ANNUAL EXAMINATION

MATHS M2 .

Class 09 - Mathematics

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E.
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

Section A

1. Two rational numbers between $\frac{2}{3}$ and $\frac{5}{3}$are **[1]**

   a) $\frac{1}{6}$ and $\frac{2}{6}$ b) $\frac{5}{6}$ and $\frac{7}{6}$

   c) $\frac{2}{3}$ and $\frac{4}{3}$ d) $\frac{1}{2}$ and $\frac{2}{1}$

2. The simplest form of $0.5\overline{7}$ is **[1]**

   a) $\frac{26}{45}$ b) $\frac{57}{99}$

   c) $\frac{57}{100}$ d) none of these

3. If a = 2, b = 3, then the value of $\left(a^b + b^a\right)^{-1}$ is **[1]**

   a) $\frac{1}{15}$ b) $\frac{1}{18}$

   c) $\frac{1}{17}$ d) $\frac{1}{16}$

4. If $\frac{x}{y} + \frac{y}{x} = -1$ (x, y $\neq$ 0), the value of x^3 - y^3 is **[1]**

   a) -1 b) 2

   c) 1 d) 0

5. The maximum number of terms in a polynomial of degree 10 is **[1]**

   a) 11 b) 12

   c) 10 d) 9

6. If (4, 19) is a solution of the equation y = ax + 3, then a = **[1]**

   a) 4 b) 6

c) 3 d) 5

7. The points A(-2, 3), B(-2, -4) and C(5, -4) are the vertices of the square ABCD, then the co-ordinates of the vertex D are: **[1]**

a) (5, 3) b) (3, 3)

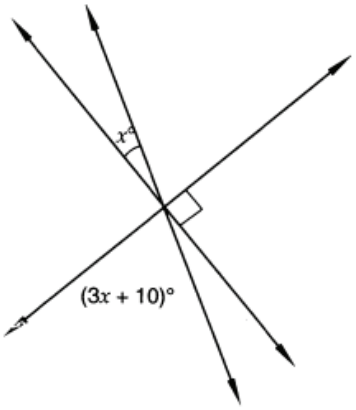
c) (0, 0) d) (3, -4)

8. John is of the same age as Mohan. Ram is also of the same age as Mohan. State the Euclid's axiom that illustrates the relative ages of John and Ram. **[1]**

a) Second Axiom b) Fourth Axiom

c) First Axiom d) Third Axiom

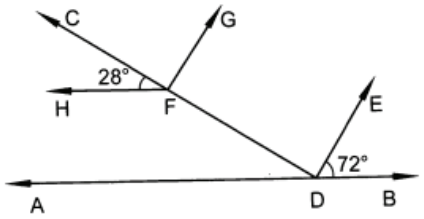
9. In Fig., the value of x, is **[1]**



a) 8° b) 20°

c) 15° d) 12°

10. In Fig. if AB|| HF and DE || FG, then the measure of $\angle FDE$ is **[1]**



a) 90° b) 80°

c) 100° d) 108°

11. PQR is a right-angled triangle in which $\angle P = 90^o$ and PQ = PR. What is the value of $\angle Q$ and $\angle R$ **[1]**

a) $45^o, 45^o$ b) $30^o, 60^o$

c) $40^o, 50^o$ d) $20^o, 60^o$

12. Rhombus is a quadrilateral **[1]**

a) in which diagonals are equal b) in which diagonals bisect opposite angles

c) in which diagonals are inclines at an angle of 60° d) in which diagonals are inclines at an angle of 120.

13. Angles of a quadrilateral are in the ratio 3 : 4 : 4 : 7. Find all the angles of the quadrilateral. **[1]**

a) b)

$60^o, 80^o, 100^o, 90^o$

$60^o, 120^o, 80^o, 140^o$

c) $60^o, 80^o, 80^o, 140^o$

d) $70^o, 70^o, 100^o, 100^o$

14. The chord of a circle is equal to its radius. The angle subtended by this chord at the minor arc of the circle, is **[1]**

a) 150^o

b) 120^o

c) 75^o

d) 60^o

15. The base of an isosceles triangle is 16 cm and its area is 48 cm^2. The perimeter of the triangle is **[1]**

a) 48 cm

b) 324 cm

c) 41 cm

d) 36 cm

16. The sides of a triangle are 11 m, 60 m and 61 m. The altitude to the smallest side is **[1]**

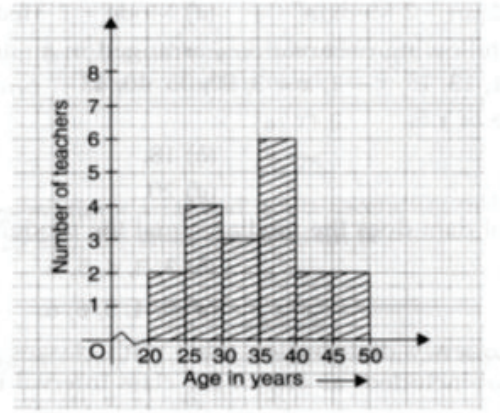
a) 60 m

b) 66 m

c) 11 m

d) 50 m

17. The graph given below shows the frequency distribution of the age of 22 teachers in a school. The number of teachers whose age is less than 40 years is **[1]**



