Full Book

SURA'S

Mathematics

7th Standard

Based on the New Textbook & New Syllabus for 2019-20

TERM - II

Salient Features :

- Term-wise Guide as per the New Textbook for the year 2019-20, Term - II
- Complete Solutions to Textbook Exercises.
- Exhaustive Additional Questions in all Units.
- Chapter-wise Unit Tests.

SURA PUBLICATIONS

Chennai

Chapter 1

Number System

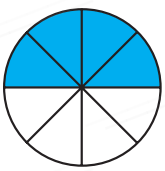
Representing a Decimal Number

- $\frac{1}{10}$ (one-tenth of a unit can be written as 0.1 in decimal notation)
- The dot represents the decimal point and it comes between ones place and tenths place.
- The place value of the decimal digits of a number are tenths $\left(\frac{1}{10}\right)$, hundredths $\left(\frac{1}{100}\right)$, thousandths $\left(\frac{1}{1000}\right)$ and so on.

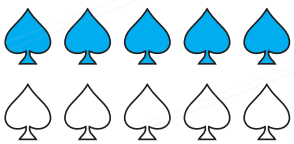
TRY THESE

(Text book Page No. 2)

1. Observe the following and write the fraction of the shaded portion and mention in decimal form also.

(i) 

(ii) 

(iii) 

Sol : (i) Total parts = 8

Shade d parts = 4

Fraction of the shaded portion = $\frac{4}{8}$

Decimal form of $\frac{4}{8}$ is 0.5

$$\begin{array}{r} 0.5 \\ 8\overline{)4.0} \\ \underline{40} \\ 0 \end{array}$$

(ii) Total parts = 10

Shaded parts = 3

Fraction of the shaded portion = $\frac{3}{10}$

Decimal form of $\frac{3}{10}$ is 0.3

$$\begin{array}{r} 0.3 \\ 10\overline{)3.0} \\ \underline{30} \\ 0 \end{array}$$

Think

(Text book Page No. 9)

1. Can you express the denominators of all fractions as powers of 10?

Sol : No, we cannot.

Eg: $\frac{1}{3}, \frac{1}{7}$

TRY THESE

(Text book Page No. 10)

1. Convert the following fractions into the decimal numbers.

(i) $\frac{16}{1000}$ **(ii)** $\frac{638}{10}$ **(iii)** $\frac{1}{20}$ **(iv)** $\frac{3}{50}$

Sol : (i) $\frac{16}{1000} = 0.016$

(ii) $\frac{638}{10} = 63.8$

(iii) $\frac{1}{20} = \frac{1\times5}{20\times5} = \frac{5}{100} = 0.05$

(iv) $\frac{3}{50} = \frac{3\times2}{50\times2} = \frac{6}{100} = 0.06$

2. Write the fraction for each of the following:

(i) 6 hundreds + 3 tens + 3 ones + 6 hundredths + 3 thousandths.

(ii) 3 thousands + 3 hundreds + 4 tens + 9 ones + 6 tenths.

Sol : (i) 6 hundreds + 3 tens + 3 ones + 6 hundredths + 3 thousandths.

$= 6 \times 100 + 3 \times 10 + 3 \times 1 + 0 \times \frac{1}{10} + 6 \times \frac{1}{100} + 3 \times \frac{1}{1000}$

$= 600 + 30 + 3 + 0 + \frac{6}{100} + \frac{3}{1000}$

$= 633 + 0.06 + 0.003$

$= 633.063$

(ii) 3 thousands + 3 hundreds + 4 tens + 9 ones + 6 tenths.

$= 3 \times 1000 + 3 \times 100 + 4 \times 10 + 9 \times 1 + 6 \times \frac{1}{10}$

$= 3000 + 300 + 40 + 9 + \frac{6}{10}$

$= 3349 + 0.6$

$= 3349.6$

Objective Type Questions

9. $3+\frac{4}{100}+\frac{9}{1000}=?$

(i) 30.49 (ii) 3049 (iii) 3.0049 (iv) 3.049

Hint: $3\times1+\frac{0}{10}+\frac{4}{100}+\frac{9}{1000}=3.049$ **[Ans : (iv) 3.049]**

10. $\frac{3}{5}=$ _____

(i) 0.06 (ii) 0.006 (iii) 6 (iv) 0.6 **[Ans : (iv) 0.6]**

Hint: $\frac{3}{5}=\frac{3\times2}{5\times2}=\frac{6}{10}=0.6$

11. **The simplest form of 0.35 is**

(i) $\frac{35}{1000}$ (ii) $\frac{35}{10}$ (iii) $\frac{7}{20}$ (iv) $\frac{7}{100}$ **[Ans : (iii) $\frac{7}{20}$]**

Hint: $0.35=\frac{35}{100}=\frac{35\div5}{100\div5}=\frac{7}{20}$

ADDITIONAL QUESTIONS

1. **Explain the following as fractions.**

(i) **A jar containing 3.6 litres of milk.**

(ii) **A cup containing 9.63 mg of medicine.**

Sol : (i) $3.6 = 3+\frac{6}{10} = 3+\frac{3}{5} = 3\frac{3}{5}$ litres of milk

(ii) $9.63 = 9+\frac{6}{10}+\frac{3}{100} = \frac{900+60+3}{100} = \frac{963}{100}$ mg of medicine.

2. **Convert into decimal.**

(i) **Three hundred three and nine hundredths.**

(ii) **Six and fifty five thousands**

Sol : (i) Three hundred three and nine hundredths

$= 303+\frac{9}{100} = 303+0\times\frac{1}{10}+9\times\frac{1}{100} = 303.09$

(ii) Six and fifty five thousandths

$= 6\frac{55}{1000}+\frac{5}{100}+\frac{5}{1000}$

$= 6+\frac{0}{10}+\frac{5}{100}+\frac{5}{1000} = 6.055$

Representing Decimal Numbers on the Number line

Division of Integers

TRY THESE

(Text book Page No. 22)

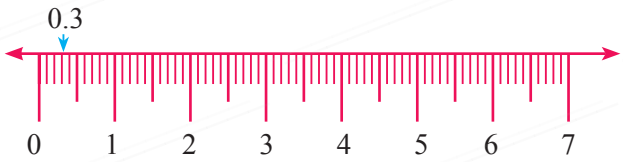
1. Mark the following decimal numbers on the number line.

(i) 0.3 (ii) 1.7 (iii) 2.3

Sol : (i) 0.3

We know that 0.3 is more than 0, but less than 1.

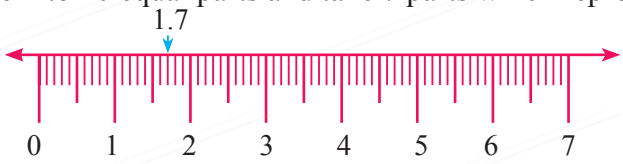
There are 3 tenths in it. Divide the unit lenght between 0 and 1 on the number line into 10 equal parts and take 3 parts, which represent 0.3.



