MENTAL MATHS

QUESTION BANK
CLASS 7

MENTAL MATHS

MATHS

CLASS VII

2022-23

DIRECTORATE OF EDUCATION

GOVT. OF NCT OF DELHI

HIMANSHU GUPTA, IAS
Director, Education & Sports

Directorate of Education
Govt. of NCT of Delhi
Room No. 12, Civil Lines
Near Vidhan Sabha,
Delhi-110054
Ph.: 011-23890172
E-mail : diredu@nic.in

सत्यमेव जयते

No. PS/DE/2022/194
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MESSAGE

They say, 'Numbers are not just symbols on paper; numbers have life!'

It is not an exaggeration to place on record that numbers have played a pivotal role in the development and growth of human civilisation.

Numerical skills are very useful for students in their future life, especially when they appear in competitive exams.

Our Mental Maths Project aims at gradually developing and nurturing foundational numerical skills among our budding mathematicians. It started nearly two decades ago, and is striding, each passing year, on the path of progress.

Incidentally, I had an opportunity to witness the State Level Mental Maths Quiz Competition recently and I was spellbound by the speed, confidence and enthusiasm exhibited by the students. Indeed, it was to be seen to be believed!

I appreciate the dedication and hard work put in by the State Core Committee members and the Subject Experts under the able guidance of the Project Director (Mental Maths) in preparing the Question Banks and carrying this project forward with great zeal & fervour.

(HIMANSHU GUPTA)

विकास कालिया
परियोजना निदेशक (मेंटल मैथ्स)
क्षेत्रीय शिक्षा निदेशक (उत्तर & मध्य)

VIKAS KALIA
PROJECT DIRECTOR (MENTAL MATHS)
REGIONAL DIRECTOR OF EDUCATION
(NORTH & CENTRAL)

सत्यमेव जयते

No. PD|MMP|609

Dated 02|01|2023

'A Few Interesting Facts About Maths'

The word 'Mathematics' has its origin in the Greek word "Mathema' which means 'something that is learnt' or 'something that one gets to know'. In the same country (Greece), an ancient scholar Archimedes is considered to be the 'Father of Mathema' as he discovered methods to measures the areas of different shapes.

However, in our own country, we consider Aryabhatta as Father of Mathematics because of his original contributions made in Spherical Trigonometry. Some people believe that Aryabhatta invented Zero also, while some others credit another Vedic scholar Brahmgupta for this landmark discovery. The Western Scholars believe that Zero was first invented by the 'Mayans' (Mesopotamia) and a little later, by the Indians from which places, Zero travelled gradually to Cambodia, China and to the Arab world.

By the way, 'Arab' reminds me of an important branch of Maths named 'Algebra' which has its roots in the Arabian word 'Al-jabr' which means 'reunion of broken parts' (also used for reuniting broken bones)!

Algebra seeks to find out 'the missing values' and restoring them, just like restoring broken bones by providing missing links. In Algebra, we first 'imagine' values in the form of symbols like 'x' or 'y' and then, manipulate them to find out the 'actual' values. This is how even today, we find the 'missing' values or links through Algebra.

In short, we can conclude that unlike the 'inventions' of bulb, printing press or pen which were made by certain individuals, Mathematics is not an invention made by one person or by one civilisation. Its various branches were cultivated and nurtured by various individuals across various continents & civilizations and through different millennia.

As for Mental Maths, one can master Mental Maths through rigorous practice. Apart from learning Tables and Formulae by heart, one needs to learn various tricks for breaking longer calculations into smaller parts and making numbers 'round'. I am sure, our Maths Teachers will be able to identify students who have aptitude for numbers and groom them for Mental Maths Quiz Competitions.

I take this opportunity to thank all our Maths Teachers who devote so much of their extra time to prepare our students to sit for these competitions. I am also indebted to our Maths Teachers who have 'written' and 'reviewed' these question banks.

I thank my HoSs, Coordinators and the Core Team who, I think, are devoted much more than their Project Director to promoting Mental Maths among students!

Finally, I thank DBTB for the efforts they made for successful publication of these Question Banks.

Above all, I am indebted to my superior, the Director of Education, for his consistent support & guidance.

02/01/23

(VIKAS KALIA)
PROJECT DIRECTOR
(MENTAL MATHS)

STATE LEVEL MENTAL MATHS QUIZ COMPETITION RESULT 2021-2022
LEVEL-2
REGION- EAST (1st POSITION)

S. No.	CLASS	NAME OF STUDENT	FATHER'S NAME	STUDENT ID	D.O.B.	SCHOOL NAME	SCHOOL CODE	NAME OF GUIDE TEACHER
1	VII	AMAN KUMAR	ARVIND KUMAR	20180251958	22.11.2008	SBV ANAND VIHAR	1001208	MANOJ KUMAR
2	VII	SALONI BOHRA	JEEWAN SINGH BOHRA	20150236610	14.05.2009	RSKV NO.2 SHAKARPUR	1002193	HEMLATA
3	VII	AYUSH	RAM BAHADUR	20150342631	20.10.2009	GBSSS SONIA VIHAR	1104336	DAYANAND TIWARI

REGION - WEST (1ST RUNNER UP)

S. No.	CLASS	NAME OF STUDENT	FATHER'S NAME	STUDENT ID	D.O.B.	SCHOOL NAME	SCHOOL CODE	NAME OF GUIDE TEACHER
1	VII	GAUTAM CHAUDHARY	LALAN CHAUDHARY	20140045124	18.08.2009	SCAN, SBV NO.2, B BLOCK JANAKPURI	1514008	ANAND KUMAR
2	VII	ANJALI	KAMAL SINGH	20140152848	09.04.2009	GSKV AMLAWAS JWALAPURI	1617036	ABHA CHAUHAN
3	VII	DHWANI GUPTA	RAJ KUMAR GUPTA	20190168191	16.03.2010	SKV NO.2 C-BLOCK JANAKPURI	1618022	JYOTI MUDGAL

REGION - SOUTH (2ND RUNNER UP)

S. No.	CLASS	NAME OF STUDENT	FATHER'S NAME	STUDENT ID	D.O.B.	SCHOOL NAME	SCHOOL CODE	NAME OF GUIDE TEACHER
1	VII	SNEHA	AMIT KUMAR MISHRA	20200009018	04.02.2010	GSKV SAMALKA	1821022	VINTI SINGLA
2	VII	PRACHI	HARENDRA SINGH	20190306601	14.11.2009	SBV NO-2 MEHRAULI	1923079	NEERAJ RANA
3	VII	ATUL ADARSH	SHRI PRAKASH SINGH	20200050037	09.04.2009	SBSSV QUTUB MEHRAULI	1923004	RAKESH

REGION - CENTRAL (4TH POSITION)

S. No.	CLASS	NAME OF STUDENT	FATHER'S NAME	STUDENT ID	D.O.B.	SCHOOL NAME	SCHOOL CODE	NAME OF GUIDE TEACHER
1	VII	ASHU	PAWAN SHUKLA	20140042794	20.02.2009	GSKV SHASTRI NAGAR	1208095	SONAM
2	VII	RUDRA MISHRA	SUDHIR KUMAR MISHRA	20200003226	15.02.2010	GBSSS NO.1 SHAKTI NAGAR	1207019	RAVI SHANKAR
3	VII	THAKUR ADARSH SINGH BAISH	THAKUR RAM SINGH	20180251754	25.07.2010	RPSV NEW RAJENDER NAGAR	2128032	SHIKHA GERA

REGION - NORTH (5TH POSITION)

S. No.	CLASS	NAME OF STUDENT	FATHER'S NAME	STUDENT ID	D.O.B.	SCHOOL NAME	SCHOOL CODE	NAME OF GUIDE TEACHER
1	VII	PRABHAT KUMAR JHA	SUSHIL JHA	20200118349	03.12.2008	GBSSS NITHARI	1412259	RAJESH SHARMA
2	VII	JATIN SHARMA	GAJENDER SHARMA	20200103916	01.09.2009	SBV POOTHKALAN	1412007	RAJU
3	VII	CHIRAG	RAM NARAYAN	20190088812	15.04.2010	SBV BANKNER	1310168	PARDEEP SHARMA

SCHEDULE OF MENTAL MATHS QUIZ COMPETITIONS

FOR THE YEAR 2022-2023

DIRECTORATE OF EDUCATION

GOVT OF NCT OF DELHI

- **Practice to students from Question Bank** **01.04.2022 to 15.10.2022**

- **School level Quiz Competition** **17.10.2022 to 07.11.2022**

- **Cluster level Quiz Competition** **08.11.2022 to 14.11.2022**

- **Zonal level Quiz Competition** **21.11.2022 to 30.11.2022**

- **District level Quiz Competition** **07.12.2022 to 14.12.2022**

- **Regional level Quiz Competition** **26.12.2022 to 31.12.2022**

- **State level Quiz Competition** **18.01.2023 to 31.01.2023**

INDEX

Chapter 1

Integers

Points to remember:

- The collection of whole numbers and negative numbers is called integers.

- On a number line, all numbers to the right of 0 are positive integers and all numbers to the left of 0 are negative integers

- Zero is an integer which is neither positive nor negative.

- On a number line, the integer occurring on the right is greater, that is, if integer x lies on the right of integer y, then $x > y$.

- On a number line, the integer occurring on the left is smaller, that is, if integer x lies on the left of integer y then $x < y$.

$4 > 2,$ $1 > 0,$ $0 > -1,$ $-1 < 0,$ $-3 < -2$ etc.
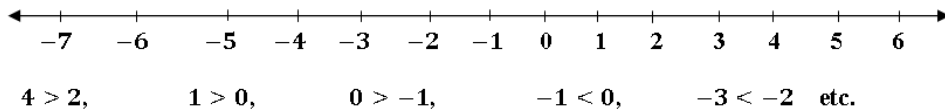
- There is no greatest or smallest integer.

- 1 is the smallest positive integer.

- -1 is the greatest negative integer.

- For any three integers a, b and c

    i. $a + b = b + a$ (Commutative law of addition)

    ii. $(a + b) + c = a + (b + c)$ (Associative law of addition)

    iii. $(a \times b) \times c = a \times (b \times c)$ (Associative law of multiplication)

    iv. $a \times (b + c) = a \times b + a \times c$ (Distributive law of multiplication over addition)

v. $a \times (b - c) = a \times b - a \times c$ (Distributive law of multiplication over subtraction)

- Product of even number of terms of negative integers is positive, whereas the product of odd number of terms of negative integers is negative.

- If a and b are two integers such that $a > b$, then $-a < -b$. For example: $3 > 2$ and $-3 < -2$. Again if $a < b$, then $-a > -b$. For example: $7 < 9$ and $-7 > -9$.

- To add two integers of same sign, add them and keep the sign of the greater number. For example : $\begin{array}{rcl} 7 + & 9 & = & 16 \\ -7 + (-9) & = & -16 \end{array}$

- To add two integers of opposite sign, subtract them and keep the sign of the greater number For example : $\begin{array}{l} -7 + 9 = +2 \\ +7 + (-9) = -2 \end{array}$

- Zero is the additive identity of integers.

- Additive inverse of a is $-$ a and vice-versa.

- Sum of a number and its additive inverse is always zero.

  $a + (-a) = (-a) + a = 0.$

- One is the multiplicative identity of integers

- Multiplicative inverse of a is $\frac{1}{a}$ and vice-versa where $a \neq 0$.

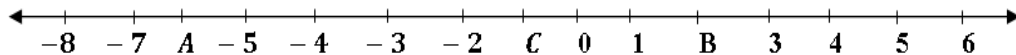- Product of a non-zero number and its multiplicative inverse is always 1

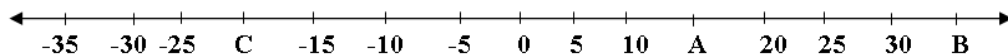 $a \times \dfrac{1}{a} = \dfrac{1}{a} \times a = 1$

Questions:

1. Find the sum of -52 and -87.

2. Find the sum of -2035 and 285.

3. Subtract -46 from 144.

4. What is the additive inverse of $285-(135+150)$.

5. Subtract the sum of -1878 and 878 from 3000.

6. Simplify $\{-13-(-27)\}+\{-25-(-40)\}$.

7. Find the value of $1487 \times 325 + (-487) \times 325$.

8. Find the value of $2895 \times 99 - (-2895)$.

9. Find the value of $1200 \div 20 - 14$.

10. Evaluate $32 - (2 \times 5) + 4$.

11. Find the two integers which have difference 6 and sum -18.

12. What is the sum of first seven negative integers?

13. What is the product of first 3 multiples of 5?

14. Find the product of $(-125) \times (-537) \times (-8)$.

15. How many odd integers less than 100 are a multiple of both 3 and 5?

16. Subtract the sum of (-1032) and 878 from -34.

17. Find the product of $225 \times (-15)$.

18. Simplify: $(-3) + (-12) \div (-4) - 3 \times (-3)$.

19. Simplify: $32 - \{32 - [32 - (32 - \overline{32 - 32})]\}$

20. Find the number which is obtained when three is multiplied by one less than the difference of nineteen and five.

21. Some number added to -11 is 37. Divide this number by -12. Then, multiply by -8. What is the final number?

22. Find the number obtained when ninety is divided by three more than the sum of 8 and 7.

23. Find: $6 \times 9 \times 0 - 8 \div 4$

24. Find: $90 - (-3) \times (-3) \times (-3)$

25. $(-1)^{27} \times (-1)^{35} =?$

26. Evaluate: $795 \times (-25) + (-795) \times 75$

27. What is the sum of first ten positive and first ten negative integers?

28. Divide 324 by (-27).

29. Evaluate: $\{(-30) \div 5\} \div 2$

30. The product of two integers is 729. If one of the integer is (-27), find the other integer.

31. What will be the quotient if (-15625) is divided by (-125)?

32. A group of hikers is descending the mountain at a rate of 600 feet per hour. What is the change in elevation of the hikers after 6 hours?

33. Arrange the following in increasing order: $-2, -9, 7, -6, 5, 0, -3$

34. Simplify: $510 - [270 - (90 - \overline{80 + 70})]$.

35. Determine the integer whose product with -3 becomes zero.

36. A man drives his car at a speed of 40 km/hr. How long will it take to cover 160 km?

37. In a test $(+6)$ marks are given for every correct answer and (-3) marks are given for every incorrect answer and 0 for answer not attempted. Ramesh gets 5 correct and 8 incorrect out of 15 questions. What is his total score?

38. Determine the integer whose product with -13 is -351.

39. Sara monitors a snail in her aquarium. She notes that this morning it crawled 1 inch up the glass. A few hours later it crawled another 2 inch up the glass. Later, it crawled 4 inch down the glass. How far is the snail from where it started?

40. Find the product of first four odd negative integers?

41. What is the multiplicative inverse of $(-150 + 85)$?

42. Simplify: $-(20) + (-8) \div (-2) \times 3$.

43. An elevator descends into a mine shaft at the rate of 7 m/min. If the descend starts from 5m above the ground level, how long will it take to reach $-205m$?

44. The sum of two integers is -1500. If one of them is 599, then find the other integer.

45. Evaluate: $24 + 12 \div 4 - 5 \times 3$.

46. Garvit earns a profit of ₹2 by selling one pen and suffers a loss of 50 paisa by selling one pencil. One day, Garvit earns a profit of ₹10 if he sold 15 pens, then how many pencils did he sell?

47. Add the additive inverse of $(-12 + 16 - 42 \div \overline{3 \text{ of } 7})$ to the product of $-2, -3$ and -4.

48. From the given number line, find the additive inverse of $(A - B - C)$

$$\xleftarrow{\quad} \overset{\;}{-8} \quad -7 \quad A \quad -5 \quad -4 \quad -3 \quad -2 \quad C \quad 0 \quad 1 \quad B \quad 3 \quad 4 \quad 5 \quad 6 \xrightarrow{\quad}$$

49. From the given number line, find the multiplicative inverse of $[(A - B)C]$.

$$\xleftarrow{\quad} -35 \quad -30 \quad -25 \quad C \quad -15 \quad -10 \quad -5 \quad 0 \quad 5 \quad 10 \quad A \quad 20 \quad 25 \quad 30 \quad B \xrightarrow{\quad}$$

50. The product of three integers is -900. It two of them are $+25$ and -6, find the third integer.

Answers:

No.	Answer	No.	Answer
1.	-139	26.	-79500
2.	-1750	27.	0
3.	190	28.	-12
4.	0	29.	-3
5.	4000	30.	-27
6.	29	31.	125
7.	325000	32.	3600 feet
8.	289500	33.	-9,-6,-3,-2, 0, 5, 7
9.	46	34.	180
10.	26	35.	0
11.	-6,-12	36.	4 hours
12.	-28	37.	6
13.	750	38.	27
14.	-537000	39.	1 inch down
15.	3	40.	105
16.	120	41.	-1/65
17.	-3,375	42.	-8
18.	9	43.	30 minutes
19.	0	44.	-2099
20.	39	45.	12
21.	32	46.	40 pencils
22.	5	47.	-26
23.	-2	48.	7
24.	117	49	1/400
25.	1	50.	6

Chapter 2

Fractions and Decimals

Points to remember:

- The numbers of the form $\frac{a}{b}$, where a and b are whole numbers and $b \neq 0$ are known as fractions.

- A fraction may be a proper fraction, improper fraction or mixed fraction.

- In a proper fraction, the numerator is smaller than the denominator. In an improper fraction the numerator is greater than the denominator.

  $\frac{a}{b}, a < b \rightarrow$ Proper Fraction

  $\frac{a}{b}, a > b \rightarrow$ Improper Fraction

- A proper fraction represents a part of a whole whereas improper fraction is a combination of whole and a proper fraction.

- Reciprocal of a is $\frac{1}{a}, a \neq 0$ and Reciprocal of $\frac{1}{a}$ is $a, a \neq 0$.

  Tips and Tricks

- Product of two fractions $= \dfrac{\text{Product of their Numerators}}{\text{Product of their Denominators}}$

- When two proper fractions are multiplied, the product is less than both the fractions.

- The product of two improper fractions is greater than each of the fractions that are multiplied.

- To multiply a decimal number by 10, 100 or 1000 we move the decimal point, in the number, to the right by as many places as the number of zeroes in the multiplier, to get the product.

- Similarly while dividing a decimal number by 10, 100 or 1000, we move the decimal point, in the number, to the left by as many places as the number of zeroes in the divisor, to get the quotient.

Questions:

1. Evaluate: $3\frac{1}{5} + 4\frac{3}{5} + 7\frac{2}{5}$

2. Find the sum of: $\frac{1}{3}, \frac{3}{5}, \frac{2}{6}$

3. Simplify: $9 - 3\frac{1}{3} + 4\frac{2}{3}$

4. What should be subtracted from 12 to get $\frac{17}{2}$?

5. What should be added to $5\frac{3}{7}$ to get 12?

6. Find the value of $6\frac{3}{4}$ of 7.

7. Simplify: $\frac{12}{25} \times \frac{15}{28} \times \frac{35}{36}$

8. Find $\frac{3}{20}$ of 1 kg in grams.

9. Find $\frac{7}{20}$ of a litre in ml.

10. Pooja plants 6 saplings in a row in her garden. The distance between two adjacent saplings is $\frac{3}{5}$ m. Find the distance between the first and the last sapling.

11. Rani ate $\frac{2}{7}$ part of a cake while her brother Rahul ate $\frac{4}{5}$ of the remaining. What part of the cake is left?

12. What is the reciprocal of $\frac{3}{7}$ of $\frac{2}{5}$?

13. The length and breadth of a rectangle are $6\frac{2}{3}$ m and 3 m respectively. Find its perimeter.

14. How many small pieces of length $\frac{3}{4}$ m can be cut from a ribbon of length $5\frac{1}{4}$ m?

15. If the cost of 20 pens is ₹356.80, then find the cost of one such pen.

16. Simplify: $\dfrac{\frac{1}{4}+\frac{1}{5}}{1-\frac{3}{8}\times\frac{3}{5}}$

17. Simplify: $0.011 \times 0.39 \div 0.13$

18. Simplify: $5\frac{4}{7} \div 1\frac{3}{10} \times 1\frac{3}{5}$

19. Dinesh went from place A to place B and from there to place C. Ayub went from place A to place D and from there to place C.

