

KENDRIYA VIDYALAYA SANGATHAN

केन्द्रीय विद्यालय संगठन

ERNAKULAM REGION

एर्नाकुलम संभाग



तत त्वं पुष्यन् अपावृणु
केन्द्रीय विद्यालय संगठन

Mathematics

Worksheets

For Class VII

SESSION 2025-26



Mathematics is the music of reasoning -

Joseph James Sylvester

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TGT Math

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LARGE NUMBERS AROUND US

MCQ – 1 MARK

1. A museum received a donation of three crore twenty-seven lakh rupees. How would this amount be written in the Indian place value notation?
 - a) ₹ 3,27,00,000
 - b) ₹ 3,27,000
 - c) ₹ 32,700,000
 - d) ₹ 3.27 crore
2. A long-distance rally driver plans a journey of approximately 50,000 km. The car maintains an average speed that covers 200 km every day. The driver has a deadline of 8 months to complete the rally. Which of the following best describes the outcome of the driver's plan (assuming 30 days in each month for estimation)?
 - a) The driver will reach the destination easily with 1 month of time remaining.
 - b) The driver will reach the destination exactly on the last day of the 8th month.
 - c) The driver will fall short of the destination by 2,000 km.
 - d) The driver will complete the journey, but it will take nearly 9 months.
3. Which of the following statements is true?
 - a) 1 billion is equal to 10 crore
 - b) 1 million is equal to 100 lakh
 - c) 1 crore is equal to 10 million
 - d) 1 billion is equal to 100 crore
4. The populations of four cities are:
City A: 2,98,36,275; City B: 2,73,64,212; City C: 2,89,36,778; City D: 2,87,96,040. Which city has the largest population?
 - a) City A
 - b) City B
 - c) City C
 - d) City D
5. A factory produces 88,000 pens per day. How many pens will it produce in 25 days?
 - a) 2,20,000 pens
 - b) 22,00,000 pens
 - c) 2,20,00,000 pens
 - d) 2,20,000,000 pens
6. Estimate the sum of 5,72,345 and 3,19,876 to the nearest lakh. Is the exact sum greater than or less than 9,00,000?
 - a) Estimated sum is 9,00,000; exact sum is less than 9,00,000.
 - b) Estimated sum is 8,00,000; exact sum is greater than 9,00,000.
 - c) Estimated sum is 9,00,000; exact sum is greater than 9,00,000.
 - d) Estimated sum is 8,90,000; exact sum is equal to 9,00,000.
7. One lakh people stand in a line stretching approximately 38 km. If ten lakh people stood in a similar line, how long would it stretch?
 - a) 38 km
 - b) 380 km
 - c) 3,800 km
 - d) 38,000 km
8. How many digits are possible in the product of a 4-digit number and a 5-digit number?

- a) Exactly 8 digits
 - b) Exactly 9 digits
 - c) Either 8 or 9 digits
 - d) Either 9 or 10 digits
9. A doctor prescribes 2 ml of a specific medication to a patient daily. The hospital buys the medicine in large drums that contain 10 litres each. Approximately how many patients can be treated with one 10-litre drum of medicine for one day?
 - a) 50 patients
 - b) 500 patients
 - c) 5,000 patients
 - d) 50,000 patients
 10. A health survey finds that avoiding sugary snacks saves a person an average of ₹15,000 in dental costs. If a town campaign convinces 8,400 people to avoid these snacks, how much total money is saved in the town?
 - a) ₹12,60,000
 - b) ₹1,26,00,000
 - c) ₹12,600
 - d) ₹12,60,00,000
 11. If 1 is added to the greatest 6 digit number, it will be equal to
 - a) 10 thousand
 - b) 1 lakh
 - c) 10 lakh
 - d) 10 million
 12. When rounded off to the nearest thousand, the sum (74,381+1321) becomes :
 - a) 75000
 - b) 76000
 - c) 74000
 - d) 77000
 13. Which of the following is closest in value to one arab?
 - a) 100 million
 - b) 10 million
 - c) 1 billion
 - d) 10 billion
 14. 2 crore = _____ lakh
 - a) 200
 - b) 20
 - c) 2000
 - d) 2
 15. A city has a population of 45,62,315. Another city has a population 3 lakh more. What is the population of the second city?
 - a) 48,62,315
 - b) 45,65,315
 - c) 42,62,315
 - d) 46,62,315
 16. A school library has 1,25,000 books. This can also be written as:
 - a) 1.25 lakh
 - b) 12.5 lakh
 - c) 0.125 lakh
 - d) 125 lakh
 17. To compare two large numbers, what is the best method?
 - a) Compare digit by digit from the right
 - b) Compare count of digits first
 - c) Compare by rounding both numbers
 - d) Convert to International system

DIRECTION: In the following questions, a statement of Assertion

is followed by a statement of Reason (R). Mark the correct choice as:

- a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)
 - b) Both (A) and (R) are true and (R) is not the correct explanation of (A)
 - c) (A) is true but (R) is false.
 - d) (A) is false but (R) is true.
18. Assertion (A): 1 crore is larger than 1 million
Reason (R): 1 crore equals to 10 million
 19. Assertion (A): Rounding 4,76,839 to the nearest lakh gives 5,00,000
Reason (R) : To round to the nearest lakh, we consider the digit in the ten thousands place
 20. Assertion (A): 1,00,000 is read as “one million” in the Indian number system
Reason (R): The Indian system groups digits differently from the American system.

SHORT ANSWER- 2 MARKS

21. A local government allocated ₹5,50,00,000 for building a new bridge. Due to material cost increases, the project actually cost ₹6,05,50,000. By how much did the project exceed the initial budget?
22. A factory produces 18,000 phones daily. What is its current annual production? Express this in lakhs and crores.
23. Assume the student is given the following number cards: 4 0 9 1 7 5
Arrange the cards to form a 6-digit number that is greater than 5 lakh but less than 7 lakh. Write two such possible number.
24. The distance between Earth and the Moon is approximately 3,84,400 km. Express this distance in Metres and write in American system of numeration.
25. A blue whale's heart is about the size of a small car and beats approximately 10 times per minute. Approximately how many times does a blue whale's heart beat in a full day.
26. The population of Rampur in 2011 was 92,000 and in 2023 was 1,18,000. By how much did the population increase over these years?
27. Estimate each of the following by rounding off each number to nearest ten thousand.
a) 45,67,389 – 21,49,734
b) 10,87,634 + 5,64,823
28. The multiplication produce interesting patterns. Evaluate and find the pattern. Extend the multiplication based on the observed pattern.
a) $6 \times 7 =$ _____
b) $66 \times 67 =$ _____
c) $666 \times 667 =$ _____
d) _____
e) _____
29. Find the product of greatest 5-digit number and smallest 4-digit number
30. The surface area of Venus is 460200000. square kilometers and the surface area of Earth is 510100000 square kilometers. Which planet has a larger surface and by how much?

SHORT ANSWER- 3 MARKS

31. The Amazon rainforest produces about 20,00,000 metric tons of oxygen every day. How much oxygen (in metric tons) is produced in a non-leap year ?
32. In an election, Candidate A received 2,45,67,100 votes, and Candidate B received 2,54,67,100 votes. Who won the election? By how many votes did the winner exceed the loser?
33. The budget allocated for a specific phase of the Jal Jeevan Mission (providing piped water supply) is 45,78,21,000.
a) Write this amount in American System of numeration, correctly placing the commas.
b) What is the difference in the place value of the digit '7' when the number is written in the Indian System versus the International System?
34. The world population consumes roughly 3 Billion liters of water per day. If a standard family water tank holds 500 liters. Estimate the total number of such tanks needed to hold the world's daily water consumption.
35. A large commercial bank processes an average of 9,35,000 digital transactions every hour during peak time.

- (a) Round the hourly transaction figure to the nearest Lakh.
 (b) Using the rounded estimate from (a), estimate the total number of transactions processed in a standard 8 hour workday.
36. Given the numbers 2,46,891 and 4,87,458, estimate their sum using rounding to the nearest ten thousand. Compare your estimate with actual sum.
37. A company produced 4,25,750 mobile phones in one year. Out of these 2,98,625 were sold within the country and 76,800 were exported. How many mobile phones are still left in stock ? Show your calculation and write the final answer in Indian Place Value System.
38. The Population of 3 villages is as follows:
 i) Village A : 1,40,520
 ii) Village B : 98,735
 iii) Village C : 2,35,480
 b) a) Find the Total Population of the three villages.
 c) b) Write this total in the International Place Value System.
 d) c) How much more is population of village C than that of village B ?
39. Two Transport companies record the distance covered by their buses in one month

i) Company	Distance Covered
(1) A	7,85,450 Km
(2) B	8,48,950 Km

 b) a) Which Company covered more distance ?
 c) b) By how much more ?
 d) c) Write the difference in words.
40. A Stadium can seat 1,50,500 people. During a sports event 1,38,965 seats were filled
 a) a) How Many seats remained empty ?
 b) b) Write the number of empty seats using expanded form

CASE BASED QUESTIONS

41. The National Highways Authority of India (NHAI) is managing a large project to upgrade major roads. They are tracking the length of road built in kilometers and the money spent in Crores . Data is given below.
 (i) How many more kilometers must be built this year to meet the New Annual Goal of 12,000 km.
 (ii) The New Annual Goal is 12,000 km. How many meters is this?
 (iii) Due to rapid inflation and material costs, the price of road construction is modeled by a simple exponential growth. The base cost is ₹2 Crore per kilometer. The cost is expected to double every 10 years. What will the cost per kilometer be 20 years from now?
42. A local charity conducted a relief drive, collecting money and essential items. The total count of collected items (like blankets, food packs, and clothes) must be represented by a 6-digit number using the specific number cards below.
 7 3 0 1 5 4
 i) Form the largest possible 6-digit number using the given cards. Round this number to the nearest Lakh.(use all these digits exactly once)
 ii) Find the difference between the largest 6 digit number and the smallest 6 digit number (use all these digits exactly once)
 iii) The smallest 6-digit number represents the items collected in the first month. For the second month, 20,000 more items were collected than first month. Calculate the total number of items collected after both months.

43. A school has printed 12,500 tickets for its Annual function. Out of these :
7845 Tickets were sold to students , 2,960 Tickets were sold to parents The remaining were unsold

- How many tickets were sold in total ?.....(2mks)
- How many tickets are still unsold ?.....(1mk)
- Write the total number of tickets sold in words (Indian System).....(1mk)

44. A School purchased Sports items for the Annual sports meet

45. Items	46. Quantity	47. Cost per Item
48. Cricket ball	a) 75	b) Rs 145 Each
49. Badminton Rackets	a) 40	b) Rs 850 Each
50. Foot Balls	a) 20	b) Rs 1,250 Each

Answer the

following :

- Find the Total cost of cricket balls ?.....(1mk)
- Find the Total cost of Badminton rackets ?.....(1mk)
- Find the total cost of Football and then calculate the total amount spent on all sports items.....(2mks)

ANSWERS

- A) ₹ 3,27,00,000
- C) The driver will fall short of the destination by 2,000 km.
- D) 1 billion is equal to 100 crore
- A) City A
- B) 22,00,000 pens
- C) Estimated sum is 9,00,000; exact sum is greater than 9,00,000.
- B) 380 km
- C) Either 8 or 9 digits
- C) 5,000 patients
- B) ₹1,26,00,000
- (C) 10 Lakhs
- (b) 76000
- (c) 1 Billion
- (a) 200
- (a) 48,62,315
- (a) 1.25 Lakh
- (b) Compare count of digits first
- (a) Both A and R are true and R is the correct explanation of A
- (a) Both A and R are true and R is the correct explanation of A
- (d) A is false and R is true
- Amount exceeded: ₹6,05,50,000 - ₹5,50,00,000 = ₹55,50,000
- $18,000 \times 365 = 65,70,000$, 65.7 lakh, 0.657 crore
- 5,01,749 or 5,97,410
- $3,84,400 \times 1000 = 3,844,000,003$ meters
- The heart beats approximately $10 \times 60 \times 24 = 14,400$ times per day.
- Increase in population = 118000 - 92000
= 26000 People
- (a) $4567389 - 2149734 = 2417665$

Rounding off to nearest 10 Thousand = 2420000

(b) $1087634 + 564823 = 1652457$

Rounding off to nearest 10 Thousand = 1650000

28. $6 \times 7 = 42$

$66 \times 67 = 4422$

$666 \times 667 = 444222$

$6666 \times 6667 = 4444222$

$66666 \times 66667 = 44444222$

29. Greatest 5 – digit number = 99999

Smallest 4 – digit number = 1000

Product = 99999000

30. Earth is having larger surface area

Difference in surface area = $510100000 - 460200000$
= 49900000 Sq.km

31. $20,00,000 \times 365 = 73,00,00,000$ metric tons

32. Candidate B received more votes than Candidate A by 900000 votes

33. (a) 457,821,000. Four hundred fifty-seven million, eight hundred twenty-one thousand.

(b) Difference: $70,000,000 - 7,00,000 = 69,300,000$

34. $3,000,000,000 \div 500 = 6,000,000$ tanks

35. (a) Rounded Estimate: 900000 (b) Estimated Daily Transactions = $9,00,000 \times 8 = 72,00,000$

36. Sum = $246891 + 487458 = 734349$

Rounding to nearest ten thousand

a. $246891 \Rightarrow 250000$

$487458 \Rightarrow 490000$

Sum after rounding to nearest ten thousand
= $2,50,000 + 4,90,000$
= 7,40,000

37. Total mobile produced per year = 4,25,750

Mobile sold within country = 2,98,625

Mobile exported = 76,800

Mobile left = $425750 - (298625 + 76800)$

b. = $425750 - 375425$

c. = 50,325

38. In Indian system = 50,325 = Fifty Thousand Three Hundred Twenty Five

Village A = 1,40,520

Village B = 98,735

Village C = 2,35,480

a. Total population = 4,74,735

b. In International place value system = 474,735
= Four Hundred Seventy four Thousand Seven Hundred Thirty Five

c. Difference in the population of Village C and Village B = 136745

39. (a) Company A covered more distance

(b) Difference in distance = $7,85,450 - 6,48,950 = 1,35,500$

Difference in words = One lakh thirty five thousand five hundred

40. Total seats = 1,50,500

Seats filled = 1,38,965

Seats remained empty = $150500 - 138965 = 11,535$

In expanded form = $10000 + 1000 + 500 + 30 + 5$

41. (i) 2500km

(ii) 1,20,00,000m

(iii) 8 crores

42. (i) 7,54,310, 800000

(ii) 650853

(iii) Total Items = $1,03,457 + 1,23,457 = 2,26,914$

43. (a) Ticket sold = $7,845 + 2,960 = 10,805$

(b) Ticket unsold = $12,500 - 10,805 = 1,595$

(c) In words (Indian system) = One Thousand Five Hundred Ninety Five.

