° **Step 2:** With center, draw an arc of convenient radius in the interior of $\angle CAE$.**Step 3:** With the same radius and E as center, draw an arc to cut drawn in step 3 at F.**Step 4:** Join AF. Then $\angle BAF = 135^\circ$ is the required angle.**Exercise 5.6****B.P.No. 81****Miscellaneous Practice Problems****1. Find the value of x if $\angle AOB$ is a right angle.****Solution:**

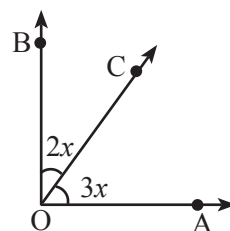
Given $\angle AOB = 90^\circ$

i.e $3x + 2x = 90^\circ$

$$5x = 90^\circ$$

$$x = \frac{90^\circ}{5}$$

$$x = 18^\circ$$

**2. In the given figure, find the value of x .****Solution:**

$$\angle AOB + \angle COB = 180^\circ$$

$$2x + 23 + 3x - 48 = 180^\circ$$

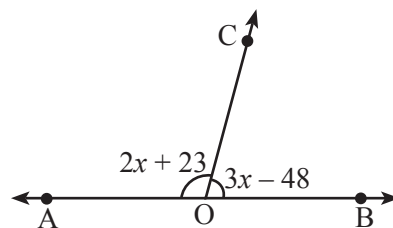
$$5x - 25 = 180^\circ$$

$$5x = 180 + 25$$

$$5x = 205$$

$$x = \frac{205}{5}$$

$$x = 41^\circ$$



3. Find the value of x , y and z

Solution:

$$\angle BOD = \angle COA$$

$$x = z + 10 \text{ ————— (1)}$$

$$\angle BOC = \angle DOA$$

$$3x + 40 = y + 30 \text{ ————— (2)}$$

$$\angle DOC = 180^\circ$$

$$x + 3x + 40 = 180^\circ$$

$$4x + 40^\circ = 180^\circ$$

$$4x = 180 - 40 = 140$$

$$x = 35 \text{ ————— (3)}$$

(3) in (1)

$$x = z + 10$$

$$35 = z + 10$$

$$z = 35 - 10$$

$$z = 25^\circ$$

(3) in (2)

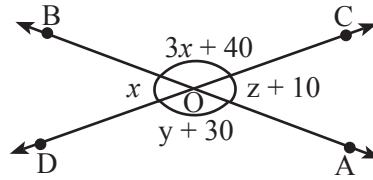
$$3(35) + 40 = y + 30$$

$$145 = y + 30$$

$$y = 145 - 30$$

$$y = 115^\circ$$

$$x = 35^\circ, y = 115^\circ, z = 25^\circ$$



4. Two angles are in the ratio 11: 25. If they are linear pair, find the angles.

Solution:

Let the angles be $11x$ and $25x$.

Since they are linear pair of angles their sum is 180° .

$$11x + 25x = 180^\circ$$

$$36x = 180^\circ$$

$$x = \frac{180}{36}$$

$$x = 5^\circ$$

The angles are

$$11x = 11 \times 5 = 55^\circ$$

$$25x = 25 \times 5 = 125^\circ$$

5. Using the figure, answer the following questions and justify your answer.

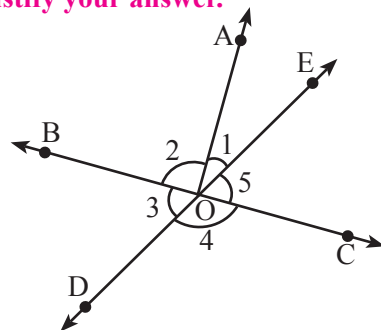
(i) Is $\angle 1$ adjacent to $\angle 2$?

(ii) Is $\angle AOB$ adjacent to $\angle BOE$?

(iii) Does $\angle BOC$ and $\angle BOD$ form a linear pair?

(iv) Are the angles $\angle COD$ and $\angle BOD$ supplementary?

(v) Is $\angle 3$ vertically opposite to $\angle 1$?



Solution:

i) Yes, OA is common arm and their interior are not overlapping.

ii) No, interior are overlapping.

iii) No, Since $\angle BOC + \angle BOD < 180^\circ$

It is not a linear pair.

iv) Yes, it is supplementary.

v) No, $\angle 1$, $\angle 3$ is a non-adjacent angles.

6. In the figure POQ, ROS and TOU are straight lines. Find the x° .

Solution:

TOU is straight line

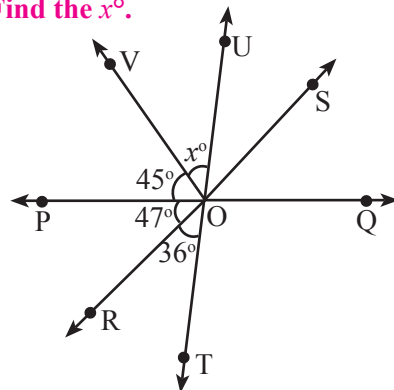
$$\text{i.e. } \angle UOV + \angle VOP + \angle POR + \angle ROT = 180^\circ$$

$$x^\circ + 45^\circ + 47^\circ + 36^\circ = 180^\circ$$

$$x^\circ + 128^\circ = 180^\circ$$

$$x^\circ = 180 - 128$$

$$x = 52^\circ$$

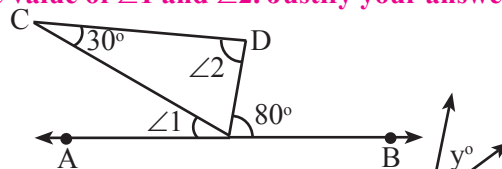


7. In the figure AB is parallel to DC. Find the value of $\angle 1$ and $\angle 2$. Justify your answer.

Solution:

$\angle 2 = 80^\circ$ (alternate interior angles)

$\angle 1 = 30^\circ$ (alternate interior angles)



8. In the figure AB is parallel to CD. Find x , y and z .

Solution:

$z^\circ = 42^\circ$ (alternate interior angles)