(ii) 1.7

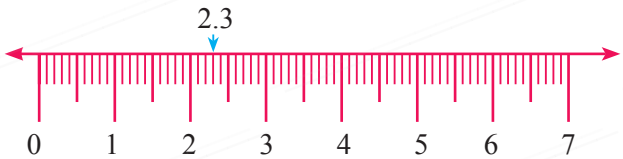
We know that 1.7 is more than 1, but less than 2.

There are one ones and 7 tenths in it. Divide the unit length between 1 and 2 on the number line into 10 equal parts and take 7 parts which represents 1.7 = 1 + 0.7



(iii) We know that 2.3 is more than 2 and less than 3.

There are 2 ones and 3 tenths in it. Divide the unit lengh between 2 and 3 into 10 equal parts and take 3 parts, which represents 2.3 = 2 + 0.3



2. Identify any two decimal numbers between 2 and 3.

Sol : 2.5 and 2.9

3. Write any decimal number which is greater than 1 and less than 2.

Sol : 1.7, 1.9, 1.6,.....

Exercise 1.5

Miscellaneous Practice problems

1. **Write the following decimal numbers in the place value table.**

(i) **247.36** **(ii)** **132.105**

Sol :

(i)

247.36	Hundreds	Tens	Ones	Tenths	Hundredths
	2	4	7	3	6

(ii)

132.105	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
	1	3	2	1	0	5

2. **Write each of the following as decimal number.**

(i) $300 + 5 + \frac{7}{10} + \frac{9}{100} + \frac{2}{100}$ **(ii)** $1000 + 400 + 30 + 2 + \frac{6}{10} + \frac{7}{100}$

Sol :

(i) $300 + 5 + \frac{7}{10} + \frac{9}{100} + \frac{2}{100} = 305.792$

(ii) $1000 + 400 + 30 + 2 + \frac{6}{10} + \frac{7}{100} = 1432.67$

3. **Which is greater?**

(i) **0.888 (or) 0.28** **(ii)** **23.914 (or) 23.915**

Sol : (i) 0.888 (or) 0.28

The whole number parts is equal for both the numbers.

Comparing the digits in the tenths place we get, $8 > 2$.

$\therefore 0.888 > 0.28$

0.888 is greater.

(ii) 23.914 or 23.915

The whole number part is equal in both the numbers.

Also the tenth place and hundredths place are also equal.

$\therefore$ Comparing the thousandths place, we get $5 > 4$.

$23.915 > 23.914$

$\therefore$ 23.915 is greater.

16. **By how much is $\frac{9}{10}$ km less than 1 km. Express the same in decimal form.**

Sol : Given measures are 1 km and $\frac{9}{10}$ km.
i.e., 1 km and 0.9 km.
Difference = 1.0 – 0.9 = 0.1 km.

Unit Text

Time: 1 hr **Max Marks : 25**

I. Choose the best answer from the options given below. **5 × 1 = 5**

1. **Lowest form of decimal 0.005 is**

(i) $\frac{3}{1000}$ (ii) $\frac{1}{200}$ (iii) $\frac{2}{200}$ (iv) $\frac{5}{100}$

2. **Which of the following decimals is the smallest?**

(i) 0.37 (ii) 1.52 (iii) 0.087 (iv) 0.105

3. **The decimal 0.238 is equal to**

(i) $\frac{119}{500}$ (ii) $\frac{238}{25}$ (iii) $\frac{119}{25}$ (iv) $\frac{119}{50}$

4. **0.7499 lies between**

(i) 0.7 and 0.74 (ii) 0.75 and 0.79
(iii) 0.749 and 0.75 (iv) 0.74992 and 0.75

5. **0.023 lies between**

(i) 0.2 and 0.3 (ii) 0.02 and 0.03
(iii) 0.03 and 0.029 (iv) 0.026 and 0.024

II. Answer the following questions. **5 × 2 = 10**

6. Write three hundred five and four hundredth as decimal form.

7. Write 3.4 as fraction in lowest form.

8. Write $300 + 40 + 5 + \frac{2}{100}$ as decimals.

9. Which is greater 1 or 0.99?

10. Convert 5244 g to kg.

III. Answer the following questions. **2 × 5 = 10**

11. Arrange 12.143, 12.125, 12.105, 12.402 and 12.214 in ascending order.

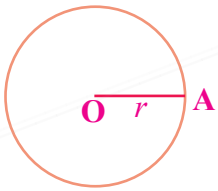
12. Which one is greater 1 m 40 cm + 60 cm or 2.6 m?

Chapter 2

Measurements

Circle

- Circle is a round plane figure whose boundary (the circumference) consists of points equidistant from the fixed point (the centre).
- The equidistance from the centre to the boundary is the radius (r) of the circle.

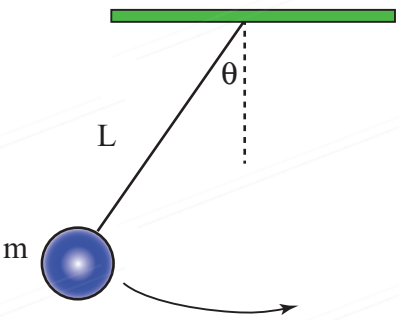


- diameter = 2 × radius
- All circles are similar to one another.
- Distance around the circular region is called circumference or perimeter.
- In circles, the ratio of the circumference to that of diameter is a constant.
- $\frac{\text{circumference}}{\text{Diameter}} = \pi$ (say pi)
- circumference of a circle C = $2\pi r$ units or C = πd
- $\pi = \frac{22}{7}$ or 3.14 approximately

TRY THESE

(Text book Page No. 23)

1. A few real life examples of circular shapes are given below.



Can you give three more examples.

Sol : (i) One and Two rupee coins

(ii) Bangles

(iii) Mouth of Bottle

Perimeter of the circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 5.6$

$= 35.2$ cm

Let the area of a square $= 100$ cm^2

$a^2 = 100$

$a = 10$ cm

Perimeter of a square $= 4a = 4 \times 10 = 40$ cm

Hence $35.2 < 40$

By this example we can see that perimeter of circle < perimeter of square, having the same area.

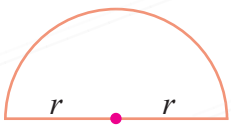
Think

(Text book Page No. 27)

1. Is the circumference of the semicircular arc and semicircular shaped disc same? Discuss.

Sol :

Semi circular arc



Semi circular disc

Circumference of the semicircular arc $= \frac{1}{2} \times 2\pi r = \pi r$ units

But circumference of the semicircular disc $= \frac{1}{2} \times 2\pi r + r + r = \pi r + 2r$

$= r(\pi + 2)$ units

Both are not the same

2. The traffic lights are circular. Why?

Sol : Because the circumference will be smaller and cost of making will be less as the outer size becomes small.