    Who travelled more and by how much?
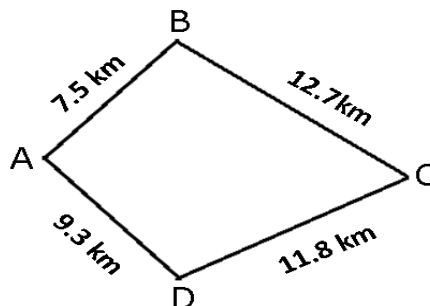
20. Find the value of: $1.07 \times 65 + 1.07 \times 26 + 1.07 \times 9$

21. What fraction is represented by shaded portion?
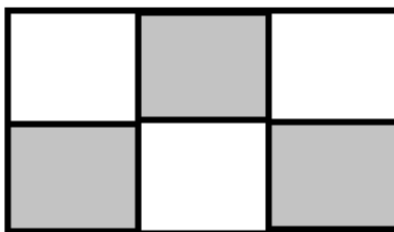
22. What is four fifth of half?

23. Multiply the sum of 1 and $4\frac{2}{3}$ by the difference of 4 and $4\frac{2}{3}$.

24. Convert $\frac{149}{4}$ into a decimal.

25. The cost of $6\frac{1}{4}$ kg of apples is ₹600. What is the cost of 1 kg of apples?

26. What should be added to 385.70 to get 499.32?

27. By how much 72.46 be decreased to get 29.73?

28. What decimal is shown by A on a number line?
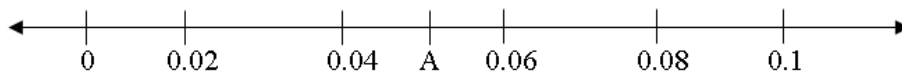
29. If $\frac{2}{3}$ of a number is 10, then what is 1.75 times of that number?

30. Each side of a regular polygon is 1.2 cm in length. The perimeter of the polygon is 14.4 cm. How many sides does the polygon have?

31. Find the product: $6.001 \times 0.001 \times 9$

32. Find the value of: $76 \div 0,.019$

33. What is the sum of place values of 2 in 2364.028?

34. Find the area of a rectangle whose length is 6.5 m and breadth is 3.5m.

35. Find the value of $325.67 \div 10000$.

36. Convert into decimal: $36 + \frac{2}{5} + \frac{3}{4}$.

37. Arrange in descending order $14.6, 159, 1.07, -1.295, 24.6$

38. The side of a square field is 5.5 m, find the area of the square field.

39. Find the area of a rectangle in sq. meter if its length and breadth are 16 cm and 12 cm respectively.

40. Simplify: $4\frac{1}{3} \times \frac{4}{15} \div 2\frac{2}{5}$

41. A plant is 1.17 cm high. It grows 1.1 times. What is its height now?

42. A grocer mixes 20.25 kg of green tea with 25.20 kg of ordinary tea and repacks all tea in 45 packets of equal weight. How much does each packet of tea weight?

43. A flask weighs 64.27 kg when empty and 150.35 kg when full of water. Find its weight when it is half full of water.

44. From the given number line, find $(A + B)$
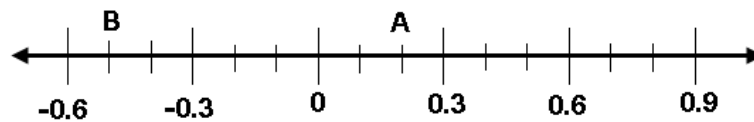
45. Evaluate: $1.564 - 0.500 + 3.001 - 2.500$

46. 4.5 kg of sweets are shared equally among 5 children. How many grams of sweets does each child get?

47. A book case is 2.38 m tall and the height of each shelf is 34 cm. How many shelves are there?

48. (i) Arrange the following in increasing order : $\frac{3}{4}, \frac{6}{5}, \frac{6}{7}, \frac{2}{3}$

   (ii) Arrange the following in decreasing order: $\frac{-2}{7}, \frac{-5}{11}, \frac{3}{8}, \frac{-1}{3}$

49. Find the perimeter of the given figure
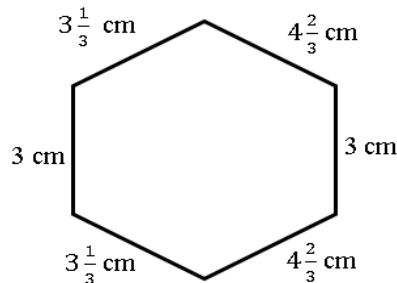
50. What is the least positive fraction that must be added to $1\frac{1}{3} \div 1\frac{1}{9}$ to make the result an integer?

Answers:

No.	Answer	No.	Answer
1.	$15\frac{1}{5}$	26.	113.62
2.	$\frac{19}{15}$ or $1\frac{4}{15}$	27.	42.73
3.	$10\frac{1}{3}$	28.	0.05
4.	$3\frac{1}{2}$	29.	26.25
5.	$\frac{46}{7}$ or $6\frac{4}{7}$	30.	12 sides
6.	$\frac{189}{4}$ or $47\frac{1}{4}$	31.	0.054009
7.	$\frac{1}{4}$	32.	4000
8.	150 g	33.	2000.02
9.	350 ml	34.	22.75 sq. meter
10.	3 m	35.	0.032567
11.	$\frac{1}{7}$	36.	37.15
12.	$\frac{35}{6}$ or $5\frac{5}{6}$	37.	$159, 24.6, 14.6, 1.07, -1.295$
13.	$19\frac{1}{3}$ m	38.	30.25 sq meter
14.	7 Pieces	39.	0.0192 sq meter
15.	₹17.84	40.	$\frac{13}{27}$
16.	$\frac{18}{31}$	41.	1.287 cm
17.	0.033	42.	1.01 kg
18.	$\frac{48}{7}$ or $6\frac{6}{7}$	43.	107.31 kg
19.	Ayub, 0.9 km	44.	-0.3
20.	107	45.	1.565
21.	$\frac{3}{6}$	46.	900 gram
22.	$\frac{2}{5}$	47.	7 shelves
23.	$\frac{34}{9}$ or $3\frac{7}{9}$	48.	(i) $\frac{2}{3}, \frac{3}{4}, \frac{6}{7}, \frac{6}{5}$, (ii) $\frac{3}{8}, \frac{-2}{7}, \frac{-1}{3}, \frac{-5}{11}$
24.	37.25	49	22 cm
25.	₹96	50.	$\frac{4}{5}$

Chapter 3

Data Handling

Points to remember:

- **Range: - The difference between the largest and the smallest observation of the data is called the range.**

- **Mean $= \dfrac{\text{Sum of all the observations}}{\text{Number of observations}}$**

- **Median refers to the value of the data which divides the data into two equal parts i.e. which lies in the middle of data (when arranged in increasing or decreasing order).**

- **Mode refers to the observation which occurs most frequently.**

- **Empirical relation between mean, median and mode: Mode $= 3$ Median -2 Mean.**

- **Probability : - The measure of chance of happening of something is called Probability**

- **The probability of happening of an event is from 0 to 1.**

- **When an event is certain to happen, its probability is 1.**

- **If an event is impossible, its probability is 0.**

TIPS:

- **If each observation of data is multiplied by 'a' then mean is also multiplied by 'a'.**

- **If each observation of data is divided by 'a' then mean is also divided by 'a'.**

- **If 'a' is added or subtracted from each observation then new mean is obtained by adding or subtracting 'a' from the old mean.**

- Total number of outcomes in toss of coins 2^n (where n is number of coins)

- Total number of outcomes in throw of dice $= 6^n$ (where n is number of dice).

- Sum of first n natural numbers $= \frac{n(n+1)}{2}$

Questions:

1. Find the arithmetic mean of the numbers $-3, 0, -4, 8, 11$.

2. Find the mean of the first ten natural numbers.

3. Find the mean of first ten whole numbers.

4. Find the mean of prime numbers between 10 and 20.

5. If the mean of 3, 1, 5, x and 9 is 4, then find the value of x.

6. Given that the mean of five numbers is 28. If one of the numbers is excluded, the new mean becomes 25. Determine the excluded number.

7. The mean of five observations is 15. If the mean of the first three observations is 14 and that of the last three is 17, find the third observation.

8. Find the mean of fist nine even numbers

9. Gunika secured 73, 86, 78 and 75 marks in four tests. What is the least number of marks she should secure in her next test if she has to have a mean score of 80 marks in five tests?

10. If the mean of $x + 2$, $x + 4$, $x + 6$ is 15. Find x.

11. Find the range of the following data :

    21, 6, 17, 18, 12, 8, 4, 13.

12. Komal worked for $2\frac{1}{2}$ hours on Monday, $3\frac{1}{4}$ hours on Tuesday and $2\frac{3}{4}$ hours on Wednesday. What is the mean number of hours she worked on these three days?

13. The mean weight of a class of 20 students is 48 kg. Two more students weighing 60 kg and 58 kg respectively join the class. What is the mean weight of the class now?

14. Find the mean of all factors of 24.

15. Find the mean of first eight multiples of 5.

16. Radha scored 97, 73 and 88 respectively in her first three examinations. If she scored 80 in her fourth examination, then by how much will her mean score increase or decrease?

17. The mean, median and mode of four numbers is 8. The smallest number is 7. Find the number.

18. The mean of three numbers a, b and c is 8, and the mean of five numbers a, b, c, d and e is 15. Find the mean of d and e.

19. Following cards are put facing down

    | A | E | I | O | U |

    What is the probability of drawing out?

    (a) a vowel (b) A or I (c) U (d) a consonant

20. A card is drawn from a pack of 100 cards numbered 1 to 100. Find the probability of drawing a square number.

21. The probability of winning a game is 0.07. What is the probability of losing it?

22. **A dice is thrown once. What is the probability that the numbers shown on the dice is**

   a. **an odd number**

   b. **a prime number**

   c. **a composite number**

   d. **a multiple of 2**

   e. **a factor of 6**

   f. **a number greater than 6.**

   g. **a number less than 3.**

23. **Find the median for the following set of numbers :**

   6, 2, 5, 4, 3, 4, 4, 2, 3

24. **If 17 is taken from the following data, then find the new median.**
    12, 26, 17, 28, 10, 14, 15, 32, 35.

25. **The mean of seven numbers is 25. If each number is divided by 2, what will be the new mean?**

26. **The mean of 200 items was 50. Later on it was discovered that the two items were misread as 92 and 8 instead of 192 and 68. Find the correct mean.**

27. **Find the median of the given data if the mean is 4.5 .**
    5, 7, 7, 8, x, 5, 4, 3, 1, 2.

28. **The mean of three numbers is 10. The mean of other four numbers is 12. Find the mean of all the numbers**

29. **The following observations have been arranged in ascending order.**

    29, 32, 48, 50, x, $x + 2$, 72, 78, 82, 96

    If the median of the data is 61, find the value of x.

30. **What is the probability of the sun setting tomorrow?**

31. **What is the probability that a student chosen at random out of 3 girls and 4 boys is a boy?**

32. **Find the mode of the ages (in years) of 10 students of class VII. 13, 12, 14, 12, 13, 12, 14, 12, 13, 14.**

33. **A coin is tossed 100 times with the following frequencies:**

    Head: 49, Tail: 51,   When a coin is tossed at random, what is the probability of getting a Head?

34. **A box contains two pairs of socks of two different colours (black and white). I have picked out a black sock. I pick out one more with my eyes closed. What is the probability that it will make a correct pair?**

35. **What is the class mark of the class 30 - 35?**

    (Answer the following questions 36 to 38)

    The weight of new born babies (in kg) in a hospital on a particular day are as follows: - 2.1, 2.4, 3.8, 3.0, 2.6, 2.1, 1.9, 3.7, 2.6

36. **Find the range.**

37. **Find the median weight.**

38. **How many babies weigh more the median weight?**

39. **Find the median of first 10 even numbers.**

40. **Find the median of first 50 whole numbers.**

Use the bar graph below to answer the questions 41 to 43.
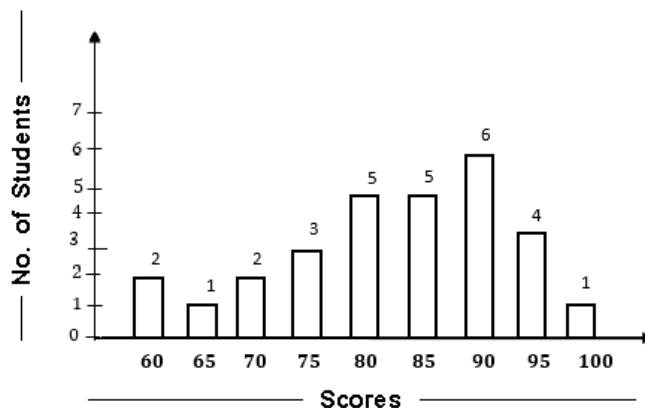
41. What is the range of marks scored by the students?

42. How many student score above 70 but less than 90?

43. If the pass score was 70, how many students did not pass?

44. The mean of Shivansh's marks in 5 subjects is 86. He got 80 marks in the 6th subject. What is the mean of his marks in all the 6 subjects together?

45. A circle is shaded as shown below and Aamir throws a dart at it. What is the probability that the dart will hit the shaded part?
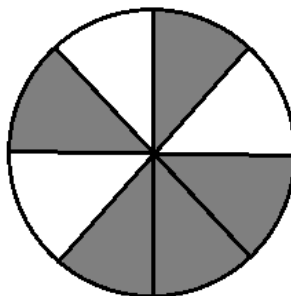
46. What is the probability of getting a number 10 on throwing a dice?

47. Six of 24 students in a class are left-handed. What is the probability that randomly selected student is right-handed?

(Answer the following questions 48 to 50)

The following graph shows the points scored in four games of basketball. Study the graph.
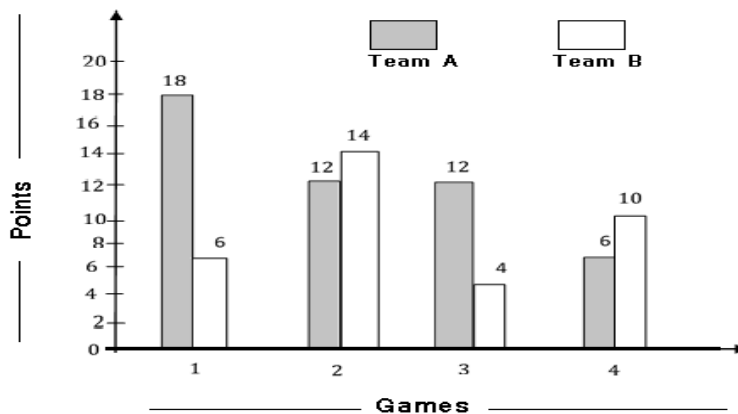
48. What is the lowest score? Who scored it and in which game?

49. By how many points did team A win in the first game?

50. By how many points did the team B win in the fourth game?

Answers:

1.	2.4	26.	50.8
2.	5.5	27.	4.5
3.	4.5	28.	$11\frac{1}{7}$
4.	15	29.	60
5.	2	30.	1
6.	40	31.	$\frac{4}{7}$
7.	18	32.	12
8.	10	33.	0.49
9.	88	34.	$\frac{1}{3}$
10.	11	35.	32.5
11.	17	36.	1.9kg
12.	$2\frac{5}{6}$ hours	37.	2.6kg
13.	49kg	38.	3 babies
14.	7.5	39.	11
15.	22.5	40.	24.5
16.	Decrease by 1.5	41.	40
17.	7, 8, 8, 9	42.	13 students
18.	25.5	43.	3 students
19.	(a) 1, (b) $\frac{2}{5}$, (c) $\frac{1}{5}$, (d) 0	44.	85
20.	$\frac{1}{10}$	45.	$\frac{5}{12}$
21.	0.93	46.	0
22.	(i) $\frac{1}{2}$ (ii) $\frac{1}{2}$ (iii) $\frac{1}{3}$ (iv) $\frac{1}{2}$ (v) $\frac{2}{3}$ (vi) 0 (vii) $\frac{1}{3}$	47.	$\frac{3}{4}$ = 0.75
23.	4	48.	Lowest score =4, scored by team B in 3rd game
24.	20.5	49	12 points
25.	12.5	50.	4 points

CHAPTER – 4

SIMPLE EQUATIONS

Points to remember:

- The collection of whole numbers and negative numbers is called integers.

- An equation is a statement of equality which contains a variable on one or on both the sides of the equation.

- An equation involving only a linear polynomial is called a linear equation. For example: $3x + 12 = 90$ etc.

- An equation remains the same if the LHS and the RHS are interchanged.

- Taking terms of one side to other side is called transposing. When we transpose a number from one side of the equation to the other side, we change its sign example $12p - 11 = 25 \Rightarrow 12p = 25 + 11$.

- An equation does not change, if
  - Same quantity is added to both sides
  - Same quantity is subtracted from both sides
  - Both sides are multiplied by same non zero quantity.
  - Both sides are divided by same non zero quantity.

Questions:

1. $2x - 14 = 10$

2. $3x + 21 = 0$

3. $2x - 9 = -3$

4. $5x - 12 = 18$

5. $-3x - 1 = 1 - 2x$

6. $8x = 20 + 3x$

7. $x - \frac{1}{3} = 1\frac{2}{3}$

8. $\frac{1}{4}y + \frac{1}{6}y = y - 7$

9. $5(t - 2) + 3(t + 1) = 25$

10. $6y = \frac{2}{3}(2y - 7)$

11. $\frac{5}{3}(2y - 1) = 3y - 5$

12. $\frac{2y + 5}{3} = 3y - 8$

13. $\frac{p - 3}{5} - 2 = -1$

14. $\frac{z}{13} + \frac{z}{9} = \frac{44}{117}$

15. $\frac{8q - 3}{3q} = 2$

16. $\frac{3z + 5}{2z + 1} = \frac{1}{3}, z \neq -\frac{1}{2}$

17. $p - 2 = \frac{1}{5}(3p - 1)$

18. $\frac{7q - 3}{9} = 9$

19. $3p - 0.7 = 1.4$

20. $4p + 0.8 = 7.2$

21. $\frac{9p}{2 - 3p} = 9$

22. $1.8\,q = 24 + q$

23. $0.1\,(3q - 1) = 0.2\,(1 - 2q)$

24. $\frac{2p - 1}{3p + 5} = 5\,, p \neq -\frac{5}{3}$

25. $\frac{2 - q}{1 - 2q} = 2\,, q \neq \frac{1}{2}$

26. $\frac{k - 2}{6k + 1} = 1\,, k \neq -1/6$

27. $\dfrac{3k}{5k-5} = -1$, $k \neq 1$

28. $2t - 1 = \dfrac{1}{3}(5 - 2t)$

29. $0.9(1 - p) = 0.1\,p - 3$

30. $0.3x + 0.4 = 0.28x + 1.16$

31. The length of a rectangle is 5m more than its breadth and its perimeter is 230m. Find its length and breadth.

32. A number when added to its one third gives result 16. Find the number.

33. When the smaller of two consecutive integers is added to three times the larger integer the result is 83. Find both the integers.

34. After 10 years Monika will be three times as old as she was four years ago. What is her present age?

35. If 5 is subtracted from three times a number, the result is 16. Find the number.

36. The sum of three consecutive even numbers is 42. Find these numbers.

37. Naina thoughts of a number. She multiplied it by 2 added 5 to the product then obtained 17 as result. What is the number she had thought of?

38. Two adjacent sides of a square are given in fig below. Find the measurement of sides of the square.

$(42 - 13x)$ cm

$(18x - 20)$ cm
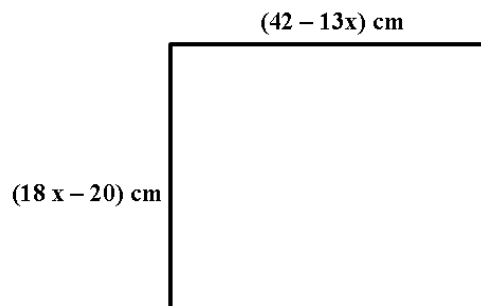
39. The difference between two numbers is 7. Six times the smaller plus the larger is 77. Find the numbers.