44. (a) Total cost of cricket balls = $145 \times 75 = \text{Rs.} 10875$

(b) Total cost of badminton rackets = $850 \times 40 = \text{Rs.} 34000$

(c) Total cost of footballs = $1250 \times 20 = \text{Rs.} 25000$

Total amount spent on all sports items = $10875 + 34000 + 25000 = \text{Rs.} 69875$

Arithmetic Expressions

MCQ – Questions

- What is an arithmetic expression?
 - A sentence with words and numbers
 - A combination of numbers and operations like $+$, $-$, $\times$, $\div$ and possibly brackets
 - Only addition of numbers
 - Only multiplication of numbers
- In the expression $45 - (23 + 7)$ the bracket part is called:
 - A term
 - The whole expression
 - A sub-expression or bracketed part
 - A factor
- Which of the following is not an arithmetic expression?
 - $12 + 5 \times 3$
 - $(8 - 2) \div 3$
 - $x + 7 - 4$
 - $100 - 45 + (6 \div 2)$
- Choose the correct comparison: $67 - 19$ ____ 5×11
 - $>$
 - $<$
 - $=$
 - none of these
- Which property says that changing the order of numbers in addition does not change the sum?
 - Distributive
 - Associative
 - Commutative
 - Identity
- For the expression $5 \times (4 + 3)$ which is true?
 - $5 \times (4 + 3) = (4 + 3) \times 5$
 - $5 \times 4 + 3 = 5 \times (4 + 3)$
 - $5 \times (4 + 3) = 5 \times 4 + 5 \times 3$
 - Both A and C
- Which of the following expressions have the same value without fully evaluating each?
 - $(8 - 3) \times 29$ and $(3 - 8) \times 29$
 - $15 + 9 \times 18$ and $(15 + 9) \times 18$
 - $(34 - 28) \times 42$ and $34 \times 42 - 28 \times 42$
 - All of the above
- In the expression $12 + 5 \times 3$, the terms are:
 - 12, 5, 3
 - 12, 5×3
 - $12 + 5$, 3
 - $12 + 5 \times$, 3
- Simplify: $12 - [3 \times (2 + 1)]$
 - 3
 - 6
 - 9
 - 18
- Which is the correct order when evaluating expressions with brackets, multiplication/division, and addition/subtraction?
 - Brackets $\rightarrow$ Addition/Subtraction $\rightarrow$ Multiplication/Division
 - Multiplication/Division $\rightarrow$ Brackets $\rightarrow$ Addition/Subtraction
 - Brackets $\rightarrow$ Multiplication/Division $\rightarrow$ Addition/Subtraction
 - Addition/Subtraction $\rightarrow$ Brackets $\rightarrow$ Multiplication/Division
- In the expression $7x + 3$, the constant term is:
 - 7
 - 3
 - x
 - $7x$
- The number of terms in $5x + 7y - 9$ is:
 - 2
 - 3
 - 4
 - 1
- The expression $3x^2 + 5$ is a:
 - Monomial
 - Binomial
 - Trinomial
 - Constant
- The coefficient of y in $4x + 9y - 3$ is:
 - 4
 - 3
 - 9
 - y
- Simplify: $5a + 3a - 2a$.
 - 10a
 - 8a
 - 6a
 - a
- Apply distributive property: $3(x + 4)$.
 - $3x + 12$
 - $x + 7$
 - $3x + 4$
 - $12x + 3$

17. Simplify using BODMAS: $10 - 3 \times 2 + 4$.
 a) 8 b) 10 c) 15 d) 12
18. If $x = 4$, value of $3x + 5 =$
 a) 12 b) 15 c) 17 d) 20
19. The expression having only one term is called:
 a) Binomial b) Monomial c) Trinomial d) Expression
20. Simplify: $2(a + b) + 3(a + b)$.
 a) $5(a + b)$ b) $a + b$ c) $10(a + b)$ d) $6a + 5b$
21. Evaluate $25 - 20 \div 5$
 a) 1 b) 21 c) 9 d) 29
22. Find the value of $32 + 4 \times 10 - 6 + 4$
 a) 52 b) 148 c) 64 d) 358
23. Anu reads 5 stories each on Sunday, Tuesday and Thursday and 2 stories on Saturday only. He doesn't read stories on other days. How many stories does he read in 4 weeks?
 Which of the following expressions is correct?
 a) $4 \times 3 \times 5 + 1 \times 2$ b) $3 \times 5 - 1 \times 2 \times 4$
 c) $4 \times (3 \times 5 + 1 \times 2)$ d) $(3 \times 5 - 1 \times 2) \times 4$
24. Which are the terms of the expression $23 - 3X4 + 67$
 a) 23, -3, 4, 67 b) -23, 3, 4, 67 c) 23, -3X4, 67 d)) 23, 3X4, 67
25. Find an expression equal to the given expression $42 - (39 + 68 - 21)$
 a) $42 - 39 + 68 - 21$ b) $42 + 39 + 68 - 21$
 c) $42 + -39 + -68 - 21$ d) $42 + -39 + -68 + 21$
26. Fill in the blanks $15 \times 46 - 28 = 15 \times 46 + 15 \times \underline{\hspace{2cm}}$
 a) -28 b) 15 c) 28 d) -15
27. Fill in the blanks with the correct number to make the expression true.
 $80 \div [10 + (\underline{\hspace{1cm}} \div 2)] = 4$
 a) 10 b) 40 c) 5 d) 20
28. A packet of biscuits costs ₹12. A boy buys 6 such packets and gives a ₹100 note to the shopkeeper. Which of the given arithmetic expressions represents the money he gets back?
 a) $12 \times 6 - 100$ b) $12 \times 6 + 100$ c) $100 - 12 \times 6$ d) $(100 - 12) \times 6$
29. Evaluate: $25 - 6 \div 3 \times 2 + 4$
 a) 19 b) 21 c) 23 d) 25
30. Without actual calculation, which of these will have the greatest value?
 a) $18 - 3 \times 4 + 8$ b) $(18 - 3) \times (4 + 8)$ c) $18 - (3 \times (4 + 8))$ d) $18 - (3 \times 4) + 8$

2 Marks Questions

31. Write an arithmetic expression for: A shop sells pencils at ₹8 each. Sam buys 6 pencils and a sharpener costs ₹12. What is the total amount he pays?
32. Identify the terms in the expression: $24 - (6 + 4)$.
33. Compare $(8 - 3) \times 29$ and $(3 - 8) \times 29$ without calculating fully.
34. Does $5 \times (4 + 3) = 5 \times 4 + 3$? Explain your answer.
35. Use distributive property to simplify $(9 + 2) \times 4$.
36. Simplify: $4x + 3y - 2x + y$.
37. Evaluate $2a + 3b + 5$ when $a = 2$, $b = 3$.
38. Use distributive property to simplify: $6 \times (2x + 5)$.

39. Add: $(3p - 5q)$ and $(7p + 9q)$.
40. Simplify using BODMAS: $12 - [2 \times (3 + 2)]$
41. Simplify $36 \div 3 \times (2 + 4) - 5$
42. A student simplified
 $48 \div 4 + 8 \times 2 = 40$ Is this correct? If not, correct it.
43. Insert brackets in the following expressions to make the statements true:
 a) $36 \div 3 \times 4 + 2 = 2$ b) $12 - 4 \times 2 + 6 = 64$
44. $34 \times 31 = 1054$. Use this value to find the value of 44×31
45. Write a simplified expression to find the sum of the numbers given in the boxes. Find its value.

3 Marks Questions

46. Write five arithmetic expressions that evaluate to 10.
47. Arrange $35 + 25$, 5×11 , $120 \div 3$, $67 - 19$, $67 - 20$ in ascending order.
48. Compare $12 + 5 \times 3$ and $(12 + 5) \times 3$. Explain the difference.
49. Explain with example why changing the order of addition does not change the value.
50. The sum of the product of 7 and 23, and 5 – write expression and find the result.
51. The sum of two consecutive numbers is 15. One number is x . Write and solve the equation to find both numbers.
52. If 4 is added to twice a number, the result is 10. Form an equation and find the number.
53. The perimeter of a rectangle is 24 cm. If length = x cm and breadth = $(x - 2)$ cm, form and solve the equation to find x .
54. Write an algebraic expression for the total cost of x pens costing ₹10 each and y pencils costing ₹5 each.
55. The total cost of 3 notebooks and 2 pens is ₹50. If a notebook costs ₹ n and a pen cost ₹ p , form an equation representing the situation.
56. Use distributive property to find the value of 101×47
57. A factory produces 120 toys in a day out of which 15 are defective, and the rest are packed into cartons containing 7 toys each.
58. Write and evaluate the arithmetic expression for the number of cartons used to pack them.
59. A shopkeeper had ₹500. He spent ₹75 on fruits, ₹25 on vegetables, and divided the remaining equally among 4 workers. Write an arithmetic expression to find how much each worker got, and find the value.

60. Write
 digits
 value 10.
 below so

2	3	2	7
7	2	7	2
3	7	2	7
7	2	3	2
2	7	3	3

any three expressions using the
 1,2,3 and 4 (only once) to get the
 Place brackets in the expression
 that the value becomes 100:

- 1) $200 - 100 \times 5 \div 5$
 2) $80 - 40 \div 4 \times 5 + 50$

3) $50 - 20 \div 4 \times 3 - 35$

Case Study Questions

61. A cinema hall sells 25 tickets at ₹150 each in the front row, and 35 tickets at ₹120 each in the back row.
- Write an arithmetic expression for the total money collected.

2. Find the total collection.

62. A family goes to a restaurant. They order 3 plates of snacks costing ₹80 each, 4 cups of juice at ₹25 each, and pay ₹100 for service charges.

1. Write an arithmetic expression for the total amount.

2. Find the total cost.

63. A school library has two kinds of books – Science and Maths. The librarian reports that the number of Maths books is twice the number of science books decreased by 30. Together, there are 330 books.

Answer the following:

a. Let the number of science books be x . Write an expression for Maths books.

b. Form an equation for the total number of books.

c. Solve for x .

d. Find the number of Maths books.

e. Find how many more Maths books than Science books are there.

64. A rectangular garden's length is 5 m more than its breadth. The total cost of fencing the garden once around at ₹50 per metre is ₹1,000.

Answer the following:

i. Let the breadth be x m. Write the length in terms of x .

ii. Write the expression for the perimeter.

iii. Form an equation using the given cost information.

iv. Solve the equation to find the length and breadth.

v. Find the area of the garden.

65. Three friends — Meera, Rohan, and Kavya — decided to share the cost of a movie outing. They bought 3 tickets at ₹120 each. They spent ₹240 on snacks. They also took a cab to and from the theatre, costing ₹180 in total. Later, Rohan paid ₹100 more to buy water bottles and popcorn for himself..

i) Write an expression for the amount spent by Meera and Kavya (1 mark)

ii) Write an expression for the amount spent by Rohan (1 mark)

iii) Write an expression for the total amount spent by all the three. (1 mark)

iv) Calculate the total amount spent. (1 mark)

66. During the Annual Sports Day, students from different houses scored points as follows:

Red House: 180 points in races , Blue House: 240 points in team games , Green House: 150 points in field events and Yellow House: 210 points in drills

The judges decided to give bonus points:

20% of Red House's points were added as bonus. 10% of Blue House's points were

deducted as penalty. Green House got 50 extra points for discipline. Yellow House shared 60 points equally among 3 teams.

Q. Write an expressions to calculate the total points scored by

a) Red House (1 mark) c) Blue House (1 mark)

b) Green House (1 mark) d) Yellow House (1 mark)

Answers for MCQs

1. B

2. C

3. C

4. B

5. C

6. D
7. C
8. B
9. A
10. C
11. b) 3
12. b) 3
13. b) Binomial
14. c) 9
15. c) 6a
16. c) $3x+4$
17. a) 8
18. c) 17
19. b) Monomial
20. a) $5(a+b)$
21. b) 21
22. a) 52
23. c) $4 \times (3 \times 5 + 1 \times 2)$
24. c) 23, - 3×4 , 67
25. c) $42 + -39 + -68 + 21$
26. a) -28
27. d) 20
28. c) $100 - 12 \times 6$
29. d) 25
30. b) $(18 - 3) \times (4 + 8) = 180$
31. Expression: $6 \times 8 + 12 = 60$.
32. Terms are 24 and $(6 + 4)$.
33. $(8 - 3) \times 29 > (3 - 8) \times 29$ because one is positive, one negative.
34. No, $5 \times (4 + 3) = 35$ but $5 \times 4 + 3 = 23$.
35. $(9 + 2) \times 4 = 9 \times 4 + 2 \times 4 = 36 + 8 = 44$.
36. $4x+3y-2x+y = 4x-2x+3y+y = 2x+4y$
37. $2a+3b+5 = 2 \times 2 + 3 \times 3 + 5 = 4+9+5 = 18$
38. $6 \times (2x+5) = 6 \times 2x + 6 \times 5 = 12x + 30$
39. $(3p-5q)+(7p+9q) = 3p+7p-5q+9q = 10p+4q$
40. $12-(2 \times (3+2)) = 12-(2 \times 5) = 12-10 = 2$
41. $36 \div 3 \times (2+4) - 5$
 $(2+4)=6$ So the expression becomes $36 \div 3 \times 6 - 5$
 $36 \div 3 = 12$ and $12 \times 6 = 72$
 $72 - 5 = 67$
42. Division and multiplication first (from left to right)
 $\rightarrow 48 \div 4 = 12$
 $\rightarrow 8 \times 2 = 16$
Now the expression becomes:
 $12 + 16 = 28$
43. $36 \div (3 \times (4 + 2))$
 $= 36 \div (3 \times 6)$

$$= 36 \div 18$$

$$= 2$$

44. $44 \times 31 = (34 + 10) \times 31 = 34 \times 31 + 10 \times 31$ (distributive property)

Given that : $34 \times 31 = 1054$

and $10 \times 31 = 310$

So $44 \times 31 = 1054 + 310 = 1364$

45. $8 \times 2 + 7 \times 7 + 5 \times 3 = 16 + 49 + 15 = 80$

46. (i) $3 + 7$, (ii) 5×2 , (iii) $20 \div 2$, (iv) $15 - 5$, (v) $(4 + 6) \times 1$.

47. $120 \div 3 < 67 - 20 < 67 - 19 < 5 \times 11 < 35 + 25$.

48. $12 + 5 \times 3 = 27$, $(12 + 5) \times 3 = 51$, brackets change value.

49. Example: $4 + 15 + (-9) = (-9) + 15 + 4 = 10$, shows commutative property.

50. Expression: $7 \times 23 + 5 = 166$.

51. Let the number be x . Then other number will be $x+1$.

Given: $x + (x + 1) = 15$

$\Rightarrow 2x + 1 = 15 \Rightarrow 2x = 14 \Rightarrow x = 7$.

Final Answer: The numbers are 7 and 8.

52. Let the number be x .

Given: $4 + 2x = 10$

$\Rightarrow 2x = 6 \Rightarrow x = 3$.

Final Answer: $x = 3$.

53. Let length = x and breadth = $x - 2$.

Perimeter = $2(l + b) = 24 \Rightarrow 2(x + x - 2) = 24$

$\Rightarrow 2(2x - 2) = 24 \Rightarrow 4x - 4 = 24 \Rightarrow 4x = 28 \Rightarrow x = 7$.

So, length = 7 cm, breadth = 5 cm.

Final Answer: $l = 7$ cm, $b = 5$ cm.

54. The total cost of x pens costing ₹10 each and y pencils costing ₹5 each:

The cost of x pens is $10x$.

The cost of y pencils is $5y$.

The total cost is the sum of these two costs: Total Cost = $10x + 5y$

55. The total cost of 3 notebooks and 2 pens is ₹50. If a notebook costs ₹ n and a pen cost ₹ p , the equation representing the situation is:

The cost of 3 notebooks is $3n$. The cost of 2 pens is $2p$.