3. When you throw a stone on still water in pond, ripples are circular. Why?

Sol : Waves always travel with a constant speed and so they need to be circular.

Exercise 2.1

1. Find the missing values in the following table for the circles with radius (r), diameter (d) and Circumference (C).

S.No.	radius (r)	diameter (d)	Circumference (C)
(i)	15 cm		
(ii)			1760 cm
(iii)		24 m	

Area of the circular garden = πr^2 sq.units

$= \frac{22}{7} \times \frac{49}{2} \times \frac{49}{2} m^2 = 1,886.5\ m^2$

Cost of levelling a m^2 area = ₹150

∴ Cost of levelling 1886.5 m^2 = ₹150 × 1886.5 = ₹ 2,82,975

Cost of levelling the flower garden = ₹ 2,82,975

9. The floor of the circular swimming pool whose radius is 7 m has to be cemented at the rate of ₹18 per m^2. Find the total cost of cementing the floor.

Sol : Radius of the circular swimming pool r = 7 m

Area of the circular swimming pool A = πr^2 sq. units

$= \frac{22}{7} \times 7 \times 7\ m^2 = 154\ m^2$

Cost of cementing a m^2 floor = ₹ 18.

Cost of cementing 154 m^2 floor = ₹ 18 × 154 = ₹ 2,772

Objective Type Questions

10. The formula used to find the area of the circle is

(i) $4\pi r^2$ (ii) πr^2 (iii) $2\pi r^2$ (iv) $\pi r^2 + 2r$

[Ans: (ii) πr^2]

11. The ratio of the area of a circle to the area of its semicircle is

(i) 2 : 1 (ii) 1 : 2 (iii) 4 : 1 (iv) 1 : 4

[Ans : (i) 2 : 1]

12. Area of a circle of radius 'n' units is

(i) $2\pi r^p$ sq.units (ii) πm^2 sq. units

(iii) πr^2sq. units (iv) πn^2 sq. units **[Ans : (iv) πn^2 sq. units]**

Additional Questions

1. The circumference of two circles are on the ratio 5 : 6. Find the ratio of their areas.

Sol : Let the radii of the given circles be r_1 and r_2.

Let their circumference be C_1 and C_2 respectively

$C_1 = 2\pi r_1$ and $C_2 = 2\pi r_2$

Since $C_1 : C_2 = 5 : 6$

$\therefore (2\pi r_1) : (2\pi r_2) = 5 : 6$

$\frac{2\pi r_1}{2\pi r_2} = \frac{5}{6} \Rightarrow \frac{r_1}{r_2} = \frac{5}{6}$

Area of Pathways

- Area of the circular path = Area of the outer circle – Area of the inner circle
- Area of the circular pathway = $\pi R^2 - \pi r^2 = \pi(R^2 - r^2)$ sq. units

where R and r are radius of the outer and inner circles respectively.

- Area of the rectangular path = Area of the outer rectangle – Area of the inner rectangle
  = LB – lb sq. units

where L, B and *l*, *b* are the length and breadth of outer and inner rectangles respectively.

TRY THESE

(Text book Page No. 35)

(i) If the outer radius and inner radius of the circles are respectively 9 cm and 6 cm, find the width of the circular pathway.

Sol : Radius of the outer circle R = 9 cm

Radius of the inner circle r = 6 cm

Width of the circular pathway = Radius of the outer circle – Radius of the inner circle

= (9 – 6) cm = 3 cm

Width of the circular pathway = 3 cm

(ii) If the area of the circular pathway is 352 sq.cm and the outer radius is 16 cm, find the inner radius.

Sol : Given outer radius R = 16 cm

Area of the circular pathway = $\pi R^2 - \pi r^2$

Area of the circular pathway = 352 sq. cm

$\pi R^2 - \pi r^2 = 352 \text{ cm}^2$

$\pi(R^2 - r^2) = 352$

$16^2 - r^2 = \frac{352 \times 7}{22}$

$16^2 - r^2 = 16 \times 7$

$16^2 - r^2 = 112$

$16^2 - 112 = r^2$

$r^2 = 256 - 112$

$r^2 = 144$

$r = 12$ cm

Inner radius r = 12 cm

(iii) If the area of the inner rectangular region is 15 sq.cm and the area covered by the outer rectangular region is 48 sq.cm, find the area of the rectangular pathway.

Sol : Area of the outer rectangle = 48 sq.cm

Area of the inner rectangle = 15 sq.cm

9. A circular path has to be constructed around a circular ground. If the areas of the outer and inner circles are 1386 m^2 and 616 m^2 respectively, find the width and area of the path.

Sol :

Area of the outer circle = 1386 m^2

πR^2 = 1386 m^2

Area of the inner circle = 616 m^2

πr^2 = 616 m^2

Area of the path = Area of outer circle – Area of the inner circle

= 1386 m^2 – 616 m^2

Area of the path = 770 m^2

Also πR^2 = 1386

$R^2 = \frac{1386 \times 7}{22}$

$R^2 = 63 \times 7$

$R^2 = 9 \times 7 \times 7$

$R^2 = 3^2 \times 7^2$

$R = 3 \times 7$

Outer Radius R = 21 m

Again πr^2 = 616

$\frac{22}{7} \times r^2$ = 616

$r^2 = 28 \times 7$

$r^2 = 4 \times 7 \times 7$

$r^2 = 2^2 \times 7^2$

$r = 2 \times 7$

Inner radius r = 14 m

Width of the path = Outer radius – Inner radius

= 21 – 14

Width of the path = 7 m

10. A goat is tethered with a rope of length 45 m at the centre of the circular grass land whose radius is 52 m. Find the area of the grass land that the goat cannot graze.

Sol : Length of the rope = 45 m = Radius of the inner circle

∴ Area of the circular area that the goat graze = πr^2 sq. units

$= \frac{22}{7} \times 45 \times 45$ m^2

= 6364.28 m^2

Radius of the gross land = 52 m

Area of inner small rectangle $= \frac{19}{2} \times \frac{13}{2} m^2$

$= 61.75 \text{ cm}^2$

(i) Area of the path = Area of the outer rectangle – Area of 4 inner small rectangles

$= 300 - 4(61.75)$

$= 300 - 247$

$= 53 \text{ m}^2$

Area of the paths $= 53 \text{ m}^2$

(ii) Area of the remaining portion of the field

= Area of the outer rectangle – Area of the paths

$= 300 - 53 \text{ m}^2$

$= 247 \text{ m}^2$

Area of the remaining portion = 247 m^2

(iii) Cost of constructing 1 m^2 road = ₹10

∴ Cost of constructing 53 m^2 road = ₹10 × 53 = ₹530

∴ Cost of constructing road = ₹ 530

Unit Test

Time: 1 hr **Section A** **Max Marks : 25**

I. Fill in the blanks. **5 × 1 = 5**

1. The diameter of a circle is 14 cm. Its area is _____ cm^2.
2. The radius of a circle is 1 cm, then the perimeter of its semi-circle is _____ cm.
3. Perimeter of a semicircle is _____
4. The length and breadth of a rectangle are 3.5 cm and 2.2 cm respectively, then its area is _____ cm^2.
5. The area of a rectangle is 150 cm^2 . If its breadth 10 cm, then its length _____ cm.