40. The sum of two numbers is 25. One of the numbers exceeds the other by 9. Find the numbers.

41. The sum of ages of father and his son is 75 years. If the age of the son is 25 years, find the age of father.

42. Find three consecutive whole numbers whose sum is 84.

43. In a hostel mess 50 kg of rice is consumed per day. If each student gets 400 gram of rice per day, find the number of students in the hostel mess.

44. Manogya is 3 years younger than her brother Shubh. If sum of their ages be 25 years, find their present ages.

45. The ages of Kishan and Rishabh are in the ratio of 4 : 5. Ten years hence the ratio of their ages will be 6 : 7. Find their present ages.

46. Find the measure of an angle if its supplement measures 39° more than twice its complement.

47. In Δ ABC if $\angle A = (3x)°$, $\angle B = (2x + 60)°$ and $\angle C = (5x – 40)°$. Find these angles.

48. Each of the two equal sides of an isosceles triangle is twice as large as the third side. If the perimeter of the triangle is 30 cm. find the length of each side of the triangle.

49. In a bag, the number of one rupee coins is three times the number of two rupees coins. If the total worth of the coins is ₹ 120. Find the number of two rupees coins.

50. The interest received by Manas is ₹ 30 more than that of Kishan. If the total interest received by them is ₹120, find the interest received by Manas.

Answer:

Q. NO.	ANSWER	Q. NO.	ANSWER
1.	$x = 12$	26.	$k = -3/5$
2.	$x = -7$	27.	$k = \frac{5}{8}$
3.	$x = 3$	28.	$t = 1$
4.	$x = 6$	29.	$p = 3.9$
5.	$x = -2$	30.	$x = 38$
6.	$x = 4$	31.	$l = 60m, \ b = 55m$
7.	$x = 2$	32.	12
8.	$y = 12$	33.	20, 21
9.	$t = 4$	34.	11 years
10.	$y = -1$	35.	7
11.	$y = -10$	36.	12, 14, 16
12.	$y = \frac{29}{7}$	37.	6
13.	$p = 8$	38.	16 cm
14.	$z = 2$	39.	10, 17
15.	$q = \frac{3}{2}$	40.	8, 17
16.	$z = -2$	41.	50 years
17.	$p = \frac{9}{2}$	42.	27, 28, 29
18.	$q = 12$	43.	125
19.	$p = 0.7$	44.	11, 14 years
20.	$p = 1.6$	45.	20 and 25 years
21.	$p = \frac{1}{2}$	46.	39°
22.	$q = 30$	47.	$\angle A = 48°, \angle B = 92°, \angle C = 40°$
23.	$q = 3/7$	48.	12 cm, 12 cm, 6 cm
24.	$q = -2$	49	24
25.	$q = 0$	50.	₹75

Chapter 5

Lines and Angles

- **A line segment has two end points**

$$\overline{A \qquad\qquad B}$$

- **A ray has only one end point**
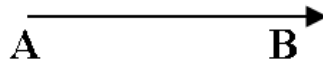
- **A line has no end points.**
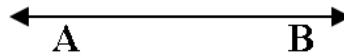
- **When two lines meet at a point, they are called intersecting lines and when two lines do not meet even on extending, those lines are called parallel lines.**
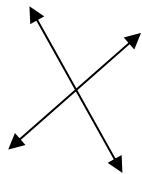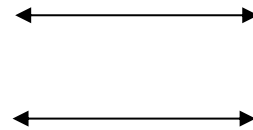
Intersecting lines   **Parallel lines.**

- **Lines passing through the same point are called concurrent lines.**

- **A line that intersects a pair of lines (intersecting or parallel lines) at distinct points is called a transversal.**

- **Vertically opposite angles formed by two intersecting lines are equal.**

- **Two angles whose sum is 90° are complimentary angles.**

- **Two angles whose sum is 180° are supplementary angles.**

- Two angles with a common vertex and a common arm between non-common arms are called adjacent angles.

- When a transversal intersects two parallel lines then :

  (a)   Each pair of corresponding angles are equal.

  (b)   Each pair of alternate angles are equal

  (c)   Interior angles on the same side of the transversal are supplementary.

- Two lines are parallel if

  (a)   A pair of corresponding angles is equal

  (b)   A pair of alternate angles is equal

  (c)   A pair of interior angles on the same side of the transversal are supplementary.

Questions:

1.   What will be he complement of the following angles?

       (a) 58°   (b) 39°   (c) 46°   (d) 82°

2.   Write the supplement of the following angles.

       (a) 133°   (b) 67°   (c) 88°   (d) 127°

3.   Find the measure of angle which is the complement of itself.

4.   Two complementary angles are in the ratio of 4 : 5. Find the angles.

5.   Find the measure of an angle which is supplement of itself.

6.   Two supplementary angles differ by 34°. Find the angles.

7.   An angle is four times its complement. Find the angle.

8.   If the complement of an angle is 28°, find the supplementary angle.

9.   An angle is equal to eight times its supplement. Determine its measure.

10. An angle is greater by 60° than its supplementary angle. What is the angle?

11. Two supplementary angles are in the ratio 2 : 3. Find the angles.

12. The sum of an angle and half of its complementary angle is 75°. Find the angle.

13. Find the angle which is one-third of its supplementary angle.

14. The difference in the measures of a pair of complementary angles is 78°. Find the measure of the angles.

15. The measure of an angle is 14° less than the measure of its complement. Find the measure of the larger angle.

16. In the given figure, if a = 3b, find a and b.
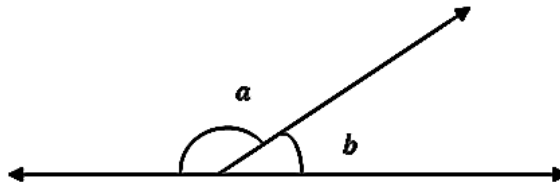
17. In the given figure, if $l \parallel m$, and p is a transversal, find x.
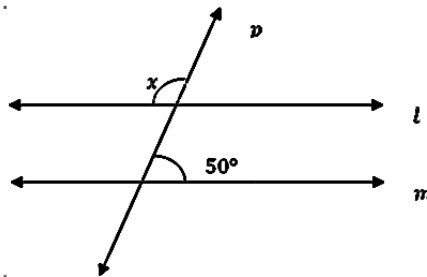
18. What is the obtuse-angle the hour hand of the clock makes with the minute hand when the time is 7 : 00 ?

19. Find the value of x if $l \parallel m$ and p is the transversal.
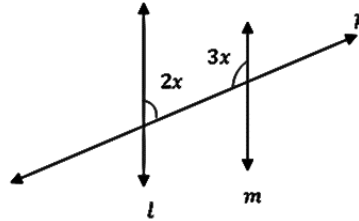
20. Find the value of $x + y + z$.
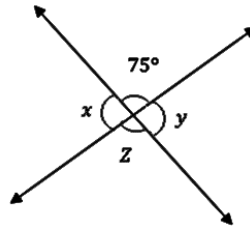
21. Find the value of x.
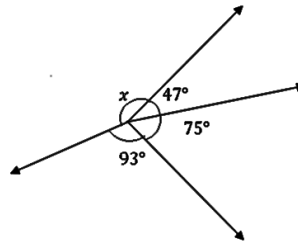
22. The angles of a linear pair are in the ratio 1 : 2. Find the angles.

23. In the given figure, find x and also find $\angle BOC, \angle COD, \angle AOD$.
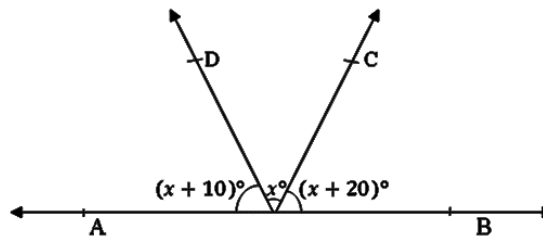
24. A clock reads 4 : 30. If the minute hand points East, in what direction will the hour hand point?

25. In the figure $l \parallel m$ and $PQ \parallel RS$, if $\angle 1 = 50°$, find $\angle 2, \angle 3, \angle 4$.
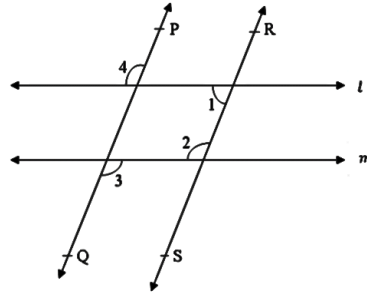
26. In the given figure, $l \parallel m$, $\angle 1 = 60°$, $\angle 2 = 100°$, find the values of x, y, z
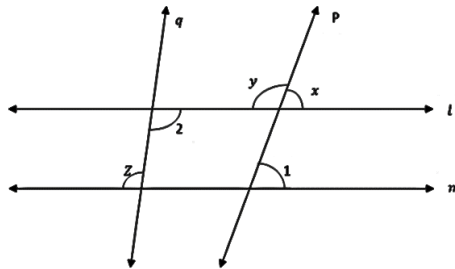
27. In the given figure, $p \parallel q$, $\angle 1 = 100°$ and $\angle 2 = 50°$. Find x, y, z.
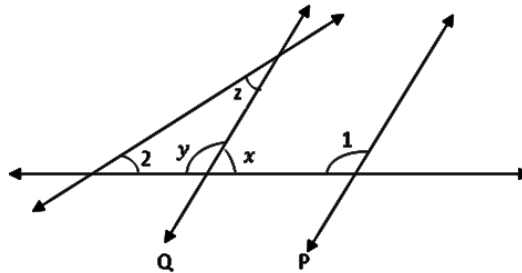
28. In the given figure, EF $\parallel$ GH, $\angle EAB = 65°$ and $\angle ACH = 100°$, find $\angle ABC, \angle ACB$ and $\angle CAF$.
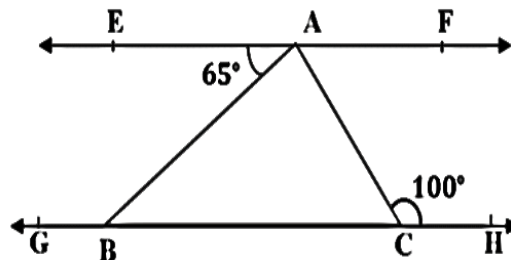
29. In the given figure $AB \parallel CD$ and DA has been produced to E so that $\angle BAE = 125°$, find x, y and z.
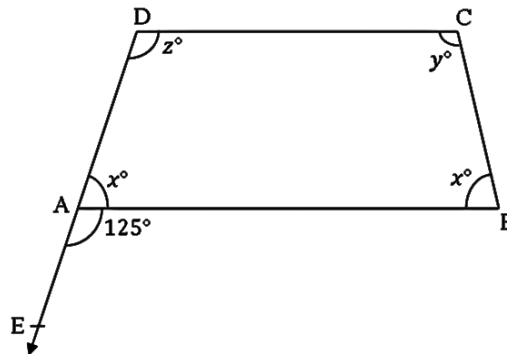
30. Two parallel lines l and m are intercepted by a transversal. If the interior angles on the same side of transversal be $(2x - 8)°$ and $(3x - 7)°$, find the measure of each of these angles.

31. In the figure it is given that AB $\parallel$ CD, $\angle ABO = 50°$ and $\angle CDO = 40°$, find the measure of $\angle BOD$ (reflex $\angle BOD$).
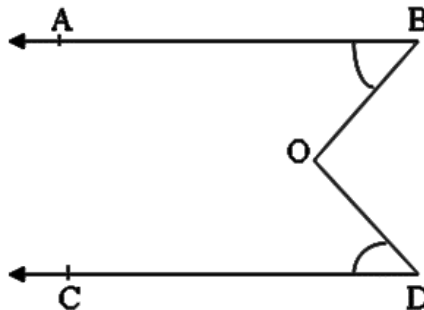
32. Two complementary angles are in the ratio of 5 : 4. Find the smaller angle.

33. Two angles forming a linear pair are in the ratio of 3 : 7. Find the two angles.

34. An angle is 30° more than one half of its complementary angle. Find the angle.

35. If the difference between two supplementary angles is equal to one right angle. Find the angles.

36. In the given figure, if PQ ∥ RS and QR ∥ ST find the value of $(a + b)$.
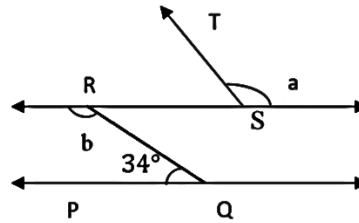
37. In the given figure, PQ ∥ SR and QR ∥ PS, then find a and b.
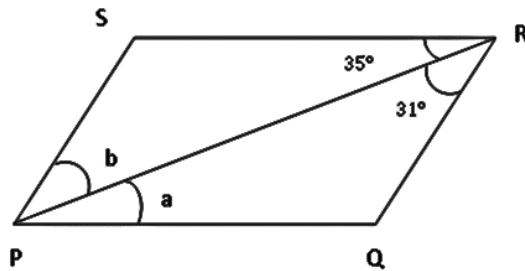
38. Find the value of x.
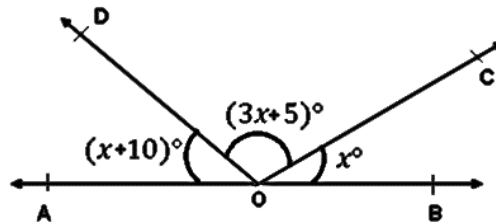
39. In the given figure AB ∥ CD, ∠APQ = 50° and ∠PRD = 130° then find ∠QPR.
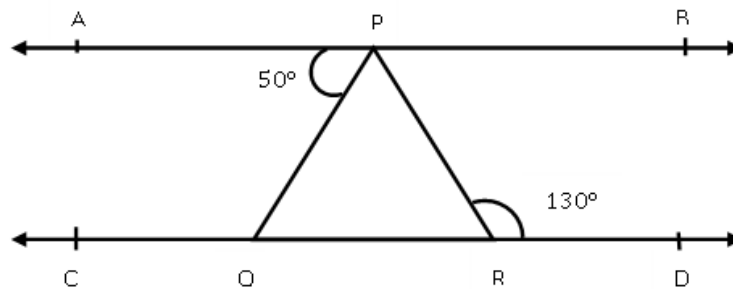
40.   Find the angle which is one-eighth of its complement.

41.   Find the angle which is $80°$ more than its supplement.

42.   Find the complement of one third right angle.

43.   Find the value of x in the given figure.
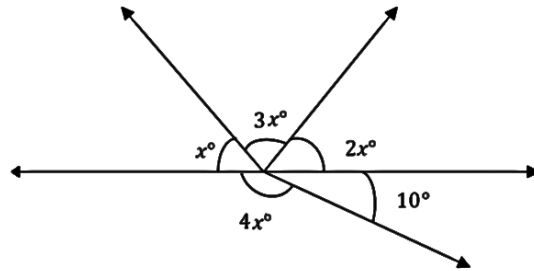
44.   Find the value of $x + y + z$.
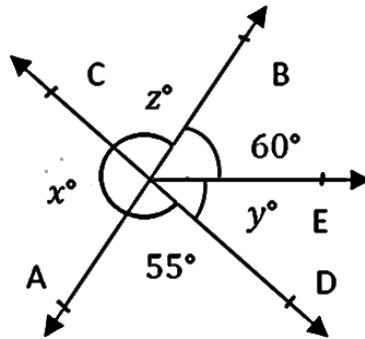
45.   In the given figure, the arms of two angles are parallel. If $\angle DEF = 70°$, then find $\angle ABC$.
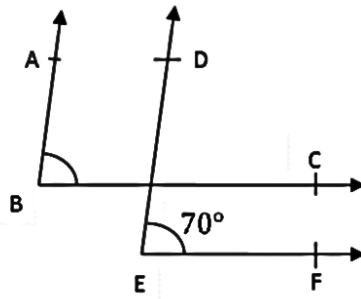
46. In the given figure, PQ is a mirror, AB is the incident ray and BC is the reflected ray. If ∠ABC = 46°, then find ∠ABP.
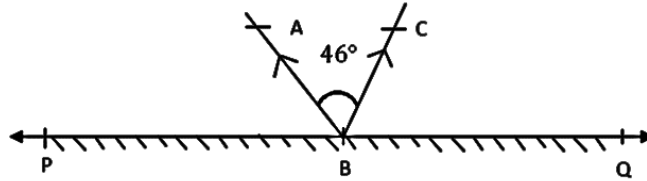
47. In the given figure, PQ ∥ RS and QR ∥ ST. If ∠PQR = 39°, find $x + y$.
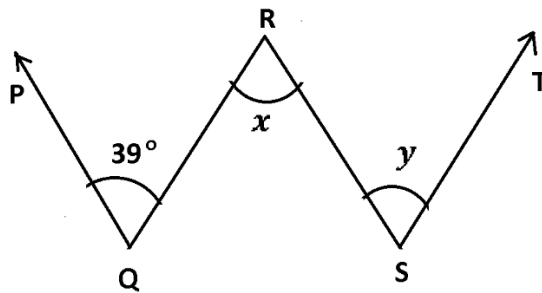
48. An angle is 38° more than its supplement. Find the angle.

49. The sum of an angle and one-third of its supplementary angle is 90°. Find the angle.

50. If the angles of a linear pair are equal, then what is the measurement of each angle?

Answers:

1.	(a) 32° (b) 51° (c) 44° (d) 8°	26.	$x = 60°, y = 120°, z = 100°$
2.	(a) 47° (b) 113° (c) 92° (d) 53°	27.	$x = 80°, y = 100°, z = 30°$
3.	45°	28.	$\angle ABC = 65°$, $\angle ACB = 80°, \angle CAF = 80°$
4.	40° and 50°	29.	$x = 55, y = 125, z = 125$
5.	90°	30.	70° and 110°
6.	73° and 107°	31.	270°
7.	72°	32.	40°
8.	118°	33.	54°, 126°
9.	160°	34.	50°
10.	60°	35.	135°, 45°
11.	108° and 72°	36.	292°
12.	60°	37.	$a = 35°, b = 31°$
13.	45°	38.	33
14.	6° and 84°	39.	80°
15.	52°	40.	10°
16.	$a = 135°, b = 45°$	41.	130°
17.	130°	42.	60°
18.	150°	43.	35
19.	36°	44.	245°
20.	285°	45.	70°
21.	145°	46.	67°
22.	60° and 120°	47.	78°
23.	$x = 50°, \angle BOC = 70°$, $\angle COD = 50°, \angle AOD = 60°$	48.	109°
24.	North East	49	45°
25.	$\angle 2 = 130°, \angle 3 = 130°$, $\angle 4 = 130°$	50.	90°

CHAPTER 6

The Triangle and Its Properties

- A simple closed figure made by three line segments is called a triangle. it is denoted by symbol Δ

- Area inside the triangular region is called interior region of the triangle.

- A triangle has three vertices three angles and three sides.

- Sum of interior angles of a triangle is 180°.

- An exterior angle of a triangle is equal to the sum of two interior opposite angles.

- The sum of the length of any two sides of a triangle is greater than the length of the third side.

- 1n a right triangle the square of the hypotenuse is equal to the sum of the square of the other two sides. This is known as Pythagoras theorem.

Questions:

1.   Name the angles in the given figure of triangle
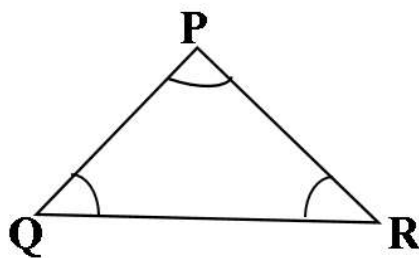
2.   What are the three sides of ΔLMN.

3.   Name the three vertices of ΔLMN.

4.   Name the equal sides in ΔPQR if ∠P = ∠R.

5.   What is the sum of interior angles of a triangle?

6.   What is the sum of exterior angles of a triangle?

7.   Name the angles which are equal in given figure of ΔLMN.
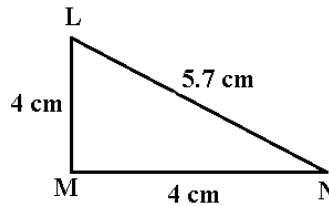
8.   The angle of a triangle are in 5 : 6 : 7. What is the measurement of smallest angle?