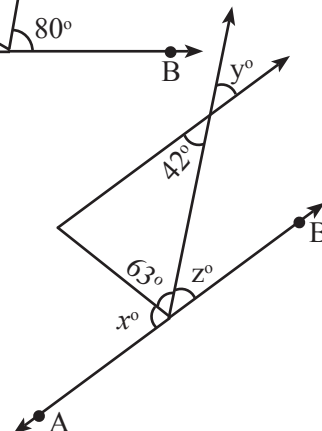
and $y^\circ = 42^\circ$ (vertically opposite angles)

$$x^\circ + 63^\circ + z^\circ = 180^\circ$$

$$x^\circ + 63^\circ + 42^\circ = 180^\circ$$

$$x^\circ + 105^\circ = 180^\circ$$

$$x^\circ = 180^\circ - 105^\circ$$



$$x^\circ = 75^\circ$$

$$x^\circ = 75^\circ, y^\circ = 42^\circ, z^\circ = 42^\circ$$

9. Draw two parallel lines and a transversal. Mark two alternate interior angles G and H. If they are supplementary, what is the measure of each angle?

Solution:

Given G and H are supplementary

$G = H$ (alternate interior angles)

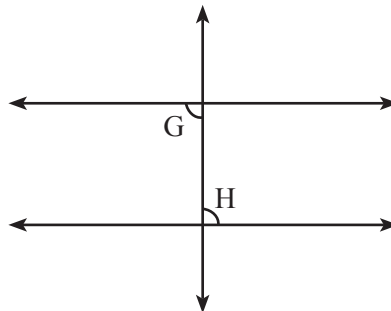
$$G + H = 180^\circ$$

$$G + G = 180^\circ \quad (G = H)$$

$$G = 90^\circ$$

$$H = 90^\circ$$

Each angle = 90°



10. A plumber must install pipe 2 parallel to pipe 1. He knows that $\angle 1$ is 53° . What is the measure of $\angle 2$?

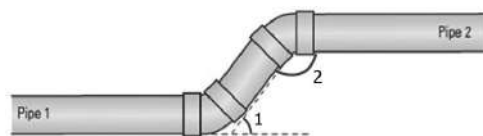
Solution:

$$\angle 1 + \angle 2 = 180^\circ$$

$$53 + \angle 2 = 180^\circ$$

$$\angle 2 = 180^\circ - 53^\circ$$

$$= 127^\circ$$



Challenge Problems

11. Find the value of y .

Solution:

$$\angle POX = 180^\circ$$

$$\angle QOR + \angle ROS + \angle SOT + \angle TOP = 180^\circ$$

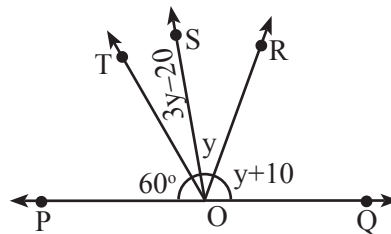
$$y + 10 + y + 3y - 20 + 60 = 180^\circ$$

$$5y + 50 = 180^\circ$$

$$5y = 130$$

$$y = \frac{130}{5}$$

$$y = 26$$



12. Find the value of z .

Solution:

angles at a points are 360°



i.e $\angle QOM + \angle MON + \angle NOP + \angle POQ = 360^\circ$

$$4z - 25 + z + 10 + 2z - 5 + 3z = 360$$

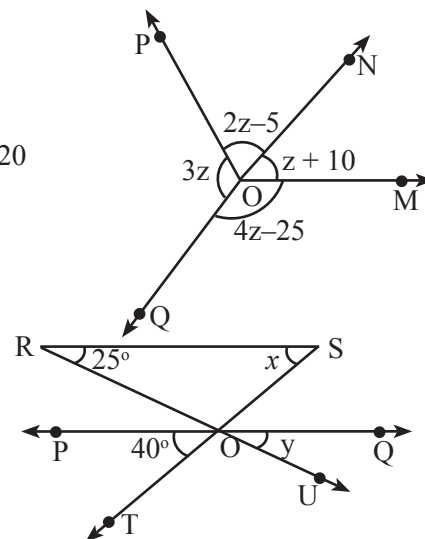
$$9z - 20 = 360$$

$$10z = 360 + 20$$

$$10z = 380$$

$$z = \frac{380}{10}$$

$$z = 38^\circ$$



13. Find the value of x and y if RS is parallel to PQ .

Solution:

$$x = 40^\circ \text{ (alternate interior angle)}$$

$$y = 25^\circ \text{ (alternate interior angle)}$$

14. Two parallel lines are cut by a transversal. For each pair of interior angles on the same side of the transversal, if one angle exceeds the twice of the other angle by 48° . Find the angles.

Solution:

Let one of the pair angle is x° .

One angle exceeds the twice of the other angle by 48° .

i.e $2x + 48^\circ$.

$$\text{Pair of interior angles} = 180^\circ$$

$$x + (2x + 48^\circ) = 180^\circ$$

$$3x + 48^\circ = 180^\circ$$

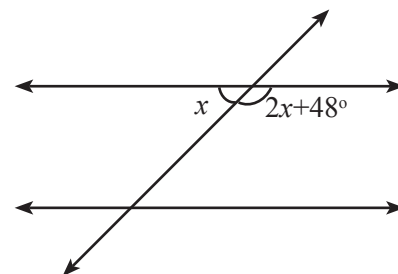
$$3x = 180 - 48^\circ$$

$$3x = 132^\circ$$

$$x = \frac{132}{3}$$

$$x = 44^\circ$$

$$\text{Other angle} = 2x + 48^\circ = 2(44) + 48^\circ = 88 + 48 = 132^\circ$$



15. In the figure, the lines GH and IJ are parallel. If $\angle 1 = 108^\circ$ and $\angle 2 = 123^\circ$, find the value of x , y and z .