II. Answer the following questions. **5 × 3 = 15**

6. What is the area of a circle whose circumference is 31.3 cm?
7. Find the area of a circular disc whose circumference is 88 cm.
8. The circumference of a circle is 12.56 cm, find its diameter.
9. The radius of a circular park is 7 m. Find its area.
10. Find the circumference of a circle, whose diamter is 21 cm.

Chapter 3

Algebra

Exponents and Powers

- If 'a' is any integer, then $a \times a \times a \times \ldots\ldots\ldots\ldots a$ (n times) $= a^n$.

  Here 'a' is the base and n is the exponent or power.

  This method of expressing a number is called the 'Exponential form'.

  Example: $16 = 2 \times 2 \times 2 \times 2 = 2^4$

  It can be read as '2 raised to the power of 4' or '2 to the power of 4' or '2 power 4'.

  Here 2 is the base and 4 is the exponent.

  The exponent is usually written at the top right corner of the base and smaller in size when compared to the base.
- When a number is expressed as a product of factors and when the factors are repeated, then it can be expressed in the exponential form.
- The repeated factor will be the base and the number of times the factor repeats will be its exponent.

$$(-1)^n = \begin{cases} 1 & \text{if } n \text{ is even natural number} \\ -1 & \text{if } n \text{ is odd natural number} \end{cases}$$

- The exponent 2 has a special name 'squared'.

  Eg: 4^2 is read as 'four squared'.
- The exponent 3 has a special name 'cubed'.

  Eg: 4^3 is read as 'four cubed'.

Laws of Exponents

If 'a' and 'b' are non-zero numbers and 'm' and 'n' are natural numbers, then

(i) $a^m \times a^n = a^{m+n}$ (Product rule of exponents)

(ii) $a^m \div a^n = a^{m-n}$, $m > n$ (Quotient rule of exponents)

(iii) $(a^m)^n = a^{m \times n}$ (Power rule of exponents)

(iv) $(a \times b)^m = a^m \times b^n$ (Power rule of exponents)

Think

(Page 47)

What is Half of 2^{10}? Ragu claims the answer is 2^5. Is he correct? Discuss.

Sol : Half of $2^{10} = \frac{1}{2} \times 2^{10} = \frac{2^{10}}{2^1}$ $\left[\text{since } \frac{a^m}{a^n} = a^{m-n}\right]$

$= 2^{10-1} = 2^9$

Half of 2^{10} is 2^9.

So Ragu's answer 2^5 is not correct.

TRY THESE

(Text book Page No. 48)

Simply the following.

1. $23^5 \div 23^2$ 2. $11^6 \div 11^3$ 3. $(-5)^3 \div (-5)^2$ 4. $7^3 \div 7^3$ 5. $15^4 \div 15$

Sol :

1. $2^3 \div 2^5 = 2^{3-5} = 23^3$ $\left[\text{since } \frac{a^m}{a^n} = a^{m-n}\right]$
2. $11^6 \div 11^3 = 11^{6-3} = 11^3$ $\left[\text{since } \frac{a}{a^n}^m = a^{m-n}\right]$
3. $(-5)^3 \div (-5)^2 = (-5)^{3-2} = (-5)^1$ $\left[\text{since } \frac{a^m}{a} = a^{m-n}\right]$
4. $7^3 \div 7^3 = 7^{3-3} = 7^0 = 1$ $\left[\text{since } \frac{a^m}{a^n} = a^{m-n};\ a^0 = 1\right]$
5. $15^4 \div 15 = 15^4 \div 15^1 = 15^{4-1} = 15^3$ $\left[\text{since } \frac{a^m}{a} = a^{m-n}\right]$

TRY THESE

(Text book Page No. 48)

Simplify and write the following in exponent form.

1. $(3^2)^3$ 2. $[(-5)^3]^2$ 3. $(20^6)^2$ 4. $(10^3)^5$

Sol :

1. $(3^2)^3 = 3^{2\times3} = 3^6$ $[\text{since } (a^m)^n = a^{m\times n}]$
2. $[(-5)^3]^2 = (-5)^{3\times2} = (-5)^6$ $[\text{since } (a^m)^n = a^{m\times n}]$
3. $(20^6)^2 = 20^{6\times2} = 20^{12}$ $[\text{since } (a^m)^n = a^{m\times n}]$
4. $(10^3)^5 = 10^{3\times5} = 10^{15}$ $[\text{since } (a^m)^n = a^{m\times n}]$

Additional Questions

1. Find the degree of the following polynomials.

(i) $x^5 - x^4 + 3$ **(ii)** $2 - y^5 - y^3 + 2y^8$ **(iii)** 2

(iv) $5x^3 + 4x^2 + 7x$ **(v)** $4xy + 7x^2y + 3xy^3$

Sol :

(i) $x^5 - x^4 + 3$

The terms of the given expression are $x^5, -x^4, 3$.

Degree of each of the terms : 5, 4, 0

Term with highest degree: x^5

Therefore degree of the expression in 5.

(ii) $2 - y^5 - y^3 + 2y^8$

The terms of the given expression are $2, -y^5, -y^3, 2y^8$.

Degree of each of the terms : 0, 2, 3, 8.

Term with highest degree: $2y^8$

Therefore degree of the expression in 8.

(iii) 2

Degree of the constant term is 0.

$\therefore$ Degree of 2 is 0.

(iv) $5x^3 + 4x^2 + 7x$

The terms of the given expression are $5x^3, 4x^2, 7x$

Degree of each of the terms : 3, 2, 1.

Term with highest degree: $5x^3$

Therefore degree of the expression in 3.

(v) $4xy + 7x^2y + 3xy^3$

The terms of the given expression are $4xy, 7x^2y, 3xy^3$

Degree of each of the terms : 2, 3, 4

Term with highest degree: $3xy^3$

Therefore degree of the expression in 4.

2. State whether a given pair of terms in like or unlike terms.

(i) **1, 100** **(ii)** $-7x, \frac{5}{2}x$

(iii) $4m^2p, 4mp^2$ **(iv)** $12xz, 12x^2z^2$

Sol :

(i) 1, 100 is a pair of like terms.

[$\because 1 = x^0$ and $100 = 100x^0$]

EXERCISE 3.4

Miscellaneous Practice Problems

1. **$6^2 \times 6^m = 6^5$, find the value of 'm'.**

Sol : $6^2 \times 6^m = 6^5$

$6^{2+m} = 6^5$ [Since $a^m \times a^n = a^{m+n}$]

Equating the powers, we get

$2 + m = 5$

$m = 5 - 2 = 3$

2. **Find the unit digit of $124^{128} \times 126^{124}$.**

Sol : In 124^{128}, the unit digit of base 124 is 4 and the power is 128 (even power).

