INTERNATIONAL INDIAN SCHOOL DAMMAM

CLASS- 9   QUESTION BANK FOR MIDTERM EXAMINATION

MATHEMATICS (2023 - 2024) CHAPTER-1 NUMBER SYSTEM

1. Every rational number is..
   a) a whole number   b) a natural number
   c) a real number   d) an integer

2. Decimal representation of rational number cannot be..
   a) terminating   b) non-terminating
   c) non-terminating repeating   d) non-terminating non-repeating

3. Decimal expansion of $\sqrt{3}$ the number is

   a) 1.73205   b) a finite decimal
   c) non-terminating non-repeating   d) none of these

**The following questions consist of two statements - Assertion (A) and Reason(R).
Answer these questions selecting the appropriate option given below**

   a. Both A & R are true and R is the correct explanation of A
   b. Both A & R are true and R is not correct explanation of A
   c. A is true but R is false.
   d. A is false but R is true

4) A: $2+\sqrt{3}$ is a rational number.

   R: Sum of rational and irrational number is an irrational number.

5) A: $\sqrt{5}$ is an irrational number.

   R: Square root of a positive integer which is not perfect square is an irrational number

6) Express in the form of p/q , where p& q are integers and q $\neq$ 0

   a. 0.6666……   c. 0.16363……
   b. 1.494949……   d. 0.9999……

7) Rationalise

   a) $\frac{1}{3+\sqrt{2}}$ a) $\frac{1}{7+5\sqrt{2}}$

8. Evaluate $\sqrt{8}$ x $\sqrt{24}$

9. Find the value of $8\sqrt{15} \div 2\sqrt{3}$?

10. Locate $\sqrt{3}$ on the number line ?

11. Represent $\sqrt{9.3}$ on the number line?

12. If $2^{5x} \div 2^x = \sqrt[5]{2^{20}}$, find x ?

13. Simplify

   a). $(\sqrt{5} + \sqrt{2})^2$ b). $\frac{30}{5\sqrt{3}-3\sqrt{5}}$ c). $\frac{7+3\sqrt{5}}{7-3\sqrt{5}}$

14. Add $2\sqrt{2} + 5\sqrt{3}$ and $\sqrt{2} - 3\sqrt{3}$?

15. Find a & b, if $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} = a+b\sqrt{15}$?

16. Find a & b , if $\frac{3-\sqrt{5}}{3+2\sqrt{5}} = a\sqrt{5} - b$?

17. Evalulate $\sqrt[3]{27} + \sqrt{49} + \sqrt[5]{32}$

18. Simplify $\sqrt{625} - \sqrt[3]{125} + \sqrt[4]{81} + \sqrt[5]{32}$

19. Rationalise the denominator $\frac{1}{\sqrt{3}+\sqrt{2}}$ and hence evaluate by taking $\sqrt{2} = 1.4141$ and

   $\sqrt{3} = 1.732$ upto three decimal places?

20. If $a = 3 + 2\sqrt{2}$ then find the value of $a^2 + \frac{1}{a^2}$?

21. If $X = \frac{\sqrt{3}+1}{\sqrt{3}-1}$, $Y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$ then find $x^2 + y^2 + xy$?

22. Case study based question

In a school one day the maths teacher told the students of class IX about the number systems. She drew a number line and told them the number line represents various types of numbers on it.

Rational numbers can be represented on the number line. A number is called rational number if it can be written in the form of $\frac{p}{q}$, where p & q are integers and $q \neq 0$.

Based on the information, answer the following questions

  i. A rational number between 2 and 3 is
     a) 1   b) $\frac{5}{2}$ c) 0   d) $\frac{1}{2}$

 ii. An irrational number between $\sqrt{3}$ and $\sqrt{5}$ is
     a) 2   b) 1   c) $\sqrt{5}$ d) $\sqrt{3.5}$

iii. The $\frac{p}{q}$ form of 1.3333... is

a) $\frac{7}{9}$ b) $\frac{5}{9}$ c) $\frac{4}{3}$ d) $\frac{5}{3}$

iv. The product of $(2+ \sqrt{3})(2- \sqrt{3})$ is

a) 4   b) 1   c) -1   d) 0

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INTERNATIONAL INDIAN SCHOOL DAMMAM

CLASS - 9   QUESTION BANK FOR MID-TERM EXAMINATION

MATHEMATICS (2023-'24)

CHAPTER -2   POLYNOMIALS

Choose the correct option:-

1. Which of the following is a linear polynomial?

   (a) 7z - 59   (b) y^2- 4y + 85   (c)1 + x^3- 2x   (d) $2x^5 + 3x^3 - 11x + 30$

2. If X^{20}+21 is divided by x+1, then the remainder is: -

     (a) 2   (b) 0   (c)1   (d) 22

3. ZERO of the zero polynomial is

     (a)0   (b)1   (c) any real number   (d) not defined

4. $\sqrt{5}$ is a polynomial of degree

     (a) 3   (b) 0   (c)1   (d)1/2

5. If X^2 +kX +6 = (X+2)(X+3) for all X, then the value of k is:

     (a) 3   (b) 5   (c) 1   (d)8

6. Which of the following is polynomial in one variable?

   (a) 6X - 9   (b) y^2- 2y - 5   (c)1 + $\sqrt{x}$ (d) 2x + 3y − 30

7. Evaluate the following using suitable identity: 188×212

     (a) 39856   (b)56546   (c)13456   (d)8566

SHORT ANSWER TYPE QUESTIONS:-

8. If p(x)= $x^2 - 2\sqrt{2}x+1$, then find the value of p($2\sqrt{2}$).

9.   If x − 3 is a factor of $x^2 - kx + 12$, then find the value of k. Also, find the other factor of the polynomial for this value of k.

10. Without actual division prove that (x - 2) divides $2x^4 + x^3 - 5x^2 - 8x - 4$

11. Factorise: $x^2 - 1 - 2a - a^2$.

12. Expand the following using suitable identities:
(i) $(y - \sqrt{3})^2$ (ii) $(x - 2y - 3z)^2$ (iii) $(3x + 2y)^3$ (iv) $(7p - 2q)^3$

LONG ANSWER TYPE QUESTIONS:-

13. If $x^3 + ax^2 - bx + 10$ is divisible by $x^2 - 3x + 2$, find the values of a and b.

14. If $a + b + c = 15$ and $a^2 + b^2 + c^2 = 83$, find the value of $a^3 + b^3 + c^3 - 3abc$

15. Factorise using appropriate identities:
    a) $2x^2 + y^2 + 8z^2 - 2\sqrt{2}xy + 4\sqrt{2}yz - 8xz$
    b) $x^2 + 3x - 10$ c) $125x^3 - 64y^3$

16. Find the value of the polynomial $p(x) = x^4 + 2x^3 - 2x^2 + x - 1$ at $x = 0$, $x = -1$, $x = -2$

17. Factorise: (i) $x^3 - 6x^2 + 11x - 6$ (ii)) $x^3 - 23x^2 + 142x - 120$

18. Factorise: a) $8X^3 + 27Y^3$ b) $125P^3 - 343q^3$

19. Without actually calculating the cubes, find the value of: $(18)^3 + (-15)^3 + (-3)^3$

20. If $x^2 + \dfrac{1}{x^2} = 18$ then find the value of $x - \dfrac{1}{x}$.

21. What are the possible expressions for the dimensions of a cuboid whose volume   is given below ?
Volume = $2x^3 + 5x^2 + x - 2$

22. If x+y=5 and xy=4, find x-y, using identities.

23. **Assertion :** The degree of the polynomial $(x^2 - 2)(x - 3)(x + 4)$ is 3.
Reason : A polynomial of degree 3 is called a cubic polynomial.

(a) Assertion and Reason both are correct statements and Reason is the correct explanation of Assertion.
(b) Assertion and Reason both are correct statements but Reason is not the correct explanation of Assertion.
(c) Assertion is correct statement but Reason is wrong statement.
(d) Assertion is wrong statement but Reason is correct statement.

24. **Assertion :** –7 is a constant polynomial.
Reason : Degree of a constant polynomial is zero.

(a) Assertion and Reason both are correct statements and Reason is the correct explanation of Assertion.
(b) Assertion and Reason both are correct statements but Reason is not the correct explanation of Assertion.
(c) Assertion is correct statement but Reason is wrong statement.
(d) Assertion is wrong statement but Reason is correct statement.