Solution:

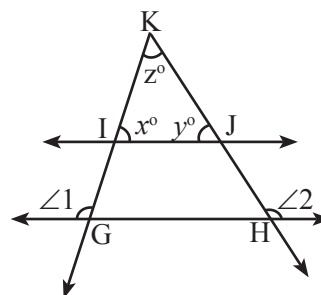
Given $\angle 1 = 108^\circ$

$$x^\circ + \angle 1 = 180^\circ$$

$$x^\circ = 180^\circ - 108^\circ$$

$$x^\circ = 72^\circ$$

$$\angle 2 + y^\circ = 180^\circ$$



$$123^\circ + y^\circ = 180^\circ$$

$$y^\circ = 180^\circ - 123$$

$$y^\circ = 57^\circ$$

$$x^\circ + y^\circ + z^\circ = 180^\circ$$

$$72^\circ + 57^\circ + z^\circ = 180^\circ$$

$$129 + z^\circ = 180^\circ$$

$$z^\circ = 180^\circ - 129^\circ$$

$$z = 51^\circ$$

$$x^\circ = 72^\circ, y^\circ = 57^\circ, z^\circ = 51^\circ$$

16. In the parking lot shown, the lines that mark the width of each space are parallel. If $\angle 1 = (x+39)^\circ$, $\angle 2 = (2x-3y)^\circ$, find x and y .

Solution:

$$\angle 1 + 65^\circ = 180^\circ$$

$$x + 39^\circ + 65^\circ = 180^\circ$$

$$x + 104^\circ = 180^\circ$$

$$x = 180^\circ - 104^\circ$$

$$x = 76^\circ$$

$$\angle 2 = 65^\circ$$

$$2x - 3y = 65^\circ$$

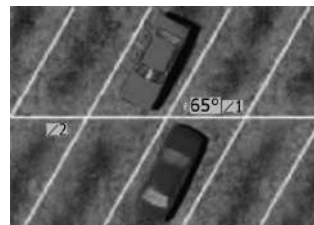
$$2(76) - 3y = 65^\circ$$

$$-3y = 65 - 152$$

$$-3y = -87$$

$$y^\circ = 29^\circ$$

$$x = 76^\circ \quad y = 29^\circ$$



17. Draw two parallel lines and a transversal. Mark two corresponding angles A and B. If $\angle A = 4x$ and $\angle B = 3x + 7$, find the value of x . Explain..

Solution:

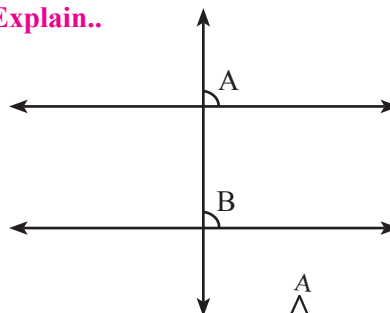
A and B are corresponding angles.

$$\angle A = \angle B$$

$$4x = 3x + 7$$

$$4x - 3x = 7$$

$$x = 7^\circ$$



18. In the figure AB is parallel to CD. Find x° , y° and z° .

Solution:

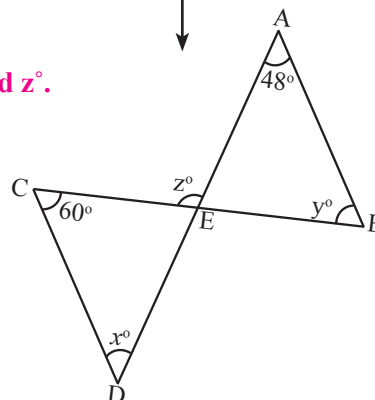
$$y^\circ = 60^\circ \text{ (alternate angle)}$$

$\triangle ABE$

$$\angle EAB + \angle ABE + \angle BEA = 180^\circ$$

$$48^\circ + y^\circ + \angle BEA = 180^\circ$$

$$48^\circ + 60^\circ + \angle BEA = 180^\circ$$



$$\begin{aligned}
 108^\circ + \angle BEA &= 180^\circ \\
 \angle BEA &= 180^\circ - 108^\circ \\
 &= 72^\circ \\
 z^\circ + \angle BEA &= 180^\circ \\
 z^\circ + 72^\circ &= 180^\circ \\
 z^\circ &= 180^\circ - 72^\circ \\
 z^\circ &= 108^\circ
 \end{aligned}$$

$\angle CED = \angle BEA$ (Vertically opposite angles)

$$\angle CED = 72^\circ$$

$\triangle CED$

$$\begin{aligned}
 60^\circ + 72^\circ + x^\circ &= 180^\circ \\
 132^\circ + x^\circ &= 180^\circ \\
 x^\circ &= 180 - 132 \\
 x^\circ &= 48^\circ
 \end{aligned}$$

$$x^\circ = 48^\circ, \quad y^\circ = 60^\circ, \quad z^\circ = 108^\circ.$$

19. Two parallel lines are cut by a transversal. If one angle of a pair of corresponding angles can be represented by 42° less than three times the other. Find the corresponding angles.

Solution:

One angles of a pair of corresponding angles can be represented by 42° less than three times the other.

Let One of the angle is x .

$$\text{i.e. } x = 3x - 42$$

$$x - 3x = -42$$

$$-2x = -42$$

$$x = \frac{-42}{-2}$$

$$x = 21^\circ$$

20. In the given figure, $\angle 8 = 107^\circ$, what is the sum of the $\angle 2$ and $\angle 4$?

Solution:

$$\angle 8 = \angle 2 \text{ (alternate exterior angles)}$$

$$\text{Given } \angle 8 = 107^\circ$$

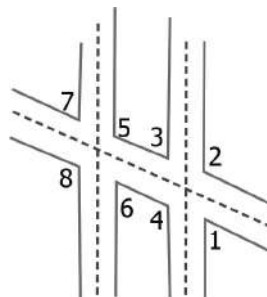
$$\angle 2 = 107^\circ$$

$$\angle 4 = \angle 2$$

$$\angle 4 = 107^\circ$$

$$\angle 4 + \angle 2 = 107 + 107 = 214^\circ$$

$$\text{Sum of } \angle 2 \text{ and } \angle 4 = 214^\circ$$





Unit Test

5. Geometry

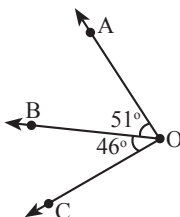
Time: 30 mins.