Therefore, unit digit of 124^{128} is 4.

Also in 126^{124}, the unit digit of base 126 is 6 and the power is 124 (even power).

Therefore, unit digit of 126^{124} is 6.

Product of the unit digits = $6 \times 6 = 36$

∴ Unit digit of the $124^{128} \times 126^{124}$ is 6.

3. **Find the unit digit of the numeric expression: $16^{23} + 71^{48} + 59^{61}$**

Sol : In 16^{23}, the unit digit of base 16 is 6 and the power is 23 (odd power).

Therefore, unit digit of 16^{23} is 6.

In 71^{48}, the unit digit of base 71 is 1 and the power is 48 (even power).

Therefore, unit digit of 71^{48} is 1.

Also in 59^{61}, the unit digit of base 59 is 9 and the power is 61 (odd power).

Therefore, unit digit of 59^{61} is 9.

Sum of the unit digits = 6 + 1 + 9 = 16

∴ Unit digit of the given expression is 6.

4. **Find the value of** $\dfrac{(-1)^6 \times (-1)^7 \times (-1)^8}{(-1)^3 \times (-1)^5}$

Sol : $\dfrac{(-1)^6 \times (-1)^7 \times (-1)^8}{(-1)^3 \times (-1)^5} = \dfrac{(-1)^{6+7+8}}{(-1)^{3+5}} = \dfrac{(-1)^{21}}{(-1)^8} = (-1)^{21-8}$ [By Quotient rule]

$= (-1)^{13}$

$= -1$

[Since the power 13 is odd positive number]

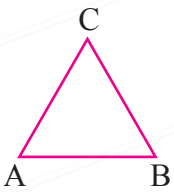
∴ $\dfrac{(-1)^6 \times (-1)^7 \times (-1)^8}{(-1)^3 \times (-1)^5} = 1$

Chapter 4

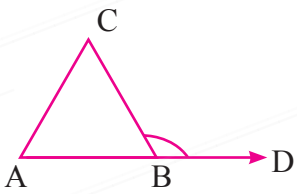
Geometry

Triangles

- A triangles is a closed figure formed by three segments. It has three vertices, three sides and three angles.
- Based on sides, triangles can be classified into three types. They are,
  - (i) Equilateral triangle
  - (ii) Isoscales triangle
  - (iii) Scalene triangle



- Based on the angle, triangles ca be classifed into three types. They are
  - (i) Acute angled triangle
  - (ii) Right angled triangle
  - (iii) Obtuse angled triangle
- In any triangle drawn by joining three non-collinear points, the sum of the lengths of any two sides is greater than the lenght of the third side. This property is claled as triangle.
- In any triangle drawn by joining three non-collinear points, the sum of the lengths of any two sides is greater than the length of the third side. This property is calle as triangle inequality.
- Angle sum property of triangle states that the sum of all angles in a triangle in a triangle is 180^{o}.
- Any triangle is made up of three vertices, three sides and three angles.
- In ΔABC, the side AB is estended to D. Here $\angle CBD$ is known as the exterior angle of ΔABC at B.

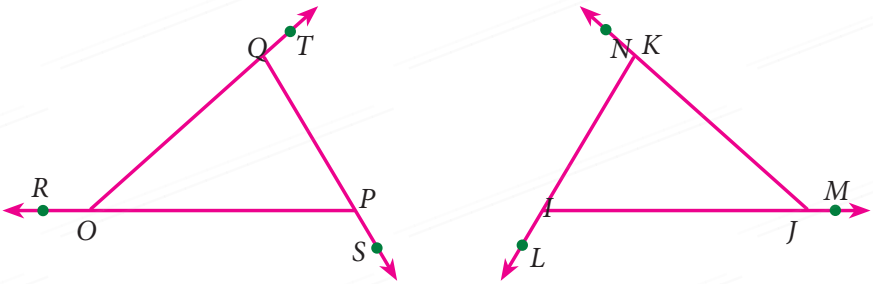


- Also $\angle ABC$ and $\angle CBD$ are adjacent and they form a linear pair.
- The non adjacent angles of $\angle CBD$ namely $\angle CAB$ and $\angle ACB$ are called interior opposite angles of $\angle CBD$.
- An exterior angle of a triangle is equal to the sum of its interior opposite angles.
- The sum of all interior angles of a triangle is 360^{o}.

Activity

(Text book Page No. 70)

To understand exeterior angle properties of a triangle list all the exterior angles of triangles that are shown below.



Measure and express each exterior angle as a sum of its interior opposite angles and complete the table.

Exterior angle	Sum of its interior opposite angle
$\angle PQT = 100^o$	$\angle QOP + \angle OPQ = 40^o + 60^o = 100^o$
$\angle QOR = 140^o$	$\angle OQP + \angle OPQ = 80^o + 60^o = 140^o$
$\angle OPS = 120^o$	$\angle PQO + \angle POQ = 80^o + 40^o = 120^o$
$\angle IKN = 100^o$	$\angle KIJ + \angle IJK = 60^o + 40^o = 100^o$
$\angle JIL = 120^o$	$\angle IJK + \angle JKI = 40^o + 80^o = 120^o$
$\angle KJM = 140^o$	$\angle JIK + \angle IKJ = 60^o + 80^o = 140^o$

From this activity we observe that an exterior angle of a triangle is equal to the sum of its interior oppsoite angles.

Activity

(Text book Page No. 71)

Imagine a person standing in one of the vertices (corners) and walking along the boundary of the triangle until he reaches the starting point. At each of the vertex of the triangle he would turn an angle equal to the exterior angle at that vertex. Hence after the complete journey around the triangle he would have turned through an angle equal to one complete revolution, that is 360°.

Exercise 4.1

1. Can 30°, 60° and 90° be the angles of a triangle?

Sol : Given angles 30^o , 60^o and 90^o

Sum of the angles = $30^o + 60^o + 90^o = 180^o$

$\therefore$ The given angles form a triangle.

Unit 4

Congruency of Triangles

- Triangle is a closed figure formed by three line segments.
- There are three sides and three angles.
- If the corresponding sides and corresponding angles of two triangles are equal then the two triangles are said to be congurent to each other.
- **Side - side - side congruence Criterion (SSS) :**

  If three sides of one triangle are equal to corresponding sides of the other triangle then the two triangles are congruents.This criterian of congruency is known as side - side side.
- **Side - Angle - Side congruence criterian (SAS):**

  If two sides and the included angle of a triangle are equal to the corresponding two sides and the included angle of another triangle, then the two triangles are congruent to each other. This criterion is called Side - Angle - Side.
- **Angle - Side - Angle congruence criterion (ASA)**

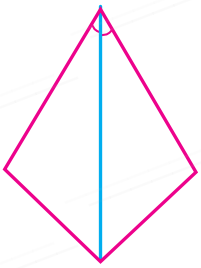
  If two angles and the included side of one triangle are congruent to the corresponding parts of another triangle, then the two triangle are congruent. This criterion is called Angle - Side - Angle criterion.
- **Right Angle - Hypothenuse - Side congruence criterion (RHS)**

  If the hypotenuse and one side of a right angled triangle is equal to the hypotenue and one side of another right angled triangle than the two right angled triangle are congruent.