25. CASE STUDY

Rahul is a creative person and loves to paint. During the lockdown, he painted a wall of his daughter's room with her favorite color olive green. He did not paint the area covered by the window and the door. The figure shows the dimensions of his daughter's room that he painted.

Based on the above information, answer the following questions.
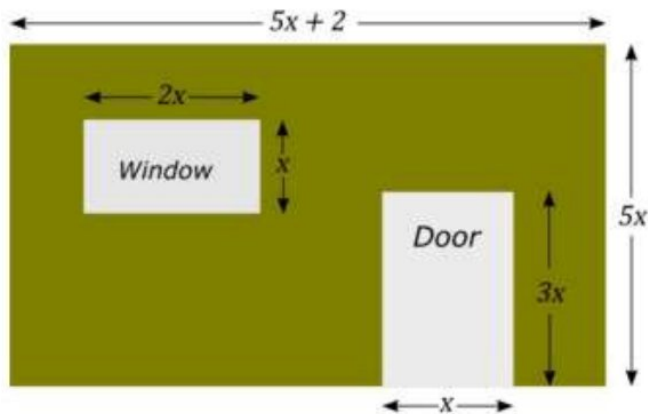
1. The area of the wall including the door and the window is:

   a) 25X + 10 sq.units

   b) 25X + 10X sq.units

   c) $10X^2 + 10x$ sq.units

   d) $25X^2 + 10x$ sq.units

2. The area of the wall excluding the door and the window is:

   a) 25X + 10 sq.units

   b) $20X^2 + 10x$ sq.units

   c) $10X^2 + 10x$ sq.units

   d) $25X^2 + 10x$ sq.units

3. The area of the door and the window is:

   a) $25X^2 + 10$ sq.units

   b) $5X^2$ sq.units

   c) 10X + 10x sq.units

d) $25X + 10x$ sq.units

4. The area of the wall if its length is decreased by 1 unit and the breadth is increased by 1 unit:

a) $25X^2 + 10X + 1$ sq.units

b) $5X^2 - 10X$ sq.units

c) $10X^2 + 10x$ sq.units

d) $25X^2 + 10x$ sq.units

1. The point (0, 5) lies on

   (a) x-axis   (b) y-axis   (c) II quadrant (d) I quadrant

2. The equation of x-axis is

   (a)) x = 0   (b) y = 0   (c) x = 0, y = 0   (d) none of these

3.   Quadrant in which the point (-3 ,-5) lies

   (a)) quadrant 1   (b) quadrant II (c) quadrant IV (d) quadrant III

4. Abscissa of all the points on the x- axis is

   (a)) 0   (b) 1   (c) 2   (d) any number

5. The co-ordinates of the origin are…

   (a) (0, 2)   (b) (2,0)   (c) (0,0)   (d) none

6. Which of the following points lie on the line y = x+1 ? (a) (2,1)

              (b) (1,2)   (c)   (3,2)   (d) (0,0)

7. The perpendicular distance of the point P(5,7) from the y axis .

   (a)) 5 units (b) 7 units (c) 12 units   (d) None

8. The perpendicular distance of the point (3,-8) from the x axis .

   (a) -8 units (b) 3 units   (c) 8 units   (d) None

9. Mirror image of the point (9, -8) in y- axis is

   (a) -9,-8)   (b) (9,8)   (c) (-9,8)   (d) (-8,9)

10. The graph of linear equation x+2y = 2 , cuts the y axis at (a) (2,0) (b)

   (0, 2)   (c) (0 ,1) (d) (1,1)

11.   The linear equation 2x- 5y = 7 has

   (a)) no solution (b) unique solution (c) two solutions   (d) Infinitely many solutions

12. Any point on the y axis is of the form

(a) (y,y)   (b) (0 ,y)   (c) (x,y)   (d)   (x,0)

13. Equation of a line passing through the origin is

(a) x+y = 1   (b) x = 2y - 4   (c) x+y =0 (d) y = x-1

14.   Which of the following is the equation of a line parallel to y-axis ?

(a) y=0   (b) x+y =z   (c) y= x   (d) x=a

15. If (2,0) is a solution of the linear equation 2x+3y = k , then the value of k is

(a) 4   (b) 6   (c) 5   (d) 2

16. If the points A (2,0), B (-6,0) and C (3, a-3) lie on the x axis, then the value of a is

(a) 0   (b) 2   (c)   3   (d) -6

17. Write the coordinates of the vertices of a rectangle whose length and breadth are 5 and 3 units respectively, one vertex is at the origin, the longer side lies on the x-axis, and one of the vertices lies in the third quadrant.

18. Without plotting the points indicate the quadrant in which they will lie, if

(i) the ordinate is 5 and abscissa is – 3

(ii) the abscissa is – 5 and ordinate is – 3

(iii) the abscissa is – 5 and ordinate is 3

(iv) the ordinate is 5 and abscissa is 3

19. The auto -rickshaw fare in a city is charged as ₹10 for the first kilometer and ₹4 per kilometer for subsequent distance covered. Write a linear equation to express the statement.

20. If the point (2k-3 , k+2) lies on the graph of the equation 2x+3y+15 =0 , find the value of k.

21.Show that the points (1,2) , (-1, -16) , (0 ,-7) lie on the graph of the linear equation y = 9x-7

27.Express the following linear equations in the form ax + by +c =0 and indicate the value of a , b and c
    (i)   x = 5y , (ii) 8x =7 , (iii) 4y =8/3 (iv) 3x +4y =5 (v) 2x +8 = 11y (vi) 3/5 x = 2y (vii) 3y =-18

28. The cost of a pen is three times the cost of a pencil .Write a linear equation in two variables to represent this statement . (take the cost of a pen to be ₹x and that of a pencil to be ₹y)

29. Find four solutions for the equation x -5y =10 .

30. If the point (4,3) lies on the linear equation 3x-ay =6 , find whether (-2,-6) also lies on the same line ?
    Find the coordinates of the point lies on above line (a) abscissa is zero (b) ordinate is zero

31. When a number is divided by another number the quotient and remainder obtained are 9 and 1 respectively. Express this information in linear equation (dividend be y and divisor be x)

CASE STUDY I

On his birthday, Manoj planned that this time he celebrates his birthday in a small orphanage centre. He bought apples to give to children and adults working there. Manoj donated 2 apples to each children and 3 apples to each adult working there along with Birthday cake. He distributed 60 total apples.

.

(a) How to represent the above situation in linear equations in two variables by taking the number of children as 'x' and the number of adults as 'y'?
   (i) $2x + y = 60$ (ii) $2x + 3y = 60$ (iii) $3x + 2y = 60$ (iv) $3x + y = 60$.

(b) If the number of children is 15, then find the number of adults? (i) 10   (iii) 15   (ii) 25   (iv) 20

c) If the number of adults is 12, then find the number of children? (i) 12   (iii) 15   (ii) 14   (iv) 18

(d) Find the value of b, if x = 5, y = 0 is a solution of the equation $3x + 5y = b$.
   (i) 12   (iii) 15   (ii) 14   (iv) 18

e) Which is the standard form of linear equations in two variables: $y - x = 5$?
   (i) $1.y - 1.x - 5 = 0$ (ii) $1.x - 1.y + 5 = 0$ (iii) $1.x + 0.y + 5 = 0$ (iv) $1.x - 1.y - 5 = 0$

CASE STUDY II
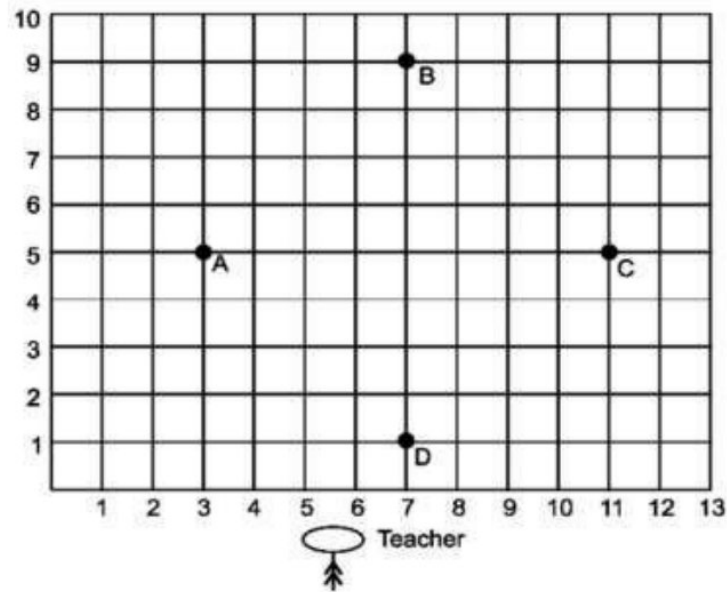
Students of a school are standing in rows and columns in their playground for a drill practice. A, B, C and D are the positions of four students as shown in the figure.