Marks: 20

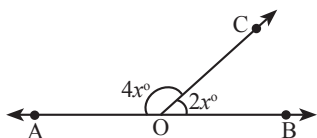
I. Answer any four questions.

4×2=8

1. In the figure find $\angle AOC$

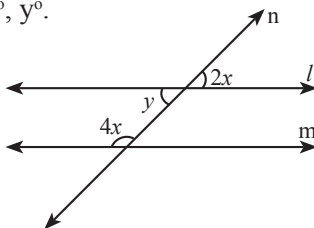


2. Calculate the value of x°



3. Two angles are in the ratio 3:2. If they are linear pair, find them.

4. If l and m are parallel find x° , y° .

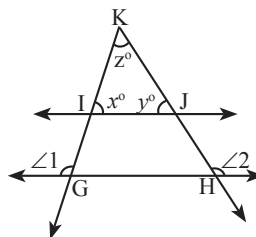


5. Draw two parallel and transversal mark two corresponding angles A and B. If $\angle A = 4x$ and $\angle B = 3x + 7$, find the value of x . Explain.

II. Answer any three questions.

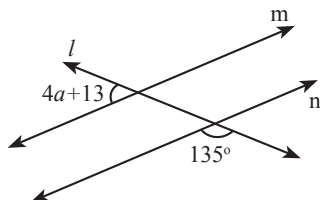
3×4=12

6. In the figure, the line GH and IJ are parallel. If $\angle 1 = 108^\circ$ and $\angle 2 = 123^\circ$, find the value of x , y and z .



7. i) The angles at a point are x° , $2x^\circ$, $3x^\circ$, $4x^\circ$ and $5x^\circ$. Find the value of the largest angle.

ii)

Find the value of a .

8. Construct a perpendicular bisector of the line segment $AB = 8$ cm using scale and compass.
9. Construct 90° using ruler and compass only.



UNIT

6

INFORMATION PROCESSING

Activity

B.P.No. 109

Discuss the properties of numbers circled in the shaded shape shown in the calendar. Identify more such shapes.

AUGUST 2019						
SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Solution:

AUGUST 2019						
SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Activity

B.P.No. 110

1. Complete the given sequence.

i)

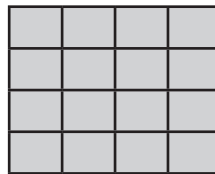
--	--	--	--	--

ii)

--	--	--	--	--



2. Find the number of all possible squares that can be formed from the Fig. 6.6.



Solution:

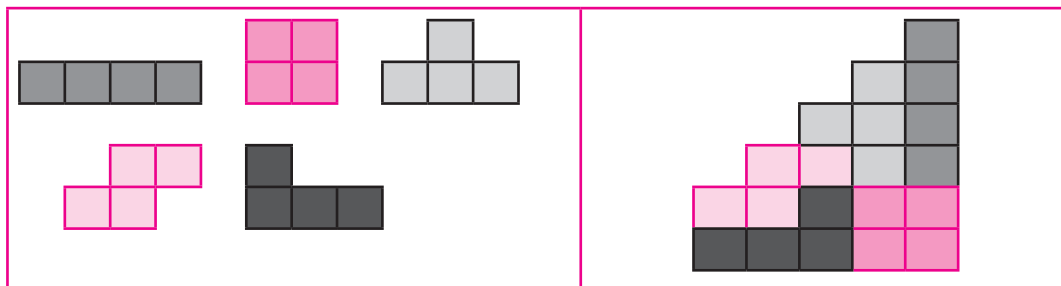
22 square

Tetrominoes:

Try This

B.P.No. 111

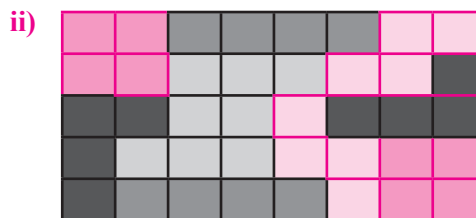
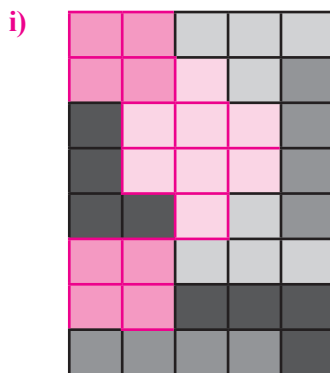
Use the given five tetrominoes only once and create the shape given below.



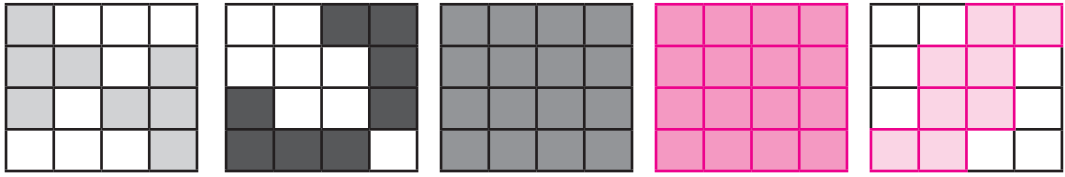
Try These

B.P.No. 113

1. Complete the rectangles given below using the five tetrominoes only once.



2. In Fig 6.16 one 4 x 4 square is filled by a tetromino shape 'T'. In the same way try to fill the other 4 x 4 square grids (Fig.6.17 to Fig.6.20) using the other four tetrominoes (I, O, L, and S). Find which tetromino shape cannot fill the 4 x 4 square grid completely.



6.17 and 6.20 are cannot fill the 4×4 square grid tetromino shape.

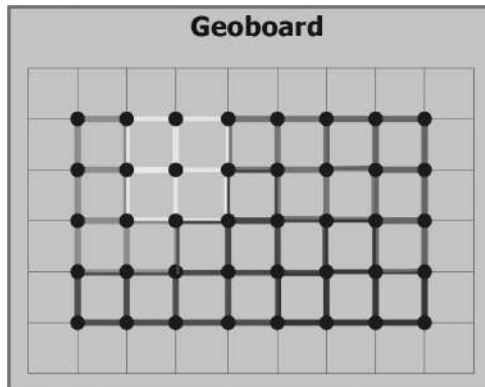
Example 6.1

B.P.No. 113

Find the tetromino shapes found in the showcase given in Fig.6.21 below. Form the same shape in the geoboard using rubberbands.