  This is called right angle - Hypotenuse - side criterion.
- If two angles and a non - included side of one triangle are congruent to the corresponding parts of another triangle, then also the triangles are congruent.
- Angle - Angle - Angle combination will triangles of same shape but not of same size. So it is not sufficient to prove the cogruency of triangles.
- The combination of two sides and a non - included angle such as side - side - angle (or) Angle - side - side (That is SSA (or) ASS) are also will not prove congruency of triangles.
- If two triangles are congruent than their corresponding parts are congruent. We can say "Corresponding Parts of congruent triangles are congruent". It can be abbreviated as CPCTC.

5. To conclude the congruency of triangles, mark the required information in the following figures with reference to the given congruency criterion.

(i)

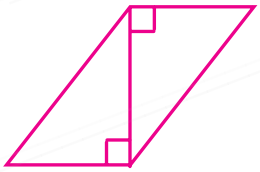


Criterion : ASA

(ii)

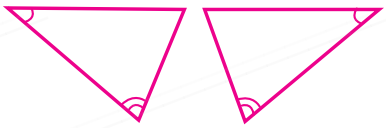
Criterion : SSS

(iii)



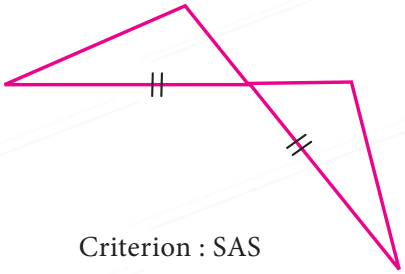
Criterion : RHS

(iv)



Criterion : ASA

(v)

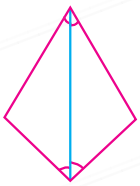


Criterion : SAS

Sol : (i) In the given triangles one angle is equal and a side is common and so equal.

To satisfy ASA criterion one more angle should be equal such that the common side is the included side of both angles of a triangle.

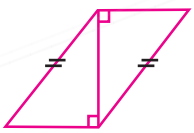
The figure will be as follows.



(ii) In the two given triangles two sides of one triangle is equal to two sides of the other triangle. To satisfy SSS criterion the third sides mut be equal.

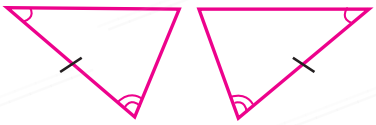
(iii) The given triangles have one side in common. They are right angled tringles.

To satisfy RHS criterion their hypotenuse must be equal.



(iv) In the given triangles two angles of one triangle is equal to two angles of the other triangles.

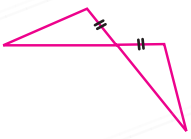
To satisfy ASA criterion included side of two angles must be equal.



(v) In both the triangles one of their sides are equal.

One of their angles are equal or they are vertically opposite angles.

To satisfy SAS criterion, one more side is to be equal such that the angle is the included of the equal sides.



Unit 4

Construction:

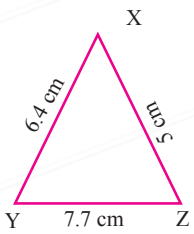
Step 1: Draw a line. Marked Y and Z on the line such that YZ = 7.7 cm.

Step 2: With Y as centre drawn an arc of radius 6.4 cm above the line YZ.

Step 3: With Z as centre, drwan an arc or radius 5 cm to intersect arc drawn in steps. Marked the point of intersection as X.

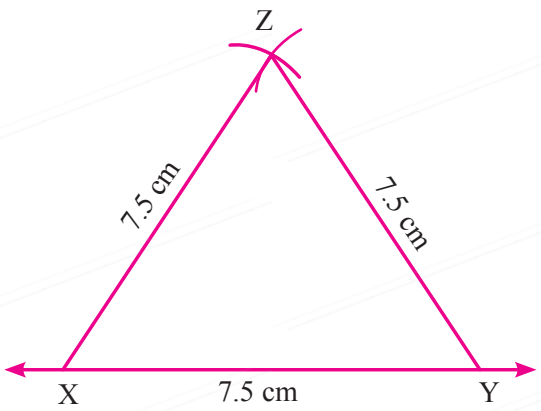
Step 3: Joined YX and ZX. Now XYZ is the required triangle.

Rough Diagram

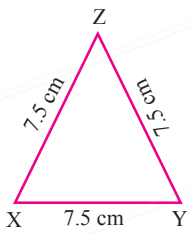


(ii) An equilateral triangle of side 7.5 cm

Sol :



Rough Diagram



Construction:

Step 1: Drawn a line. Marked X and Y on the line such that XY = 7.5 cm.

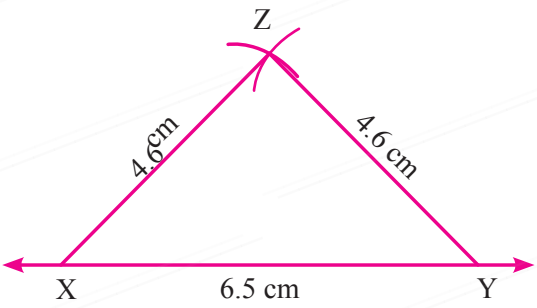
Step 2: With X as centre, drawn an arc of radius 7.5 cm above the line XY.

Step 3: With Y as centre, drawn an arc of radius 7.5 cm to intersect arc drawn in steps. Marked the point of intersection as Z.

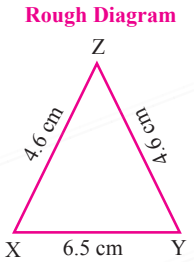
Step 4: Joined XZ and YZ. Now XYZ in the required triangle.

(iii) An isosceles triangle with equal sides 4.6 cm and third side 6.5 cm

Sol :



Rough Diagram



Unit 4

Construction:

Step 1: Drawn a line. Marked P and R on the line such that PR = 7.8 cm.

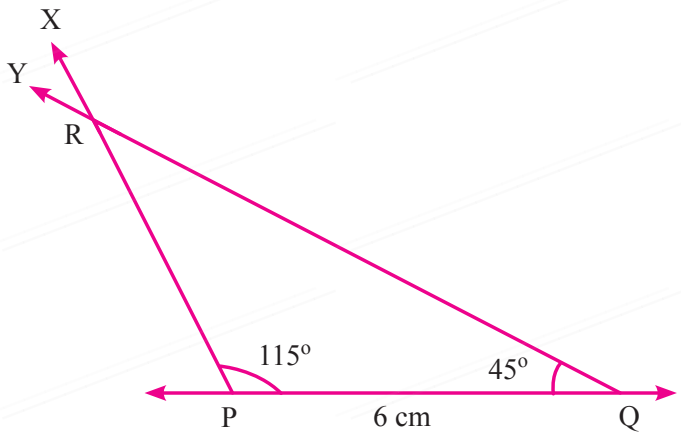
Step 2: At P, drawn a ray PX making an angle of 60° with PR.