(a) What are the coordinates of A and B respectively?

(i) A(3, 5); B(7, 8)   (ii) A(5, 3); B(8, 7)   (iii) A(3, 5); B(7, 9)   (iv) A(5, 3); B(9, 7)

(b) What are the coordinates of C and D respectively?

(i) C(11, 5); D(7, 1)   (ii) C(5, 11); D(1, 7)   (iii) C(5, 11); D(7, 1)   (iv) C(5, 11); D(-1, 7)

(c) What is the distance between B and D?

(i) 5 units   (ii) 14 units   (iii) 8 units   (iv) 10 units

(d) What is the distance between A and C?

(i) 5 units   (ii) 14 units   (iii) 8 units   (iv) 10 units

(e) What are the coordinates of the point of intersection of AC and BD? (i) (7, 5)   (ii) (5, 7)   (iii) (7, 7)   (iv) (5, 5)

Q1. In ΔABC and ΔPQR, ∠A = ∠Q, ∠B = ∠R and AB = QR, then these triangles are congruent by_____congruence criterion.

    a) SAS   b) ASA   c) RHS   d) None of these

Q2. In ΔABC, BC = AB and ∠B = 100°. Then ∠A is equal to:

    a) 80° b) 40° c) 50° d) 100°

Q3. If E and F are the midpoints of equal sides AB and AC of a triangle ABC. Then:

    a) BF=AC   b) BF=AF   c) CE=AB   d) BF = CE

Q4. If PQR is an equilateral triangle, then each angle equals to: a) 90°   b)180°   c) 120°   d) 60°

Q5. In a right triangle, the longest side is:-

    a) Perpendicular   b) Hypotenuse c) Base   d) None of the above

Q6. If ΔABC ≅ ΔPQR then which of the following is not true?

    (a) BC = PQ   (b) AC = PR   (c) BC = QR   (d) AB = PQ

Q8. For two triangles, if two angles and the included side of one triangle are equal to two angles and the included side of another triangle. Then the congruency rule is:

    a) SSS   b) ASA   c) SAS   d) None of the above

Q9. A triangle in which three   sides are equal is called:

    a) Scalene triangle   b) Equilateral triangle   c) Isosceles triangle   d) None of the above

Q10. In two triangles DEF and PQR, if DE = QR, EF = PR and FD = PQ, then
    a) ΔDEF ≅ ΔPQR   b) ΔFED ≅ ΔPRQ   c) ΔEDF ≅ ΔRPQ
    d) ΔPQR ≅ ΔEFD

Q11. In ΔABC and ΔPQR, if ∠A = ∠Q, ∠B = ∠R and PR = AC, then two triangles are congruent by_____congruence criterion.

    a) SAS   b) ASA   c) AAS   d) None of these

Q12. ABC is an isosceles triangle such that AB = AC and AD ⊥ BC. Then, ∠BAD =
    (a) 55°   (b) 70°   (c) 35°   (d) 110°
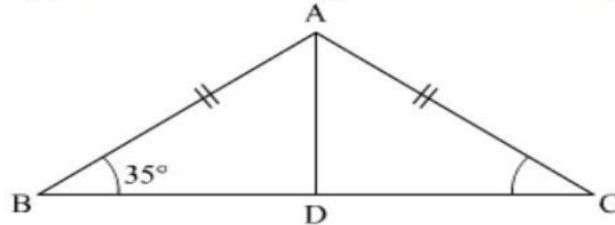
Q13. All the medians of a triangle are equal in case of a:

    a) Scalene triangle   b) Right angled triangle
    c) Equilateral triangle   d) Isosceles triangle

Q14. If ΔXYZ ≅ ΔPQR by SSS congruence rule, then write three equalities of corresponding angles.

Q15. In ΔPQR, ∠P = ∠R, QR = 4 cm and PR = 5 cm. Then PQ =
    (a) 5 cm   (b) 4 cm   (c) 9 cm   (d) none of these

Q16. Assertion : In the adjoining figure, X and Y are respectively two points on equal sides AB and AC of ΔABC such that AX = AY then CX = BY.
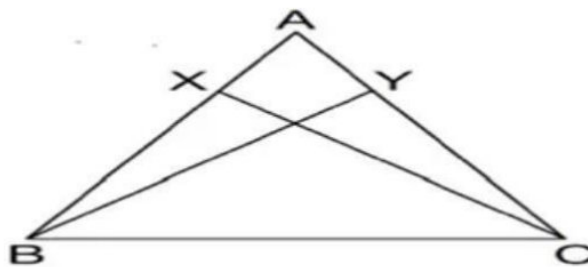
Reason: If two sides and the included angle of one triangle are equal to two sides and the included angle of the other triangle, then the two triangles are congruent

    a) both Assertion and reason are correct and reason is correct explanation for Assertion.

b) b) both Assertion and reason are correct but reason is not correct explanation for Assertion

c) c) Assertion is true but reason is false.

d) d) both Assertion and reason are false.

Q17. Assertion: Two angles measures a – 60° and 123º – 2a. If each one is opposite to equal sides of an isosceles triangle, then the value of a is 61°.
Reason: Sides opposite to equal angles of a triangle are equal.

   a) Both Assertion and reason are correct and reason is correct explanation for Assertion.
   b) Both Assertion and reason are correct but reason is not correct explanation for Assertion
   c) Assertion is true but reason is false.

   d) Both Assertion and reason are false.

Q18. Assertion: In ΔABC, BC = AB and B = 80°. Then, ∠A = 50°
Reason: In a triangle, angles opposite to two equal sides are equal

   a) Both Assertion and reason are correct and reason is correct explanation for Assertion.
   b) Both Assertion and reason are correct but reason is not correct explanation for Assertion
   c) Assertion is true but reason is false.

   d) Both Assertion and reason are false.

Q19. In the given figure, AD = BC and BD = AC, prove that ∠DAB = ∠CBA.
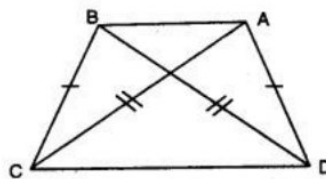
Q.20. In the given figure, if ∠1 = ∠2 and ∠3 = ∠4, then prove that BC = CD.
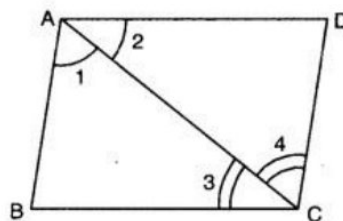
CASE STUDY 1 Mohan has a triangle field ABC. He divided the whole field into two triangular fields ABD and ACD. After measuring he found that BC = AB, $\angle EBC = 40^0$ and $\angle CAD = 30^0$. Again, he divided the whole field into two triangular fields ABE and CBE. His son is in Class

IX. So, he assumed $\angle ACD = x^0$ and $\angle ADB = y^0$. He prepared some questions based on his field and he asked his son to solve the questions:

Answer the following
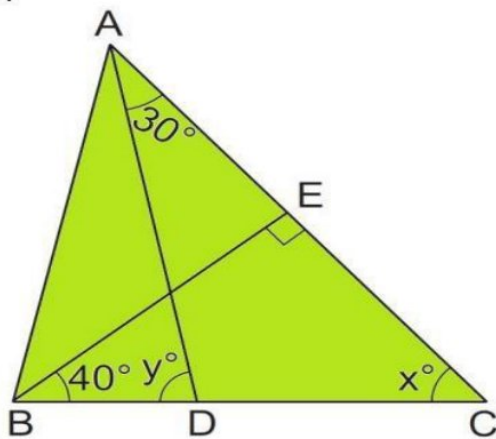
Answer the following questions:

1. Find the value of x.
    (a) 50°   (b) 60°   (c) 70°   (d) None of these

2. Find the value of y.

    (a) 90°   (b) 80°   (c) 70°   (d) None of these
    Find $\angle ADC$.
3.
    (a) 90°   (b) 110°   (c) 120°   (d) None of these
    Find $\angle BAD$.
4.
    (a) 30°   (b) 40°   (c) 20°   (d) None of these

CASE STUDY - 2

A triangular shaped agricultural field ABC is divided by the farmer in four parts . In two parts of his field he wants to grow sugarcane and other two parts he wants to grow wheat . He want to grow wheat on the field division which are exactly same in shape and size , the same he wants to do for growing sugarcane .
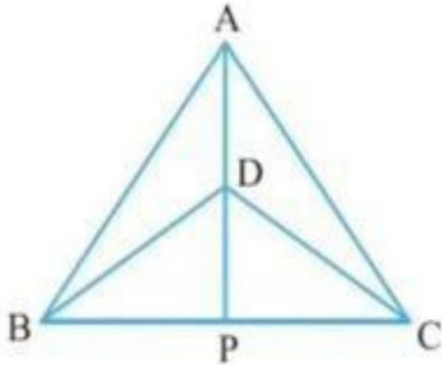
If $\triangle$ ABC and $\triangle$ DBC are two isosceles triangles on the same base BC and vertices A and D are on the same side of BC . AD is extended to intersect BC at P .

With reference to the figure given, answer the following questions:

(a) If he decides to grow wheat in $\triangle$ ABD , then which other triangle is of exact shape and size?

(i) $\triangle$ ABD $\cong$ $\triangle$ ABC   (ii) $\triangle$ ABD $\cong$ $\triangle$ DBP
(iii) $\triangle$ ABD $\cong$ $\triangle$ ACP   (iv) $\triangle$ ABD $\cong$ $\triangle$ ACD

(b) If he decides to grow sugarcane in $\triangle$ BDP , then which other triangle is of exact shape and size ?

(i) $\triangle$ BDP $\cong$ $\triangle$ ADC   (ii) $\triangle$ BDP $\cong$ $\triangle$ CDP
(iii) $\triangle$ BDP $\cong$ $\triangle$ ABC   (iv) $\triangle$ BDP $\cong$ $\triangle$ APC

(c) The combined field of wheat and sugarcane in $\triangle$ ABD and $\triangle$ BDP is exactly same in shape and size of which triangle?

(i) $\triangle$ ACP   (ii) $\triangle$ ABC   (iii) $\triangle DPC$ (iv) $\triangle BDC$

(d) The congruency in part (a) is established by which criteria of congruency?

(i) SSS   (ii) SAS   (iii) RHS   (iv) ASA

(e) The congruency in part (b) is established by which criteria of congruency?

(i) SSS   (ii) SAS   (iii) RHS   (iv) ASA

1. The perimeter of an equilateral triangle is 60m. Then the area is

   a) $10\sqrt{3}$ m²   b) $15\sqrt{3}$ m²   c) $20\sqrt{3}$ m²   d) $100\sqrt{3}$ m²

2. The length of each side of an equilateral triangle having area of $16\sqrt{3}$ cm² is

   a) 10 cm   b) 4 cm   c) 6 cm   d) 8 cm

3. Triangle with three sides a, b, c has semi perimeter, s = ---------- and area

   A = -------

   a) 3a, $\sqrt{3}/4\ a^2$ b) a+b+c, ½ bh

   c) $(a + b + c)/2$, $\sqrt{s(s-a)(s-b)(s-c)}.$ d) 3a, base x height

4. The area of an isosceles triangle having base 4cm and the lengths of one of the equal sides 5 cm is ?

   a) $4\sqrt{21}$ cm²   b) 84 cm²   c) 42 cm²   d) $2\sqrt{21}$ cm²

5. The perimeter of a triangle is 45 cm. If its sides are in the ratio 1 : 2 : 2, then its smallest side is

   a) 19 cm   b) 9 cm   c) 18 cm   d) 20 cm

6. **Q.** Assertion: The area of an equilateral triangle having side 4 cm is 3 cm².

   Reason: The area of an equilateral triangle having each side a is $\left(\frac{\sqrt{3}}{4}a^2\right)$ sq units.

   (a) Both Assertion and Reason are true and Reason is a correct explanation of Assertion.
   (b) Both Assertion and Reason are true but Reason is not a correct explanation of Assertion.
   (c) Assertion is true and Reason is false.
   (d) Assertion is false and Reason is true.

7. Assertion: The sides of a triangle are in the ratio of 25 : 14 : 12 and its perimeter is 510 m. Then the greatest side is 250 cm
Reason: Perimeter of a triangle = a + b +c, where a, b, c are sides of a triangle.
(a) Both Assertion and Reason are true and Reason is the correct explanation of 'Assertion'
(b) Both Assertion and Reason are true and Reason is not the correct explanation of 'Assertion'
(c) Assertion is true but Reason is false
(d) Assertion is false but Reason is true

8. The two sides of a triangle is 8 cm and 15 cm and perimeter is 40 cm. Find its area.

9. Find the length of each side of an equilateral triangle having area $9\sqrt{3}$ cm²

10. Find the area of a right triangle in which sides containing the right angle measures 20 cm and 15 cm ?

11. One side of an equilateral triangle is 4 cm. Find its area

12. Using Heron's formula, find the area of an equilateral triangle, the length of one side is 'a'

13. If the area of equilateral triangle is $16\sqrt{3}$ cm². Find its height

14. If the area of equilateral triangle is $64\sqrt{3}$ cm². Find its perimeter

15. The sides of a triangle are 12 cm, 13 cm and 15 cm. Find its area .

16. The perimeter of isosceles triangle is 30 cm and one of its equal side is 12 cm. Find its area

17. Find the area of an isosceles triangle, whose equal sides are of length 15 cm and the third side is 12 cm

18. Sides of triangle are in the ratio of 13 : 14 : 15 and its perimeter is 84 cm. Find the area of the triangle

19. The perimeter of a triangular park is 180 cm and its sides are in the ratio of 5:6:7 Find the area of the park

20. The base of triangular filed is 880m and its height is 550m. Find the area of the field. Also calculate the charges for supplying water to the field at the

rate of Rs. 25 per square meter

21. The perimeter of an isosceles triangle is 32cm. The ratio of the equal side and its base is 3:2. Find the area of the triangle

22. A floral design on a floor is made up of 18 tiles which are triangular, the sides of triangle being 14cm, 13cm & 15cm. Find the cost of polishing the tiles at the rate of 50 paisa per cm²

23. The sides of triangular field are 41m, 40m & 9m. Find the number of rose beds that can be prepared in the field, if each rose bed on an average needs 900cm² space.

*****

STATISTICS

1) Draw a histogram and frequency polygon for the data on marks obtained by 74 students in an examination given in the table below.

Marks	No. Of Students
0 – 10	8
10 – 20	32
20 – 30	18
30 – 40	10
40 – 50	6

2) Represent the following data by means of a frequency polygon.

Marks	Frequency
41 – 44	4
45 – 48	10
49 – 52	15
53 – 56	18
57 – 60	20
61 – 64	12
65 – 68	13

3) In a city following weekly instructions are made a study on cost of living index .Draw a histogram and the frequency polygon for the data.