Solution:



Example 6.2

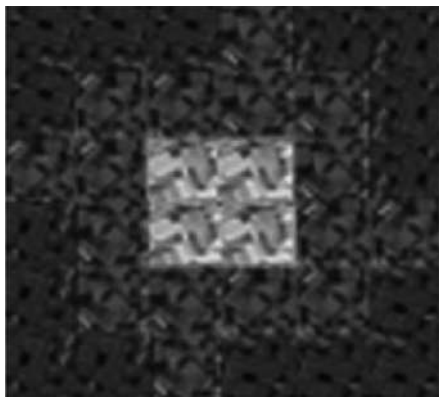
B.P.No. 113

Raghavan wants to change the front elevation of his house using the tiles made up of tetromino shapes (  ).

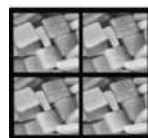
1. How many tetrominoes are there in a tile  ?
2. If the cost of a square tile is ` 52 then what will be the cost of the tiles that Raghavan buys for the front elevation? (see Fig. 6.22)

**Solution:**

1.



In one tile there are



= 1 tetromino



= 4 tetrominoes



= 4 tetrominoes

Therefore, there are nine tetrominoes in a tile.

2. Given, the cost of a tile is ₹ 52

There are six tiles in the front elevation

Therefore, the total cost = $6 \times 52 = ₹ 312$ **Exercise 6.1****B.P.No. 114**

1. A tetromino is a shape obtained by _____ squares together.

Ans: 4

2. Draw a tetromino which passes symmetry _____

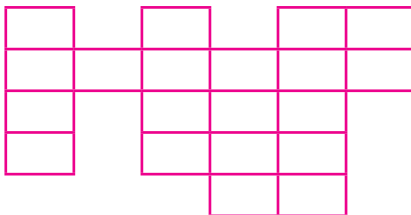
Ans:

3. Complete the table

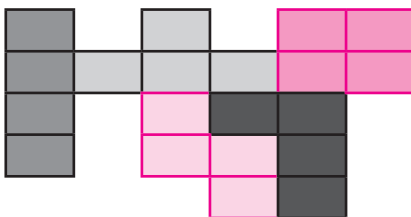
S.No.	Tetro Minoes	Rotation of Tetrominoes°			
		90°	180°	270°	360°
1					

2					
3					

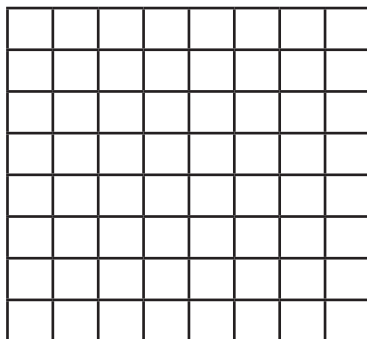
4. Shade the figure completely, by using five Tetromino shapes only once.



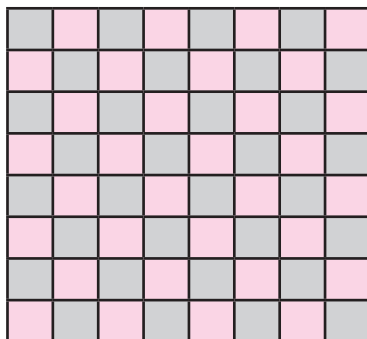
Solution:



5. Using the given Tetromino shaded in two different ways (and), fill the grid in such a way that, no two adjacent boxes have the same colour.



Solution:





6. Match the tetrominoes of same type.

(i)



(ii)



(iii)



(iv)



Ans: i)



ii)



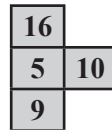
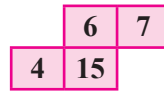
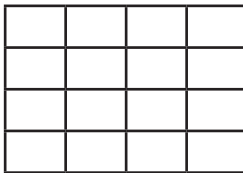
iii)



iv)



7. Using the given tetrominoes with numbers, complete the 4 x 4 magic square .



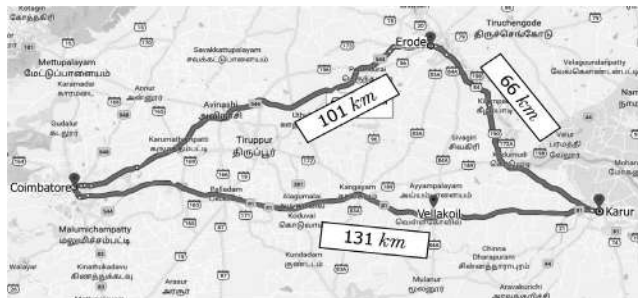
Solution:

16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1

Example 6.3

B.P.No. 118

Madhan has to go to Karur from Coimbatore for an official visit. On his onward journey, he goes via Vellakoil to reach Karur. While returning to Coimbatore he travels via Erode. Both the routes travelled by him are given in the Fig. 6.26. Find the shortest route?



Solution:

Distance travelled by Madhan from Coimbatore to Karur via Vellokoil = 131 km

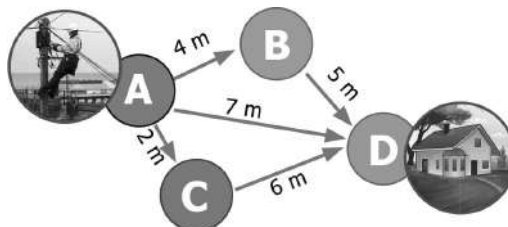
Distance travelled by Madhan from Karur to Coimbatore via Erode = $66 + 101 = 167$ km

Therefore, the route via Vellokoil is the shortest route.

Example 6.4

B.P.No. 118

A telephone exchange worker wants to give the telephone connection to Amutha's house. Fig.6.27 shows all the possibilities of cable connections. Find the route which requires minimum cable?