9.   The angles ∠A, ∠B are ∠C of ΔABC are in the ratio 1: 3 : 1. Which angle is obtuse angle and what is it's measurement?

10.   The angles of a triangle are $(x - 20)°, (x - 10)°$ and $x°$. Find the value of x.

11.   The point of concurrency of medians of a triangle is known as _____

12.   From the given figure, find the value of x.
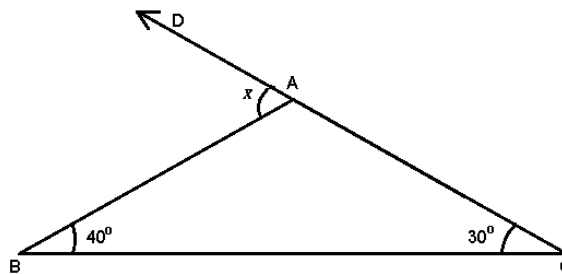
13.   The sum of two angles of a triangle is equal to its third angle. Find the third angle.

14. In a triangle one angle is thrice the smallest and another one is twice the smallest. Find the angles.

15. Find the value of 'y' from the given figure-
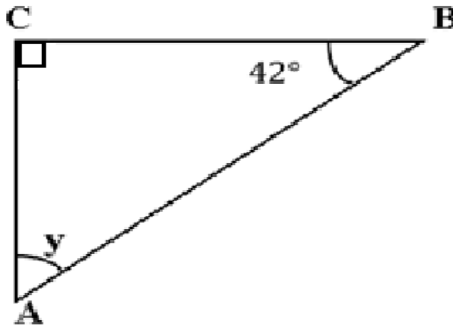
16. If one angle of a triangle in $40°$ and other two angles are in the ratio 3 : 4, find these angles.

17. From the given figure find the values of 'a' and 'b'.
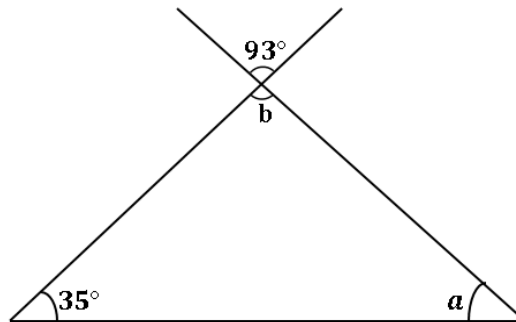
18. The angles of a triangle are in ratio 3 : 5 : 7. Find the greatest angle.

19. The angles of a triangle are $(2x - 5)°, (x - 3)°$, and $x°$. Find the value of x and measurement of angles.

20. Find $\angle CAB$ from the given figure –
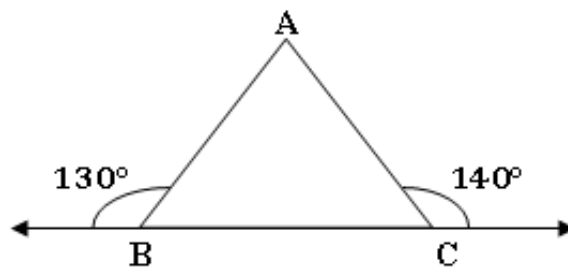
21. What is the minimum and maximum integral value of length of third side of a triangle whose two sides are 7 cm and 10 cm.

22. In the given figure ∠BAC = 25° and ∠ECD = 45°, find ∠ABC and also name the type of triangle.
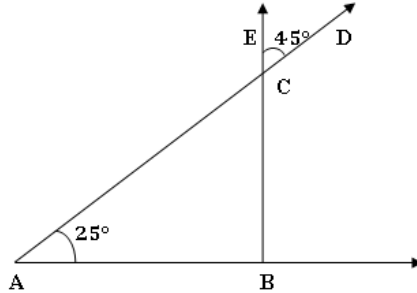
23. In ΔART if ∠A = 32°, ∠R = 64°, ∠T = 84°, then which side is smallest?

24. Find the value of 'a' from the given Fig.
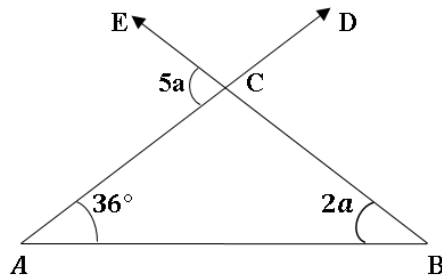
25. ΔXYZ in an equilateral triangle and XP is the median, if $PY = 2.5$ cm, find the perimeter of ΔXYZ.

26. From the given figure, find the value of x and y.
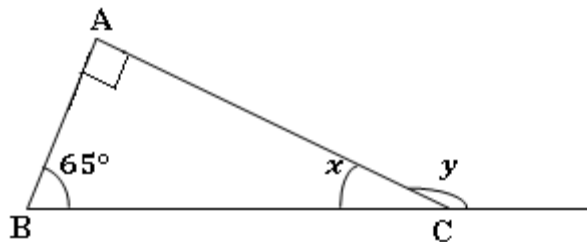
27. In a right angle triangle LMN if $LM^2 + MN^2 = LN^2$, then which angle of this triangle is $90°$.

28. A man goes 10 m due east and then 24 m due north, find his distance from the starting point.

29. A square is described on the hypotenuse of a right angled triangle whose other two sides are 12 cm and 5 cm. What is the area of the square so formed?

30. Find the value of x, y and z if DE ∥ BC in $\triangle$ABC.
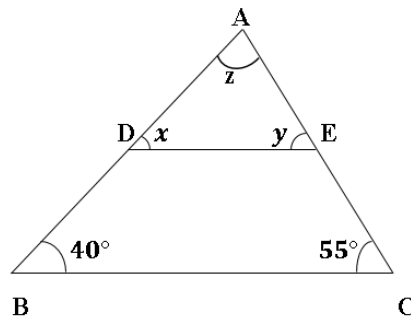
31. Two acute angles of a right angled triangle are equal. Find these two angles.

32. From the given figure, find the value of x and y.
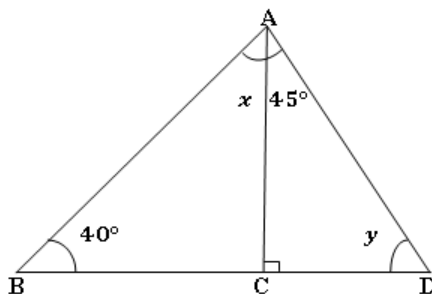
33. In $\triangle$ABC if $3\angle A = 4\angle B = 6\angle C$, find the angles.

34. In $\triangle$PQR $\angle P = 100°$. PS bisects $\angle P$ and PS $\perp$ QR. Find $\angle Q$.

35. If one angle of a triangle is $80°$ and other two angles are in the ratio $2 : 3$, Find these angles.

36. From the given figure, find the value of x, y and z.
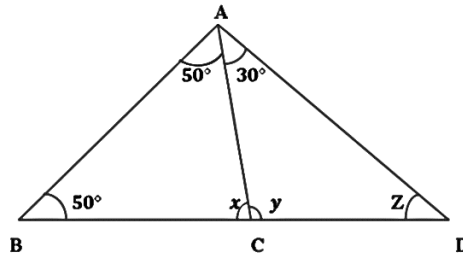
37. An exterior angle of a triangle is $110°$ and one of the interior opposite angles in $40°$, find the other two angles of the triangle.

38. From the given figure, find ∠A and ∠B.
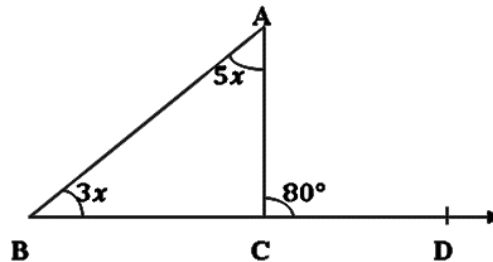
39. One of the exterior angles of a triangle in $100°$ and the interior opposite angles are equal to each other. What is the measure of each of these angles?

40. Find the value of x and y from the given figure.
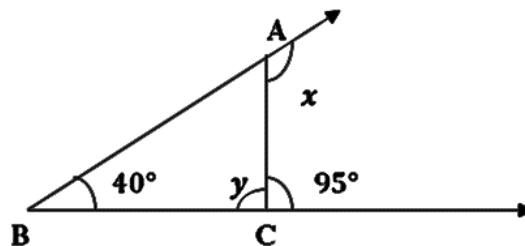
41. The exterior angle obtained on producing the base of a triangle both ways are $104°$ and $136°$. Find all the angles of the triangle.

42. Find the value of x in the given figure
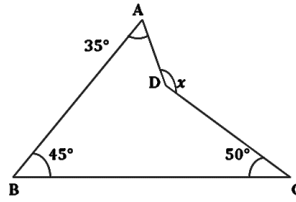
43. If the exterior angle of a triangle are $(2x + 10)°, (3x - 5)°$ and $(2x + 40)°$, then find the value of x.

44. In the given figure AB ∥ DE, Find the value of x.
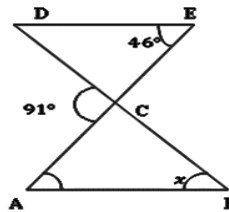
45. A man goes 12 m east than 5 m north. Find his shortest distance from starting point.

46. Find the length of the diagonal of a square whose side is 8 cm.

47. Find the perimeter of the rectangle whose length is 40 cm and 41cm.

48. In the given figure AB ∥ CD find the value of x and y.
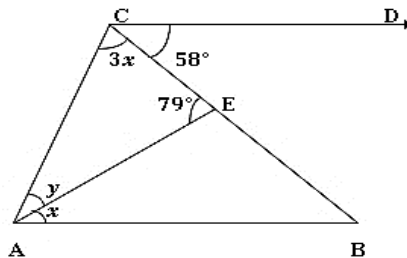
49. If $m^2 + 1$, $m^2 - 1$ and 2m form a Pythagorean triplet for $m > 1$, then what are the value of Pythagorean triplet for $m = 3$?

50. Find the perimeter of a rectangle whose one side measures 20 m and the diagonal is 29 m.

Answers:

Q. NO.	ANSWER	Q. NO.	ANSWER
1.	∠PQR, ∠QRP, ∠RPQ	26.	$x = 25°, y = 155°$
2.	LM, MN, LN	27.	∠M or ∠LMN
3.	L, M, N	28.	26 m
4.	PQ = RQ	29.	169 sq cm
5.	180°	30.	$x = 40°, y = 55°,$ $z = 85°$
6.	360°	31.	45°, 45°
7.	∠MLN and ∠LNM	32.	$x = 50°, y = 45°$
8.	50°	33.	∠A = 80°, ∠B = 60° ∠C = 40°
9.	∠B, ∠B = 108°	34.	40°
10.	70	35.	40° , 60°
11.	Centroid	36.	$x = 80°, y = 100°,$ $z = 50°$
12.	70°	37.	70°, 70°
13.	90°	38.	∠A = 50°, ∠B = 30°
14.	30°, 60°, 90°	39.	50°
15.	$y = 48°$	40.	$x = 125°, y = 85°$
16.	60°, 80°	41.	60°, 76°, 44°
17.	$a = 52°, b = 93°$	42.	130°
18.	84°	43.	$x = 45$
19.	$x = 47,$ 89°, 44°, 47°	44.	$x = 45°$
20.	90°	45.	13 m
21.	Min. = 4 cm, Max. = 16 cm	46.	$8\sqrt{2}$ cm
22.	∠ABC = 110° (obtuse angled triangle)	47.	98 cm
23.	RT	48.	$x = 21°, y = 38°$
24.	$a = 12°$	49	10, 8, 6
25.	15 cm	50.	82 cm

CHAPTER 7

Congruence of Triangles

Points to remember:

- Two plane figures are congruent if each when superimposed on the other covers it exactly. Symbol of congruence is ′ ≅ ′ and is read as 'congruent to'

- The congruency condition for any two triangles to be congruent are

  SSS – (side – side –side) congruency.

  SAS – (side – angle –side) congruency.

  ASA – (angle – side – angle) congruency.

  RHS – (right angle – hypotenuse – side) congruency.

- If $\triangle ABC \cong \triangle PQR$, then their compounding parts are equal. Thus

  $AB = PQ, BC = QR, CA = RP$ and $\angle A = \angle P, \angle B = \angle Q$ and

  $\angle C = \angle R.$

  Example:
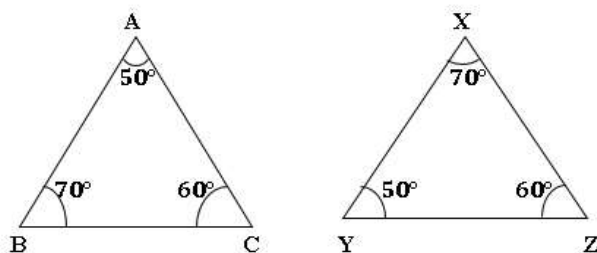
  Observe the correspondence of the vertices in above figure

  Correspondence of vertices: A ↔ Y   B ↔ X   B ↔ X

  Correspondence of sides: AB ↔ YX   BC ↔ XZ   CA ↔ ZY

Questions

1. Fill up the blanks :

    (a) Two line segments are congruent if their _____ are equal.

    (b) Two squares are congruent if measurement of their_____ are equal.

    (c) Two circles are congruent if their_____ are equal.

2. If ΔLMN $\cong$ ΔDEF, then find the value of $\frac{MN}{EF}$.

3. If ΔEFG $\cong$ ΔRST, then what will be the corresponding part of
    (i) EF (ii) RT (iii) RS

4. Are the given triangles congruent? If yes, then mention the congruence criterion, state the result in the symbol form.
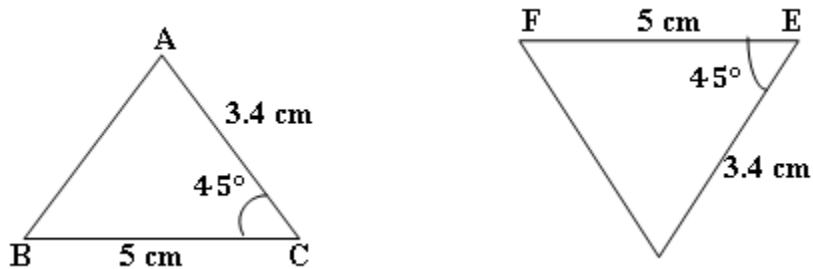
5. What is the length of side EF?
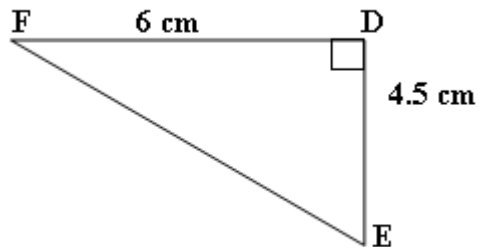
6. If ΔPQR $\cong$ ΔFGH and $\angle$P $= 2x + 15°, \angle$F $= 5x - 60°,$ then find the value of $x.$

What is the measurement of unknown angles or sides in the following pair of geometrically congruent figures (Q. 7 – 10).
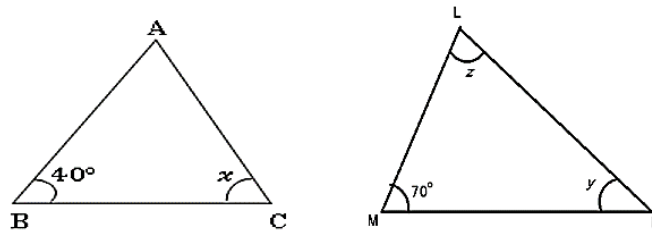
7.
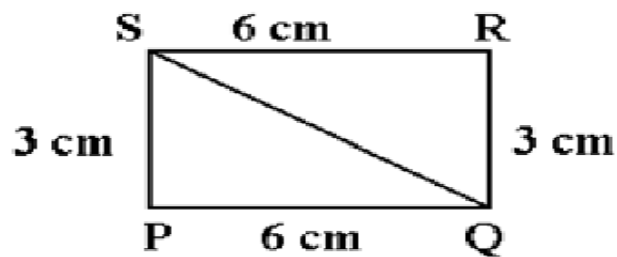
Q

6.6 cm

P

B

x

A

8.

R

65°

S   T

D

$x°$ E

F

9.

H   6 cm   G

3cm

E   F

Z   b   Y

l

W   X

10.

2.5 cm

O   P

r

C   D
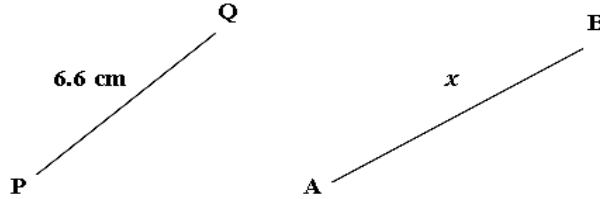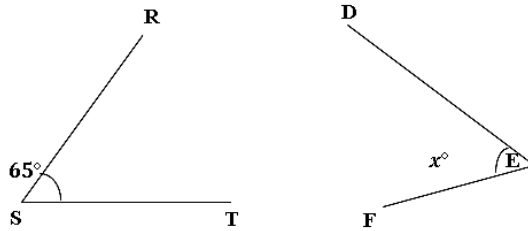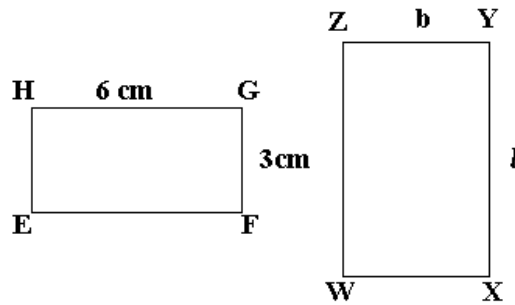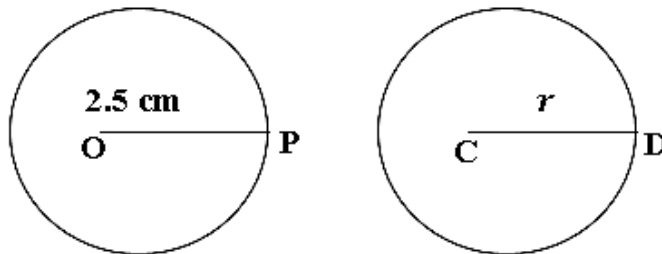
11. If △ABC ≅ △ LNM, then find the values of x, y and z.

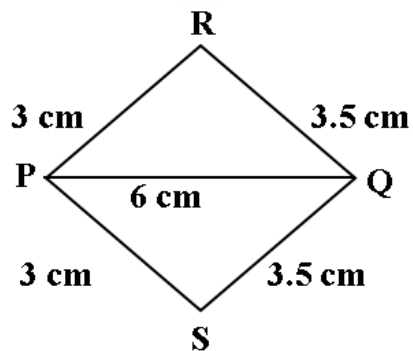**12.** In the given figure which triangles are congruent? Mention the congruency criterion in the symbolic form?

13. If radius of a circle is 3.5 cm, then find the circumference of other circle if two circles are congruent.

Observe the following pair of triangles and mention the congruence
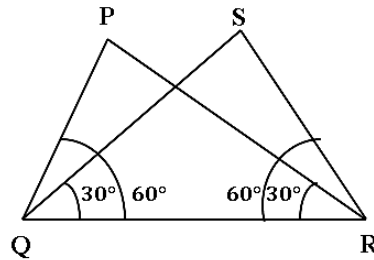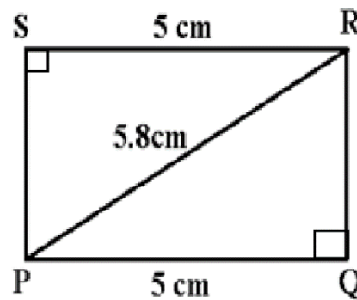
Criterion (Q – 14 to Q. 17)

14.

15.
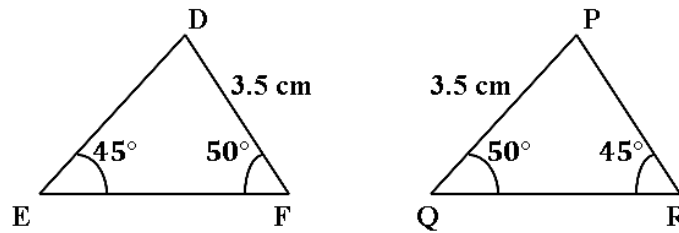
16.