Step 3: At R, drawn another ray RY making an angle of 35° with PR. Mark the point of intersection of the rays PX and RY as Q.

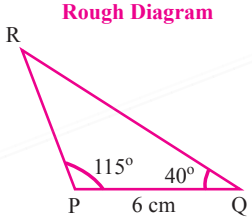
PQR is the required triangle.

(ii) $\angle P = 115°$, $\angle Q = 40°$ and PQ = 6 cm

Sol :



Rough Diagram



Construction:

Step 1: Drawn a line. Marked P and Q on the line such that PQ = 6 cm.

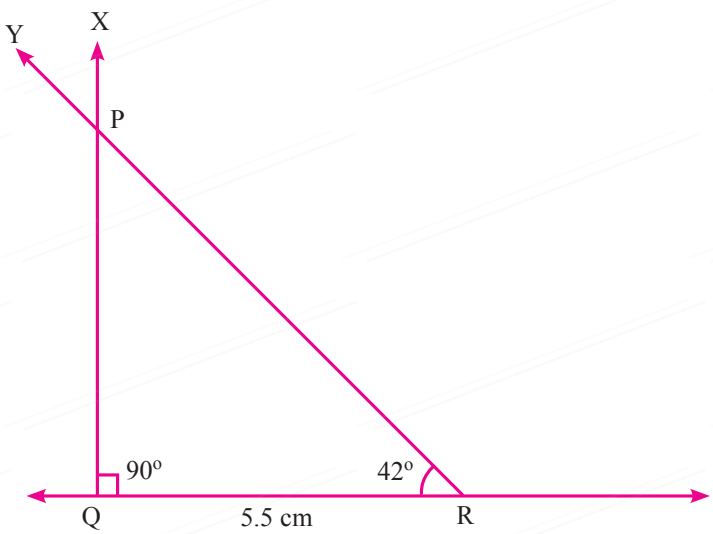
Step 2: At P, drawn O ray PX making an angle of 115° with PQ.

Step 3: At Q, drawn another ray QY making an angle of 40° with PQ. Marked the point of intersection of the rays PX and QY as R.

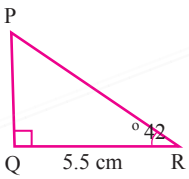
PQR is the required triangle.

(iii) $\angle Q = 90°$, $\angle R = 42°$ and QR = 5.5 cm

Sol :



Rough Diagram



Geometry

Unit Test

Time: 1 hr **Section A** **Max Marks : 25**

I. Choose the best answer from the options given below. **(10 × 1 = 10)**

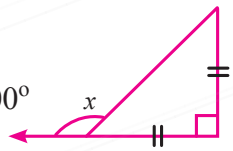
1. Least number of possible acute angles in a triangle is
(i) 0 (ii) 1 (iii) 2 (iv) 3

2. Angles of a triangle are in the ratio 1 : 2 : 3 the smallest angle is
(i) 15^o (ii) 90^o (iii) 60^o (iv) 30^o

3. In an isoscles right triangle each of the acute angle is
(i) 30^o (ii) 45^o (iii) 60^o (iv) 90^o

4. In a triangle ABC, which of the following is true.
(i) AB + BC < CA (ii) AB + CA < BC
(iii) AC + BC > AB (iv) AC + BC = AB

5. The value of x is
(i) 90^o (ii) 45^o (iii) 135^o (iv) 100^o



6. Two figures are said to be congruent if they have the same.
(i) Length and width (ii) shape and size
(iii) Area (iv) Perimeter

7. Which of the following is not sufficient to prove congruency of triangles.
(i) SSS (ii) SAS (iii) ASA (iv) AAA

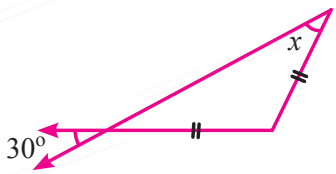
8. In ΔPQR, the included side between $\angle P$ and $\overline{BC}$ is.
(i) $\overline{PQ}$ (ii) $\overline{QR}$ (iii) $\overline{PR}$ (iv) $\overline{AB}$

9. In ΔABC, the included side between $\overline{AC}$ and $\overline{BC}$ is
(i) $\angle A$ (ii) $\angle B$ (iii) $\angle C$ (iv) $\angle D$

10. Two angles are congruented if they have
(i) the same length arms (ii) the same measure
(iii) the same vertex (iv) none of these

II. Answer the following question. **(5 × 2 = 10)**

11. Find the value of x.



Unit 4

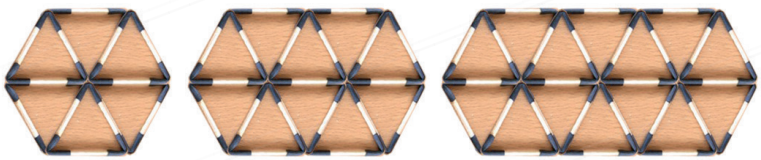
Chapter 5

Information Processing

Activity

(Text book Page No. 91)

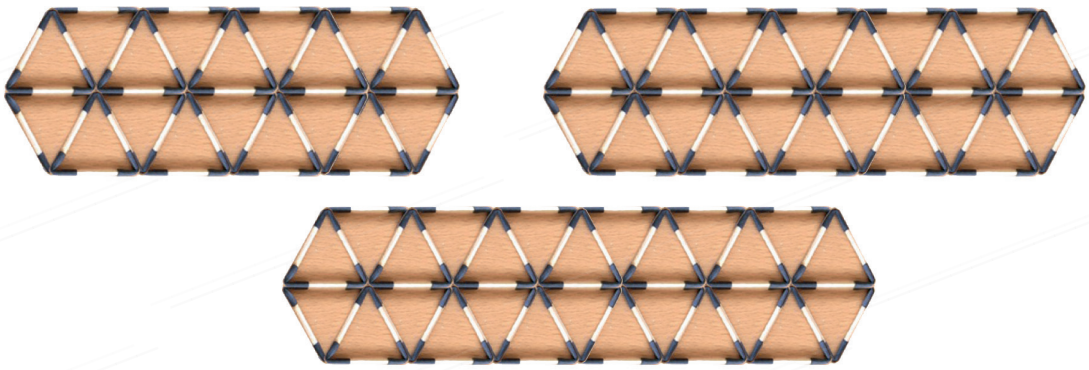
Observe the pattern given below. Continue the pattern for three more steps.