**Solution:**

Distance from A to D = 7 m

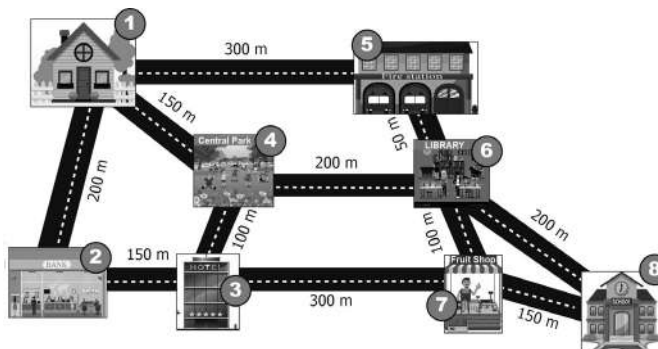
Distance from A to D (via B) = $4 + 5 = 9$ m

Distance from A to D (via C) = $2 + 6 = 8$ m

Therefore, the route directly from A to D requires minimum cable of length 7 m.

Try These

B.P.No. 119

1. Observe the picture and answer the following

- Find all the possible routes from house to school via fire station
- Find all the possible routes between central park and school with distance. Mention the shortest route?
- Calculate the shortest distance between bank and school.

Solution:

- i) a) $(1) \rightarrow (5) \rightarrow (6) \rightarrow (7) \rightarrow (8)$
 b) $(1) \rightarrow (5) \rightarrow (6) \rightarrow (8)$
- ii) a) $(8) \rightarrow (6) \rightarrow (4) = 20 + 200 = 220\text{m}$
 b) $(8) \rightarrow (7) \rightarrow (3) \rightarrow (4) = 150 + 300 + 100 = 550\text{m}$
 c) $(8) \rightarrow (7) \rightarrow (6) \rightarrow (4) = 150 + 100 + 200 = 450\text{m}$

Possible shortest distance

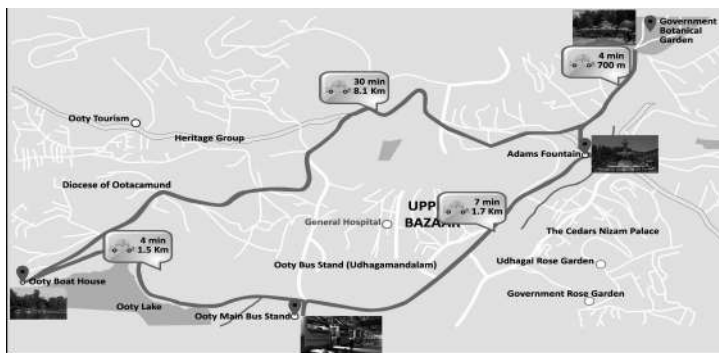
School $\rightarrow$ Library $\rightarrow$ Central bank = 220m

- iii) a) $(2) \rightarrow (3) \rightarrow (7) \rightarrow (8) = 150\text{m} + 300\text{m} + 150\text{m} = 600\text{m}$
 b) $(2) \rightarrow (1) \rightarrow (4) \rightarrow (6) \rightarrow (8) = 200\text{m} + 150\text{m} + 200\text{m} + 20\text{m} = 570\text{m}$
 c) $(2) \rightarrow (1) \rightarrow (4) \rightarrow (3) \rightarrow (7) \rightarrow (8) = 200\text{m} + 150\text{m} + 100\text{m} + 300\text{m} + 150 = 900\text{m}$
 d) $(2) \rightarrow (1) \rightarrow (4) \rightarrow (6) \rightarrow (7) \rightarrow (8) = 200\text{m} + 150\text{m} + 200\text{m} + 100\text{m} + 150 = 800\text{m}$
 e) $(2) \rightarrow (1) \rightarrow (5) \rightarrow (6) \rightarrow (8) = 200\text{m} + 300\text{m} + 50\text{m} + 20\text{m} = 570\text{m}$
 f) $(2) \rightarrow (1) \rightarrow (5) \rightarrow (6) \rightarrow (7) \rightarrow (8) = 200\text{m} + 300\text{m} + 50\text{m} + 100\text{m} + 150 = 800\text{m}$

Two ways are shortest distance between bank and school. that is

- i) Bank $\rightarrow$ house $\rightarrow$ Central park $\rightarrow$ Library $\rightarrow$ School = 570m
 ii) Bank $\rightarrow$ house $\rightarrow$ Fire station $\rightarrow$ Library $\rightarrow$ School = 570m

2. A school has planned for a trip to Ooty. Using the route map, the school decides to visit the places such as Boat House, Adam Fountain and Botanical Garden.



- (i) How much distance you have to travel to Botanical Garden from Ooty Boat House?
- (ii) Find the shortest route to Botanical from the Ooty Main Bus Stand.
- (iii) Mention the direction of Botanical Garden from Adams Fountain.
- (iv) In what direction, Ooty Boat House is situated from Ooty Main Bus Stand.
- (v) Complete the following route map from Ooty Main Bus Stand to Botanical Garden.

Solution:

- i) Botanical Garden from Ooty Boat house

$$\begin{aligned}
 8.1 \text{ km} + 700\text{m} &= 8\text{km } 100\text{m} + 700\text{m} \\
 &= 8 \text{ km } 800 \text{ m} \\
 &= 8.8 \text{ km}
 \end{aligned}$$

- ii) Ooty Bus stand Adam Fountain Botanical Garden

$$\begin{aligned}
 1.7\text{km} + 700\text{m} &= 1\text{km } 700\text{m} + 700\text{m} \\
 &= 1\text{km } 1400\text{m} \\
 &= 2\text{km } 400\text{m} \\
 &= 2.4 \text{ km}
 \end{aligned}$$

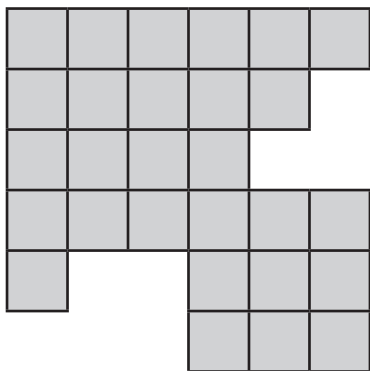
- iii) The direction of Botanical Garden from Ooty Main Bus stand is North.