17.

**18.** In the given figure ∆PQS ≅ ∆RSQ, find the value of ∠PSQ.
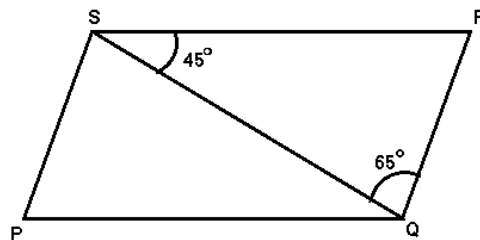
19. Two equilateral triangles are congruent and one side of the first triangle is 3.6 cm, find the length of corresponding side of the other triangle.

20. ΔPQR is a triangle with PQ = PR. Line segment PS bisects ∠*P* and meets the base QR at S. Is ΔPSQ ≅ ΔPSR? If yes then state the congruency criterion.

21. Two line segments are congruent and one has length 4.6 cm, what will be the length of twice of the other line segment?

22. ΔABC is an isosceles triangle with AB = AC. AD is the altitude from A on BC. Is ΔABD ≅ ΔACD? If yes then state the congruency criterion.

23. If diameter of a circle is 42 cm, then find the area of other circle if two circles are congruent.

24. Four congruent triangles are cut off from the corners of a rectangle as shown in the figure, find the area of remaining portion.
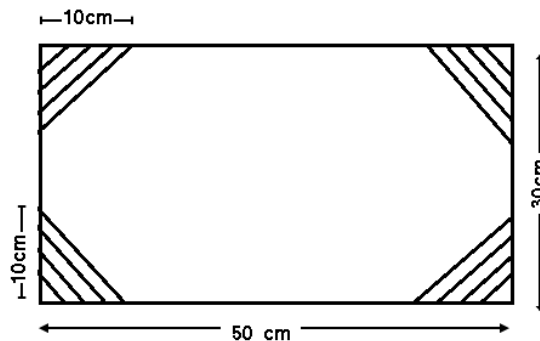
25. On the basis of measurement given in the figure, state the congruence criterion by which

(i)   ΔABC ≅ ΔBAD   (ii) ΔACP ≅ ΔBDP.
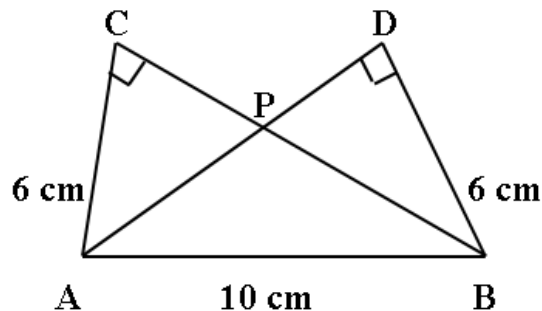
26. If ΔPOT ≅ ΔARM, then

(i) PO = -----------   (ii) RM = --------   (iii) TP = --------

(iv) ∠P = ----------   (v) ∠M = --------   (vi) ∠R = -------

27. In the given figure, QM = MR, LM = NM, ML ⊥ PQ and MN ⊥ PR. If ∠Q = 50°, then find ∠R.
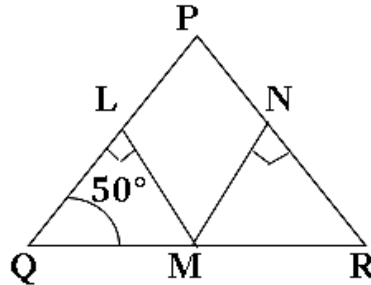
28. In ΔRAT, which side is included by the ∠RAT and ∠ATR?

29. From the given figure, find ∠BCD.
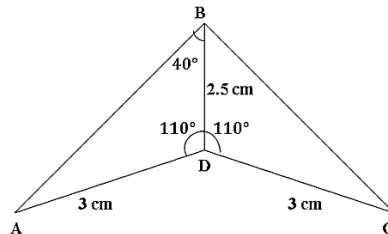
30. If ΔABC ≅ ΔPQR and $AC = 3.8$ cm, ∠B = 60°, then find PR and ∠Q.

31. From the given figure, state the congruence criterion in symbolic form which is applicable in the triangle shown
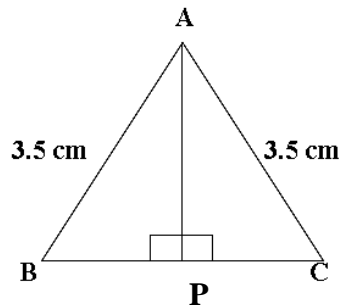
32. In the given figure, BD and CE are altitudes of ΔABC and BD = CE.

(i) Is ΔBCD ≅ ΔCBE?   (ii) If yes then by which congruence criterion?
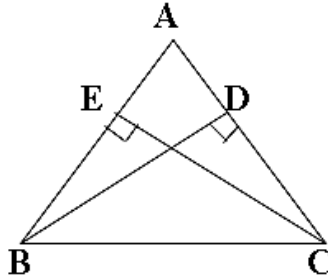
33. In ΔPIT which angle lie between sides IT and TP?

34. In ΔABC altitudes $AD = BE = CF = 3\sqrt{3}$ cm, find AB.

35. Fill in the blanks

(i) The bisector of the vertical angle of an isosceles triangle bisects the base at _____ angle.

(ii) In an isosceles triangle, the angles opposite to equal sides are _____.

Answers

1.	(i) Length (ii) Sides (iii) Radius.	19.	3.6 cm
2.	$\frac{MN}{EF} = 1$	20.	Yes, SAS
3.	(i) EF = RS (ii) RT = EG (iii) RS = EF	21.	9.2 cm
4.	Yes, SAS, $\Delta ACB \cong \Delta DEF$	22.	Yes, RHS
5.	7.5 cm	23.	Area = 1386 sq. cm
6.	25°	24.	Area = 1300 sq. cm
7.	$x = 6.6$ cm	25.	(i) RHS (ii) ASA
8.	65	26.	(i) PO = AR (ii) RM = OT (iii) TP = MA (iv) ∠P = ∠A (v) ∠M = ∠T (vi) ∠R = ∠O
9.	$l = 6$ cm, $b = 3$ cm	27.	∠R = 50°
10.	$r = 2.5$ cm	28.	AT
11.	$x = 70°, y = 40°$, $z = 70°$	29.	∠BCD = 30°
12.	$\Delta PQS \cong \Delta RSQ$	30.	$PR = 3.8$ cm, ∠Q = 60°
13.	22 cm	31.	$\Delta ABP \cong \Delta ACP$, RHS
14.	SSS	32.	Yes, RHS
15.	ASA	33.	∠T or ∠ITP
16.	ASA	34.	AB = BC = CA = 6 cm
17.	RHS	35.	(i) right (ii) equal
18.	∠SPQ = 70°		

CHAPTER 8

Comparing Quantities

Points to remember:

- When two quantities of same kind are in the same units are compared by Division, ratio of two quantities is obtained.

- A ratio has no unit.

- A ratio is said to be in simplest form, if its two terms have no common factor other than one.

- Comparison of two ratios is done by making them fractions with equal denominators and these ratios are called equivalent or proportional.

- Another method of comparison is percentage.

- Any simple fraction, decimal fraction or ratio can be converted into percentage and any percentage can be converted into simple fraction, decimal or ratio.

  Percentage means 'for each 100'; % = $\frac{1}{100}$

- When S.P. > C.P., there is profit.

- Profit = S.P. − C.P.

- Profit % = $\frac{Profit}{C.P.} \times 100$ %

- When C.P > S.P, there is loss

- Loss = C.P − S.P

- Loss % = $\frac{Loss}{C.P.} \times 100$ %

- **Simple Interest** $= \dfrac{\text{Principal} \ \times \text{Rate of interest} \ \times \text{Time}}{100}$

TRICKS

- **A number which, when added to terms of a:b makes it equal to the c:d is** $\dfrac{ad-bc}{c-d}$

- **A number which, when subtracted from the terms of ratio a:b makes it equal to ratio c:d is** $\dfrac{bc-ad}{c-d}$

- **If the sum of two numbers is A and their difference is B, then the ratio of numbers is given by A + B : A − B**

- **If a : b :: c : d, then a × d = b × c.**

Questions

1. **Find the ratio**

   (a) ₹4 to 20 paisa   (b) 5 kg to 100 gram

2. **Convert into percent:**

   (a) $\dfrac{7}{25}$ **(b)** $\dfrac{3}{20}$ **(c)** $\dfrac{3}{8}$

3. **Convert into fraction:**

   (a) 62.5 %   (b) 72 %   (c) 28 %

4. **Find:**

   (a) 15 % of ₹500   (b) 75 % of 180 kg

5. **Find x if:**

   (a) 25 : 8 = x : 24   (b) 20 : x = 4 : 35

6. **Two amount of money are proportional to 5: 7. If the first is ₹20, then what is the other amount?**

7. If 80 % students of a class of 45 students like to play cricket, then how many students don't like to play cricket?

8. Express the ratio of 12 cm to 25 cm in percentage.

9. Express the ratio of ₹2 to ₹10 as a percentage.

10. If CP of 16 articles is equal to SP of 20 articles, then find the gain or loss percent.

11. 12.5 % more is gained by selling a pen for ₹88 instead of selling for ₹80. Find the CP of pen.

12. A dishonest dealer decides to sell his goods at cost price but uses a weight of 800 gram for 1 kg weight. Find his gain percent.

13. A sum of money amounts to ₹1000 in 3 years at a certain rate of interest and it amounts to ₹1200 in 4 years at same rate. Find the sum.

14. At a certain rate of simple interest a certain sum doubles itself in 6 years. In how many years will it triple itself?

15. A shopkeeper marks his goods at 20 % above cost price but allows 10 % discount for cash. What is his net profit percent?

16. In what time period will ₹3000 triples itself, if the rate of interest is 20 % per annum?

17. A fruit basket has 20 apples out of which 30% are rotten. How many good apples are there in the basket?

18. A team won 8 games this year against 5 games won last year. What is the percentage increase this year?

19. Sides of two squares are 7.5 cm and 5 cm respectively. Find the ratio of their areas.

20. Manas saves 35 % from his salary. If his savings is ₹14000, then what is his salary?

21. **Ankur saves 30 % from his salary. If his salary is ₹50000, then find his expenditure.**

22. **If price of one dozen banana is ₹72, then find price of 15 such bananas.**

23. **Ram purchased an old car for ₹100000. He spent 10 % of cost price on its repair. He sold the car for ₹99000, find his gain or loss percent.**

24. **Iqbal purchased an old scooter for ₹20000 and spent 20 % of its CP on painting and sold the scooter for ₹30000. Find his gain or loss percent.**

25. **If 30 % of y is 150, then find y.**

26. **If 15 % of x is 60, then find x.**

27. **A farmer gained 50 % after selling his cow for ₹15000. Find CP of the cow.**

28. **A person sold his motorcycle for ₹38000 with 5 % loss, find CP of the motorcycle.**

29. **Convert the ratio given below into percentage:**

   (a) 2 : 3   (b) 3 : 5

30. **A sum of money triples itself in 25 years. Find the rate of interest.**

31. **A sum of ₹2000 invested for 3 years at 6 % per annum. Find the amount at the end of 3rd year.**

32. **A sum of ₹5000 invested for six months at 10 % per annum. Find the amount at the end of this time period.**

33. **A sum doubles itself in 10 years. Find rate of interest.**

34. **3 kg of flour is enough for 15 people. How much flour is needed for such 80 people?**

35. **A dealer buys a radio for ₹2500 and spends ₹500 on transportation. He sells the radio for ₹3300. Find his gain or loss percent.**

36. At what rate percent per annum will ₹8000 amounts to ₹10000 in a year?

37. 15 persons finish a work in 30 days, how many days will be taken to finish the same work by 5 persons?

38. The first three numbers of a proportion are 8, 10 and 12. Find the fourth number.

39. The ratio of three angles of a triangle is 3:4:5. Find the smallest angle.

40. Ratio of calcium, carbon and oxygen in chalk is 8: 3: 9. Find the percentage of carbon in the chalk.

41. A library contains 50 % of books in Hindi, 30 % of books in English and remaining 300 books are in Punjabi. Find total number of books in library.

42. The population of a town has increased from 80000 to 92000. Find the percentage increase in population.

43. There are 12 boys and 8 girls in a class. Find the percentage of girls in the class.

44. What percentage of 5 km is 200 meter?

45. Annual income of a person is ₹800000. If his salary increases 5 % per annum, what will be his salary after 2 years?

46. What is the ratio of 6 minutes to 1 hour?

47. If 3 : x :: 9 : 15 find x.

48. 70 % of a number is 28. Find the number.

49. If ratio of the cost price and selling price of an article is 5 : 6, then find the gain or loss percent.

50. A man buys balloons at the rate of 3 balloons for a rupee and sells them at the rate of 2 balloons for a rupee. Find his gain or loss percent.

Answers

1.	(a) 20 : 1 (b) 50 : 1	25.	500
2.	(a) 28 % (b) 15 % (c) 37.5 %	26.	400
		27.	₹10000
3.	(a) 5/8 (b) 18/25 (c) 7/25	28.	₹40000
		29.	(a) 66.67% (b) 60%
4.	(a)₹75 (b) 135 Kg	30.	8% per annum
5.	(a) 75 (b) 175	31.	₹2360
6.	₹28	32.	₹5250
7.	9	33.	10% per annum
8.	48%	34.	16 kg
9.	20%	35.	10% profit
10.	20% loss	36.	25%
11.	₹ 64	37.	90 days
12.	25% profit	38.	15
13.	₹400	39.	45^0
14.	12 years	40.	15%
15.	8% profit	41.	1500 books
16.	10 years	42.	15% increase
17.	14	43.	40%
18.	60%	44.	4%
19.	9 : 4	45.	₹880000
20.	₹ 40000	46.	1 : 10
21.	₹35000	47.	5
22.	₹ 90	48.	40
23.	10% loss	49.	20%, Gain
24.	25% profit	50.	50%, Gain

Chapter 9

Rational Numbers

Points to remember

- Rational numbers are the numbers which can be expressed as $\frac{p}{q}$, where p and q are integers and $q \neq 0$ example, $\frac{2}{3} \ \frac{5}{9} \ \frac{-4}{7}$ etc.

- Number 0 is neither a positive rational number nor negative rational number. It is only a rational number.

- If two or more rational numbers have equal simplest form, then these are called equivalent rational numbers.

- All integers and fractions are rational numbers.

- There are infinitely many rational numbers between any two rational numbers.

Questions:

1. Find the rational number whose numerator is (36−15) and denominator is 7 × (-4).

2. Find the rational number whose numerator is 3 × (-2) and denominator is 5 × (-1).

3. Express $\frac{-3}{4}$ as a rational number with denominator 28.

4. Express $\frac{-5}{8}$ as a rational number with numerator 40.

5. Express $\frac{-30}{85}$ into simplest form.

6. Express $\frac{-65}{150}$ into simplest form.

7. Find the product of $\frac{-5}{9}$ and its reciprocal.

8. Find the reciprocal of $\frac{-9}{7}$.

9. Fill in the blanks:

   $$\frac{-4}{9} = \frac{}{18} = \frac{16}{}$$

10. **Fill in the blanks:**

$$\frac{3}{-13} = \frac{}{26} = \frac{15}{}$$

11. **Find the sum of the smallest natural number and the largest negative integer.**
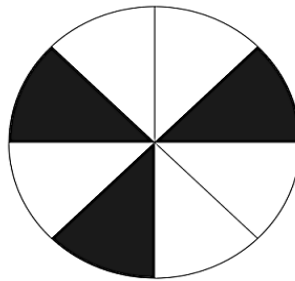
12. **Find the product of the smallest whole number and the smallest positive integer.**

13. **Amongst how many people 21 Kg of ration be distributed so that each one gets $\frac{7}{3}$ Kg.**

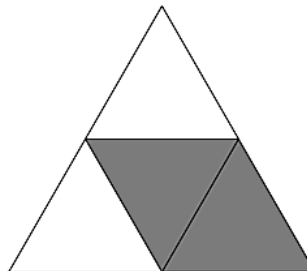14. **Express the shaded portion as a rational number:**
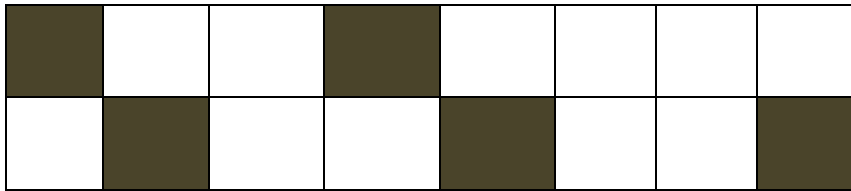
15. **Express the shaded portion as a rational number.**

16. **Simplify:** $(\frac{1}{2} \times \frac{2}{3}) + (\frac{2}{3} \times \frac{5}{2})$.

17. **Simplify:** $(\frac{3}{5} \times \frac{15}{7}) + (\frac{1}{7} \times \frac{3}{1})$.

18. **Express the shaded portion as a rational number:**

19. **Subtract $\frac{3}{2}$ from $\frac{2}{3}$.**

20. Simplify: $\frac{4}{3} \div (\frac{4}{5} - \frac{3}{4})$.

21. Express $\frac{1}{4} + \frac{1}{5}$ into decimal form.

22. Fill in the blanks:

$\frac{6}{-7} = \frac{}{35} = \frac{-54}{}$

23. Divide $\frac{-8}{9}$ by $\frac{8}{9}$.

24. A person bought $\frac{3}{4}$ Kg potatoes and $\frac{2}{3}$ Kg onions from the market.

What is the amount of weight he is carrying?

25. Find the value of x, if

a) $\frac{x}{5} = -10$ b) $\frac{-15}{x} = \frac{1}{-2}$

26. Find the product of $\frac{2}{5}$ with the reciprocal of -2.

27. Find the value of $\frac{-3}{5} \div (-3)$.

28. Divide the reciprocal of $\frac{2}{5}$ by $\frac{-4}{5}$.

29. Simplify $\frac{93}{100} - \frac{17}{25}$.

30. Find the additive inverse of $\frac{5}{3} + \frac{3}{4}$.

31. Find the product of $\frac{3}{8}$ and $(\frac{-5}{3})$.

32. Simplify: $\frac{48}{25} \div (\frac{16}{-5})$.

33. Product of two rational numbers is $\frac{8}{27}$. If one of the numbers is $\frac{2}{3}$, then find the other number?

34. Which number gives $\frac{2}{3}$ on multiplying with $\frac{-4}{3}$.

35. Express the shaded portion as a rational number.
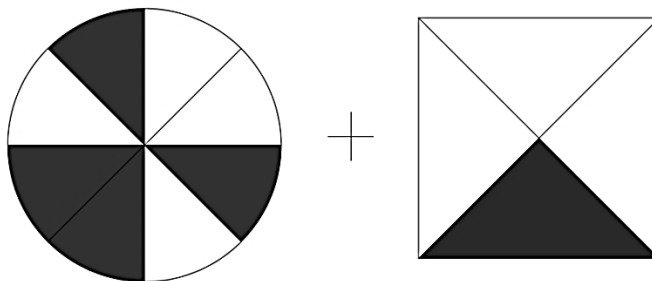
36. $\frac{-5}{7}$ should be added to which number to get $\frac{22}{14}$?

37. Ramesh gives $\frac{3}{5}^{th}$ of his income to his wife and $\frac{1}{8}^{th}$ to his son.

    Find what fraction does he have now?

38. Simplify: $\frac{-4}{11} + \frac{-7}{22}$

39. Simplify: $\frac{2}{5} + \frac{3}{4} + \frac{5}{12}$

40. Find the multiplicative inverse of $\frac{4}{5} + \frac{5}{4}$

41. Find the multiplicative inverse of $\frac{85}{125} + \frac{60}{125}$

42. Simplify: $(\frac{-17}{18}) \times (\text{-108})$.

43. Find the rational number that should be subtracted from 5 so as to get

    $\frac{7}{9}$?