The total cost is ₹50:

The total cost is $3n + 2p = 50$

56. $101 \times 47 = (100 + 1) \times 47$

$= 100 \times 47 + 1 \times 47$ (distributive property)

$100 \times 47 = 4700$ and $1 \times 47 = 47$

Add them:

$4700 + 47 = 4747$

57. Good toys = Total – Defective = $120 - 15$

Each carton holds 7 toys, so

Number of cartons = $(120 - 15) \div 7 = 105 \div 7 = 15$

58. Money left = $500 - (75 + 25)$

Each worker gets = $(500 - (75 + 25)) \div 4$

$(500 - (75 + 25)) \div 4 = (500 - 100) \div 4 = 400 \div 4 = 100$

59. a) $1 + 2 + 3 + 4 = 10$

b) $(4 \times 2) + (3 - 1) = 10$

c) $4 + 1 \times 2 \times 3 = 10$

d) $3 \times 4 - 2 \times 1$

60. a. $(200 - 100) \times 5 \div 5 = 100$

b. $(80 - 40) \div 4 \times 5 + 50 = 100$

c. $(50 - 20 \div 4) \times 3 - 35 = 100$

Case Study Questions

61. Total = $(25 \times 150) + (35 \times 120)$

= $3750 + 4200 = ₹7950$

62. Total = $(3 \times 80) + (4 \times 25) + 100$

= $240 + 100 + 100 = ₹440$

63. a) Given that the number of science books is x , and the number of Maths books is twice the number of science books decreased by 30, the expression for the number of Maths books is $2x - 30$.

b) The total number of books is the sum of the number of Science and Maths books.

Given there are 330 books in total, the equation is $x + (2x - 30) = 330$

c) $x + (2x - 30) = 330$

$3x - 30 = 330$, $3x = 360$, $x = 120$

d) Substitute the value of $x = 120$ into the expression for Maths books $2x - 30$

$2(120) - 30 = 240 - 30 = 210$

e) More maths book = $210 - 120 = 90$

There are 90 more Maths books than Science books.

64. (i) Given that the breadth of the rectangular garden is x m, and the length is 5 m more than the breadth, the length can be expressed as $x + 5$ m

(ii) The perimeter of a rectangle is given by the formula

$P = 2(\text{length} + \text{breadth})$

Substituting the expressions for length and breadth:

$P = 2(x + 5 + x) = 2(2x + 5) = 4x + 10$

(iii) The total cost of fencing is the perimeter multiplied by the cost per meter. The total cost is given as ₹1,000 and the cost per meter is ₹50.

Total Cost = Perimeter $\times$ Cost per metre

(iv) $1000 = \text{Perimeter} \times 50$

Perimeter = $1000 / 50 = 20$ m.

$2(2x + 5) = 20$

$2x + 5 = 10$, $2x = 5$, $x = 2.5$

The breadth of the garden is $x = 2.5$ m.

The length is $x + 5 = 2.5 + 5 = 7.5$ m.

(v) The area of a rectangle is given by the formula

$A = \text{length} \times \text{breadth}$

Area = $7.5 \times 2.5 = 18.75 \text{ m}^2$

65. a. $120 + (240 + 180) \div 3$

b. $120 + 100 + (240 + 180) \div 3$

c. $3 \times 120 + 240 + 180 + 100$

d. Rupees 880

66. a) $180 + 180 \times \frac{20}{100}$

b) $240 - \frac{10}{100} \times 240$

c) $150 + 50$

d) $210 + 60 \div 3$

LESSON 3: A PEEK BEYOND THE POINT

- The decimal form of $\frac{34}{100}$
a) 3.4 b) 0.34 c) 0.75 d) 7.5
- Ten times one-tenth is equal to -----
a) 10 b) 1 c) 100 d) 1
- Which of the following decimal is the greatest?
a) 3.4 b) 3.09 c) 3.1324 d) 3.99
- Two ones, 3-tenths and 4-hundredths can be written as :
a) 234 b) 0.234 c) 2.34 d) 2.034
- How many millimetres make 1 kilometre?
a) 10000 b) 1000 c) 100 d) 10
- The decimal form of 434 hundredths is
a) 4.34 b) 43.4 c) .434 d) 43400
- 125 paise when expressed in rupees is written as:
a) 125 b) 1.25 c) 12.50 d) 0.125
- Which among the following is greater than half?
a) 0.59 b) 0.50 c) 0.059 d) 0.099
- 7.6 kg is same as :
a) 76g b) 760g c) 7600g d) 706g
- Which of the following decimal lies between 0.798 and 0.8:
a) 0.789 b) 0.801 c) 0.797 d) 0.799
- Which of the following is the smallest decimal number?
a) 0.5 b) 0.05 c) 0.005 d) 0.0005
- 1 millimetre is equal to:
a) 0.01 cm b) 0.1 cm c) 0.001 cm d) 0.1 mm
- Which of the following is correctly converted?
a) 1.25 m = 125 cm b) 0.5 m = 50 cm c) 2.5 m = 205 cm d) 0.75 m = 65 cm
- Decimal representation of $\frac{3}{10}$ is:
a) 0.03 b) 0.3 c) 3.0 d) 0.003
- 4 units and one-tenths and 5 one-hundredths can be written as;
a) 44105100 b) 45104100 c) 4105100 d) 441045100
- $0.1 + 0.01 + 0.001 =$
a) 0.11 b) 0.111 c) 0.101 d) 0.011
- Which of these is the correct order from smallest to largest?
a) 0.5, 0.05, 0.005 b) 0.005, 0.05, 0.5 c) 0.05, 0.005, 0.5 d) 0.5, 0.005, 0.05
- Which of the following is equal to 1.25?
a) $\frac{5}{4}$ b) $\frac{6}{5}$ c) $\frac{3}{2}$ d) $\frac{7}{6}$
- Which number is equal to 7 units and 5 hundredths?
a) 7.5 b) 7.05 c) 7.005 d) 7.50
- Which of the following is true?
a) $0.3 > 0.33$ b) $0.33 > 0.3$ c) $0.3 = 0.33$ d) $0.03 > 0.3$

Two Mark Questions

- Write the following decimals in expanded form:
a) 309.4009 b) 127.98

22. Write the following expressions as a decimal number:

a) $600 + 9 + \frac{5}{100}$ b) $4000 + 200 + 8 + \frac{2}{10} + \frac{7}{100}$

23. Arrange the following decimals in ascending order:

13.5009, 13.0059, 13.905, 13.595, 13.8

24. How much should be added to 54.675 to get 60?

25. Plot the following numbers on the number line.

a) 769.235 b) 0.0082

26. Convert 3.75 meters into centimeters.

27. Write 0.125 as a fraction in simplest form.

28. Arrange the following in ascending order: 0.25, 0.05, 0.5, 0.005

29. What is the difference between 25 and 6.47?

30. Add: $3.45 + 0.6 + 0.005$

Short Answer Questions (3 marks each)

31. A rectangular garden has dimensions 15m 35cm and 9m 7cm. Find the length of the rope needed to fence the garden in meter.

32. Arun purchased a ribbon of length 3m 65cm and used 1m 90cm for decorating a gift. Find the length of the remaining ribbon in meter.

33. A person bought 4kg 150g of flour, 3kg 250g of sugar and 5kg 125g rice. What is the total weight of the items purchased in kilogram?

34. Using all the digits 7, 8, 1, 9, 6, 2 without repetition make

a) a decimal closest to 176.

b) a smallest decimal in between 10 and 20.

c) a largest decimal in between 600 and 800.

35. Find the sum:

a) $23\frac{5}{10} + 10\frac{6}{100} + 10\frac{8}{10} + \frac{7}{100}$

b) $36\frac{5}{10} + \frac{6}{100} - 10\frac{7}{10} + \frac{9}{100}$

36. A pencil is 0.145 m long. Express its length in cm and mm.

37. Explain why 0.2, 0.20, and 0.200 are equal using place value.

38. Write the decimal forms of the quantities mentioned

a) 87 ones, 5 tenths and 60 hundredths

b) 12 tens and 12 tenths

c) 10 tens, 10 ones, 10 tenths, and 10 hundredths

39. Subtract: $5.678 - 2.345$

40. Arrange in Descending Order

(a) 11.01, 1.011, 1.101, 11.10, 1.01

(b) 2.567, 2.675, 2.768, 2.499, 2.698

(c) 33.13 m, 33.31 m, 33.133 m, 33.331 m, 33.313 m

Case-Based Questions (4 marks each)

- 41 A smart home system tracks the energy usage of three devices: Smart Fridge: 245.376kWh, Smart T V: 127.762kWh and Smart Light Bulbs: 89.625 kWh.
- What is the total energy consumption of these devices?
 - The Smart T V and Smart Light Bulbs are replaced with more energy efficient models, which consume 50.120kWh and 30.563kWh respectively. What is the total energy consumption now?
 - After using the devices mentioned above, how much more energy is used compared to the energy-saving devices?
- 42 Sonu is curious about the lengths of his body parts and uses a scale to measure them. He records the following measurements:
- Length of his lower arm: $2\frac{9}{10}$
- Length of his upper arm : $3\frac{7}{10}$
- What is the total length of Sonu's arm (lower arm + upper arm) in decimal form?
 - What is the difference between the length of his upper arm and his lower arm?
 - Sonu's friend measures his own total arm length as 6.5 units. Whose arm is longer, Sonu's or his friend's, and by how much?
- 43 Ravi is measuring the length of screws using a scale marked in millimetres. He finds the lengths to be 2.5 cm, 3.75 cm, and 4.25 cm.
- Convert each length into millimetres.
 - What is the total length of all three screws in cm?
 - Which screw is the longest and by how much compared to the shortest?
 - Express the difference between the longest and shortest screw in mm.
44. Consider the number 7.05.
- Write its place value table.
 - How many hundredths are in this number?
 - Compare 7.05 with 7.5 and 7.005.
 - Arrange these three numbers in increasing order.

ANSWERS

- 0.75
- 1
- 3.99
- 2.34
- 1000000
- 4.34
- 1.25
- 0.59
- 7600
- 0.799
- d) 0.0005
- c) 0.001 cm
- b) 0.5 m = 50 cm
- b) 0.3

15. a) 4 410 5100
16. b) 0.111
17. b) 0.005, 0.05, 0.5
18. a) $\frac{5}{4}$
19. B. 7.05
20. b) $0.33 > 0.3$
21. a) $300 + 9 + \frac{4}{10} + \frac{9}{10000}$
- b) $100 + 20 + 7 + \frac{9}{10} + \frac{8}{100}$
22. a) 609.05
- b) 4208.207
23. 13.0059, 13.5009, 13.595, 13.8, 13.905
24. $60.000 - 54.675 = 5.325$
25. NUMBER LINE
26. $3.75 \text{ m} = 375 \text{ cm}$
27. $0.125 = 125/1000 = 1/8$
28. Ascending order: 0.005, 0.05, 0.25, 0.5
29. $25 - 6.47 = \mathbf{18.53}$
30. $3.45 + 0.6 + 0.005 = 4.055$
31. $15.35 + 9.07 + 15.35 + 9.07 = 48.84$
32. $3.65 - 1.90 = 1.75$
33. $4.150 + 3.250 + 5.125 = 12.525 \text{ kg}$
34. a) 176.289
- b) 12.789
- c) 798.621
35. a) 34.43
- b) 25.77
36. $0.145 \text{ m} = 14.5 \text{ cm} = 145 \text{ mm}$
37. $0.2 = 2 \text{ tenths}$
 $0.20 = 2 \text{ tenths and } 0 \text{ hundredths}$
 $0.200 = 2 \text{ tenths, } 0 \text{ hundredths, } 0 \text{ thousandths}$
 All represent the same value: **0.2**
38. a) Answer: 88.10
 Explanation: $87 + 0.5 + 0.60 = 88.10$
- b) Answer: $120 + 1.2 = 121.2$
 Explanation: 12 tens = 120; 12 tenths = 1.2
- c) Answer: $100 + 10 + 1.0 + 0.10 = 111.10$
 Explanation: Sum of all place values
39. $678 - 2.345 = 3.333$
40. a) 11.10, 11.01, 1.101, 1.011, 1.01
- b) 2.768, 2.698, 2.675, 2.567, 2.499
- c) 33.331 m, 33.313 m, 33.31 m, 33.133 m, 33.13 m

41. a) 462.763
b) 326.059
c) 136.704

42. a) 6.6
b) 0.8
c) Sonu's, by 0.1

43. a) $2.5 \text{ cm} = 25 \text{ mm}$, $3.75 \text{ cm} = 37.5 \text{ mm}$, $4.25 \text{ cm} = 42.5 \text{ mm}$

b) $\text{Total} = 2.5 + 3.75 + 4.25 = 10.5 \text{ cm}$

c) $\text{Longest} = 4.25 \text{ cm}$, $\text{Shortest} = 2.5 \text{ cm} \rightarrow \text{Difference} = 1.75 \text{ cm}$

d) $1.75 \text{ cm} = 17.5 \text{ mm}$

44. a) $1.25 + 0.75 + 2.5 = 4.5 \text{ m}$

b) $4.5 \text{ m} \times 100 = 450 \text{ cm}$

c) $4.5 \div 5 = 0.9 \text{ m}$

d) $0.9 \text{ m} \times 1000 = 900 \text{ mm}$

CHAPTER- EXPRESSIONS USING LETTER- NUMBERS

A. Multiple Choice Questions One Mark

1. If the variable is x , then “7 more than x ” is represented by:
(A) $7x$ (B) $x+7$ (C) $x-7$ (D) $7+x-x$
2. Which of the following is an expression (not an equation)?
(A) $3x+5=14$ (B) $5+y$ (C) $2a=b+6$ (D) $c/4=9$
3. The perimeter of a square of side s is:
(A) $4+s$ (B) $4s$ (C) s^4 (D) $s+s+s$
4. If $y=4$, then the value of $3y-2$ is:
(A) 14 (B) 10 (C) 3 (D) 12
5. Which of the following has like-terms that can be combined?
(A) $2x+3y$ (B) $4a+5a$ (C) $m-n$ (D) $5+6$
6. “Twice a number minus 5” (with number = n) can be written as:
(A) $2n-5$ (B) $2(n-5)$ (C) $n-2\times 5$ (D) $2n-5n$
7. In the expression $6x-(2x+3)$, the simplified form is:
(A) $4x+3$ (B) $8x-3$ (C) $4x-3$ (D) $6x-2x+3$
8. A rectangle has width w cm and length is 4 cm more than its width. The expression for the length is:
(A) $w+4$ (B) $4w$ (C) $w-4$ (D) $4+w-w$
9. The number of matchsticks in step k of a pattern is given by $2k+1$. For $k=8$, the number is:
(A) 15 (B) 17 (C) 13 (D) 21
10. Which of these describes the situation: “A pipe of length 20 m, an extra pipe of length k m is joined” $\rightarrow$ the total length is:
(A) $20k$ (B) $20+k$ (C) $k-20$ (D) $20-k$

B. Two-mark Questions

11. Write an expression for “5 less than three times a number x ”.
12. If $a=3$, $b=-2$, evaluate $4a+5b-6$.
13. Simplify the expression: $7m+4n-3m+5n$
14. A shop sells pens at ₹ p each and pencils at ₹ q each. You buy 4 pens and 6 pencils. Write the expression for total cost.
15. Write an expression for “one-half of the sum of a number u and 10”. Then if $u=14$, find its value.