- iv) The direction, Ooty Boat house is situated Easten side from Main Bus Stand.

- v) Adam fountain

Exercise 6.2**B.P.No. 120****Miscellaneous Practice Problems**

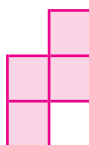
- 1. Make a model of a fish using the given tetromino shapes.**



= 3 times



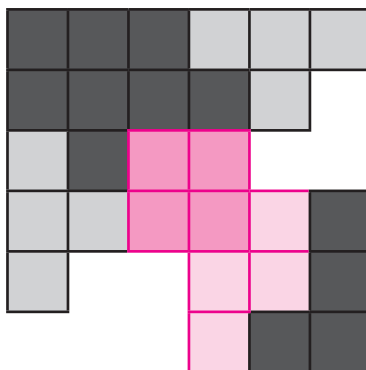
= 2 times



= 1 time

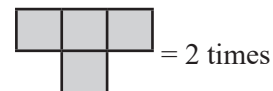
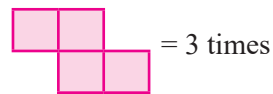
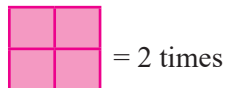
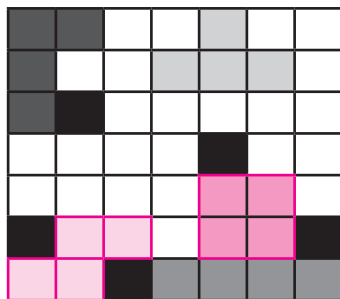


= 1 time

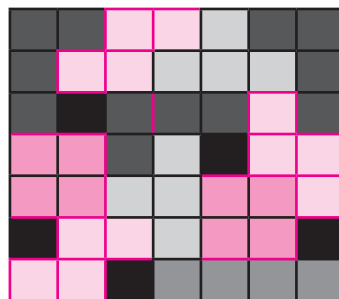
Solution:



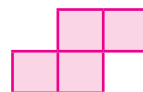
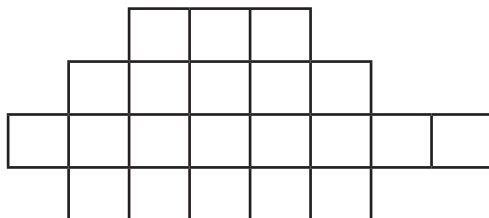
2. Complete the given rectangle using the given tetromino shapes.



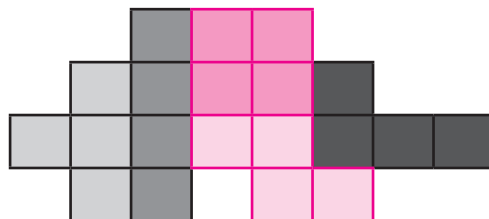
Solution:



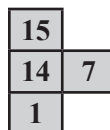
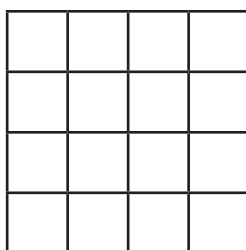
3. Shade the figure completely, by using five Tetromino shapes only once.



Solution:



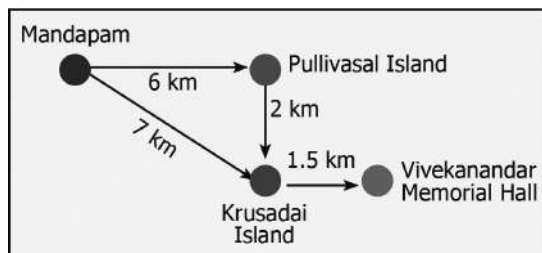
4. Using the given tetrominoes with numbers on it, complete the 4×4 magic square ?



Solution:

16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1

5. Find the shortest route to Vivekanandar Memorial Hall from the Mandapam using the given map.

**Solution:**

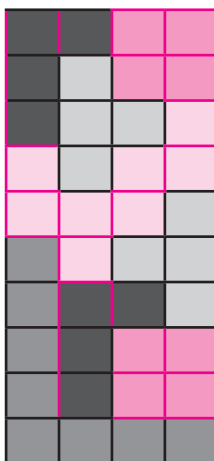
Mandapam → Pullivasal Island → Krusadai Island → Vivekanandar Memorial Hall
 $= 6\text{ km} + 2\text{ km} + 1.5\text{ km} = 9.5\text{ km}$

Mandapam → Krusadai Island → Vivekanandar Memorial Hall
 $= 7\text{ km} + 1.5\text{ km} = 8.5\text{ km}$

Shortest route is Mandapam → Krusadai Island → Vivekanandar Memorial Hall

Challenge Problems

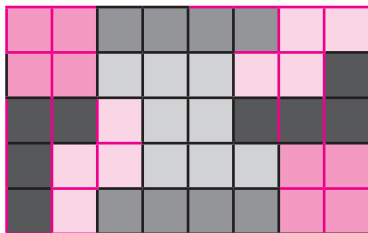
6. Fill in 4×10 rectangle completely, using all the five tetrominoes twice.

Solution:



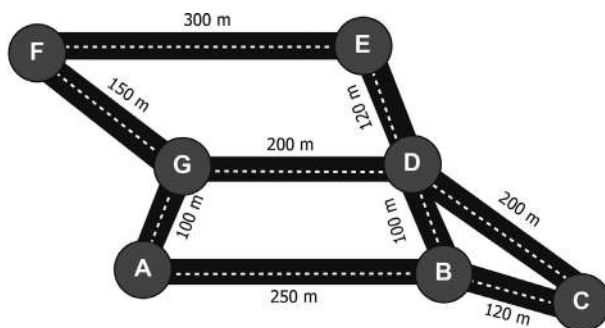
7. Fill in 8×5 rectangle completely, using all the five tetrominoes twice.