Cost of living index	Number of weeks
120 - 130	8
130 - 140	12
140 - 150	4
160 - 170	16
170 - 180	4

4) The marks obtained (out of 100) by a class of 80 students are given below :

Construct a histogram to represent the data given:

MARKS	NUMBER OF STUDENTS
10 - 20	6
20 - 30	17
30 - 50	15
50 - 70	16
70 - 100	26

5) Find the range of the following data: 25, 18, 20, 22, 16, 6, 17, 15, 12, 30, 32, 10, 19, 8, 11, 20.

a. 10

b. 15

c. 18

d. 26

6) What is the class mark of the class interval 90-120?

a. 90

b. 105

c. 115

d. 120

7) In the class intervals 10-20, 20-30, the number 20 is included in which interval?

a. 10-20

b. 20-30

c. Both the intervals

d. None of the intervals

8) Find the class width for the grouped frequency distribution of the class intervals 1-20, 21-40, 41-60, ..

a. 19

b. 15

c. 17

d. 20

9) The difference between the maximum and minimum values of the given observation is called

a. Class

b. Class interval

c. Classmark

d. Range

10) In a frequency distribution, the mid value of a class is 10 and the width of the class is 6. The upper limit of the class is:
(a) 6
(b) 7
(c) 10
(d) 13

11) The width of each of five continuous classes in a frequency distribution is 5 and the lower class-limit of the lowest class is 10. The lower class-limit of the highest class is:
(a) 15
(b) 30
(c) 35
(d) 40

12) To draw a histogram to represent the following frequency distribution:

Class interval	5–10	10–15	15–25	25–45	45–75
Frequency	6	12	10	8	15

the adjusted frequency for the class 25-45 is:

(a) 6

(b) 5

(c) 3

(d) 2

13) The Class mark of a frequency distribution are as given below:-

$$38,43,48,53,58$$

The Class corresponding to the Class mark 43 is

A] 38-48

B] 38.5- 48.5

C] 35.5 – 45.5

D] 40.5 – 45.5

14) In a Bar graph , the widths of the bar :-

A] Have no significance

B] Are proportional to the corresponding heights

C] Are proportional to the corresponding frequency

D] Are proportional to the space between two consecutive bars

15) In a frequency distribution, the mid value of a class is 60.5 and the width of the class is 10. The upper limit of the class is:

A] 55.5

B] 65.5

C] 56.5

D] 62.5

16] In a histogram , which of the following is proportional to the frequency of corresponding class:- A] Length of the rectangle

B] Width of the rectangle

C] Area of the rectangle

D] Perimeter of the rectangle

17) **Assertion: Range = Maximum value – Minimum value**

Reason: The range of the first 6 multiples of 6 is 9.

a) both Assertion and reason are correct and reason is correct explanation for Assertion

b) both Assertion and reason are correct but reason is not correct explanation for Assertion

c) Assertion is correct but reason is false

d) both Assertions and reason are false

18) **Assertion: the class mark of the class interval 90-120 is 105**

Reason: Class mark = (upper limit + lower limit)/2

a) both Assertion and reason are correct and reason is correct explanation for Assertion

b) both Assertion and reason are correct but reason is not correct explanation for Assertion

c) Assertion is correct but reason is false

d) both Assertions and reason are false

19) **Assertion: the class intervals 10-20, 20-30, 20 is included in which interval**

Reason: the number is always included in the lower limit of the class interval.

a) both Assertion and reason are correct and reason is correct explanation for Assertion

b) both Assertion and reason are correct but reason is not correct explanation for Assertion

c) Assertion is correct but reason is false

d) both Assertions and reason are false

Ans: a) both Assertion and reason are correct but reason is correct explanation for assertion

20) Assertion: the class width for the grouped frequency distribution of the class intervals 1-20, 21-40, 41-60, .. is 20 Reason: Class width is the same as the class size

a) both Assertion and reason are correct and reason is correct explanation for Assertion

b) both Assertion and reason are correct but reason is not correct explanation for Assertion

c) Assertion is correct but reason is false

d) both Assertions and reason are false

CASE STUDY QUESTIONS

Q.1) Anil is a Mathematics teacher in Hyderabad. After Periodic test 3, he asks students to collect the Mathematics marks of all the students of Class IXA, B and C. A student is able to collect marks from some students. Rekha scored least mark 6 in the class and Ram scored highest marks 59 in the class. He prepares the frequency distribution table using the collected marks and draws Histogram using the table as shown in adjoining figure.
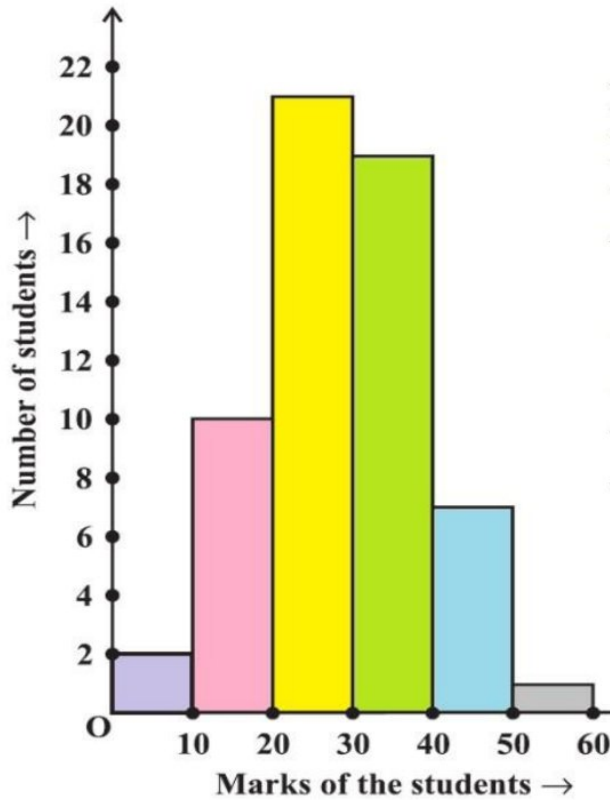
a) What is the width of the class?

(i) 10   (ii) 15   (iii) 5   (iv) none of these

b) What is the total number of students in Histogram?

(i) 50   (ii) 60   (iii) 65   (iv) none of these

c) How many students scored 50% and above marks?

 (i) 19   (ii) 26   (iii) 27   (iv) none of these

d) How many students scored less than 50% marks?

 (i) 19   (ii) 26   (iii) 27   (iv) 33

e) What is the range of the collected marks?

(i) 60 (ii) 59 (iii) 53 (iv) none of these

Q.2) A group of students decided to make a project on Statistics. They are collecting the heights (in cm) of their 51 girls of Class IX-A, B and C of their school. After collecting the data, they arranged the data in the following frequency distribution table form:

Height (in cm)	Number of girls
135 – 140	4
140 – 145	7
145 – 150	18
150 – 155	11
155 – 160	6
160 – 165	5

Based on the information, answer the following questions :

(a) The class interval with highest frequency is :

 (i) 145-150   (ii) 150-155   (iii) 140-145   (iv) 155-160

(b) What is the width of the class?

(i) 10   (ii) 15   (iii) 5   (iv) none of these

(c) How many students of the height 150 cm and below are there?

(i) 40   (ii) 29   (iii) 18   (iv) 22

(d) How many students of the height 145 cm and above are there?

(i) 40   (ii) 29   (iii) 18   (iv) 22

(e) How many students of the height more than 145 cm but less than 155 are there?

 (i) 40   (ii) 29   (iii) 18   (iv) 22

INTERNATIONAL INDIAN SCHOOL DAMMAM

MATHEMATICS WORKSHEET (2023 – 2024)
GRADE IX

LINES AND ANGLES

1. If two lines intersect each other, then the vertically opposite angles are:

   a. Equal   b. Unequal   c. Cannot be determined   d. None of the above

2. Two straight lines AB and CD cut each other at O. If ∠BOD = 63°, then ∠BOC =
   a) 63°   b) 117°   c) 17°   d) 153°

3. If AB ‖ CD, EF ⊥ CD and ∠GED = 135° as per the figure given below. Find ∠AGE and ∠GEF
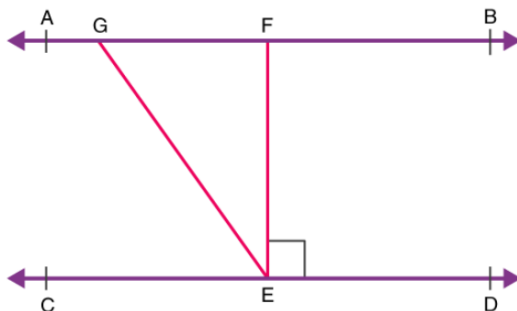
4. In the given figure, the value of *y* is
   a) 20°   b) 30°   c) 45°   d) 60°
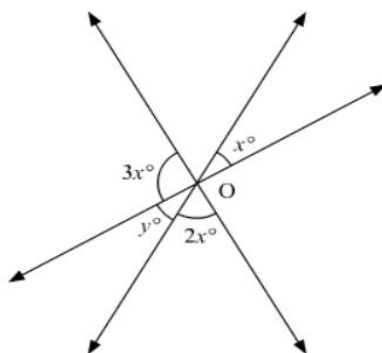
5. If one of the angles of a triangle is 130°, then the angle between the bisectors of the other two angles can be

   a) 50°   (b) 65°   c) 145°   d) 155°

6. One angle is equal to three times its supplement. The measure of the angle is
   a) 130°   b) 135°   c) 90°   d) 120°

7. If one angle of a triangle is equal to the sum of the other two angles, then the triangle is

   a) a right triangle   b) an isosceles triangle   c) an equilateral triangle
   d) an obtuse triangle