C. Three-mark Questions

16. The length of a rectangular field is 3 m more than the width. If the width is w m, write an expression for the perimeter of the rectangle. Then find the perimeter when $w=12$ m.
17. Explain the difference between an expression and an equation. Give one example of each.
18. Simplify: $8x-3(x-2)+4$
19. A gardener plants p rows of trees. In each row he plants 8 trees and then adds 5 extra trees in total. Write an expression for the total number of trees planted. If $p=7$, how many trees are planted?
20. A factory takes 20 minutes to set up a machine, and then it takes r minutes to produce each unit of a product. If the machine produces 8 units, write an expression for the total time taken. Then evaluate the time when $r=6$ minutes.

D. Case-Study Questions Five Marks

Case Study 1:

A caterer rents tables and chairs for an event. For each chair the cost is ₹ x and for each table the cost is ₹ y . She rents 12 chairs and 5 tables. At the end of the event, she receives ₹ 6 back per chair and ₹ 10 back per table as a return deposit.

- Write an expression for the total amount she pays initially.
- Write an expression for the total deposit returned.
- Hence write an expression for net cost.
- If $x=40$, $y=75$ evaluate the net cost.

Case Study 2:

In a match-stick pattern: At step n you have n horizontal sticks and $n+1$ diagonal sticks.

- Write an expression for the total number of sticks at step n .
 - For $n=10$, how many sticks total?
 - If at step n there are 23 sticks, find n .
 - Verify that the expression simplifies to $2n+1$.
-

ANSWERS

A. MCQs

- B
- B
- B
- B
- B
- A
- C
- A
- B
- B
-

B. Two-mark Solutions

- Expression: $3x-5$.
- Substitute: $4(3)+5(-2)-6=12-10-6=-4$
- Combine like terms: $7m-3m=4m$; $4n+5n=9n \rightarrow 4m+9n$
- Expression: total cost = $4p+6q$.
- Expression: $1/2(u+10)$. For $u=14$: $1/2(14+10)=1/2(24)=12$

C. Three-mark Solutions

- Width = w .
Length = $w+3$.
Perimeter = $2(\text{length}+\text{width})=2((w+3)+w)=2(2w+3)=4w+6$.
For $w=12$: $4 \times 12+6=48+6=54\text{m}$.

17. Expression: A mathematical phrase that may include numbers, variables and operations (e.g., $3x+5$).

Equation: A statement that two expressions are equal (e.g., $3x+5=20$).

Example of expression: $4a-b+7$.

Example of equation: $4a-b+7=15$.

18. Simplify:

$$8x-3(x-2)+4=8x-3x+6+4=(8x-3x)+(6+4)=5x+10.$$

19. Rows = p . Trees per row = 8. Extra trees = 5.

Expression = $8p+5$.

For $p=7$: $8 \times 7 + 5 = 56 + 5 = 61$ trees.

20. Setup time = 20 min.

Production time per unit = r min.

For 8 units = $8r$.

Total time = $20+8r$.

When $r=6$: $20+8 \times 6 = 20+48 = 68$ minutes.

D. Case-Study Solutions

Case Study 1:

(i) Initial cost = $12x+5y$.

(ii) Deposit returned = $6 \times 12 + 10 \times 5 = 72 + 50 = 122$

(iii) Net cost = $(12x+5y)-122$

(iv) For $x=40$, $y=75$: Initial = $12 \times 40 + 5 \times 75 = 480 + 375 = 855$. Net cost = $855 - 122 = 733$.

Case Study 2:

(i) Total sticks = $n+(n+1)=2n+1$.

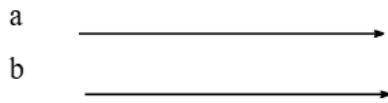
(ii) For $n=10$ Total = $2 \times 10 + 1 = 21$.

(iii) If $2n+1=23 \rightarrow 2n=22 \rightarrow n=11$

(iv) Expression " $n+(n+1)$ " simplifies to $2n+1$.

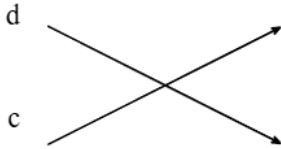
Parallel & Intersecting Lines

1. What term describes the relationship between line a and line b?



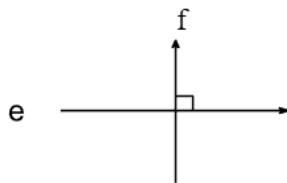
Answer: -----

2. What term describes the relationship between line c and line d?



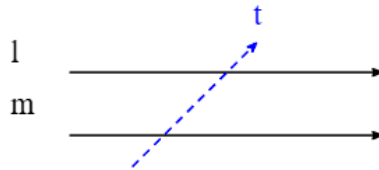
Answer-----

3. What term *best* describes the relationship between line e and line f?



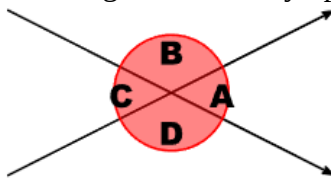
Answer-----

4. In this diagram, line t has a special name. What is it called?



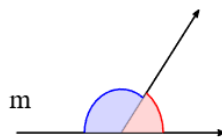
Answer-----

5. Which angle is vertically opposite to Angle A?



Answer: -----

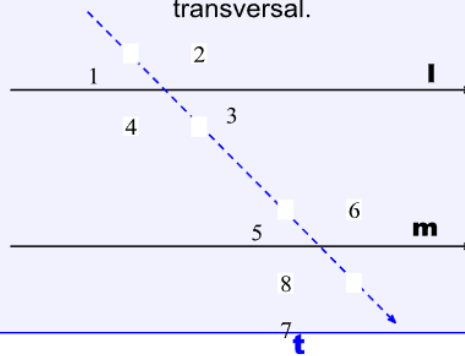
6. Line m is a straight line. If one angle = 45° , what is the measure of other angle ?



Answer-----

Use the diagram below for questions 7-15.

In this diagram, line **l** is parallel to line **m** ($l \parallel m$). Line **t** is the transversal.

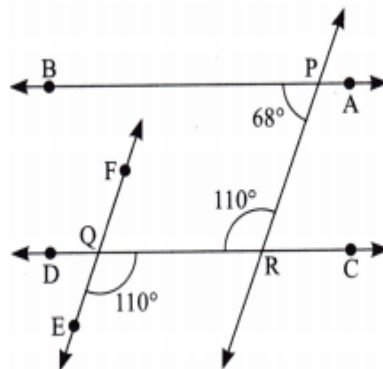


7. Angles 2 and 6 are in the same relative position at each intersection. What are they called?
8. Angles 3 and 5 are between the parallel lines and on opposite sides of the transversal. What are they called?
9. Angles 2 and 7 are outside the parallel lines and on opposite sides of the transversal. What are they called?
10. Angles 3 and 6 are between the parallel lines and on the *same* side of the transversal. What are they called? (Hint: They are supplementary!)
11. If the measure of Angle 1 is 125° , what is the measure of Angle 5?
12. If the measure of Angle 4 is 55° , what is the measure of Angle 5?
13. If the measure of Angle 8 is 130° , what is the measure of Angle 4?
14. If the measure of Angle 3 is 60° , what is the measure of Angle 6? (Hint: They are Consecutive Interior angles/co-interior angles).
15. If the measure of Angle 2 is 75° , find the measure of Angle 3.
16. If two lines are never intersecting in the same plane, they are said to be -----lines.
a) Perpendicular lines (b) parallel lines (c) intersecting lines (d) none of these.
17. -----line cross each other at a point
a) Perpendicular lines (b) parallel lines (c) intersecting lines (d) none of these.
18. If one angle of a linear pair is 40° , then the other one is -----
a) 40° (b) 140° (c) 80° (d) 180°
19. If two lines intersect each other then the vertically opposite angles are -----
a) Unequal (b) equal (c) 90° (d) 180°
20. If lines l and m are both parallel to p, then
a) l and m are perpendicular (b) l and m are intersecting
(c) l and p are parallel (d) l and m are not in the same plane
21. The number of angles formed when two lines intersect each other
(a) 2 (b) 3 (c) 4 (d) 1
22. How many pairs of alternate angles are formed when a transversal intersect two parallel lines
a) 2 (b) 4 (c) 6 (d) 8
23. How many parallel sides does a trapezium have?
(a) 0 (b) 1 (c) 2 (d) 4
24. Which quadrilateral has both pairs of opposite sides parallel and equal

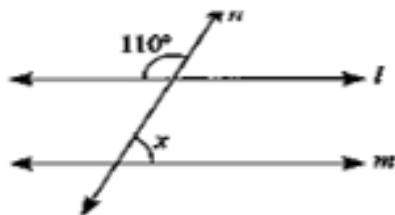
- (a) square (b) rectangle (c) parallelogram (d) trapezium
25. A line that intersects two or more lines at distinct points is called ____ .
 (a) Transversal (b) Parallel lines (c) Intersecting lines (d) None of these
26. Two lines that do not meet even when extended in both directions are called:
 a) Intersecting lines b) Perpendicular lines c) Parallel lines d) Curved lines
27. Two lines that meet at one point are known as:
 a) Parallel lines b) Intersecting lines c) Horizontal lines d) Vertical lines
28. The point where two lines intersect is called:
 a) Vertex b) Origin c) Intersection point d) Midpoint
29. If two lines intersect at right angles, they are called:
 a) Parallel lines b) Skew lines c) Perpendicular lines d) Equal lines
30. Lines lying in the same plane that never cross each other are:
 a) Skew lines b) Perpendicular lines c) Parallel lines d) Intersecting lines
31. How many points can two distinct lines intersect at most?
 a) One b) Two c) Three d) Infinite
32. If two lines intersect, how many angles are formed at the point of intersection?
 a) 2 b) 3 c) 4 d) 5
33. Lines that are both parallel to a third line are:
 a) Intersecting each other b) Perpendicular to each other
 c) Also parallel to each other d) None of these
34. Which of the following pairs of objects represents parallel lines?
 a) The edges of a closed book b) The letter 'X'
 c) The sides of a triangle d) The diagonals of a square
35. What is the main property of parallel lines regarding distance?
 a) Distance keeps decreasing b) Distance keeps increasing
 c) Distance remains the same everywhere d) Distance becomes zero

2 MARKS QUESTIONS

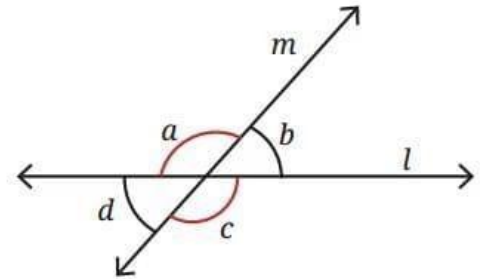
36. Distinguish between intersecting line and parallel lines with figures.
37. State which lines are parallel and why?



38. If l is parallel to m , then find the value of x



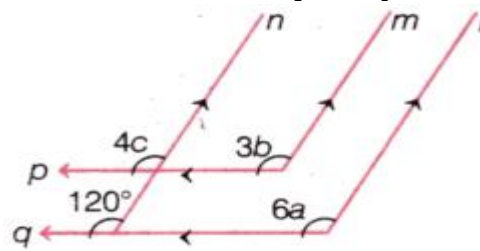
39. Draw any rectangle and find the measures of angles at the four vertices made by the intersecting lines.
40. a and b are linear pairs and b is 2 times a . Find a and b
41. In given figure, if $\angle c$ is 120° , figure out the measurements of $\angle a$, $\angle b$, and $\angle d$, without drawing and measuring them



42. Two angles form a straight line. One angle measures 102° . What is the other?
43. What happen to the corresponding angles if two lines intersected by a transversal are not parallel?
44. What is a transversal? How many angles does it form when it intersects two lines?

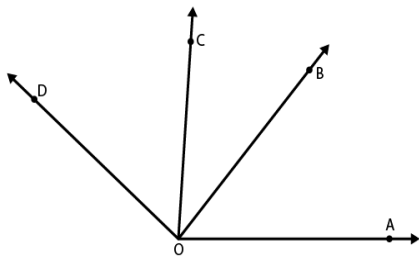
3 marks questions

45. In the given figure, l , m and n are parallel lines and the lines p and q are also parallel.

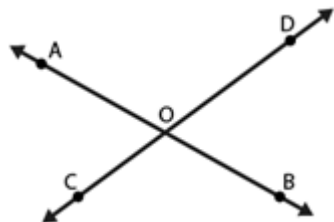


Find the values of a , b and c

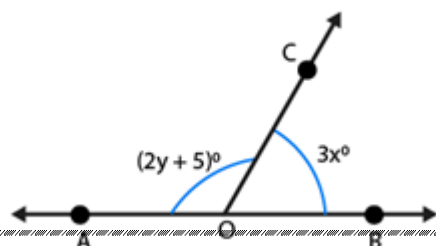
46. Write down each pair of adjacent angles in the given figure



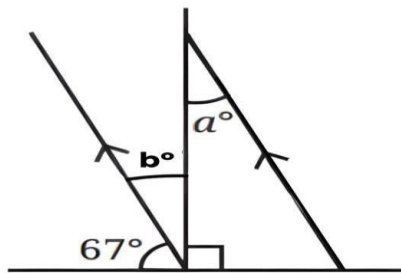
47. Name the four pairs of supplementary angles in the given figure



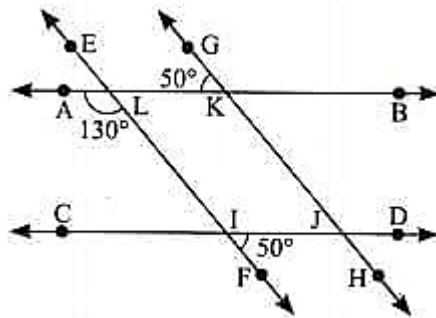
48. If two supplementary angles have equal measure, what is the measure of each angle?
OA and OB are opposite rays:
49. (i) If $x = 25^\circ$, what is the value of y ?
(ii) If $y = 35^\circ$, what is the value of x ?



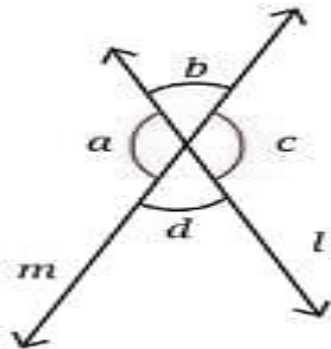
50. Find the measure of angle 'a' and angle 'b'



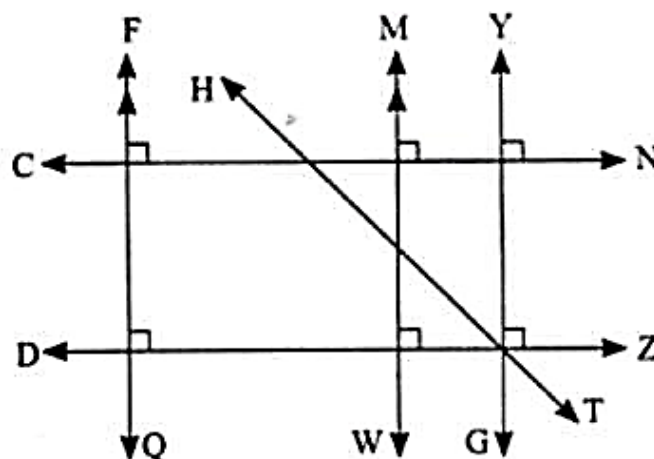
51. Find whether the lines AB and CD are parallel or not.