44. A boy walks $\frac{7}{24}$ Km towards north direction and another boy walks $\frac{17}{36}$

    Km towards south direction. Find the distance between two boys.

45. Find the rational numbers to complete the pattern such that they are

    equivalent fractions:

    a) $\frac{12}{20}, \frac{36}{60},$ _____   b) $\frac{7}{13},$ _____ $, \frac{28}{52}$

46. If p = 2m × r and q = n × 2r, then find $\frac{p}{q}$

47. Fill in the blanks: _____ $\times \frac{-7}{9} = 1$.

48. Simplify: $0 \div \frac{3}{5}$?

49. Which rational number does not have a reciprocal?

50. Which rational number is its own reciprocal?

ANSWERS

1.	$\dfrac{-3}{4}$	26.	$\dfrac{-1}{5}$
2.	$\dfrac{6}{5}$	27.	$\dfrac{1}{5}$
3.	$\dfrac{-21}{28}$	28.	$\dfrac{25}{-8}$
4.	$\dfrac{40}{-64}$	29.	$\dfrac{1}{4}$
5.	$\dfrac{-6}{17}$	30.	$\dfrac{-29}{12}$
6.	$\dfrac{-13}{30}$	31.	$\dfrac{-5}{8}$
7.	1	32.	$\dfrac{-3}{5}$
8.	$\dfrac{7}{-9}$	33.	$\dfrac{4}{9}$
9.	-8 and -36	34.	$\dfrac{-1}{2}$
10.	-6 and -65	35.	$\dfrac{6}{8}$ or $\dfrac{3}{4}$
11.	0	36.	$\dfrac{16}{7}$
12.	0	37.	$\dfrac{11}{40}$
13.	9	38.	$\dfrac{-15}{22}$
14.	$\dfrac{5}{16}$	39.	$\dfrac{47}{30}$
15.	$\dfrac{3}{8}$	40.	$\dfrac{20}{41}$
16.	2	41.	$\dfrac{125}{145}$ or $\dfrac{25}{29}$
17.	$\dfrac{12}{7}$	42.	102
18.	$\dfrac{2}{4}$ or $\dfrac{1}{2}$	43.	$\dfrac{38}{9}$
19.	$\dfrac{-5}{6}$	44.	$\dfrac{55}{72}$ Km
20.	$\dfrac{80}{3}$	45.	(a) $\dfrac{108}{180}$ (b) $\dfrac{14}{26}$
21.	0.45	46.	$\dfrac{m}{n}$
22.	$-30, 63$	47.	$\dfrac{-9}{7}$
23.	-1	48.	0
24.	$1\dfrac{5}{12}$kg	49.	0
25.	(a) -50 (b) 30	50.	1

Chapter 10

Practical Geometry

Points to remember

- A triangle can be constructed if sum of the lengths of any two sides is greater than the third side.
- In a triangle the sum of interior angles is 180°. This is known as angle sum property of a triangle.
- Exterior angle of a triangle is equal to the sum of both opposite interior angles.
- In a right angled triangle square of hypotenuse is equal to the sum of the squares of other two sides.
- Minimum three elements are required to construct a triangle. A triangle can be constructed uniquely if

  a) Three sides are given (SSS)

  b) Two sides and included angle are given (SAS)

  c) One side and both angles lying on the sides are given (ASA)

  If any two angles of a triangle are given, we can find the required (third) angle by using the angle sum property (ASP) of a triangle.

  d) In case of a right triangle, hypotenuse and one of the other two sides are given. (RHS)

Questions:

1. What should be the sum of three angles so that a triangle may be constructed?
2. Which geometrical instrument is used to draw an arc?
3. In a $\triangle PQR$, if $\angle P = 40°$ and $\angle Q = 40°$, then what type of triangle can be constructed?
4. If $\angle A = 90°$ and $\angle B = 40°$ and $AB = 5$ cm, then what type of triangle is $\triangle ABC$?
5. How many lines can be drawn parallel to a given line?
6. How many lines can be drawn parallel to a given line through a point outside it?

7. If length of one side and a hypotenuse of a triangle are given, then what kind of triangle it is?

8. How many minimum number of elements are required to construct a triangle?

9. Find the measure of ∠BAC in the given figure.
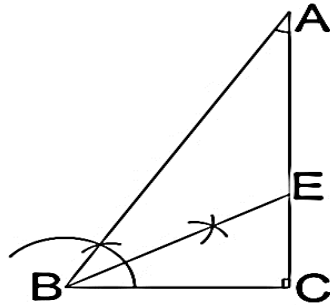
10. Find the measure of ∠BEC in the figure of Question number 9.

11. Find the measure of ∠PQR.
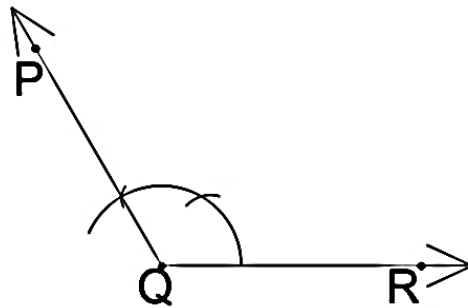
12. What will be the measure of all three angles of the triangle whose three sides are 8 cm each?

13. Which angle needs to be bisected to construct an angle of 75°?

14. How many times we need to construct an angle bisector in order to construct an angle of measure 22.5°?

15. What is the measurement of shorter angle formed by two hands of the clock at 7o'clock?

16. If 'a' is perpendicular to 'b' and 'b' is perpendicular to 'c', then what type of lines are 'a' and 'c'?

17. What type of angles will be formed on bisecting an obtuse angle?

18. Find the measure of ∠KML.
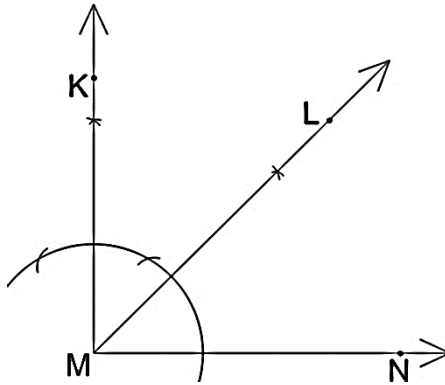
19. If the unequal angle of an isosceles triangle is 40°, then find the measures of other two angles of the triangle.

20. What is the difference of two angles, formed by two hands of the clock at 5 o'clock?

21. If measure of three angles of a triangle are 62°, 58° and 60°, then what type of triangle is this?

22. If the sum of squares of the two sides of a right angled triangle other than hypotenuse is 169 sq. cm, then what is the length of the third side of the triangle?

23. If the length of the hypotenuse and a side of a right angle triangle are 17 cm and 8 cm respectively, then what is the length of the third side?

24. Find the value of∠A?
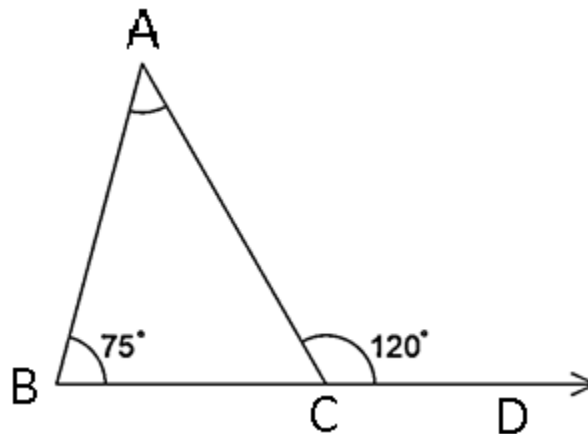
25. Find the measure of ∠KMN in the figure of Question number 18.

26. If three sides of a triangle are 4cm, 5 cm and 5.5 cm, then what type of triangle is this?

27. How many times we need to construct the bisector in order to construct an angle of 30°.

28. If line p is parallel to q and q is parallel to r, then what kind of lines are p and r?

29. From the given figure in Q.24, find the measure of ∠ACB.

30. Find the length of the hypotenuse in a right angled triangle whose two sides are of length 3cm and 4cm.

Answers:

1.	180°	16.	a & c are Parallel Lines
2.	Compass	17.	Acute Angles
3.	Isosceles Obtuse Triangle	18.	45°
4.	Right Angled Triangle	19.	70°, 70°
5.	Infinite	20.	60°
6.	Only One	21.	Scalene Acute angled Triangle
7.	Right Angled Triangle	22.	13 cm
8.	Three	23.	15 cm
9.	30°	24.	45°
10.	60°	25.	90°
11.	120°	26.	Scalene Acute angled Triangle
12.	60°, 60°, 60°	27.	Two
13.	150°	28.	p & r are Parallel Lines
14.	Three	29.	60°
15.	150°	30.	5cm

Chapter 11

Perimeter and Area

1. Parallelogram:

   Perimeter = Sum of all sides

   Area = Base × Corresponding height

2. Rectangle:

   Perimeter = 2 × Sum of adjacent sides

                    Or

             2 × (length + breadth)

   Area   =   length × breadth

                    Or

             Product of adjacent sides

3. Square:

   Perimeter = 4 × side

   Perimeter of regular polygon = No. of sides × Length of one

Area = Side × Side or $(\text{side})^2$

4 Triangle:

   Perimeter   = Sum of all sides

   Area= $\frac{1}{2}$ × Base × Corresponding height

   Area of triangle = $\frac{1}{2}$ × Area of parallelogram

5 Circle:

   Circumference (Perimeter)   = $2 \times \pi \times$ radius

   Area = $\pi \times$ radius × radius   or $\pi \times (\text{radius})^2$

6 Conversion of area units:

$$1 \text{ cm}^2 = 1 \text{ cm} \times 1 \text{ cm} = 10 \text{ mm} \times 10 \text{ mm} = 100 \text{ mm}^2$$

1 Hectare   =   10000 m²

Tricks

- **Area of Path-**

a) **When path is outside the rectangle**

Area of path = 2 × (Width of path) × [Length + Breadth of rectangle + 2(Width of path)]

b) **When path is within the rectangle**

Area of path = 2 × (Width of path) × [Length + Breadth of rectangle − 2(Width of path)]

- **Area of ring = π × width of ring × [2 × smaller radius + width of ring]**

- **If the length and breadth of a rectangle is increased by x% and y% respectively, then area is increased by $(x + y + \frac{xy}{100})$%**

- **Area of a square inscribed in a circle of radius r = 2 r²**

- **Area of a square circumscribed to a circle of radius r = 4 r²**

- **If perimeter of a square is P and Area is A then P = 4√A and A = $(\frac{p}{4})^2$**

Questions:

1. The circumference of a circle is 154 m, find the diameter.

2. Find the perimeter of a square park, whose area is 625 sq. m.

3. Side of a square is 12 cm. Find its area in sq. cm.

4. If area of ΔABC is 150 sq. cm. and height 6 cm, then find its corresponding height.

5. If area of a parallelogram is 160 sq. cm. and base is 5 cm, then find its corresponding height.

6. The length and breadth of a rectangular park are in the ratio 3:2. If the perimeter of park is 200m, then find its area.

7. If the area of the circle is 154 sq. cm, then find its diameter.

8. A chess board is in square shape as shown in the figure, find the side of each smaller square.
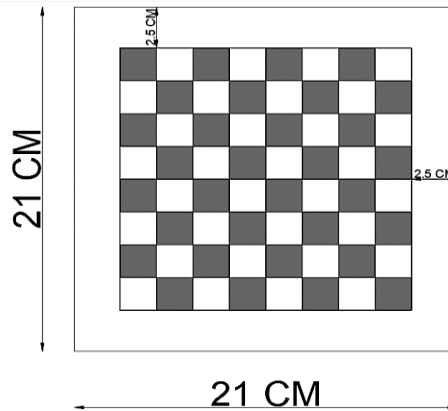
9. Area of one rectangle is 4800 sq. mm and length of a side is 8 cm, find the other side.

10. In ΔPQR, PL ⊥ QR, PL = 5 cm and QR = 18 cm, find the area of the triangle.

11. If base and height of a parallelogram are 20 cm and 5.5 cm respectively, then find its area.

12. Find the breadth of the rectangle whose length and breadth are in the ratio 5:3 and perimeter is 48 m.

13. If the ratio of radii of two circles is 6:5, then find the ratio of their circumferences.

14. A triangle has 19 m base and 6 m corresponding height. Find its area in sq. cm?

15. In the given figure, find the area of ΔLMN with side LQ = 12cm.
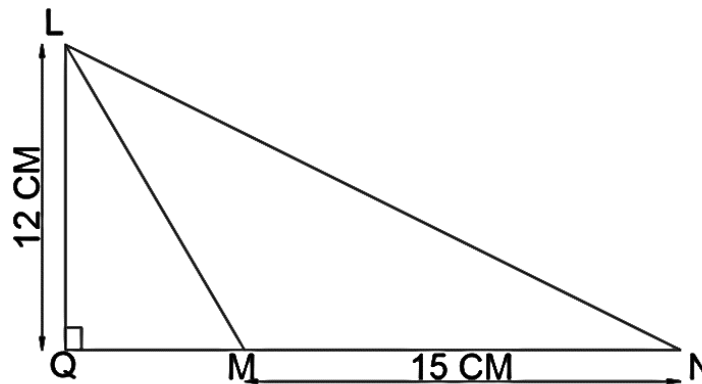
16. From the given figure, find the area of △ ABC,
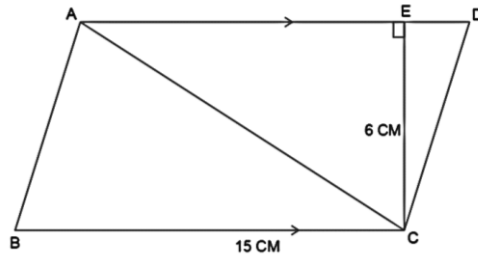
17. If length of a rectangle is 12 cm and area is 108 sq. cm, then find the perimeter.

18. If the ratio of radii of two circles is 3:5, then find the ratio of their areas.

19. Area of a circle is 1540000 sq. cm. find the radius.

20. For making a paper envelope, a rectangular paper of 15 cm × 12 cm is required. Find the total cost of 5 such envelopes at 2 paisa per sq. cm.

21. If radius of a wheel is 7 m, find the distance covered in 15 revolutions.

22. Length and breadth of a garden is 300 m and 200 m respectively, find its area in hectares?

23. Find the length of the rectangle whose breadth is 20 cm and perimeter is 90 cm.

24. A strip is cut around one rectangular sheet. Find the remaining area.
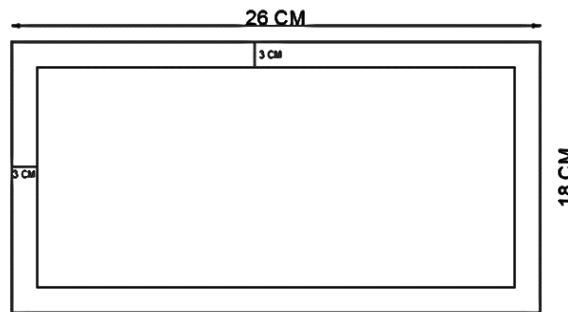
25. Find the perimeter of the given semicircular shape.
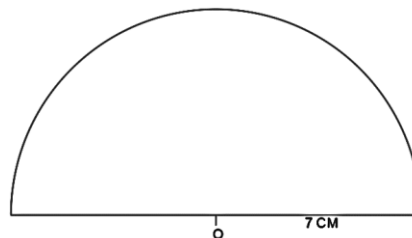
26. Find the shaded area in the adjoining figure
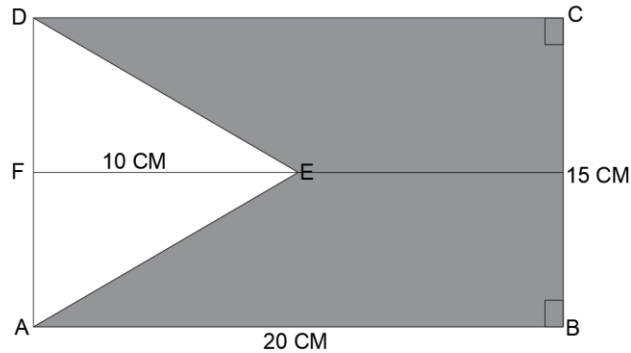
27. If the area of a triangle is equal to the area of a square of side 12 cm, height is 18 cm, then find the corresponding side.

28. A wire bent in the form of rectangle with length 65 cm and breadth 35 cm. If it is re-bent in the form of a square, then find the area of square.

29. A square carpet of side 10 m is laid on a rectangular floor with dimensions 12 m × 10 m, find area of the floor which is not carpeted?

30. Find the shaded area in the adjoining figure.
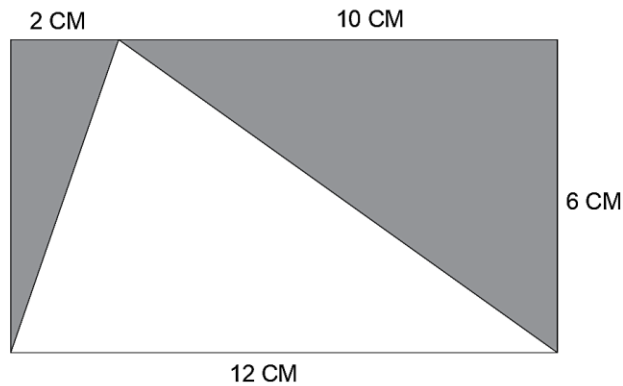
31. Find the area of ΔRSQ in the adjoining figure.
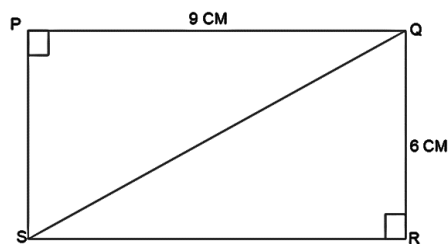
32. A square BEST is divided into four triangles. Find the area of ∆EOS.

8cm
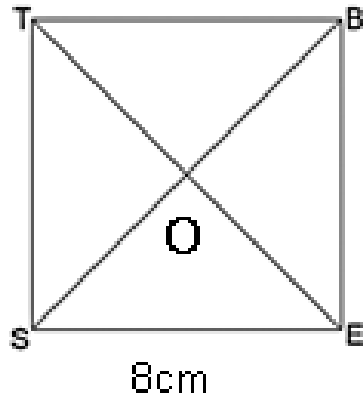
33. Find the perimeter of adjoining figure.