8. In the given figure, POQ is a line. The value of x is
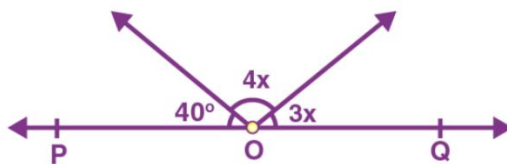
9. In the given figure, , if AB || CD || EF, PQ || RS, ∠RQD = 25° and ∠CQP = 60°, then ∠QRS is equal to
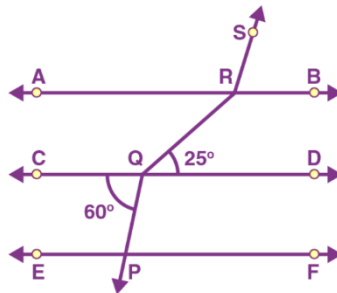
   a) 85°   b) 110°   c) 135°   d) 145°

10. In the given figure, if *l* || *m*, what is the value of *x*?
    a) 60⁰   b) 50⁰   c) 45⁰   d) 30⁰
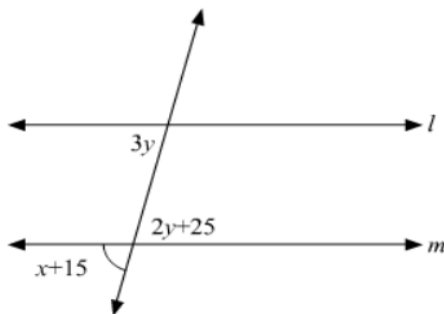
11. In the given figure, if $CP \parallel DQ$, then the measure of x is

    a) 130°   b) 105° c) 175°   d) 125°
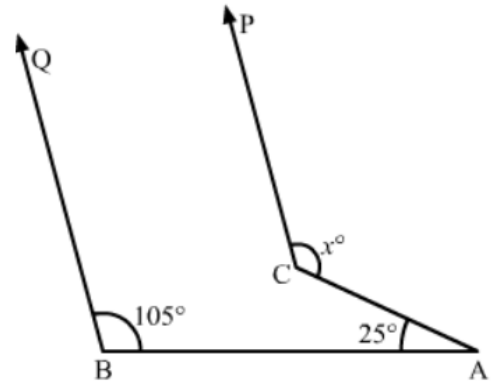
In the following questions 12 ,13 and 14, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

12. **Assertion**: In the given figure, if ACB is a straight line, then $\angle ACD = 72°$.
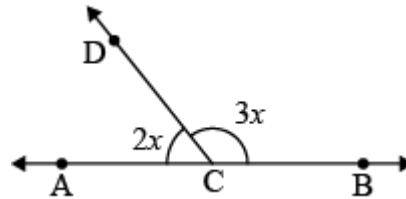
Reason: If a ray stands on a line, the sum of two adjacent angles formed is 180°.

13. **Assertion**: In the given figure, lines AB and CD intersect at O. If $\angle AOC = 40°$, then $\angle BOC = 140°$.
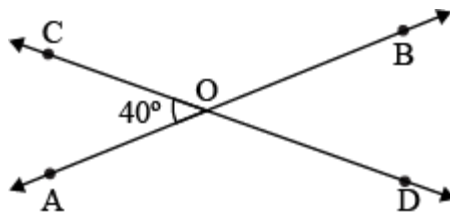
Reason: If two lines intersect, then vertically opposite angles are equal.

14. **Assertion**: If angles 'a ' and 'b' form a linear pair and $a = 40^0$, then $b = 150^0$
  Reason: Sum of linear pair of angles is always 180^0.

15. Determine the value of x in the given figure if ABIICDIIEF

i.
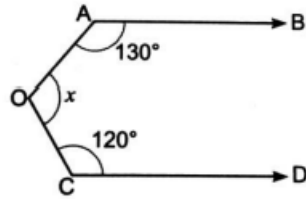
ii.
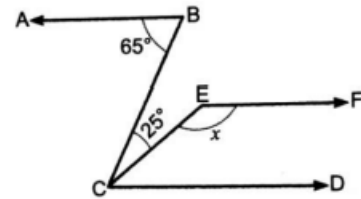
16. The sum of two vertically opposite angles is 166^0. Find each of the angles.

17. In the figure, AB $\parallel$ CD, $\angle AFC=68^0$ and $\angle FED=42^0$. Find $\angle EFD$
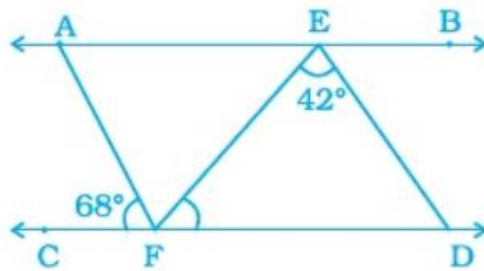
18. In the figure, QP $\parallel$ RS. Find a and b.
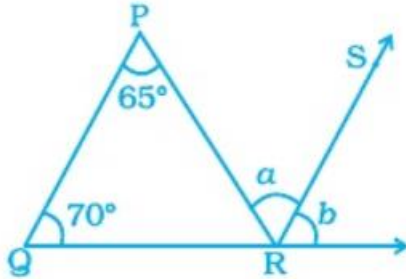
19. Lines AB and CD are intersected by the transversal PQ such that the bisectors of $\angle APQ$ and $\angle DPQ$ are parallel. Prove that AB $\parallel$ CD.
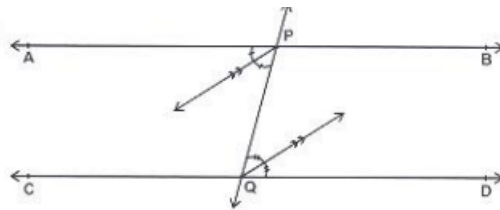
20. Case study question

There were two parallel roads AM and XY in New Delhi. Due to increasing pollution, MCD planned to plant trees on these roads. On the road AM, pine trees were planted by one company. While on the road XY mango trees were planted by another company.
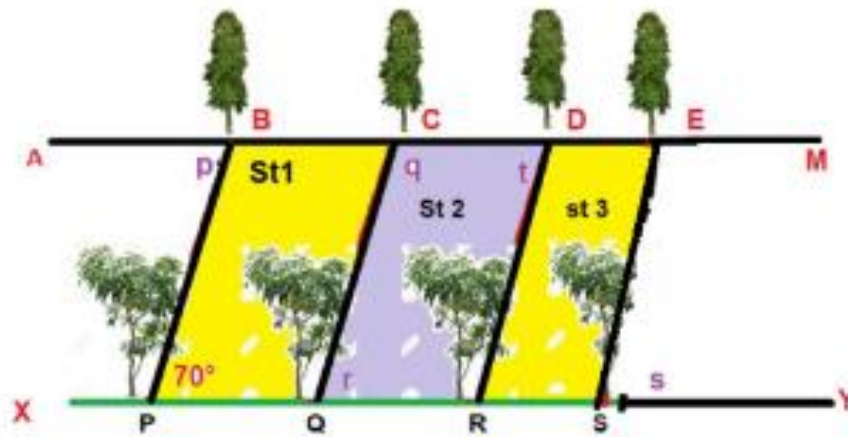
Between these roads three streets St 1, St 2 and St 3 were situated.
During the survey, ∠BPQ was measured to be 70° and other angles p, q, r, s and t were also measured.
1. What is the measure of ∠p?
2. What is the measure of ∠q?
3. What is value of {4p -(q+r)-(r-s)}?