52. List all the linear pairs and vertically opposite angles you observe in Figure.



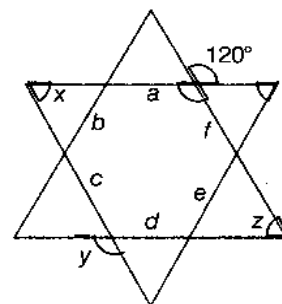
53. Questions 1–3 refers to the figure below. For each given pair of lines, identify whether they are parallel, perpendicular, or intersecting



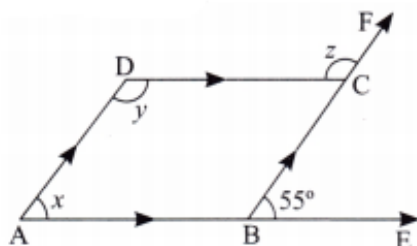
- (i). Lines FQ and HT are _____ lines.
 (ii). Lines FQ and MW are _____ lines.
 (iii). Lines CN and FQ are _____ lines.

CASE STUDY

54. Amith makes a star with the help of line segments a, b, c, d, e and f in which a is parallel to d, b is parallel to e and c is parallel to f. Chithra marks an angle as 120° , as shown in figure and asks Amith to find $\angle x$, $\angle y$ and $\angle z$. Find the angles



55. Two girls are finding angles of a parallelogram ABCD, AB is parallel to DC, and AD is parallel to BC. AB is produced to E, such that $\angle CBE = 55^\circ$. BC is produced to F, such that BCF is a straight line. Find the values of x, y, and z.



57. SITA was folding paper to make art decorations. She folded one sheet diagonally and noticed that two lines intersected forming four angles. She observed that if one angle was 120° , she could find the rest without using a protractor, just by logic. Her brother asked her how she knew that opposite angles were equal.
- When two lines intersect and one of the angles is 120° , what will be its vertically opposite angle?
 (a) 60° (b) 90° (c) 120° (d) 180°
 - What will be the measure of the angle adjacent to the 120° angle?
 (a) 90° (b) 120° (c) 60° (d) 30°
 - What do we call two angles that are adjacent and add up to 180° ?
 (a) Supplementary angles (b) Linear pair
 (c) Complementary angles (d) Vertically opposite angles
 - Which of the following is always true for any pair of intersecting lines?
 (a) All angles formed are equal (b) All angles are 90°
 (c) Vertically opposite angles are equal (d) Adjacent angles are equal
58. **Parallel Lines and Transversals**

Mira was using tracing paper to study how angles behave when a line crosses two others. Her teacher asked her to check whether two lines were parallel by checking the corresponding angles. She measured angle $\angle 1$ as 60° and found its corresponding angle $\angle 5$ was also 60° .

- i. If corresponding angles formed by a transversal are equal, what can we conclude about the lines it intersects?
- (a) The lines are perpendicular (b) The lines are intersecting
(c) The lines are parallel (d) The lines are curved
- ii. What is the sum of interior angles on the same side of the transversal in parallel lines?
- (a) 180° (b) 90° (c) 120° (d) 60°
- iii. If $\angle 3$ is 50° , what is the value of its alternate angle $\angle 6$ when the lines are parallel?
- (a) 90° (b) 60° (c) 50° (d) 130°
- iv. A transversal intersects two lines. One corresponding angle is 80° and another is 100° . Are the lines parallel?
- (a) Yes (b) No (c) Only if other angles are equal (d) Can't say

Answer Key

1. Parallel Lines
2. Intersecting Lines
3. Perpendicular Lines
4. Transversal
5. Angle C
6. 135° (Angles on a straight line are supplementary; $180 - 45 = 135$)
7. Corresponding Angles
8. Alternate Interior Angles
9. Exterior Angles
10. Co- Interior (or Same-Side Interior) Angles
11. 125° (Corresponding angles are equal)
12. 135° (co Interior angles are supplementary)
13. 130°
14. 120° (Consecutive Interior angles add up to 180° ; $180 - 60 = 120$)
15. 105° (Angles 2 and 3 are supplementary; $180 - 75 = 105$)
16. b – parallel lines
17. c – intersecting lines
18. b - 1400
19. b – equal
20. c – l and p are parallel
21. c – 4
22. a- 2
23. c – 2
24. a – square
25. a – transversal
26. c) Parallel lines
27. b) Intersecting lines
28. c) Intersection point
29. c) Perpendicular lines
30. c) Parallel lines
31. a) One
32. c) 4
33. c) Also parallel to each other
34. a) The edges of a closed book

35. c) Distance remains the same everywhere

2 marks

36. Correct figure

37. $FE \parallel PR$

38. 1100

39. Each angle is equal to 900

40. a is 600 b is 1200

41. $\angle d = 180^\circ - \angle c$

$\angle d = 180^\circ - 120^\circ = 60^\circ$ (linear pair).

$\angle c = \angle a = 120^\circ$ (vertically opposite).

$\angle d = \angle b = 60^\circ$ (vertically opposite).

42. Angles on a straight line add up to 180° (linear pair).

So, $180^\circ - 102^\circ = 78^\circ$

43. corresponding angles will not be equal if lines are not parallel

44. A transversal is a line that intersects two or more lines. It forms 8 angles when it intersects two lines.

3 marks

45. a = 200 b = 400 c = 300

46. $\angle DOC$ and $\angle COB$,

$\angle COB$ and $\angle BOA$

47. $\angle AOC$ and $\angle COB$,

$\angle BOC$ and $\angle DOB$,

$\angle BOD$ and $\angle DOA$,

$\angle AOC$ and $\angle DOA$

48. Each is equal to 900

49. 1) $y = 500$

2) $x = 350$.

50. $67^\circ + b^\circ + 90^\circ = 180^\circ$ (Using angles on a straight line)

$\Rightarrow b^\circ = 180^\circ - 67^\circ = 23^\circ$

$\Rightarrow a^\circ = b^\circ$ (Also, alternate angles are equal).

$\Rightarrow b^\circ = 23^\circ$

51. $\angle CIF + \angle FIJ = 180^\circ$ [Linear pair]

$\angle CIF = 180^\circ - \angle FIJ = 180^\circ - 50^\circ = 130^\circ$

So, $\angle ALI = \angle CIF = 130^\circ$.

If two parallel lines are intersected by a transversal, then each pair of corresponding angles are equal.

Here, $\angle ALI = \angle CIF = 130^\circ$ are two corresponding angles.

Hence, $AB \parallel CD$

52. Linear Pairs: These are angles that are adjacent and form a straight line (add up to 180°).

$\angle a$ and $\angle b$, $\angle b$ and $\angle c$, $\angle c$ and $\angle d$, $\angle d$ and $\angle a$

Vertically Opposite Angles: These are angles that are opposite each other when two lines intersect (they are equal).

$\angle b$ and $\angle d$ (they are opposite each other at the intersection).

$\angle a$ and $\angle c$ (they are opposite each other at the intersection)

53. i) Lines FQ and HT are intersecting lines.

- ii) Lines FQ and MW are parallel lines.
iii) Lines CN and FQ are perpendicular lines

CASE STUDY

54. $\angle x = 600$

$\angle y = 1200$

$\angle z = 600$

55. $x = 550$

$y = 1250$

$z = 1250$

57. i) c

ii) c

iii) b

iv) c

58 i) c

ii) a

iii) c

iv) b

NUMBER PLAY

MULTIPLE CHOICE QUESTION

- The parity of the sum of 2 even numbers and 2 odd numbers is
a) Even b) Odd c) Even or Odd d) not determined
- Which among the expressions that always have odd parity
a) $4n$ b) $8n + 6$ c) $6n + 2$ d) $4n + 3$
- To create a magic square whose magic sum is 60, what should be multiplied to magic square with numbers 1-9 .
a) 5 b) 4 c) 3 d) 2
- Write the next 3 numbers in the sequence:
1, 2, 3, 5, 8, 13, 21, , , , __, ...
a) 23, 29, 31 b) 34, 55, 89 c) 24, 45, 69 d) 33, 44, 55
- If we create a 3×3 magic square using the set of numbers 3 to 11 , then what will be number of centre of magic square?
a) 9 b) 7 c) 5 d) 11
- Two consecutive numbers in the Virahanka sequence are 377 and 610. Which are the previous two numbers .
a) 233, 144 b) 987, 1597 c) 234, 145 d) 144, 233
- How many different magic squares can be made using the set of numbers 3-11 ?
a) 9 b) 7 c) 8 d) 10
- Anil wants to find the parity of the 10th term of the Virahānka sequence. What is the parity?
a) 0 b) 1 c) 2 d) 3
- Solve the cryptarithm: $X4 + Y = Z11$. The value of X is _____.
a) 1 b) 0 c) 2 d) 5
- UnEEK wants to find all 5-beat rhythms (sums of 1's and 2's). The number of ways to write 5 as a sum of 1's and 2's is _____.
a) 5 b) 7 c) 8 d) 10
- The sum in each row/column/diagonal of a 3×3 magic square using 1 to 9 is —
(a) 9 (b) 12 (c) 15 (d) 18
- The sum of two odd numbers is always
(a) even (b) odd (c) prime (d) composite
- Which of the following is an example of a Fibonacci sequence?
(a) 1, 2, 3, 4, (b) 0, 1, 1, 2, 3, (c) 2, 4, 6, 8, (d) 1, 1, 2, 4, 8,
- In a 3×3 magic square, the sum of each row, column and diagonal is the same. This sum is called the:
(a) Square sum (b) Magic sum (c) Total sum (d) Equal sum
- Which of the following statements is true?
(a) $\text{Odd} + \text{Even} = \text{Odd}$ (b) $\text{Odd} \times \text{Odd} = \text{Even}$
(c) $\text{Even} \times \text{Even} = \text{Odd}$ (d) $\text{Odd} + \text{Odd} = \text{Odd}$
- In the Fibonacci pattern, if two consecutive terms are 5 and 8, the next term is:
(a) 12 (b) 11 (c) 10 (d) 13
- If the middle in a magic square is 6, then the sum of each row is
(a) 20 (b) 12 (c) 15 (d) 18
- The even number in the sequence 1, 2, 3, 5, 8, 13, 21, is
(a) 2 (b) 8 (c) both 2 and 8 (d) none of these

- 19 The parity of the number $25 \times 2 \times 3$ is
 (a) odd (b) even (c) prime (d) composite
- 20 If each row in a magic square total is 24, the middle number is —
 (a) 6 (b) 8 (c) 9 (d) 12

VERY SHORT ANSWER TYPE QUESTIONS (2 MARKS)

- 21 Two consecutive numbers in the Virahanka sequence are 987 and 1597. What are the next 2 numbers in the sequence?
- 22 Priya and Rohan, two siblings born one year apart, celebrate their birthdays. Priya claims the sum of their ages is 25. Is this possible?
- 23 Find out the parity for the product of two (a) odd numbers and (b) even numbers
- 24 If each number of magic square increased by 5, then is the resulting grid also a magic square? How does the magic sum change in this case?
- 25 In a 3×3 grid, there are 9 small squares, which is an odd number. Meanwhile, in a 3×4 grid, there are 12 small squares, which is an even number. Given the dimensions of a grid, can you tell the parity of the number of small squares without calculating the product?
- 26 Write the next three numbers in the pattern: 1, 3, 6, 10, 15, ...

- 27 Fill in the missing number to make this a magic square

2	7	6
9	5	1
4	?	8

- 28 If each side of a magic square adds up to 15, what is the sum of all numbers?
- 29 Write the rule for the pattern 5, 10, 20, 40, 80 ... and find its 7th term.
- 30 The sequence 1, 2, 3, 5, 8, 13, follows which rule? Explain in one line.

SHORT ANSWER TYPE QUESTIONS (3MARKS)

- 31 Fill in the grids below:

(a)

2			15
	4		14
		6	16
14	16	15	

(b)

	8		27
9	14		33
	15		39
27	37	35	

- 32 Solve these cryptarithms

(a)

$$\begin{array}{r} \\ A B \\ + C B \\ \hline B B A \end{array}$$

(b)

$$\begin{array}{r} A B \\ + B C \\ \hline C A \\ \hline A B C \end{array}$$

- 33 What is the parity of the sum of numbers from 1 to 200?

- 34 Find the parity of the number of small squares in grids of the given dimensions without calculating the product.
 (a) 23×19 (b) 62×26 (c) 124×271 .
- 35 Create a magic square whose magic sum is 45, using magic square with sum 15.
- 36 Create a 3×3 magic square using the numbers 2 to 10 with a magic sum of 18.
- 37 Write any pattern using the rule “add 4 to get the next number” starting with the number 1. Write its first 6 terms.
- 38 A number pattern starts with 2 and doubles each time. Write the first 6 terms and find the 10th term using a rule

8	1	6
3	5	7
4	9	2

- 39 Take the following 3×3 magic square and
 (a) increase each number by 1
 (b) double each number.
 In each case, is the resulting grid also a magic square

- 40 Find the parity of the sum of two consecutive numbers.

CASE BASED QUESTIONS (4MARKS)

- 41 Neha has an odd number of ₹ 5 coins, an odd number of ₹ 10 coins and even number of ₹ 1 coins in her bag. She calculated the total and got ₹ 110. Did she make a mistake? If she did, explain why?
- 42 In a poetry class, Aanya discovered the Virahāṅka–Fibonacci numbers, which help count possible rhythm patterns using **short syllables (1 beat)** and **long syllables (2 beats)**. Her teacher asked: “How many rhythms are possible with 8 beats?”
 i. What is the 8th number in the Virahāṅka–Fibonacci sequence?
 ii. Which rule generates the Virahāṅka–Fibonacci sequence?
 iii. If a rhythm starts with a long syllable (2 beats), how many beats remain for a total of 8?

Magic Numbers in a Square

- 43 Aarav made a magic square using numbers 4 to 12. He found that each row, column, and diagonal adds up to the same total.

Answer the following:

11	4	9
6	8	10
7	12	5

- a) What is the magic sum?
- b) Which number lies in the centre?
- c) Verify the sum of one row and one column.
- d) What is the total of all numbers in the square?

Case Study 2 – Patterns in a Design

- 44 Meena observes a pattern in a design: 1 star in the first row, 3 stars in the second row, 5 in the third, 7 in the fourth and so on.

Answer the following questions:

- a) Write the number pattern she observes.
- b) What is the rule of the pattern?
- c) Write the next two numbers of the pattern.
- d) What kind of numbers are represented here

ANSWERS.

MCQ

- 1.(a) 2. (d) 3.(b) 4. (b) 5.(b) 6.(d) 7. (c) 8. (b) 9 (b) 10. (c) 11. (c) 15
12. (a) even 13. (b) 0, 1, 1, 2, 3,... 14. (b) Magic sum 15. (a) Odd +

Even = Odd

16. (d) 13 17. (d) 18 (6 3 = 18) 18. (c) both 2 and 8 19. (b) even
20. (b) 8

21 . The given numbers are 987 and 1597.

In the Virahanka sequence, each number is the sum of the two preceding numbers.

The next two numbers are:

$$987 + 1597 = 2584$$

$$1597 + 2584 = 4181$$

The previous two numbers are:

$$1597 - 987 = 610$$

$$987 - 610 = 377$$

The sequence is,377, 610, 987, 1597, 2584, 4181,.....

22 Yes it is possible if their ages are 12 and 13 years

23 (a) Product of two odd numbers: The parity for the product of two odd numbers is always odd.

Example: $3 \times 5 = 15$ (odd number).

(b) Product of two even numbers: The parity for the product of two even numbers is always even.