D   14 CM   C

14 CM

A   B
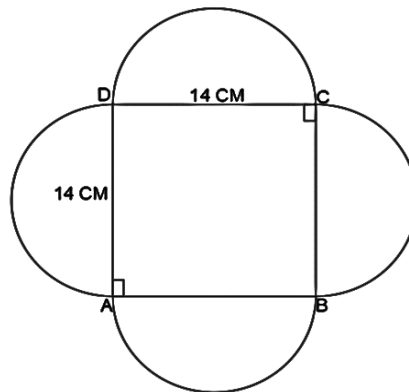
34. Find the area of the shaded region:

3 CM

6 CM

3 CM

10 CM
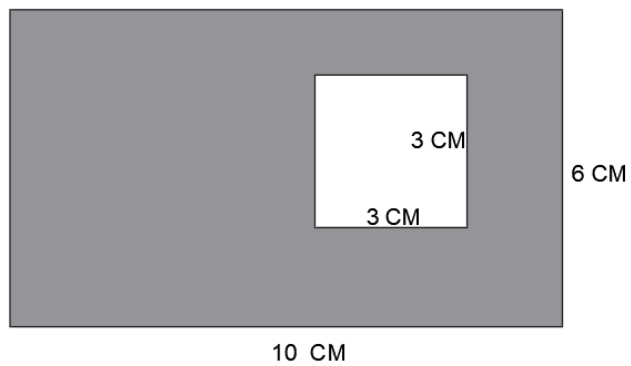
35. Find the area of the remaining circle after cutting out one rectangle and a square out of the circular card with radius 7 cm.
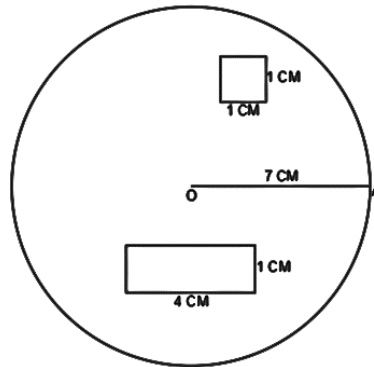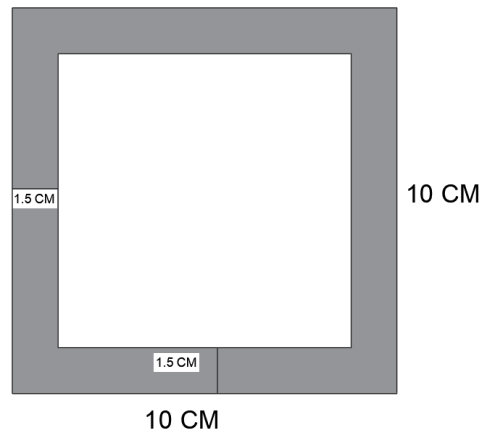

36. Find the shaded area in the adjoining figure.
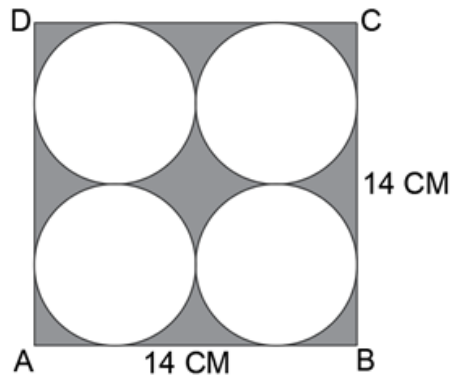
37. A triangle ABC is cut out from a rectangular sheet. Find the remaining area.
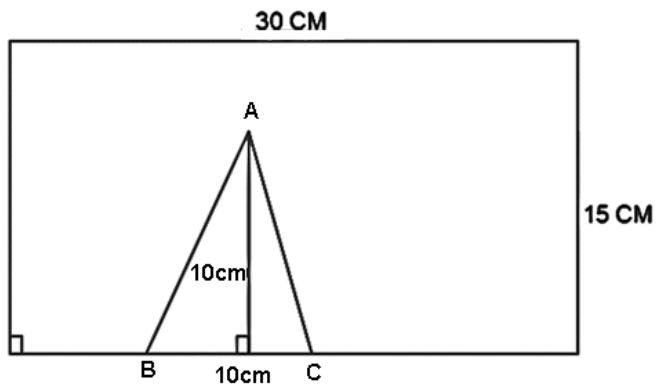
38. Find the length of rectangle, if both shapes have same perimeter.

18 CM
15 CM
17 CM
10 CM
X
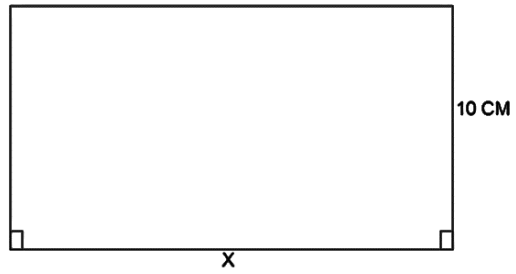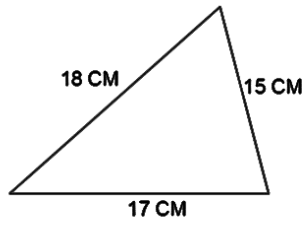
39. Find the area of the shaded region in the following figure:

1.5 CM
10 CM
1.5 CM
10 CM

40. Find the breadth of rectangle, if both figures are made by same length of wire.

12 CM
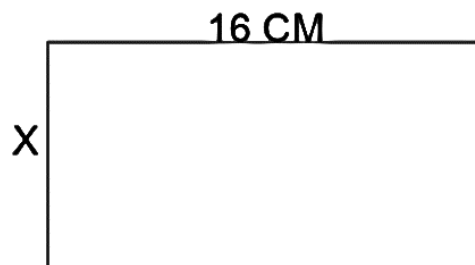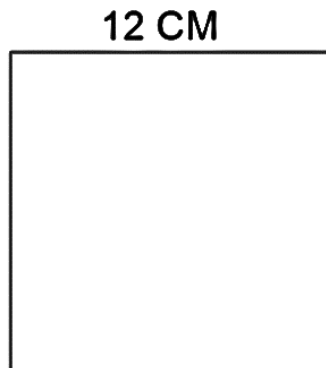
16 CM
X

Answers:

1.	49 m	21.	660 m
2.	100 m	22.	6 Hectares
3.	144 sq.cm	23.	25 cm
4.	50 cm	24.	240 sq. cm
5.	32 cm	25.	36 m
6.	2400 sq cm	26.	225 sq. cm
7.	14 cm	27.	16 cm
8.	2 cm	28.	2500 sq. cm
9.	60 mm or 6 cm	29.	20 sq. m
10.	45 sq. cm	30.	36 sq. cm
11.	110 sq. cm	31.	27 sq. cm
12.	9 m	32.	16 sq. cm
13.	6:5	33.	88 cm
14.	570000 sq. cm	34.	51 sq. cm
15.	90 sq. cm	35.	149 sq. cm
16.	45 sq. cm	36.	42 sq. cm
17.	42 cm	37.	400 sq. m
18.	9:25	38.	15 cm
19.	7 m	39.	51 sq. cm
20.	₹ 18	40.	8 cm

Chapter 12

Algebraic Expressions

Points to remember

- **Algebraic expressions are formed from variables and constants.**
- **A quantity having a fixed numerical value is called a constant whereas a quantity having different numerical values is called a variable.**
- **Expressions are made up of terms.**
- **Terms which have the same algebraic factors are like terms and terms which have different algebraic factors are unlike terms.**
- **Any expression with one or more terms is called a polynomial. A one term expression is called monomial, a two-term expression is called binomial and a three term expression is called trinomial.**
- **The highest power of the variable is the degree of an algebraic expression.**
- **Rules and formula are written in a concise and general form using algebraic expressions.**

QUESTIONS:

1. **What is the coefficient of variable x^2 in the algebraic expression?**
    a. $7x^3 - 5x^2 + 3$
    b. $\frac{3}{2}x^2 + 9$
    c. $6 + 3x + 2x^2$
2. **Add the like terms:**
    - 4 ab^2, 9 b^{2}a, 7 ab^2
3. **Subtract $(2x - y)$ from $(4x - 3y + 6)$**
4. **Find the value of 7 – 55x, if x = -3.**
5. **Simplify: 4a(2 – b) – (2a – ab).**
6. **If p = - 2 and q = 3, then what will be the value of $p^2 - q^2 + pq$.**
7. **Add: 12 xy, -20 yx, 28 xy.**

8. Add : $49y^2x$, $12xy^2$, $11x^2y$, $32xy$.

9. If x = -2, then find the value of $-4x + 9 - 2x^2$.

10. What should be added to $a^2 + b^2$ to get $3a^2 + 7b$.

11. Add the algebraic expressions: $(-13 x + 20)$ and $(22xy - 7y + 20x)$.

12. Find the value of algebraic expression $(2ab + 3bc + 4ca)$, when a = 2, b = -1 and c = 1.

13. Evaluate $\frac{4}{a} - \frac{5}{b}$ for a = 1 and b = -2.

14. Subtract $(1 - 2x^2)$ from $(x^3 + 5x^2 + x + 1)$.

15. Simplify: $5x - [\{3y - (x - 2y)\}]$.

16. Subtract $x^4 - y^4$ from $(2x^4 - x^2y^2 - y^4)$.

17. If x = -8, find the value of $89 - 4(11 - x)$.

18. What should be added to $a^2 + b^2$ to get $(a - b)^2$?

19. What should be added to $a^2 + b^2 - 2ab$ to get $(a + b)^2$

20. Find the value of $\frac{1}{2}p - \frac{1}{2}q$, if $q - p = 32$.

21. By how much is $4x^3 - 2x^2 + 8x$ greater than $2x^3 - 2x^2 + 6x$?

22. Add $3x + 5$ and $5x + 3$ and find the coefficient of x.

23. Find the product of numerical coefficient of x^2 and y in the algebraic expression: $5x^2 + 2y^2 - 7y + 2x + 9$.

24. Simplify: $(4ax - 3by)(4ax + 3by)$.

25. Find $x^2 - y^2$ if x = 2 and y = -2.

26. Find $x^3 + y^3$ if x = 4 and y = -3.

27. Add $(2x^2 - 3x + 1)$ to sum of $(5x^2 - 3x)$ and $(2x + 3)$.

28. Raju purchased a book for ₹ $(3x + 15)$ and 2 copies for ₹ $(x - 4)$. How much did he spend in all?

29. If a side of an equilateral triangle is 9x units, then find the perimeter of the triangle.

30. The perimeter of a triangle is $(12x - 5)$ cm. If its two sides are $(x - 2)$ cm and $(5x + 12)$ cm long, then what is the length of its third side?

31. If p = -2, then find the value of $-2p^3 + 4p^2 + p$.

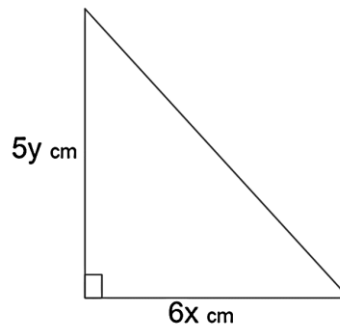**32.** The length of three sides of a triangle (in cm) are $6a - 3$, $5a + 2$ and $6a + 5$. Find the perimeter of the triangle, if $a = 2$.
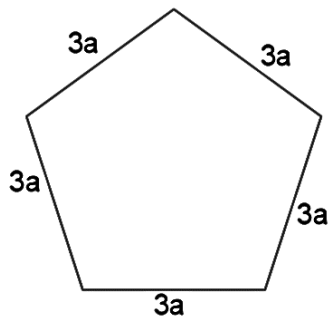
6a-3

5a+2

6a+5
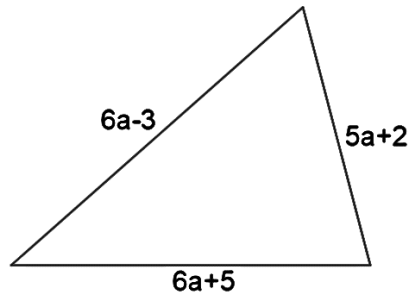
33. Find the area of the rectangle, if $x = 2$.

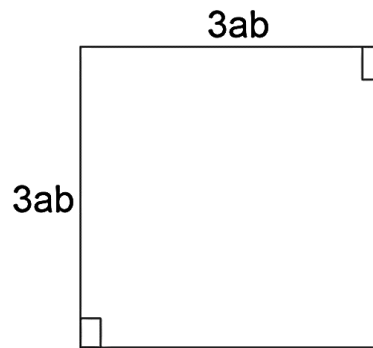9x-2
units

7x+2 units
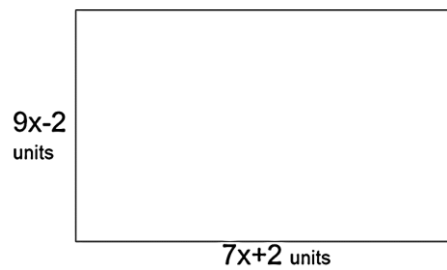
34. Base of the triangle is 6x cm and its height is 5y cm, find the area of the triangle.

5y cm

6x cm

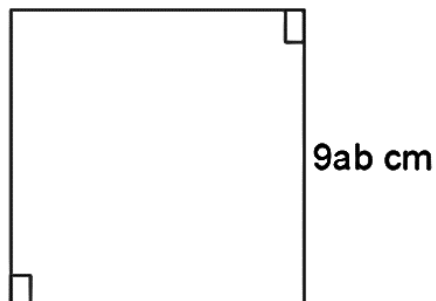**35.** Find the perimeter of a regular pentagon whose side is 3a cm.

3a

3a

3a

3a

3a

36. Find the area of a square whose side is 3ab.

$$3ab$$

$$3ab$$

37. In the given figure, rectangular length is 7x cm and its breadth is 3y cm, find its perimeter.

$$3y \text{ cm}$$

$$7x \text{ cm}$$
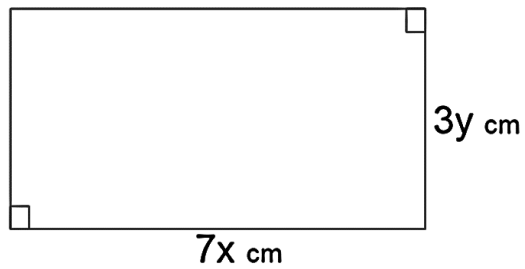
38. Find the perimeter of a square whose side is 9ab cm.

$$9ab \text{ cm}$$

39. Find the perimeter of a circle whose radius is 3x cm.

3x cm
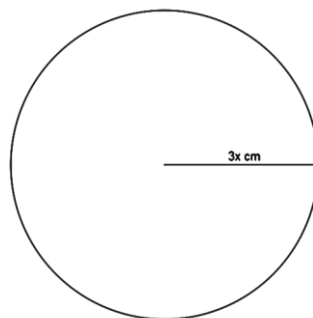
40. **Perimeter of a square is 28x cm. Find its area.**

41. **Simplify: $16a^2b + 9ba^2 + 3a^2b - 4a^2b$ and find the numerical coefficient of the resultant algebraic expression.**

42. **Simplify: $(- 4a + 5x)(5x + 4a)$.**

43. **Find: $(a+ b)(a - b)$ if $a = 7$ and $b = -6$**

44. **Evaluate: $5ab + 4a^2 - 2b^2$ for $a = 1$ and $b = -1$.**

45. **Write an algebraic expression for the following:**

    7 is added to the product of two numbers 2x and 3y.

46. **Simplify: $7x + [5x - (2 - x) + 2]$**

47. **Simplify: $-2a^2 + (2a - b)(a + b) + 2ba + b^2$.**

48. **Write an algebraic expression for:**

    5 is subtracted from the sum of x and y.

49. **Find the nth term of the number pattern 6, 11, 16, 21, ………………….**

50. **Find the nth term of the number pattern 4, 8, 12, 16, …………………..**

Answers

No.	Answer	No.	Answer
1.	(i) -5 (ii) $\frac{3}{2}$ (iii) 2	26.	37
2.	$12ab^2$	27.	$7x^2 - 4x + 4$
3.	$2x - 2y + 6$	28.	₹ $(5x + 7)$
4.	172	29.	27x units
5.	$6a - 3ab$	30.	$(6x - 15)$ cm
6.	-11	31.	30
7.	20xy	32.	38 cm
8.	$11x^2y + 32xy + 61xy^2$	33.	256 sq. units
9.	9	34.	15xy sq. cm
10.	$2a^2 - b^2 + 7b$	35.	15a cm
11.	$22xy + 7x - 7y + 20$	36.	$9a^2b^2$ sq. cm
12.	1	37.	$(14x + 6y)$ cm
13.	$6\frac{1}{2}$	38.	36ab cm
14.	$x^3 + 7x^2 + x$	39.	$6\pi x$ cm
15.	$6x - 5y$	40.	$49x^2$ sq. cm
16.	$x^2(x^2 + y^2)$	41.	24
17.	13	42.	$25x^2 - 16a^2$
18.	-2ab	43.	13
19.	4ab	44.	-3
20.	-16	45.	$6xy + 7$
21.	$2x^3 + 2x$	46.	13x
22.	8	47.	3ab
23.	-35	48.	$x + y - 5$
24.	$16a^2x^2 - 9b^2y^2$	49.	$5n + 1$
25.	0	50.	4n

CHAPTER – 13

EXPONENTS AND POWERS

Points to Remember

Recall that we may write 3×3×3×3 as 3^4 and read it as three raise to the power four. In 3^4 , we call 3 as base and 4 as exponent. Similarly, when an integer 'a' is multiplied 'n' times the result is expressed as a^n. Here 'a' is called the base and 'n' is called as exponent.

- **LAWS OF EXPONENTS:**

  (i). $a^m \times a^n = a^{m+n}$ (ii). $\dfrac{a^m}{a^n} = a^{m-n}$

  (iii). $(a^m)^n = a^{m \times n}$ (iv). $a^m \times b^m = (ab)^m$

  (v). $a^m \div b^m = (\dfrac{a}{b})^m$ (vi). $a^{-m} = \dfrac{1}{a^m}$

- **Further we recall that**

  (i). $a^0 = 1$

  (ii). $(-1)^{\text{even number}} = 1$

  (iii). $(-1)^{\text{odd number}} = -1$

- **STANDARD FORM:**

  When a number is expressed as a decimal between 1.0 and 10.0 multiplied by a power of 10 is called its standard form. Thus $A \times 10^n$ is the standard form where $1 \leq A < 10$, n is an integer. For example, a number 2806196 can be expressed in standard form as 2.806196×10^6

Questions:

1.   What is the base and exponent of 10^{-3}?

2.   Write in exponential form: $(-2) \times (-2) \times (-2) \times (-2) \times (-2) \times (-2)$.

3.   **Write in exponential form a $\times$ b $\times$ a $\times$ b $\times$ b.**

4.   **Find the value of $(-2)^2 \times (-2)^3$**

5.   **If $4^3 = 4^x$, then find x.**

6.   **Express 64 x 27 in exponential form.**

7.   **Express 2000000 in standard form.**

8.   **What is usual form of 3.469×10^6?**

9.   **Simplify: $(2^{-1} \times 3^{-1} \times 4^{-1})^2$.**

10.   **Change into negative exponent $(\frac{2}{3})^3$.**

11.   **Simplify: $(1234)^0 \times 2^3 \times x^2 \times y$.**

12.   **Find the value of $9^0 \times 99^0 \times 125^0 \times 256^0$.**

13.   **Find the value of $(a^0 + b^0) \times (a^0 - b^0)$.**

14.   **Find the reciprocal of $\frac{5}{12}$.**

15.   **Simplify: $2^3 \times 2^5 \times 2^7$.**

16.   **Simplify: $(\frac{1}{36})^2 \times (-6)^3$**

17.   **Express $\frac{625}{243}$ in exponential form.**

18.   **If $a^2 b^3 = a^{2x} b^y$. Find x and y.**

19.   **Simplify: $(2p^3)^3 \div 3 (p^2)^3$**

20.   **Find value of $(81)^{-\frac{1}{2}} \times (25)^{\frac{1}{2}}$**

21.   **Simplify: $\frac{9\,w^2 z^5}{36w^2 z^3}$**

22.   **Find the value of $((36)^{\frac{1}{2}} + (16)^{\frac{1}{2}})$.**

23.   **Find the value of $\left(-\frac{1}{64}\right)^{\frac{2}{3}}$**

24.   **Find the reciprocal of $(-\frac{1}{3})^2$**

25. Express $\dfrac{128}{81}$ in exponential form.

26. Express $\dfrac{216}{243}$ in exponential form.

27. Simplify: $[(x^{\frac{2}{3}})^{3/8}]^2$

28. Simplify: $\left(\dfrac{a}{b}\right)^{-1} \times \left(\dfrac{b}{a}\right)^2 \times a^3 \times b^3$

29. What is usual form of 2.29×10^4.

30. If $\left(\dfrac{2}{5}\right)^2 \times \left(\dfrac{2}{5}\right)^t = 1$, then find the value of t.

31. The speed of light is 300000000 m/s. Express it in standard form.

32. Change in to positive exponent $\left(\dfrac{2}{3}\right)^{-3}$.

33. Change in to negative exponent $(3^2)^5$.

34. If $4^{2x} = 64$, then find the value of x.

35. Find the value of x if $3^{2x} \times 3^2 = 3^8$.

36. What number is obtained from expanded form

   $5 \times 10^4 + 2 \times 10^3 + 5 \times 10^2 + 2 \times 10^1 + 10^0$

37. The distance of moon from earth is 384000 km, express it in standard form.

38. If $\dfrac{p}{q} = \left(\dfrac{2}{7}\right)^2 - \left(\dfrac{2}{7}\right)^0$, then find the value of $\dfrac{q}{p}$.