QUADRILATERALS

1. In a ΔABC, P,Q,R, are the midpoints of the sides BC, CA and AB respectively. If AC = 21cm, BC= 29cm, AB=30cm.Find the perimeter of quadrilateral ARPQ.
   a)20 cm.   b) 52cm   c) 51cm   d) 80cm

2. The diagonal of a rectangle is inclined to one side of the rectangle at 25° .The acute angle between the diagonals is
   a)55°   b) 50°   c) 40°   d) none of these

3. ABCD is rhombus such that $\angle ACB = 40°$ then $\angle ADB$ is
   a)40°   b) 45°   c) 50°   d) 60°

4. In the given figure, ABCD is a parallelogram. Find the value of x.
   a) 25°   b) 60°   c)75°   d) 75°
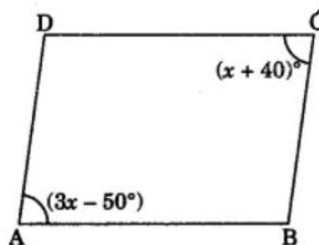
5. In the given figure, ABCD is a rectangle in which $\angle APB = 100°$. The value of x is

   a) 40°   b) 50°   c) 60°   d) 70°
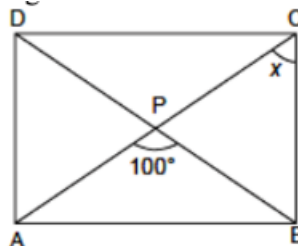
6. In the following question , a statement of assertion (A) is followed by a statement of Reason (R).
   Assertion (A): The quadrilateral formed by joining the midpoints of consecutive sides of a quadrilateral whose diagonals are perpendicular is a rectangle.
   Reason (R): In a triangle, the line segment joining the midpoints of any two sides of the triangle is parallel to its third side and is also half of the third side . Also the quadrilateral formed by joining the midpoints of consecutive sides of a quadrilateral is a parallelogram.
   Choose the correct answer out of the following choices.
   (a) Both A and R are true and R is the correct explanation of A.
   (b) Both A and R are true but R is not the correct explanation of A.
   (c) A is true but R is false.
   (d) A is false but R is true.

7. In quadrilateral ABCD, BN and DM are drawn perpendicular to AC. Such that BN = DM. Prove that O is mid-point of BD.
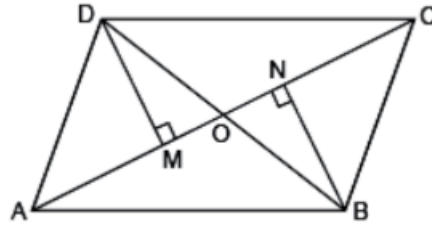
8. In the given figure, ABCD is a parallelogram and line segments AX and CY bisect the angles A and C respectively. Show that AX || CY.
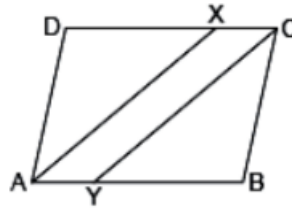
9. Show that the diagonals of a square are equal and bisect each other at right angles.
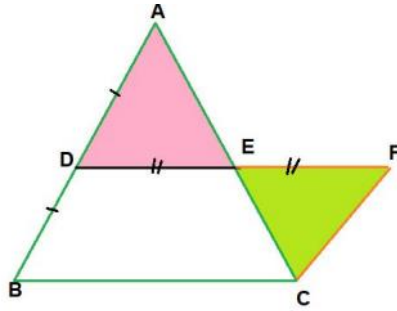10. In the given figure, PQRS is a parallelogram and X and Y are the points on the diagonal QS such that SX = QY. Prove that PYRX is a parallelogram.
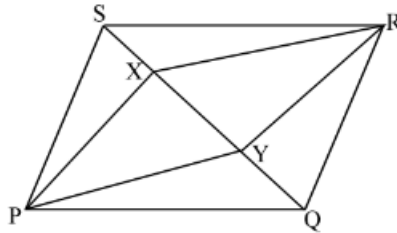
11. ABC is a triangle right angled at B and D is the mid-point of AC. DE is drawn perpendicular to BC. Prove that BD =½ AC
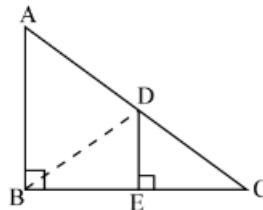
12. Case study question
    Dev and Alvin were trying to prove a theorem. For this they did the following;

They drew a triangle ABC, D and E are found as the mid points of AB and AC .DE was joined and DE was extended to F so DE = EF. Then FC was joined.

Now answer the following questions:

i.   Are ΔADE and ΔEFC congruent? If so by which criteria?
ii.   Prove that CF is parallel to BD
iii.   Prove that BC is parallel to DE

INTERNATIONAL INDIAN SCHOOL DAMMAM
MATHEMATICS WORKSHEET (2023 – 2024)
### GRADE: IX   CIRCLES

1. Given a chord AB of length 5 cm, of a circle with centre O. OL is perpendicular to chord AB and OL = 4 cm. OM is perpendicular to chord CD such that OM = 4 cm. Then CM is equal to
   (a) 4 cm (b) 5 cm (c) 2.5 cm (d) 3 cm

2. A chord of a circle is equal to the radius of the circle. Then the angle subtended by the chord at a point on the major arc is
   (a) 90° (b) 30° (c) 150° (d) 60°

3. In the given figure, the value of ∠OPR is
   (a) 65° (b) 10° (c) 20° (d) 50°
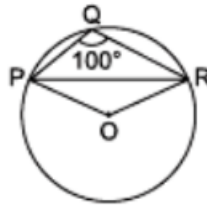
4. If O is the centre of a circle, find the value of x in the following figures:
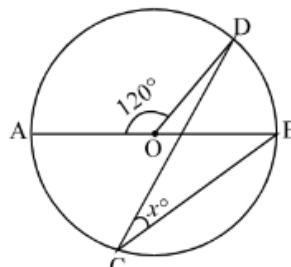
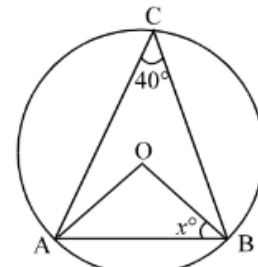(i)   (ii)   (iii)

(iv)   (v)   (vi)

1
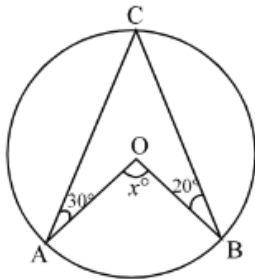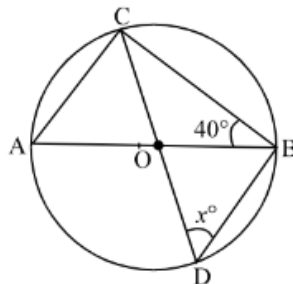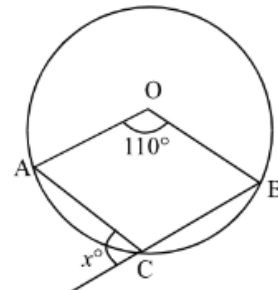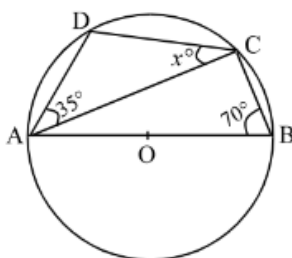
In the following questions 5 and 6, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

5. **Assertion (A):** In the given figure,
   O is the centre of circle. If ∠AOC = 140°, then ∠ABC =110°.
   Reason (R): In cyclic quadrilateral, opposite angles are supplementary.
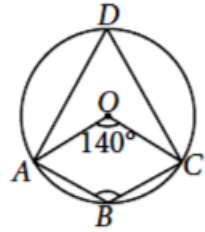
6. **Assertion (A):** In the given figure, ∠BAO = 30° and ∠BCO = 40°. Then the measure of ∠AOC= 70°.
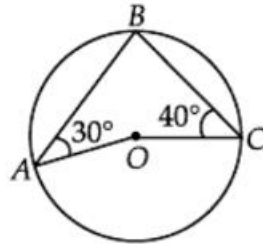
   Reason (R): Angle subtended by an arc of a circle at the centre of the circle is twice the angle subtended by that arc on the remaining part of the circle.

7. In a circle of radius 5 cm having centre O, OL is drawn perpendicular to the chord AB. If OL = 3cm, find the length of AB.

8. In the given figure, chord AB subtends AOB equal to 60° at the centre O of the circle. If OA =5cm. then find the length of AB.
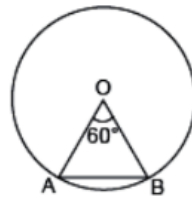
9.   In the given figure, AB is a diameter of a circle with centre O and chord CD = radius OC. If AC and BD when produced meet at P, prove that ∠APB = 60°.
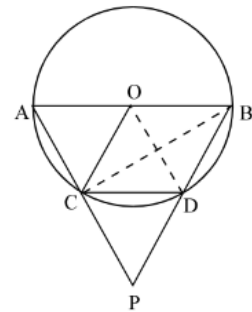
10. In the given figure, AB is diameter of the circle with centre O and CD ‖ AB. If DAB = 25°, then find the measure of CAD.