Example: $4 \times 6 = 24$ (even number).

24 Yes, if each number of magic square increased by 5, then the resulting grid is also a magic square. Here, adding 5 to each number, the magic sum increases by 5 times.

25 Yes, we can determine the parity of the number of small squares in a grid without directly calculating the full product, simply by observing the parity of the dimensions.

Rule: The product of two numbers is:

Even if at least one of the numbers is even.

Odd if both numbers are odd

26 $15 + 6 = 21$, $21 + 7 = 28$, $28 + 8 = 36$

27 For getting the magic sum 15, the number in place of ? = 3
(Since $4 + 3 + 8 = 15$ and $7 + 5 + 3 = 15$)

28 The sum of all numbers in a magic square is the sum of the numbers from 1 to 9.
ie, the sum = 45

29 The rule for the above pattern is “twice of the previous number”
7th term = 320 (6th term, $160 \times 2 = 320$)

30 To get the next number, add two previous numbers

SHORT ANSWER TYPE

31 a)

2	5	8	15
9	4	1	14
3	7	6	16
14	16	15	

b)

7	8	12	27
9	14	10	33
11	15	13	39
27	37	35	

32 a)

	2	1
+	9	1
1	1	2

b)

	1	9
+	9	8
	8	1
1	9	8

33 The sum from 1 to 200 is given by:

$$\begin{aligned}
 1 + 2 &= \frac{2 \times 3}{2} = 3 \\
 1 + 2 + 3 &= \frac{3 \times 4}{2} = 6 \\
 1 + 2 + 3 + 4 &= \frac{4 \times 5}{2} = 10 \\
 &\vdots \\
 1 + 2 + 3 + \dots + 200 &= \frac{200 \times 201}{2} = 20100
 \end{aligned}$$

34 (a) Both 23 and 19 are odd numbers, and $\text{Odd} \times \text{Odd} = \text{Odd}$

So, the parity of the number of small squares is odd

(b) Both 62 and 26 are even numbers, and $\text{Even} \times \text{Even} = \text{Even}$.

So, the parity of the number of small squares is even

c) 124 is even, 271 is odd, and $\text{Even} \times \text{Odd} = \text{Even}$.

So, the parity of the number of small squares is even.

35

8×3	1×3	6×3
3×3	5×3	7×3
4×3	9×3	2×3

=

24	3	18
9	15	21
12	27	6

This is

the magic square with magic

24	3	18
9	15	21
12	27	6

sum 45 .
36

37 $1, 1 + 4 = 5, 5 + 4 = 9, 9 + 4 = 13, 13 + 4 = 17, 17 + 4 = 21, \dots$

The first 6 terms in the pattern are 1, 5, 9, 13, 17 and 21

38 $2, 2 \times 2 = 4, 4 \times 2 = 8, 8 \times 2 = 16, 16 \times 2 = 32, 32 \times 2 = 64.$

The terms are 2, 4, 8, 16, 32, 64,.....

The general rule is $2n = 2 \times 2 \times 2 \times 2 \dots n \text{ times}.$

10th term is $2^{10} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 1024$

39

:(a)

9	2	7
4	6	8
5	10	3

(b)

16	2	12
6	10	14
8	18	4

Yes. In each case, the resulting grid is also a magic square. In the first grid, the magic sum is 18 and in the second grid, the magic sum is 30.

40 Let the two consecutive numbers be n and $(n + 1)$.

Their sum $n + (n + 1) = 2n + 1$, which is always odd. Therefore, the parity of the sum of two consecutive numbers is odd.

41 Given, Neha has an odd number of ₹ 5 coins, an odd number of ₹ 10 coins and even number of ₹ 1 coins. The value of an odd number of ₹ 5 coins is odd and value of an odd number of ₹ 10 coins is even. So, the sum of an odd number and an even number is odd. And the value of an even number of ₹ 1 coins is even. So, the sum of an even number and an odd number is odd. Therefore, the parity of resultant money should be odd.

∴ The money calculated by Neha = ₹ 110 (even parity)

∴ Neha must have mistaken in her calculation.

42 i (b) 34

ii. (c) Add two previous terms

iii. (c) 6

43 a) The magic sum is 24.

b) The number lies in the centre is 8. ($24 \div 3 = 8$)

c) The sum of one row is $11 + 4 + 9 = 24$ and one column is $11 + 6 + 7 = 24$

d) The total of all numbers in the square is $11 + 4 + 9 + 6 + 8 + 10 + 7 + 12 + 5 = 72$

44 a) 1, 3, 5, 7,.....

b) Add 2 to the previous term

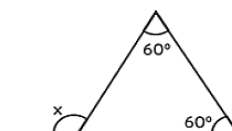
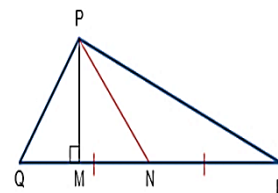
c) The next two terms of the pattern are 9, 11.

d) The numbers represented here are odd numbers.

A TALE OF THREE INTERSECTING LINES

MCQ

- What does the triangle inequality rule says?
 - One side must be the longest
 - Each angle must be less than 90°
 - Each side must be longer than the sum of the other two
 - Each side must be shorter than the sum of the other two
- What tool helps construct a triangle accurately when sides are given?
 - divider
 - Compass
 - Set square
 - Graph paper
- What happens if the sum of two shorter sides equals the third side?
 - Triangle exists
 - Triangle is equilateral
 - Triangle is right-angled
 - Triangle cannot exist
- Which triangle has all angles equal?
 - scalene triangle
 - isosceles triangle
 - equilateral triangle
 - right angled triangle
- Which condition guarantees triangle existence?
 - two sides are equal
 - All sides are odd numbers
 - Sides satisfy triangle inequality
 - Only one large angle
- Which triangle has one angle greater than 90° ?
 - Obtuse-angled
 - Right-angled
 - Acute-angled
 - Scalene
- In triangle $\triangle ABC$, $\angle B = \angle C$ and $\angle A = 50^\circ$, what is $\angle B$?
 - 50°
 - 45°
 - 65°
 - 60
- The sum of the interior angles of a triangle is -----
 - 270
 - 90
 - 360
 - 180
- Triangles with all the sides are equal
 - equilateral triangle
 - Isosceles
 - Scalene
 - square
- Angle which is less than 90° is called
 - reflex angle
 - obtuse angle
 - acute angle
 - right angle
- In a triangle if the sum of two angle is 120 degree what is the measure of the third angle?
 - 180
 - 60
 - 120
 - 70
- Which of the following sets of lengths forms a triangle
 - 1cm,2cm,3cm
 - 5cm,6cm,12cm
 - 6cm,8cm,10cm
 - 10cm,15cm,30cm
- If a, b and c are three sides of a triangle, then
 - $a+b=c$
 - $a+b<c$
 - $a+b>c$
 - $a-b>c$
- A triangle is not possible if the measures of the angles are
 - $40^\circ, 65^\circ, 75^\circ$
 - $56^\circ, 50^\circ, 74^\circ$
 - $72^\circ, 63^\circ, 45^\circ$
 - $67^\circ, 42^\circ, 81^\circ$
- Which of the following represents the altitude of the triangle PQR?
 - PM
 - PN
 - PQ
 - PR
- The value of the unknown exterior angle x in the given triangle is
 - 70°
 - 120°
 - 40°
 - 90°

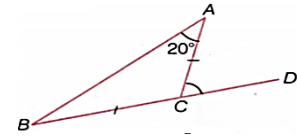


17. If the exterior angle of a triangle is 130° , then sum of two opposite interior angles is equal to

- (a) 50° (b) 60° (c) 180° (d) 130°

18. In the following figure, $\angle A = 20^\circ$ and $\angle B = 20^\circ$, then $\angle ACD$ is equal to

- (a) 30° (b) 40° (c) 60° (d) 80°



19. "A packaging designer needs to create a triangular-shaped gift box. They have three cardboard strips pre-cut with the following lengths. Which of these sets of lengths will actually connect to form a closed, three-dimensional triangular base?"

- a) 2 cm, 3 cm, 6 cm b) 4 cm, 5 cm, 9 cm
c) 7 cm, 10 cm, 4 cm d) 3 cm, 7 cm, 10 cm

20. If the sides of a triangle are a , b , and c , which of the following correctly represents the triangle inequality condition?

- a) $a + b \leq c$ b) $a + b > c$, $b + c > a$, $c + a > b$
c) $a^2 + b^2 = c^2$ d) $a + b + c = 180^\circ$

21. "A builder is constructing a triangular garden bed. Two of the pre-cut wooden sides are 8 meters and 3 meters long. What is the full range of possible lengths, in meters, for the third side of the garden bed to ensure that the three sides can connect and form a closed triangle?"

- a) Greater than 5 cm b) Less than 5 cm
c) Between 5 cm and 11 cm d) Between 8 cm and 3 cm

22. "A land surveyor is mapping a triangular property. They have measured two of the interior angles of the plot: one is 45° and the other is 75° . What is the measure of the third, unmeasured corner angle of the property?"

- a) 50° b) 60° c) 70° d) 65°

23. "A carpenter is trying to brace a wooden frame by adding a diagonal support beam. The two existing sides of the frame where the beam will connect measure 8 feet and 12 feet. Which of the following pre-cut beam lengths—18 feet, 20 feet, or 3 feet—is the only one that could possibly be used to form a stable triangular brace?"

24. "A park ranger is mapping a triangular hiking trail. At one of the sharpest turns (an exterior angle), their compass measures an angle of 120° . They know that one of the two interior opposite corners of the trail measures 50° . What must be the measure of the third, final interior corner angle of the triangular trail?"

- a) 60° b) 70° c) 50° d) 80°

25. "A packaging designer needs to create a triangular-shaped gift box. They have three cardboard strips pre-cut with the following lengths. Which of these sets of lengths will actually connect to form a closed, three-dimensional triangular base?"

- a) 5 cm, 3 cm, 9 cm b) 8 cm, 5 cm, 13 cm
c) 6 cm, 10 cm, 5 cm d) 5 cm, 7 cm, 12 cm

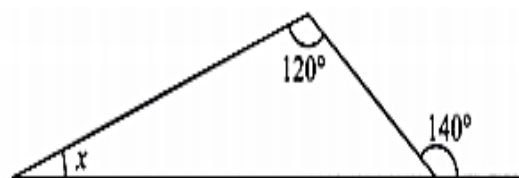
26. "An architect is designing a triangular window frame. To ensure the frame is structurally sound, they must know the measure of every corner angle. If two of the corners are 65° and 55° , what must the measure of the third corner angle be?"

- a) 60° b) 70° c) 50° d) 80°

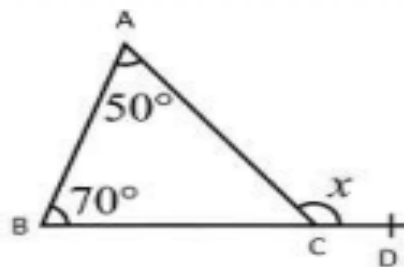
SECTION B

27. Can a triangle have side lengths 6 cm, 8 cm, and 10 cm?
28. Construct a triangle with side lengths 5, 5 and 8. (all units are in cm)
29. For each of the following, give at least 5 possible values for the third length so there exists a triangle having these as side lengths (decimal values could also be chosen):
 - (a) 4 and 10
 - (b) 6 and 6
30. Construct a triangle for the following measurements:
 - (a) 5 cm, 40° , and 8 cm
 - (b) 45° , 5 cm, and 60°
 - c) side length 4cm, 5cm and 6cm.
 - d) triangle ABC with $AB = 5\text{cm}$, $AC = 4\text{cm}$ and $\angle A = 45^\circ$
 - e) triangle PQR with $\angle P = 120^\circ$, $PQ = 6\text{cm}$ and $4\angle Q = 30^\circ$
 - f) a triangle ABC with $BC = 5\text{cm}$, $AB = 6\text{cm}$, $CA = 5\text{cm}$. Construct an altitude from A to BC

31. Find the value of the unknown angle:

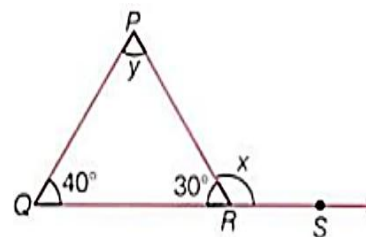


32. In triangle ABC, if $\angle A = 50^\circ$ and $\angle B = 70^\circ$, find the exterior angle x.



33. Can you construct a triangle all of whose angles are equal to 70° ? If two of the angles are 70° , what would the third angle be? If all the angles in a triangle have to be equal, then what must its measure be?

34. In the following figure, find the value of $2x$.



35. Riya is designing a triangular garden with sides of lengths x , 7 m, and 10 m. She wants to ensure the garden can be made with real sides.
 - (a) What condition must x satisfy for the garden to be possible?
 - (b) What happens if $x = 17$?
36. A park has a triangular walking track. Two of the corners have angle boards showing 65° and 75° . The third angle's board has faded away. Find the measure of the missing angle of the park pathway.

37. An architect is designing a triangular roof for a house. The angles formed at the base are 58° and 72° .
- Calculate the angle at the top of the roof.
 - If the architect changes the top angle to 50° , what will the new base angles sum to?
38. In a school playground, students mark a triangle ABC for a game. $\angle A = x$, $\angle B = 2x$, and $\angle C = 3x$.
- Find the value of x and hence each angle of the triangle.
 - Which type of triangle is this based on its angles?
39. Riya is making a triangular wall hanging. She uses three wooden sticks that meet at three corners forming angles of a , $(a + 20)$, and $(a + 40)$
- Find the value of a and each angle.
 - Check if her triangle is acute, right, or obtuse.
40. At a triangular road junction, two roads meet at an angle of 65° , and another at 50° . The third road extends straight forming an exterior angle at that vertex.
- Find the measure of the exterior angle formed at the third junction.
 - If a traffic signal is placed at the vertex where the exterior angle is formed, what should be the measure of the remaining interior angle at that vertex?
41. In a triangular playground, three flag posts are placed at each corner. At one corner, the exterior angle is 100° , and the two interior opposite angles are equal.
- Find each interior opposite angle.
 - What type of triangle is it based on its angles?

42. Activity:

Draw a triangle on paper, label it ABC. Extend side BC to D to form an exterior angle $\angle ACD$. Measure $\angle ACD$, $\angle A$, and $\angle B$ using a protractor. Check whether $\angle ACD = \angle A + \angle B$. Record your observations.

43. Construct triangles for the following measurements where the angle is included between the sides:
- 6 cm, 75° , 14 cm
44. Construct triangles for the following measurements: 110° , 8 cm, 20°
45. Construct a triangle ABC with BC = 10 cm, AB = 12 cm, CA = 10 cm. Construct an altitude from A to BC.
46. Construct a triangle TRY with RY = 8 cm, TR = 14 cm, $\angle R = 100^\circ$. Construct an altitude from T to RY.

CASE STUDY

47. Sandeep wanted to create different triangle shapes for his project using paper strips of various lengths. He picked three strips of lengths 3 cm, 4 cm, and 8 cm. Despite trying multiple times, he couldn't join them to form a triangle. His teacher explained to him about the triangle inequality and helped him to explore which combinations of lengths can form valid triangles.
- Which of the following is a correct condition of the triangle inequality theorem?
 - Each side must be greater than the sum of the other two
 - Each side must be less than the sum of the other two

- (c) Each side must be equal to the other two
- (d) Sum of all three sides should be greater than 180

ii. Can a triangle be formed with lengths 3 cm, 4 cm, and 8 cm?