39. Find the value of $(3^{-2} - 5^{-1}) \times 13^0$.

40. If $2^x \times 3^y = 64 \times 81$, then find the value of x + y.

41. What is the standard form of the number 2467895?

42. Find the value of x: $\left(-\dfrac{8}{3}\right)^{10} \div \left(-\dfrac{8}{3}\right)^4 = \left(-\dfrac{8}{3}\right)^{2x+2}$

43. Simplify and express in exponential form:

   $\{ (2^5)^2 \times 3^4 \} \div \{2^8 \times 3^2\}$

44. What is the standard form of the number 0.0032456?

45. Simplify: $(2^{-1} \times 3^{-1} \times 4)^2$.

46. If $6^{3x} = 216^2$, find the value of x.

47. Find the value of x if, $(2^6 \div 2^{-3}) \times 2^{14} = 2^x$

48. Simplify: $(\frac{1}{4})^{-2} + (\frac{1}{2})^{-2} + (\frac{1}{3})^{-2}$

49. Find the reciprocal of $(\frac{2}{3})^{-2} \div (\frac{5}{3})^{-2}$.

50. Simplify: $\dfrac{(\frac{2}{5})^5 \times (\frac{2}{3})^2}{\frac{4}{9} \times (\frac{2}{5})^3}$

ANSWERS

#	Answer	#	Answer
1	**Base= 10, Exponent = - 3**	26	$\left(\frac{6}{7}\right)^3$ or $\frac{6^3}{7^3}$
2	$(-2)^6$	27	$x^{1/2}$
3	$a^2\ b^3$	28	b^6
4	-32	29	**22900**
5	**x = 3**	30	$t = -2$
6	$2^6\ 3^3$	31	3.0×10^8 **m/s**
7	2×10^6	32	$\left(\frac{3}{2}\right)^3$
8	**3469000**	33	$\left(\frac{1}{3}\right)^{-10}$
9	$\dfrac{1}{576}$	34	$x = \dfrac{3}{2}$
10	$\left(\frac{3}{2}\right)^{-3}$	35	$x = 3$
11	$8x^2y$	36	**52521**
12	**1**	37	3.84×10^5 **km**
13	**0**	38	$-\dfrac{49}{45}$
14	$\dfrac{12}{5}$	39	$-\dfrac{4}{45}$
15	2^{15}	40	$x + y = 10$
16	$-\dfrac{1}{6}$	41	2.467895×10^6
17	$\dfrac{5^4}{3^5}$	42	$x = 2$
18	$x = 1, y = 3$	43	6^2
19	$\frac{8}{3}p^3$	44	3.2456×10^{-3}
20	$\dfrac{5}{9}$	45	$\dfrac{4}{9}$
21	$\frac{1}{4}z^2$	46	$x = 2$
22	**100**	47	$x = 23$
23	$\dfrac{1}{16}$	48	**29**
24	**9**	49	$\dfrac{25}{4}$
25	$\dfrac{2^7}{3^4}$	50	$\dfrac{4}{25}$

Chapter 14

Symmetry

- **A line that divides a figure into two congruent parts is called the line (axis) of symmetry. There may be one, more than one or no line of symmetry in a figure.**
- **The angle by which a figure is rotated to get same position is called angle of rotation.**
- **One complete rotation is 360°.**
- **Figures having no line of symmetry can still have rotational symmetry.**
- **The number of times the shape coincides with the original shape while rotating it till complete rotation is called its order of rotational symmetry.**
- **Every object has at least a rotational symmetry of order 1.**

Questions:

1.   **How many lines of symmetry are there in an equilateral triangle?**
2.   **How many lines of symmetry does the following figure have?**
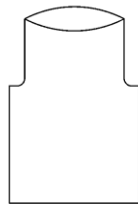
3.   **Name the fixed point about which an object can rotate?**
4.   **What is the order of rotational symmetry?**
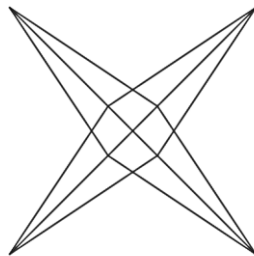
5. **What is the order of symmetry of a butterfly?**

6. **Angle of rotation of a figure is 60°. Find the number of lines of symmetry.**

7. **What is the order of rotational symmetry for the given figure?**
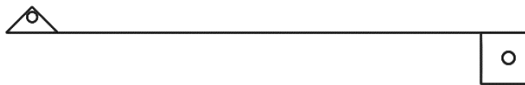
8. **List all the single digit numbers which have both vertical and horizontal line of symmetry?**

9. **What is the maximum number of lines of symmetry in a regular polygon with (n−1) sides?**

10. **Find the number of lines of symmetry in the given figure and also find the order of rotational symmetry?**
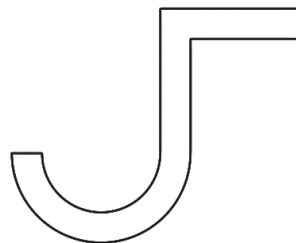
11. **Name the centre of rotation for a circle.**

12. **In the given figure, find the**

a) **Order of rotational symmetry.**

b) **Degree measure of the angle of rotation.**
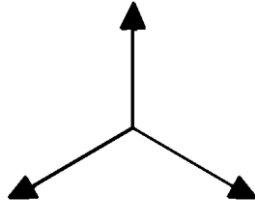
13. Find the number of lines of symmetry in the given figure:

T
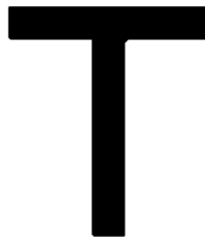
14. Find the number of lines of symmetry in the given figure:

M

15. In the plane figure, find the order of rotational symmetry and the number of lines of symmetry.

B

16. Which plane figure can have an angle of any measurement as the angle of rotation?

17. **What is the relation between order of rotational symmetry and angle of rotation?**

18. **How many lines of symmetry are there in the given figure?**
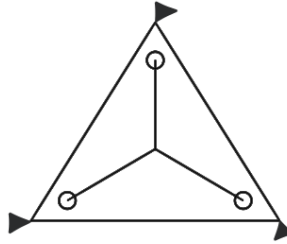
19. **If the angle of rotation of a figure is 22°, then what is the number of lines of symmetry?**

20. **If the angle of rotation of a figure is 45°, then what is the number of lines of symmetry?**

21. **Find the order of rotational symmetry and angle of rotational symmetry.**
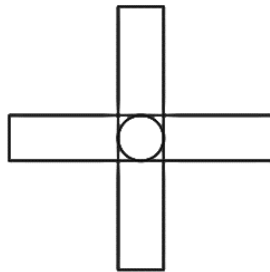
22. **What is the order of rotation for a line segment?**

23. **In the given figure, find the**

   a) **Order of rotational symmetry.**

   b) **Degree of measure of the angle of rotation.**
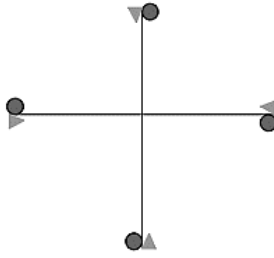
24. What is the order of rotational symmetry?
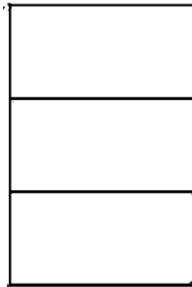
25. The alphabets X, H, O have reflection symmetry about both vertical and horizontal mirror, name one another such alphabet.

26. Find the number of lines of symmetry in the given figure.

2

27. What is the order of rotational symmetry of a star fish?
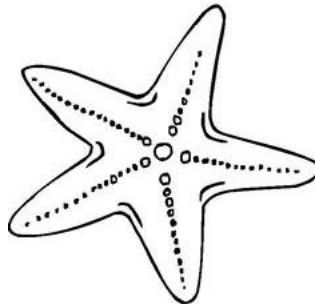
28. How many lines of symmetry does a rhombus have?

29. If the angle of rotation of a figure is 35°, then what is the number of lines of symmetry?

30. Find the number of lines of symmetry in a peepal leaf.
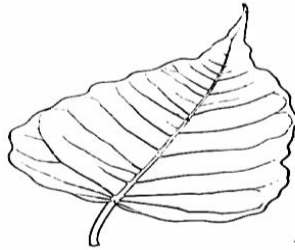
31. In the given figure, find the

   a) Order of rotational symmetry.

   b) Degree of measure of the angle of rotation.

32. Find the number of lines of symmetry in given triangle.
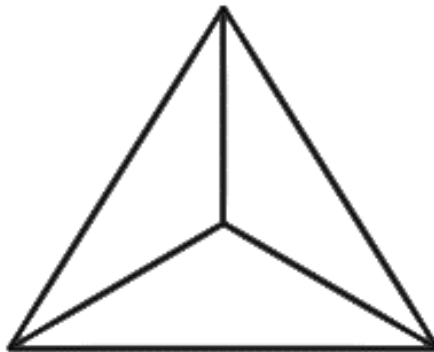
33. Name the centre of rotation of an equilateral triangle.

34. What is the smallest number of degrees you need to rotate the following image for it to look the same?
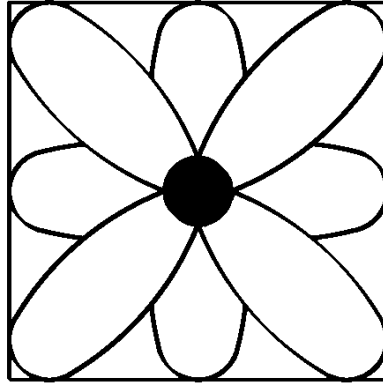
35. Which quadrilateral other than Rhombus has both the diagonals as the axis of symmetry?

36. What is the number of lines of symmetry for a regular hexagon?

37. In ΔPQR, PQ = QR = 8 cm and PR = 7 cm. Name the vertex through which the line of symmetry will pass.

38. What is the centre of rotation for a square and rectangle?

39. How many lines of symmetry are there in the given figure? Also find the order of rotational symmetry.
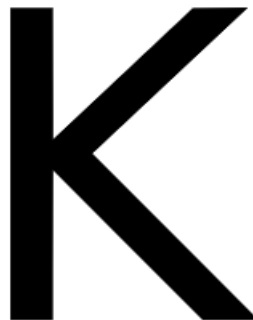
40. A rectangle is rotated by 90° and even then it remains symmetrical about its centre of rotation. What can you tell about the sides of this rectangle?

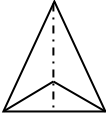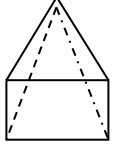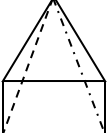| **Answers**			
1.	3	21.	**4, 90°**
2.	1	22.	**2**
3.	**Centre of Rotation**	23.	**4, 90°**
4.	**4**	24.	**2**
5.	**1**	25.	**I**
6.	**6**	26.	**0**
7.	**1**	27.	**5**
8.	**0, 8**	28.	**2**
9.	**(n − 1)**	29.	**0**
10.	**0, 1**	30.	**1**
11.	**Centre of the Circle**	31.	**(a) 4 (b) 90°**
12.	**(a) 3 (b) 120°**	32.	**3**
13.	**1**	33.	**Centroid**
14.	**1**	34.	**90°**
15.	**1, 1**	35.	**Square**
16.	**Circle**	36.	**6**
17.	**Order of symmetry =** $\dfrac{360°}{\textbf{Angle of Rotation}}$	37.	**Q (Point Q or Vertex Q)**
18.	**3**	38.	**Point of intersection of their diagonals**
19.	**0**	39.	**1, 1**
20.	**8**	40.	**All sides are equal**

Chapter 15
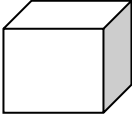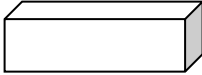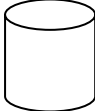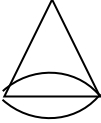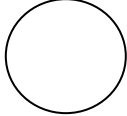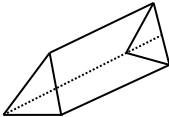
Visualising Solid Shapes

Points to remember:

- **One dimensional figures: Lines, rays, line segments.**

- **Two dimensional figures or 2 – D: Circle, square, rectangle, quadrilateral, polygon etc.**

- **Three dimensional figures or 3 – D: Cube, cuboid, cylinder, cone, sphere, prism, pyramid etc.**

- **A net is a skeleton outline of a solid that can be folded to make it.**
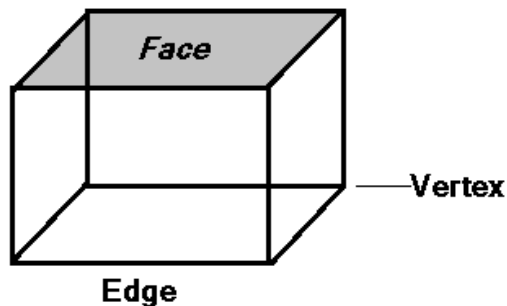
- **Cube and cuboid are also called square prism and rectangular prism respectively.**

- **A pyramid is named according to the shape of its non-triangular face.**

- **If all the faces are triangular, then it is called a triangular prism (Tetrahedron)**

- **If the base is a square, then it is called a square prism.**

3-D Figures	Faces	Vertices	Edges
1. Cube (Square Prism)	6	8	12
2. Cuboid (Rectangular Prism)	6	8	12
3. Cylinder (Circular Prism)	3	0	2
4. Cone	2	1	1
5. Sphere	1	0	0
6. Hemisphere	2	0	1
7. Triangular Prism	5	6	9
8. Triangular Pyramid	4	4	6
9. Square Pyramid	5	5	8
10. Rectangular Pyramid	5	5	8

Questions:

1.   Name the shape of a ball.

2.   Name the solid with one vertex.

3.   Two cubes of same dimensions are joined side by side. What 3 - D shape will be formed?

4.   Two cylinders of same radii are joined by one end. What 3 - D shape will be formed?

5.   How many faces and vertices does a cuboid have?

6.   How many edges and vertices does a triangular - pyramid have?

7.   How many edges does a football have?

8.   What is the sum of dots on opposite faces on a dice?

9.   A man has 10 rupees coins of similar kind. He puts them exactly one over the other. What shape will he get?

10.   Name two 3-D shapes such that vertices, edges and faces of one shape are equal in number to vertices, edges and faces of another shape.

Q. No. - 11 to 13, Net of a dice is given below:
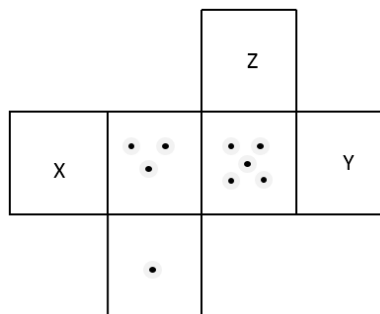
11.   Find the number of dots on the face X of the dice.

12.   Find the number of dots on the face Z of the dice.

13.   What will be the sum of the dots on the face X and Y?

14.   Which solid shape does not have any edge?

15. Name the solid shapes whose net consists of 4 triangles and one square.

16. Name the solid shape having 8 edges, 5 vertices and 5 faces.

17. What geometrical shape will the cross section have if a vertical cut is given to a cylinder?
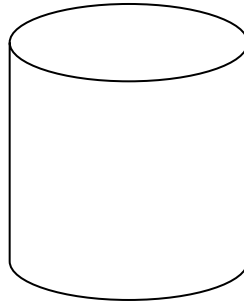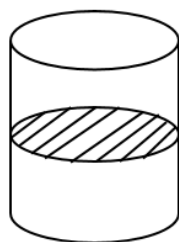
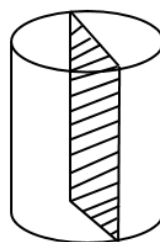18. Which solid is formed by the following net diagram?
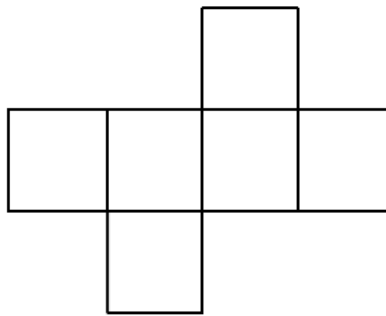
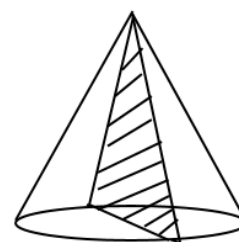19. Name the shape of the cross-section in each of the following solids.
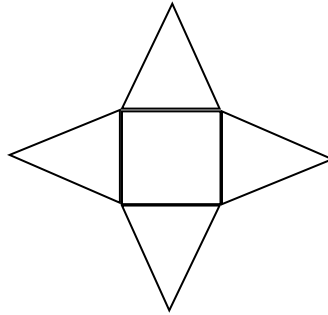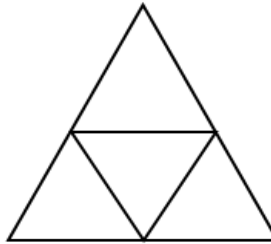
(i)   (ii)   (iii)

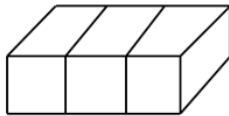**Which solid is formed by the following net diagram?**

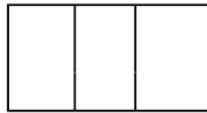20. **Which solid shape is formed by the following net diagram?**

21. **Name the different plane shapes needed to draw the net of a triangular prism.**

22. **The three views (a), (b) and (c) are given for the solid. Identify them as front view, side view or top view.**
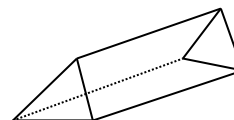

Figure   (a)   (b)   (c)

23. **A dice has A, B, C, D written in a clockwise order on the adjacent faces and E and F at the top and bottom respectively. When C is at the top, what will be at the bottom?**

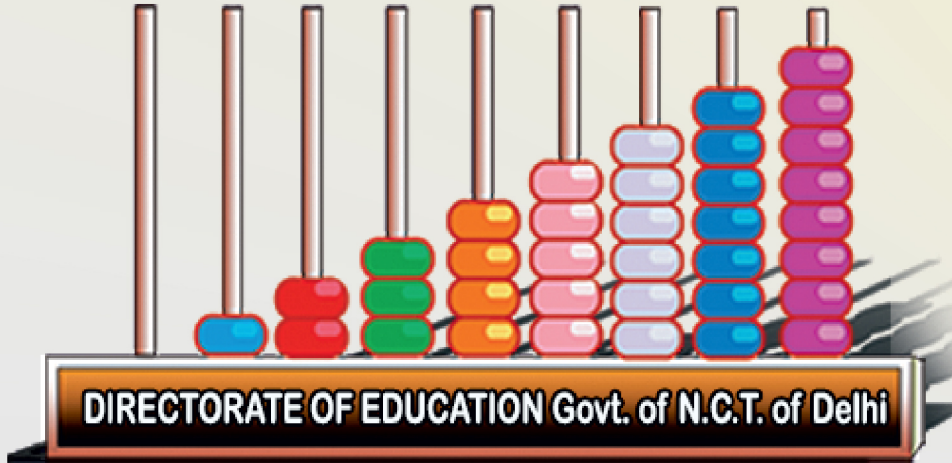24. **Which cross-section (horizontal or vertical) of the given prism with equilateral triangular base will be**

   i.   **A rectangle**

   ii.   **An equilateral triangle**

25. **The net of a solid consists of a rectangle and two equal circles. Name the solid.**

26. **What is the polygon region of a solid shape called?**

27. **Name the shape of a road roller.**

28. **Does cube and square prism refer to the same solid?**

29. **How many edges and vertices does a square pyramid have?**

Answers:

1.	Sphere	16.	Square Pyramid/Rectangular Pyramid
2.	Cone	17.	Rectangle
3.	Cuboid	18.	Cube
4.	Cylinder	19.	(i) Circle (ii) Rectangle (iii) Triangle
5.	Faces = 6, Vertices = 8	20.	Square Pyramid
6.	Edges = 6, Vertices = 4	21.	Triangular Pyramid
7.	0	22.	Triangles, Rectangles
8.	7	23.	(a) Top (b) Side (c) Front
9.	Cylinder	24.	A
10.	Cube and cuboid	25.	(i) Vertical (ii) Horizontal
11.	X = 2	26.	Cylinder
12.	Z = 6	27.	Faces
13.	6	28.	Cylinder
14.	Sphere	29.	Yes
15.	Square Pyramid	30.	Edges = 8, Vertices = 5

MENTAL MATHS

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