Solution:



8. Observe the picture and answer the following.

- Find all the possible routes from A to D.
- Find the shortest distance between E and C.
- Find all the possible routes between B and F with distance. Mention the shortest route.



Solution:

- routes 1 : $A \rightarrow G \rightarrow D$

routes 2 : $A \rightarrow B \rightarrow D$

routes 3 : $A \rightarrow B \rightarrow C \rightarrow D$

routes 4 : $A \rightarrow B \rightarrow C \rightarrow E \rightarrow D$
- $E \rightarrow D \rightarrow B \rightarrow C = 120 + 100 + 120 = 340$ m

$E \rightarrow D \rightarrow C = 120 + 200 = 320$ m

Shortest distance = 320 m
- route 1: $B \rightarrow A \rightarrow G \rightarrow F$

$250 + 100 + 150 = 600$ m

route 2: $B \rightarrow D \rightarrow E \rightarrow F$

$100 + 120 + 300 = 520$ m

route 3: $B \rightarrow D \rightarrow G \rightarrow F$

$100 + 200 + 150 = 450$ m

route 4: $B \rightarrow C \rightarrow D \rightarrow E \rightarrow F$

$120 + 200 + 120 + 300 = 740$ m

route 3 is shortest distance.



Summative Assessment

Time: 2 hours

MATHEMATICS

Marks: 60

I. Choose the correct answer:

5×1=5

1. Identify the problem with negative numbers as its answer:

- i) $-9+(-5)+6$ ii) $8+(-12)-6$ iii) $-4+2+10$ iv) $-4+2+10$

2. $(-200) \div 10$ is

- i) 20 ii) -20 iii) -190 iv) 210

3. In an expression we can add or subtract only.

- i) like terms ii) Unlike terms iii) All terms iv) None of the above

4. 12 cows can graze a field for 10 days 20 cows can graze the same field for _____ days.

- i) 15 ii) 18 iii) 6 iv) 8

5. The sum of all angles at a point is

- i) 360° ii) 180° iii) 90° iv) 0

II. Fill in the blanks:

5×1=5

6. $75 + (-25) =$ _____.
 7. A parallelogram with one pair of non-parallel sides is _____.
 8. The additive inverse of $-37xy$ is _____.
 9. If 40 workers can do a project work in 8 days, then _____ workers can do it in 4 days.
 10. A line which intersects two or more lines in different points is known as _____.

III. Say True or False:

5×1=5

11. $8 \times (-4) = 32$
 12. Area of trapezium is $\frac{1}{2}h(a+b)$
 13. The expression $8x+3y$ and $7x+2y$ can not be added.
 14. The lines which intersect at right angles are perpendicular line.
 15. The quotient of two integers having opposite sign is a negative integer.

IV. Match the following:

5×1=5

16. 999×0 – Right angle
 17. Area of parallelogram – $10xy$
 18. $(6xy) - (-4xy)$ – $7b$
 19. 90° – same size
 20. Vertically opposite – 0

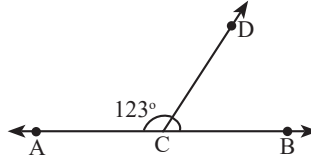
V. Answer any Ten questions:

5×2=10

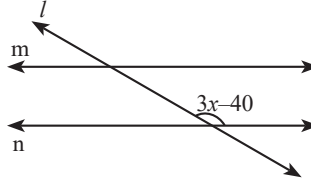
21. From the ground floor a man went up six floors and came down six floors. In which floor is he now?
 22. $3 \times [(-4) + (-10)]$ and $[3 \times (-4) + 3 \times (-10)]$ equal? mention the property?
 23. One of the side and the corresponding height of the parallelogram are 12m and 8m respectively. Find the area of the parallelogram?
 24. Find the height of the trapezium whose parallel sides are 13 cm and 28 cm and area is 492 sq.cm.
 25. $p = 5$, $q = 6$, then find $pq - p - q$?
 26. Solve: $7x + 10 = 80$
 27. If $c = kd$,
 i) find k when $C = 30$, and $d = 6$, ii) find C , when $d = 10$



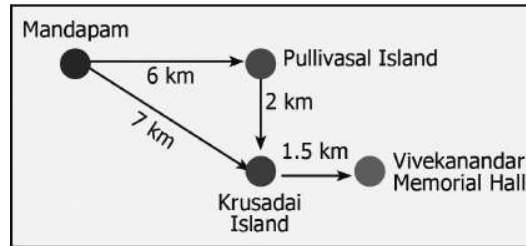
28. Find the missing angle.



29. Two angles are in the ratio 3:2. If they are linear pair. find them.
30. Find the value of x .



31. Find the shortest route to Vivekanandar Memorial Hall from the Mandapam using the given up.



32. What should be added to $5a-3b+2c$ to get $a-4b-2c$?

VI. Answer any Five questions:

5×3=15

33. Kabilan was having 10 pencil with him. He gave 2 pencil to Senthil and 23 to Karthick. Next day his father gave him 6 more pencils. from that he gave 8 to his sister. How many pencil are left with him?
34. The price of an item x increase by ₹10 every year and an item y decreases by ₹15 every year. If in 2018, the price of x is ₹50 and y is ₹90, then which item will be costlier in the year 2020.
35. The base of the parallelogram is thrice its height. If the area is 192 sq. cm find the base and height?
36. A window is in the form of trapezium whose parallel sides are 105 cm and 50 cm respectively and the distance between the parallel sides is 60 cm. Find the cost of the glass used to cover the window at the rate of ₹15 per 100 sq. cm.
37. Simplify: $100x + 99y - 98z + 10x + 10y + 10z - x - y + z$
38. Find two consecutive odd numbers whose sum is 200.
39. A toy company requires 36 machine to produce car toys in 54 days. How many machine would be required to produce the same number of car toys in 81 days?

VII. Answer any one question:

1×5=5

40. Construct 110° angle. Using protractor and draw a bisector to each of the angle using ruler and compass.

(OR)

Construct 90° angle using ruler and compass only.