- (a) Yes, always
- (b) Only if it's a right triangle
- (c) No, triangle inequality fails
- (d) Only in a scalene triangle

iii) Which of the following sets can form a triangle?

- (a) 2 cm, 2 cm, 5 cm
- (b) 5 cm, 6 cm, 12 cm
- (c) 3 cm, 4 cm, 5 cm
- (d) 1 cm, 1 cm, 3 cm

iv) If the sum of two smaller sides equals the longest side, what kind of triangle is formed?

- (a) Right triangle
- (b) Acute triangle
- (c) Line segment, not a triangle
- (d) Obtuse triangle

48. Khushbu wanted to draw a triangle with $AB = 5$ cm, $\angle A = 60^\circ$, and $\angle B = 70^\circ$. She wanted to find the third angle before construction and was also curious whether any triangle is possible if the sum of two angles is more than 180° .

i). What is the sum of angles in any triangle?

- (a) 180°
- (b) 360°
- (c) 90°
- (d) Depends on the triangle

ii). If $\angle A = 60^\circ$ and $\angle B = 70^\circ$, what is the measure of $\angle C$?

- (a) 60°
- (b) 50°
- (c) 40°
- (d) 30°

iii). Can a triangle exist if the two given angles are 90° and 100° ?

- (a) Yes
- (b) No
- (c) Only if the side is small
- (d) Only if all sides are equal

iv). In a triangle where $\angle A = 45^\circ$ and $\angle B = 80^\circ$, how can the third angle $\angle C$ be determined?

- (a) Subtract their sum from 180°
- (b) Average the two angles
- (c) Add their values
- (d) Construct the triangle and measure

49. A carpenter wants to make a triangular frame using three metal rods of lengths 12 cm, 5 cm, and x cm.

- (a) Write the inequalities that must hold for x .
- (b) If $x = 6$ cm, can the triangle be formed?
- (c) What is the minimum integer length of x that will form a triangle?
- (d) If $x = 10$ cm, what type of triangle will it be (based on sides)?

50. Three friends, Riya, Aarav, and Kabir, are painting a triangular signboard for a road safety campaign. While designing, they measured two angles of the triangle as 65° and 75° , but the third angle marking got smudged.

- (a) Using the angle sum property of a triangle, find the measure of the third angle.
- (b) Classify the triangle as acute, right, or obtuse based on its angles.
- (c) If Riya accidentally paints the third angle as 50° , will it still form a valid triangle? Explain why or why not.

(d) If they make a larger, similar triangle with the same angles, will the sum of its angles remain the same? Why?

51. At a construction site, an engineer marks the layout of a triangular garden.

She extends one side of the triangle to form an exterior angle for a pathway.

She observes: One interior opposite angle is 50°

The other interior opposite angle is 60°

- (a) Find the measure of the exterior angle formed at that vertex.
- (b) Find the measure of the interior angle adjacent to this exterior angle.
- (c) If the engineer mistakenly makes the exterior angle 100° , does the triangle still satisfy the exterior angle property? Explain.
- (d) State the relationship between an exterior angle and its interior adjacent angle in a triangle.

ANSWERS

- 1. d) Each side must be shorter than the sum of the other two
- 2. b) Compass
- 3. d) Triangle cannot exist
- 4. c) equilateral triangle
- 5. c) Sides satisfy triangle inequality
- 6. a) Obtuse-angled
- 7. c) 65°
- 8. d) 180
- 9. a) equilateral triangle
- 10. c) acute angle
- 11. b) 60
- 12. c) 6cm, 8cm, 10cm
- 13. c) $a+b > c$
- 14. (d) 67° , 42° , 81°
- 15. (a) PM
- 16. (b) 120°
- 17. (d) 130°
- 18. (b) 40°
- 19. (c) 7 cm, 10 cm, 4 cm
- 20. (b) $a + b > c$, $b + c > a$, $c + a > b$
- 21. (c) Between 5 cm and 11 cm
- 22. (a) 60°
- 23. 18
- 24. b) 70°
- 25. c) 6 cm, 10 cm, 5 cm
- 26. a) 60°

- 27. To form a triangle, the sum of the lengths of any two sides should be greater than the length of the third side.
So, $6\text{ cm} + 8\text{ cm} = 14\text{ cm} > 10\text{ cm}$
 $8\text{ cm} + 10\text{ cm} = 18\text{ cm} > 6\text{ cm}$
 $6\text{ cm} + 10\text{ cm} = 16\text{ cm} > 8\text{ cm}$
Thus, a triangle is possible with side lengths 6 cm, 8 cm, and 10 cm.
- 28. Correct construction
- 29. (a) 5 possible values for the third length = 6.5, 7, 8, 9.5, 13.
Since $10 < 4 + 6.5$, $10 < 4 + 7$, $10 < 4 + 8$, $10 < 4 + 9.5$, $10 < 4 + 13$.
(b) 5 possible values for the third length = 3, 5, 7, 8.5, 11.
Since $6 < 6 + 3$, $6 < 6 + 5$, $6 < 6 + 7$, $6 < 6 + 8.5$, $6 < 6 + 11$.

30. a) , b) correct construction
31. In $\triangle PQR$, $\angle PRS = \angle PQR + \angle QPR$ (exterior angle)
 So, $140^\circ = x + 120^\circ$
 $x = 140^\circ - 120^\circ$
 $x = 20^\circ$
32. 120
33. No, it is not possible to construct a triangle with all angles equal to 70° , As In any triangle, the sum of all three angles is always 180° . If you try to make all three angles 70° , the total will be: $70^\circ + 70^\circ + 70^\circ = 210^\circ$, which is more than 180° . That's not possible, so such a triangle cannot be made. If all the angles in a triangle have to be equal, then each angle must measure 60° . This type of triangle is called an equilateral triangle.
34. $\angle P = y$, $\angle Q = 40^\circ$, $\angle PRQ = 30^\circ$, $\angle SRP = x$ By angle sum property of a triangle,
 $\angle Q + \angle P + \angle PRQ = 180^\circ \rightarrow 40^\circ + y + 30^\circ = 180^\circ \rightarrow y = 180^\circ - 70^\circ = 110^\circ$
 Also, the sum of interior opposite angles is equal to exterior angle. $\therefore x = 40^\circ + 110^\circ \rightarrow x = 150^\circ$ Now, $2x = 2 \times 150^\circ \therefore 2x = 300^\circ$
35. i) $3 < x < 17$
 ii) $7 + 10 = 17 \rightarrow$ equality, not greater $\rightarrow$ the garden would form a straight line, not a triangle
36. $\angle_3 = 180^\circ - (65^\circ + 75^\circ) = 40^\circ$
37. $\angle_{\text{top}} = 180^\circ - (58^\circ + 72^\circ) = 50^\circ$
 If top = 50° , then base angles sum = $180^\circ - 50^\circ$
38. $x + 2x + 3x = 180^\circ \Rightarrow 6x = 180^\circ \Rightarrow x = 30^\circ$
 $\angle A = 30^\circ$, $\angle B = 60^\circ$, $\angle C = 90^\circ$
 Hence, it is a right-angled triangle.
39. $a + (a + 20) + (a + 40) = 180$
 $3a + 60 = 180 \Rightarrow a = 40^\circ$
 Angles = 40° , 60° , $80^\circ \rightarrow$ All less than $90^\circ \rightarrow$ Acute-angled triangle.
40. $\angle_{\text{Exterior}} = 65^\circ + 50^\circ = 115^\circ$
 $\angle_{\text{Interior at that vertex}} = 180^\circ - 115^\circ = 65^\circ$
41. Let each opposite angle = x .
 $100^\circ = x + x \Rightarrow 2x = 100^\circ \Rightarrow x = 50^\circ$
 The remaining interior angle = $180^\circ - 100^\circ = 80^\circ$
 triangle: Scalene (angles 50° , 50° , $80^\circ \rightarrow$ actually isosceles by angles)
42. -
43. Right construction
44. Right construction
45. Right construction
46. Right construction

CASE STUDY

47. i) b ii) c iii) iv) c
48. i) a ii) b iii) b iv) a
49. i) $7 < x < 17$
 ii) No, since $6 < 7$ violates the inequality.

(iii) $x = 8$ cm

(iv) Sides: 12, 10, 5 $\rightarrow$ All sides different $\rightarrow$ Scalene triangle.

50. (a) $\angle_3 = 180^\circ - (65^\circ + 75^\circ) = 40^\circ$

(b) All angles $< 90^\circ \Rightarrow$ Acute-angled triangle

(c) $65^\circ + 75^\circ + 50^\circ = 190^\circ \neq 180^\circ \rightarrow$ Not possible.

It violates the angle sum property.

(d) Yes — the sum of angles of any triangle (regardless of size) is always 180° , as it depends on geometry, not dimensions.

51. (a) Exterior angle = sum of opposite interior angles
 $= 50^\circ + 60^\circ = 110^\circ$

(b) Interior adjacent angle $= 180^\circ - 110^\circ = 70^\circ$

(c) If exterior $= 100^\circ$, opposite angles sum $= 50^\circ + 60^\circ = 110^\circ \rightarrow$ Not equal
So, the property is not satisfied; the triangle layout is incorrect.

(d) An exterior angle and its adjacent interior angle are supplementary, i.e. their sum $= 180^\circ$

Working with Fractions

Section A – Multiple Choice Questions (20)

- Aaron walks 3 km in 1 hour. How far can he walk in $\frac{1}{2}$ hour?
a) 1.5 km b) 1 km c) 2 km d) 3.5 km
- A 9 m rope cut into pieces of $\frac{3}{4}$ m. How many pieces can we get?
a) 9 b) 15 c) 12 d) 10
- The product of two fractions $\frac{3}{4}$ and $\frac{2}{5}$ is:
a) $\frac{6}{9}$ b) $\frac{6}{20}$ c) $\frac{3}{10}$ d) $\frac{5}{7}$
- When multiplying fractions, we multiply:
a) numerator with denominator b) denominators only
c) numerators and denominators separately d) cross multiply
- A baker has 5 kg of flour. He uses $\frac{1}{5}$ kg for each loaf of bread. How many loaves can he bake?
a) 15 b) 20 c) 22 d) 25
- Which of the following statements is true?
a) $(\frac{2}{3}) \times 3 = 3$ b) $(\frac{2}{3}) \times 3 = 2$ c) $(\frac{2}{3}) \times 3 = 1$ d) 6
- Evaluate $(\frac{3}{5}) \times 4 =$
a) $\frac{12}{5}$ b) $\frac{7}{5}$ c) $\frac{4}{15}$ d) $\frac{5}{12}$
- The reciprocal of $(\frac{4}{7})$ is:
a) $\frac{7}{4}$ b) $\frac{4}{7}$ c) $-\frac{4}{7}$ d) 1
- Division of two fractions means:
a) Multiply by reciprocal b) Subtract
c) Divide numerators only d) Multiply by same fraction
- $(\frac{3}{4}) \div (\frac{1}{2}) =$
a) $\frac{3}{8}$ b) $\frac{3}{2}$ c) $\frac{2}{3}$ d) $\frac{4}{3}$
- $(\frac{7}{8}) \div (\frac{7}{8}) =$
a) 0 b) 1 c) $\frac{7}{64}$ d) $\frac{8}{7}$
- The product of a number and its reciprocal is always:
a) 0 b) 1 c) same number d) its square
- If divisor is between 0 and 1, quotient is:
a) equal to dividend b) smaller
c) greater d) zero
- Simplify: $(\frac{1}{6}) \times (\frac{3}{2})$
a) $\frac{1}{3}$ b) $\frac{1}{4}$ c) $\frac{3}{8}$ d) $\frac{3}{12}$
- $(\frac{2}{3}) \div (\frac{3}{5}) =$

a) $\frac{10}{9}$ b) $\frac{9}{10}$ c) $\frac{5}{9}$ d) $\frac{3}{8}$

16. The product of two fractions less than 1 is always:

- a) greater than 1 b) less than each
c) equal to one d) none

17. In $\frac{a}{b} \times \frac{c}{d}$, product equals:

a) $\frac{a+d}{b+c}$ b) $\frac{a \times c}{b \times d}$ c) $\frac{a \times d}{b \times c}$ d) $\frac{b \times c}{a \times d}$

18. Simplify $(\frac{12}{7}) \times (\frac{5}{24})$:

a) $\frac{5}{14}$ b) $\frac{60}{168}$ c) $\frac{5}{28}$ d) $\frac{10}{7}$

19. The number of months in $\frac{3}{5}$ of a century is

- a) 60 b) 600 c) 720 d) 100.

20. $\frac{20}{3}$ litres milk is being distributed among 10 persons. How much milk would one person get?

a) $\frac{2}{3}$ litre b) $\frac{1}{3}$ litre c) $\frac{4}{3}$ litre d) $\frac{2}{3}$ ml.

21. A farmer has 5 grandchildren and he distributes $\frac{2}{3}$ acre of land to each. How much land does he give to all his grandchildren in total?

a) $\frac{10}{3}$ acres b) $\frac{8}{3}$ acres c) $\frac{15}{3}$ acres d) $\frac{5}{3}$ acres

22. If Aaron walks 3 kilometres in 1 hour, how far will he walk in $\frac{2}{5}$ hours?

a) $\frac{6}{5}$ km b) $\frac{3}{5}$ km c) $\frac{6}{5}$ km d) $\frac{9}{5}$ km

23. Tenzin drinks $\frac{1}{2}$ glass of milk every day. How many glasses does he drink in a week?

a) 2 glasses b) 3.5 glasses c) 3 glasses d) 5 glasses

24. A tap fills $\frac{7}{10}$ of a tank in 1 hour. How much of the tank is filled if the tap is open for $\frac{1}{2}$ hour?

a) $\frac{1}{5}$ of the tank b) $\frac{7}{20}$ of the tank c) $\frac{1}{4}$ of the tank d) $\frac{1}{3}$ of the tank

25. If 1 hour of internet time costs ₹8, how much will $1\frac{1}{4}$ hours of internet time cost?

a) ₹10 b) ₹12 c) ₹8 d) ₹14

26. What is $\frac{3}{4}$ divided by $\frac{2}{5}$?

a) $\frac{15}{8}$ b) $\frac{5}{8}$ c) $\frac{3}{10}$ d) $\frac{3}{20}$

27. A team of workers can make 1 km of a water canal in 8 days. How much can they make in 5 days?

a) $\frac{5}{8}$ km b) $\frac{1}{2}$ km c) $\frac{5}{64}$ km d) $\frac{5}{4}$ km

28. If a water tank is filled by a tap that fills $\frac{7}{10}$ of the tank in 1 hour, what fraction of the tank is filled in $\frac{1}{3}$ hour?

a) $\frac{7}{30}$ b) $\frac{7}{20}$ c) $\frac{1}{4}$ d) $\frac{1}{5}$

29. If $\frac{1}{4}$ kg of flour is used to make 12 rotis, how much flour is used for 6 rotis?

a) $\frac{1}{8}$ kg b) $\frac{1}{12}$ kg c) $\frac{1}{6}$ kg d) $\frac{1}{2}$ kg

30. How much is $\frac{3}{5}$ of $\frac{2}{3}$?

a) $\frac{2}{5}$ b) $\frac{6}{15}$ c) $\frac{1}{5}$ d) $\frac{1}{10}$

Section B – Short Answer Questions (20 questions)