Let, 'x' be the number of steps and 'y' be the number of match sticks. Tabulate the values of 'x' and 'y' and verify the relationship $y = 7x + 5$.

Sol : Three more patterns are

Number of steps (x)	1	2	3	4	5	6	.....
Number of match sticks (y)	12	19	26	33	40	47	....



From the table $y = 7x + 5$ is verified.

Objective Type Questions

2. **Identify the correct relationship between x and y from the given table.**

x	1	2	3	4	...
y	4	8	12	16	...

(i) $y = 4x$ (ii) $y = x + 4$ (iii) $y = 4$ (iv) $y = 4 \times 4$

[Ans : (i) $y = 4x$**]**

3. **Identify the correct relationship between x and y from the given table.**

x	–2	–1	0	1	2	...
y	6	3	0	–3	–6	...

(i) $y = -2x$ (ii) $y = +2x$ (iii) $y = +3x$ (iv) $y = -3x$

[Ans : (iv) $y = -3x$**]**

Additional Questions

1. **Find the relationship between x and y if**

x	–2	–1	0	1	2	...
y	10	5	0	–5	–10	...

Sol : The relationship between x and y is $y = -5x$

2. **Find the relationship between x and y if**

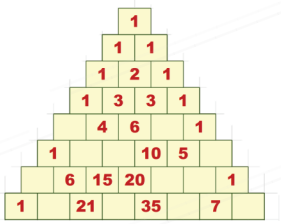
x	1	2	3	4	5	...
y	5	8	11	14	17	...

Sol : The relationship between x and y is $y = 3x + 2$

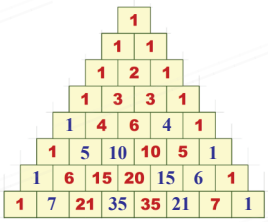
Activity

(Text book Page No. 93 & 94)

1. **Complete the following Pascal's Triangle by observing the number pattern.**

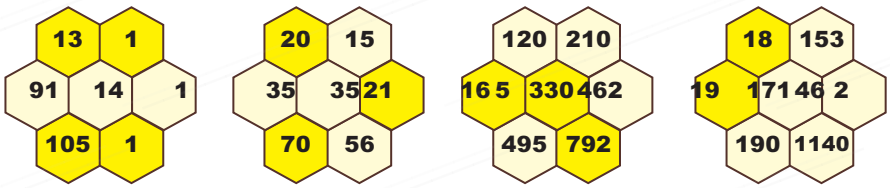


Sol : Pascal's triangle is given by

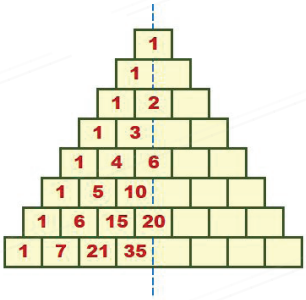


Unit 5

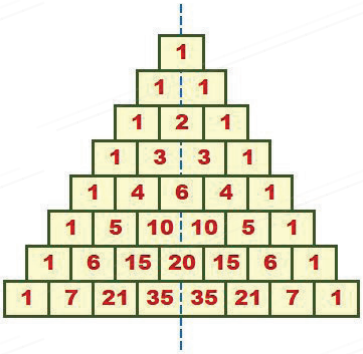
Sol :



3. Complete the Pascal's Triangle by taking the numbers 1,2,6,20 as line of symmetry.



Sol : Corresponding numbers are equal about the line of symmetry.



Objective Type Questions

4. The elements along the sixth row of the Pascal's Triangle is

(i) 1,5,10,5,1 (ii) 1,5,5,1 (iii) 1,5,5,10,5,5,1 (iv) 1,5,10,10,5,1

[Ans : (iv) 1,5,10,10,5,1**]**

5. The difference between the consecutive terms of the fifth slanting row containing four elements of a Pascal's Triangle is

(i) 3,6,10,… (ii) 4,10,20,… (iii) 1,4,10,… (iv) 1,3,6,…

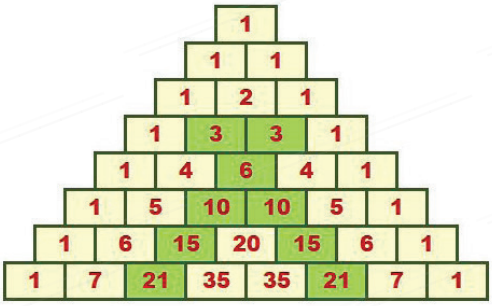
[Ans : (ii) 4,10,20,…**]**

6. What is the sum of the elements of nineth row in the Pascal's Triangle?

(i) 128 (ii) 254 (iii) 256 (iv) 126

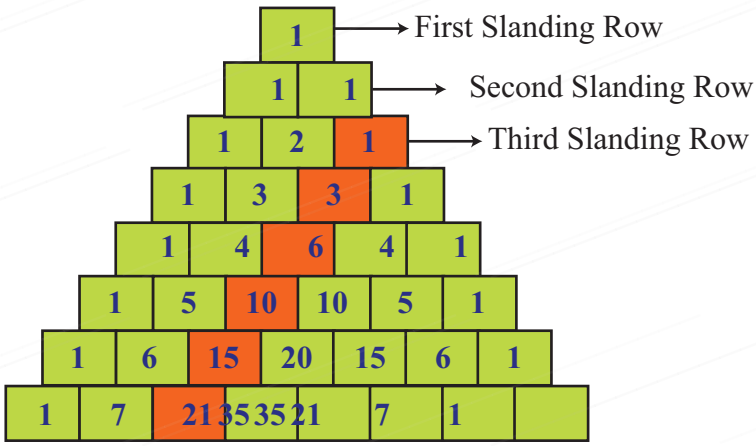
[Ans : (iii) 256**]**

From Pascal's Triangle, the triangular numbers are



3. Write the first five numbers in the third slanting row of the Pascal's Triangle and find their squares. What do you infer?

Sol :



Numbers in the 3rd slanding row are 1, 3, 6, 10, 15, 21, ...

The squares are 1^2, 3^2, 6^2, 10^2. 15^2, 21^2, ... = 1, 9, 36, 100, 225, 441, ...

Natural Numbers	Cubes	Sum of the cubes	Squares of triangular Nos.
1	$1^3 = 1$	1	1
2	$2^3 = 8$	1 + 8 = 9	9
3	$3^3 = 27$	1 + 8 + 27 = 36	36
4	$4^3 = 64$	1 + 8 + 27+ 64 = 100	100
5	$5^3 = 125$	1 + 8 + 27+ 64 + 125 = 225	225
6	$6^3 = 216$	1 + 8 + 27+ 64 + 125 + 216 = 441	441
7	$7^3 = 343$	1 + 8 + 27+ 64 + 125 + 216 +343 = 784	784
.	.	.	.
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From the above table we can conclude that the squares of the triangular numbers are the sum of cubes of natural numbers.