2
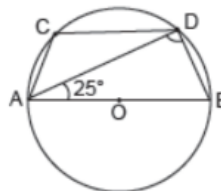
11. Prove that the quadrilateral formed (if possible) by the internal angle bisectors of any quadrilateral is cyclic.

12. In Fig, ABCD is a cyclic quadrilateral in which AC and BD are its diagonals. If ∠ DBC = 55° and ∠BAC = 45°, find ∠ BCD.

13 Three girls Reshma, Salma and Mandip are playing a game by standing on a circle of radius 5m drawn in a park. Reshma throws a ball to Salma, Salma to Mandip, Mandip to Reshma. The distance between Reshma and Salma and between Salma and Mandip is 6m each. In the given below figure Reshma's position is denoted by R, Salma's position is denoted by S and Mandip's position is denoted by M.
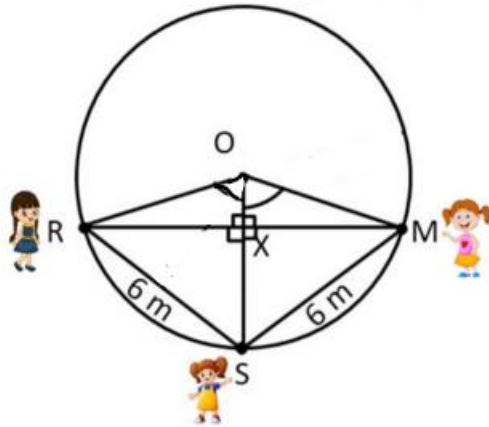
(i) Find the area of triangle ORS.
(ii) What is the distance between Reshma and Mandip?

14. Four Friends Rima, Mohan, Sohan and Sita are sitting on the circumference of a circular park full of water. Their locations are marked by points A, P, Q and R such that the APQR is a quadrilateral with greenery.
Rohit joins them and sits at the centre of the circular park, so he is equidistant from all the other friends. His position is marked as O. They are sitting in such a way that ∠PQR = 110°.
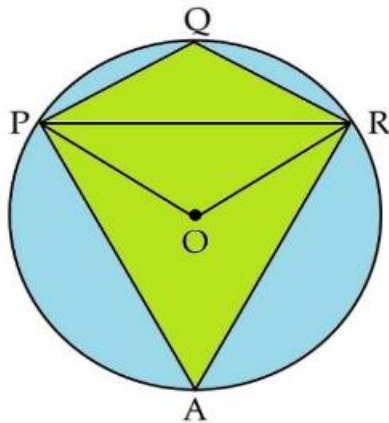
(i) What is measure of reflex ∠POR?
(ii) What is the measure of ∠PAR?

(ii) Find ∠OPR

SURFACE AREAS AND VOLUMES

1. Total surface area of a hemisphere is 4158 cm², the diameter of the hemisphere is equal to _____ cm. (Take $\pi = 22/7$)
   a) 40 cm   b) 20 cm   c) 21 cm   d) 42 cm

2. If the surface area of a sphere of radius "R" is equal to the curved surface area of a hemisphere of radius "r", what is the ratio of R/r?
   a) ½   b) $1/\sqrt{2}$ c) 2   d) $\sqrt{2}$

3. If a right circular cone has radius 4 cm and slant height 5 cm then what is its volume?
   (a) $16\,\pi$ cm³   (b) $14\,\pi$ cm³   (c) $12\,\pi$ cm³   (d) $18\,\pi$ cm³

4. If the radius and height of a right circular cone are 'r ' and 'h ' respectively, the slant height of the cone is
   a) $(h^2 + r^2)^{1/3}$ b) $(h + r)^{1/3}$ c) $(h^2 + r^2)^{½}$ d) none of these

5. The diameter of the moon is approximately one-fourth of the diameter of the earth. What fraction of the volume of the earth is the volume of the moon?

   a. $\dfrac{1}{64}$ b. $\dfrac{1}{32}$ c. $\dfrac{1}{48}$ d $\dfrac{1}{16}$

6. Two right circular cones of equal curved surface areas have slant heights in the ratio of 3 : 5. Find the ratio of their radii.
   (a) 4 : 1   (b) 3 : 5   (c) 5 : 3   (d) 4 : 5

7. The radius of a hemispherical balloon increases from 6 cm to 12 cm as air is being pumped into it. The ratios of the surface areas of the balloon in the two cases is
   a) 1 : 4   b) 1 : 3   c) 2 : 3   d) 2 : 1

8. **Assertion:** If a ball in the shape of a sphere has a surface area of 221.76cm² then it's diameter is 8.4 cm
   Reason: If the radius of the sphere be r then the surface area, $S=4\pi r^2$
   a) both Assertion and reason are correct and reason is correct explanation for Assertion
   b) both Assertion and reason are correct but reason is not correct explanation for Assertion
   c) Assertion is correct but reason is false
   d) both Assertions and reason are false

9. How many square metres of canvas is required for a conical tent whose height is3.5 m and the radius of the base is 12 m?

10. The diameters of two cones are equal. If their slant heights are in the ratio 7 : 4, find the ratio of their curved surface areas.

11. If the radius of the sphere is doubled, find the ratio of volume of the new sphere to the original sphere.

12. If the curved surface area of a solid hemisphere is 2772 cm² , find its total surface area.

13. The curved surface area of a cone of radius 6 cm is 188.4 cm². Find its height.

14. A hemi-spherical bowl is made of steel 0.5 cm thick. The inside radius of the bowl is 4 cm. Find the volume of the steel used in making it.

15. A right triangle with sides 6 cm, 8 cm and 10 cm is revolved about the side 8 cm.Find the volume and the curved surface of the solid so formed.

16. A semi-circular sheet of metal of diameter 28 cm is bent to form an open conical cup. Find the capacity of the cup.

17. Find the capacity in litres of a conical vessel whose diameter is 14 cm and slant height is 25 cm.

18. .A dome of a building is in the form of a hemisphere. From inside, it was whitewashed at the cost of ₹498.96. If the rate of whitewashing is ₹4 per square metre, find the
    (i) inside surface area of the dome
    (ii) volume of the air inside the dome.

19. A spherical ball of lead, 3 cm in diameter is melted and recast into three spherical balls. If the diameters of the small balls are 1.5 cm, 2 cm and p cm, find
    (i) Volume of the ball before melting.
    (ii) Volume of the each spherical ball after melting.
    (iii) Find the value of p

20. Case study question

    Peter has a piece of canvas whose area is 551 m². He uses it to make a conical tent made, with a base radius of 7 m. Assuming that all the stitching margins and the wastage incurred while cutting, amounts to approximately 1m² ,
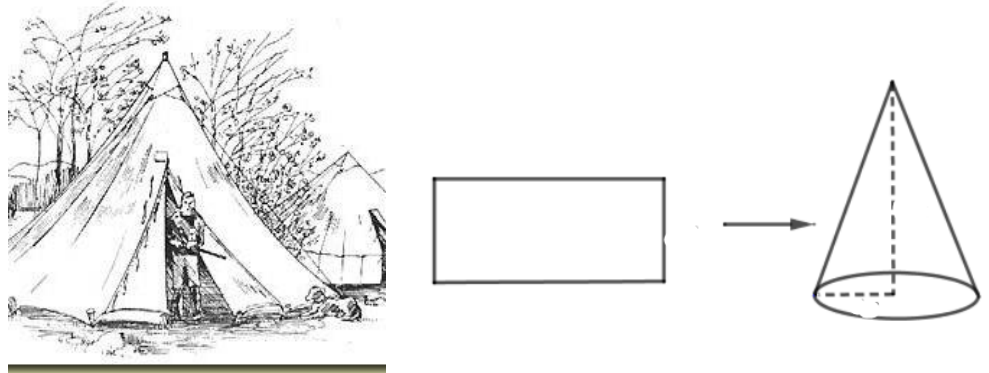
    (i)   Find the slant height of the conical tent so formed.
    (ii)   Find the height of the conical tent so formed.
    (iii)   Find the volume of the conical tent?