31. A bus covers 12 km using 1 litre of diesel. How far will it go using $3\frac{1}{2}$ litres of diesel?
32. 1 hour of internet time costs ₹8. How much will $1\frac{1}{4}$ hours of internet time cost?
33. What is the product of $\frac{7}{197}$ and its reciprocal?
34. A recipe needs $\frac{3}{4}$ cup of sugar. If you make half the recipe, how much sugar will you need?
35. Maya plants four saplings in a row, with $\frac{3}{4}$ m between two saplings. Find the distance between the first and last saplings?
36. Find $(\frac{3}{5}) \times 6$ and express it as a mixed fraction.
37. Ritu spends $\frac{2}{5}$ of her pocket money on books and $\frac{1}{10}$ on snacks. What fraction of her pocket money is left?
38. Each side of a square is $6(\frac{2}{3})$ m long. Find its area
39. Tanish drinks $\frac{1}{2}$ glass of milk every day. How many glasses of milk does he drink in a week?
40. Find the reciprocal of $(\frac{7}{8})$ and $(\frac{9}{5})$.
41. Calculate $(\frac{4}{5}) \div 2$.
42. Show that $(\frac{a}{b}) \times (\frac{c}{d}) = (\frac{a \times c}{b \times d})$ using numbers.
43. Out of 50 students, $\frac{3}{10}$ are girls. How many are boys?
44. Evaluate: $(\frac{2}{5}) \div (\frac{3}{10})$.
45. Find the area of a rectangular park which is $41(\frac{2}{3})$ m long and $18(\frac{3}{5})$ m broad
46. The reciprocal of a fraction is $\frac{4}{5}$. Find the fraction.
47. Divide $(\frac{7}{9}) \div (\frac{2}{3})$.
48. Frame a real-life example of multiplication of fractions.
49. Write a real-life example of division of fractions.
50. Explain the relationship between dividend, divisor, and quotient.
51. A car travels 16 km per litre of petrol. How far will it go using 234 litres of petrol?
52. One loaf of bread needs 16 kg flour. How many loaves can be made using 5 kg flour?
53. 45kg of rice is to be equally distributed among 4 families. How much rice (in kg) will each family get?
54. Shivam completed 35 of his homework on Monday. On Tuesday, he completed 13 of the remaining homework. What fraction of the total homework is still incomplete?
55. Without actual multiplication, explain whether the product of 15×45 will be greater than or less than 15. Give a reason for your answer.

Section C – Long Answer Questions

56. A tap fills $\frac{7}{10}$ of a tank in 1 hour. How much of the tank will be filled in $\frac{3}{4}$ hour?
57. A farmer gives $\frac{2}{3}$ acres to each of her 5 grandchildren. How much land does she distribute?
58. Find the area of a rectangle of sides $3\frac{3}{4}$ m and $9\frac{3}{5}$ m.
59. If $\frac{1}{2}$ kg of flour makes 12 rotis, how much flour is needed for 6 rotis?
60. Aaron's pet tortoise walks at a much slower pace. It can walk only $\frac{1}{4}$ kilometre in 1 hour. How far can it walk in 3 hours?

61. A car runs 16 km per litre of petrol. How far will it go using $2\frac{3}{4}$ litres?
62. A picture hall has seats for 820 persons. At a recent film show, user Mr. X guessed it was $\frac{3}{4}$ full, another user Mr. Y guessed that it was $\frac{2}{3}$ full. The ticket office reported 648 sales. Which user (X or Y) made the better guess? .
63. A square brick has a side of $\frac{1}{5}$ m. How many such bricks are needed to cover $7\frac{1}{2}$ m²?
64. If Radhika takes $2\frac{1}{3}$ m of cloth to make a shirt. How many shirts can Radhika make from a piece of cloth $9\frac{1}{3}$ m long?.
65. Sameera purchased $3(\frac{1}{2})$ kg apples and $4(\frac{3}{4})$ kg oranges. What is the total weight of fruits purchased by her?
66. Two workers together complete $\frac{2}{3}$ of a job. Worker A completes $\frac{3}{10}$. How much work does Worker B complete?
67. A jug has $\frac{5}{6}$ litre of juice. If $\frac{2}{9}$ litre is poured out, how much remains?
68. A tailor used $2\frac{1}{4}$ metres of cloth for a shirt and $3\frac{2}{5}$ metres of cloth for a trouser. If he started with a roll of 10 metres of cloth, how much cloth (in metres) is left with him?
69. A car travels at a uniform speed of $60\frac{3}{5}$ km/hour. How much distance (in km) will it cover in $2\frac{1}{2}$ hours?
70. If $\frac{3}{4}$ of a number is 27, what is $\frac{5}{9}$ of that same number?

Case study questions

71. I.Baking for a Party

Sunita decides to bake a delicious chocolate cake for her birthday party. The original recipe requires the following ingredients:

Ingredient	Quantity (in cups)
Flour	$3\frac{1}{2}$ cups
Sugar	$1\frac{3}{4}$ cups
Butter	$\frac{3}{4}$ cup
Milk	$1\frac{1}{2}$ cups

Since she is expecting many guests, Sunita decides to prepare $1\frac{1}{2}$ times the original recipe.

- i) Calculate the total amount of Flour (in cups) Sunita will need for the increased recipe
Express your answer as a mixed fraction.
- ii)What is the total quantity of liquid ingredients (Milk and Butter) required for the *original* recipe? Write the answer as a simplified mixed fraction.
- iii)Sunita bought a bag containing 10 cups of Sugar. How much Sugar will remain after she has measured the quantity required for the increased recipe?

iv) Sunita calculates that the total cost of all ingredients for the original recipe is ₹ 600.

If the cost of the Milk makes up $\frac{1}{10}$ of the total cost, what is the cost of the remaining ingredients?

72. II. Gardening Project

Rohan and his grandfather are working on their rectangular garden plot, which measures $15\frac{1}{2}$ metres in length and $8\frac{4}{5}$ metres in width. They plan to use the land for three different purposes:

Flowers: $\frac{2}{5}$ of the total area will be used to plant flowers.

Vegetables: $\frac{1}{3}$ of the remaining area after planting flowers will be used for vegetables.

Grass/Path: The rest of the area will be covered with grass and a walkway.

a) Calculate the total area of the garden plot in square metres. Express your answer as a mixed fraction.

b) Find the area (in square metres) allocated for Flowers.

c) What fraction of the total garden area is used for the Vegetables?

d) What is the area (in square metres) covered by the Grass/Path?

e) Rohan needs to buy fertilizer for the Flower area. If 1 kg of fertilizer is sufficient for $10\frac{1}{2}$ sq metres, how much fertilizer (in kg) should he buy for the Flower area?

(ANSWER KEY)

Multiple Choice Questions

1. **a)** 1.5 km
2. **c)** 12 pieces ($9 \div \frac{3}{4} = 12$)
3. **c)** $\frac{3}{10}$ ($\frac{3}{4} \times \frac{2}{5} = \frac{6}{20} = \frac{3}{10}$)
4. **c)** numerators and denominators separately
5. **d)** 25 loaves ($5 \div \frac{1}{5} = 25$)
6. **b)** $2\frac{2}{3}$ ($\frac{2}{3} \times 3 = 2$)
7. **a)** $\frac{12}{5}$
8. **a)** $\frac{7}{4}$
9. **a)** Multiply by reciprocal
10. **b)** $\frac{3}{2}$ ($\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times 2 = \frac{6}{4} = \frac{3}{2}$)
11. **b)** 1
12. **b)** 1
13. **c)** greater (dividing by a number between 0 and 1 gives a larger quotient)
14. **b)** $\frac{1}{4}$ ($\frac{1}{6} \times \frac{3}{2} = \frac{3}{12} = \frac{1}{4}$)
15. **a)** $\frac{10}{9}$ ($\frac{2}{3} \div \frac{3}{5} = \frac{2}{3} \times \frac{5}{3} = \frac{10}{9}$)
16. **b)** less than each
17. **b)** $(a \times c) / (b \times d)$

18. **a)** $5/14$ ($12/7 \times 5/24 = 60/168 = 5/14$)
19. **c)** 720 months (If question means $3/5$ of a century = 60 years $\rightarrow 60 \times 12 = 720$ months)
20. **Answer: 20.3 litres** per person ($203 \div 10 = 20.3$ L). Note: none of the printed options match; correct value is 20.3 L.
21. a) $\frac{10}{3}$ acres
22. c) $\frac{6}{5}$ km
23. b) 3.5 glasses
24. b) $\frac{7}{20}$ of the tank
25. a) ₹10
26. a) $\frac{15}{8}$
27. a) $\frac{5}{8}$ km
28. a) $\frac{7}{30}$
29. a) $\frac{1}{8}$ kg
30. b) $\frac{6}{15}$
31. **42 km.** ($12 \text{ km per litre} \times 3\frac{1}{2} \text{ L} = 12 \times 3.5 = 42$)
32. **₹912.** ($₹8 \times 114 = ₹912$)
33. **1.** (a number $\times$ its reciprocal = 1)
34. **$3/8$ cup.** (If original needs $3/4$ cup, half recipe needs $(3/4) \div 2 = 3/8$)
35. **$2\frac{1}{4}$ m ($9/4$ m).** (Four saplings have 3 gaps $\rightarrow 3 \times 3/4 = 9/4$ m)
36. **$18/5 = 3\frac{3}{5}$.** ($3/5 \times 6 = 18/5$)
37. **$1/2$ is left.**
38. **$400/9 \text{ m}^2 = 44\frac{4}{9} \text{ m}^2$.** (Side = $6\frac{2}{3} = 20/3$; area = $(20/3)^2 = 400/9$)
39. **$3\frac{1}{2}$ glasses.** ($1/2 \times 7 = 7/2 = 3\frac{1}{2}$)
40. **Reciprocals:** $7/8 \rightarrow 8/7$; $9/5 \rightarrow 5/9$
41. **$2/5$.** ($((4/5) \div 2 = 4/5 \times 1/2 = 4/10 = 2/5)$)
42. **Example to show rule:**
- Take $(2/3) \times (3/4) = 6/12 = 1/2$.
 - Using formula $(a/b) \times (c/d) = (a \times c)/(b \times d)$: $(2 \times 3)/(3 \times 4) = 6/12 = 1/2$.
43. **19 boys.** (If 31 are girls out of 50 $\rightarrow 50 - 31 = 19$)
44. **$4/3 = 1\frac{1}{3}$.** ($(2/5) \div (3/10) = 2/5 \times 10/3 = 20/15 = 4/3$)
45. **775 m^2 .** ($41\frac{2}{3} = 125/3$; $18\frac{3}{5} = 93/5$; area = $125/3 \times 93/5 = 11625/15 = 775$)
46. **$5/4$.** (If reciprocal is $4/5$, original fraction = $5/4$)
47. **$7/6 = 1\frac{1}{6}$.** ($((7/9) \div (2/3) = 7/9 \times 3/2 = 21/18 = 7/6)$)
48. **Real-life example (multiplication):** Half of a $3/4$ kg cake = $(1/2) \times (3/4) = 3/8$ kg.
49. **Real-life example (division):** How many $1/4$ -litre cups are there in $3/2$ litres? $(3/2) \div$

$$(1/4) = 6 \text{ cups.}$$

50. **Relationship:** Dividend = Divisor $\times$ Quotient (+ Remainder, if any). In exact fractional division there is no remainder, so Dividend = Divisor $\times$ Quotient.

51. Convert to improper fraction: $2\frac{3}{4} = \frac{11}{4}$

$$\text{Distance} = \frac{11}{4} \times 16 = 44 \text{ km}$$

$$52. 5 \div \frac{1}{6} = 5 \times 6 = 30$$

$$53. \text{Rice per family} = \frac{4}{5} \div 4 = \frac{1}{5} \text{ kg}$$

54. 1. Fraction remaining after Monday: $1 - 3/5 = 2/5$

2. Fraction incomplete after Tuesday (Remaining part of the remaining): $\frac{2}{3}$ of $\frac{2}{5} = \frac{4}{15}$

55. The product will be less than 15. Reason: When a number is multiplied by a fraction that is between 0 and 1, the product is always smaller than the original number

Long Answer Questions

56. $21/40$ of the tank. ($7/10 \times 3/4 = 21/40$)

57. $10/3$ acres = $3\frac{1}{3}$ acres. ($2/3 \times 5 = 10/3$)

58. 36 m^2 . ($3\frac{3}{4} = 15/4$; $9\frac{3}{5} = 48/5$; area = $15/4 \times 48/5 = 720/20 = 36$)

59. $1/4 \text{ kg}$. (If $1/2 \text{ kg} \rightarrow 12 \text{ rotis}$, then 1 roti needs $1/24 \text{ kg} \rightarrow 6 \text{ rotis need } \frac{6}{24} = \frac{1}{4} \text{ kg}$)

60. $3/4 \text{ km}$. ($1/4 \text{ km per hour} \times 3 \text{ hours} = 3/4 \text{ km}$)

61. 44 km . ($16 \text{ km/L} \times 2\frac{3}{4} \text{ L} = 16 \times 11/4 = 176/4 = 44 \text{ km}$)

62. Mr. X made the better guess. $\frac{3}{4}$ of 820 = 615; $\frac{2}{3}$ of 820 = 546; actual sales = 648 $\rightarrow$ closer to 615 (difference 33 vs 102).

63. 188 bricks (rounding up). Area of one brick = $(\frac{1}{5})^2 = \frac{1}{25}$. Required area = $7\frac{1}{2} = \frac{15}{2} \text{ m}^2$.

$$\text{Number} = (15/2) \div (1/25) = (15/2) \times 25 = 375/2 = 187.5 \rightarrow 188 \text{ bricks required.}$$

64. 4 shirts.

$$\text{Cloth per shirt} = 2\frac{1}{3} = 7/3 \text{ m.}$$

$$\text{Total cloth} = 9\frac{1}{3} = 28/3 \text{ m.}$$

$$\text{Number} = (28/3) \div (7/3) = 4.$$

65. $8\frac{1}{4} \text{ kg}$ (8.25 kg). ($3\frac{1}{2} + 4\frac{3}{4} = 7/2 + 19/4 = 14/4 + 19/4 = 33/4 = 8\frac{1}{4}$)

$$66. \text{Work by B} = \frac{2}{3} - \frac{3}{10}$$

$$\text{LCM of 3 and 10} = 30$$

$$\frac{20}{30} - \frac{9}{30} = \frac{11}{30}$$

67. $\frac{5}{6} - \frac{2}{9} = \frac{11}{18}$ (lcm=18)

68. Total cloth used = $\frac{113}{20} m$

Cloth left = $4\frac{7}{10} m$

69. Convert to Improper Fractions:

Then find distance and then calculations $151\frac{1}{2} km$

70. 1.5 marks for finding the original number, 1.5 marks for finding the final required fractional part. Answer = 20

71. i) $3\frac{1}{2} \times 1\frac{1}{2} = 5\frac{1}{4}$

ii) $2\frac{1}{4}$

iii) $7\frac{3}{8}$

iv) ₹ 540/-

72. i) $136\frac{2}{5} m^2$

ii) *Flower area* = $54\frac{14}{25} m^2$

iii) $\frac{1}{5}$

iv) $\frac{\text{Flower area}}{\text{coverage}} = \frac{1364/25}{21/2} = \frac{1364}{25} \cdot \frac{2}{21} = \frac{2728}{525} = 5\frac{103}{525} kg \approx 5.19619 kg.$

Practical: Buy 6 Kg