a) 17

b) 16

c) 15

d) 14

18. In a histogram the area of each rectangle is proportional to **[1]**

a) the class size of the corresponding class interval

b) cumulative frequency of the corresponding class interval

c) the class mark of the corresponding class interval

d) frequency of the corresponding class interval

19. **Assertion (A):** A shot put is a metallic sphere of radius 4 cm. If the density of the metal is 10 g per cm^3. then the mass of the shot put is 2 kg. **[1]**

Reason (R): Volume of sphere of radius r is $\frac{4}{3}\pi r^3$.

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.

20. **Assertion (A):** The sum of either pair of opposite angles of a cyclic quadrilateral is 180^o. **[1]**

Reason (R): Two or more circles are called concentric circles if and only if they have different centre and radii.

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.

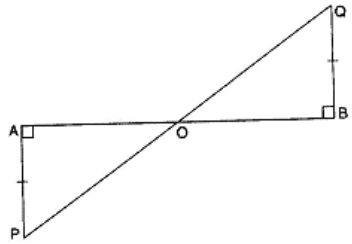
SECTION B

21. The surface area of a sphere is 346.5 cm^2. Find its radius and hence its volume. **[2]**

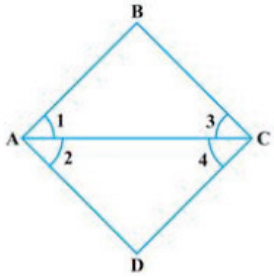
OR

The radius of a spherical balloon increases from 7 cm to 14 cm as air is being pumped into it. Find the ratio of surface areas of the balloon in the two cases.

22. In figure, AP and BQ are perpendicular to the line segment AB and AP = BQ. Prove that O is the mid-point of line segments AB and PQ. **[2]**



23. In the given figure, we have $\angle 1 = \angle 3$ and $\angle 2 = \angle 4$. Show that $\angle A = \angle C$. **[2]**



24. Solve the following equation for x: (5x + 1)(x + 3) - 8 = 5(x + 1)(x + 2) **[2]**

25. Classify the number $\sqrt{225}$ as rational or irrational. **[2]**

SECTION C

26. Factorise: $9y^2 - 66yz + 121z^2$ **[3]**

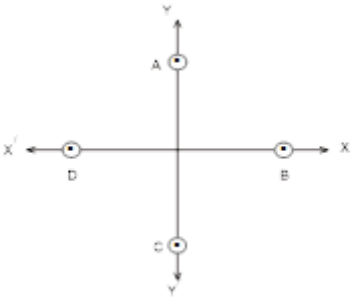
OR

If x = 2 is a root of the polynomial f (x) = $2x^2$ - 3x + 7a, find the value of a.

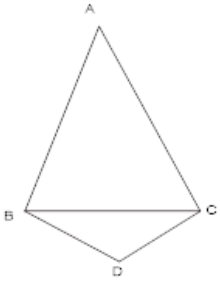
27. Find at least 3 solutions for the following linear equation in two variables: **[3]**

2x + 3y = 4

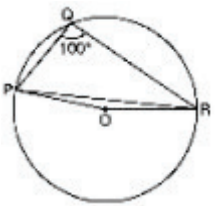
28. In fig. write the Co-ordinates of the points and if we join the points write the name of fig. formed. Also write Co-ordinate of intersection point of AC and BD. **[3]**



29. In the given figure, ABC and DBC are two triangles on the same base BC such that AB = AC and DB = DC. Prove that $\angle ABD = \angle ACD$, **[3]**



30. In figure, $\angle \mathrm{PQR} = 100^\circ$, where P, Q and R are points on a circle with centre O. Find $\angle OPR$ **[3]**



OR

It is given that $\angle$XYZ = 64^0 and XY is produced to point P. Draw a figure from the given information. If ray YQ bisects $\angle$ZYP, find $\angle$XYQ and reflex $\angle$QYP.

31. The sides of a triangular field are 41m, 40m and 9m. Find the number of rose beds that can be prepared in the field, if each rose bed on an average needs 900 cm^2 space. **[3]**

SECTION D

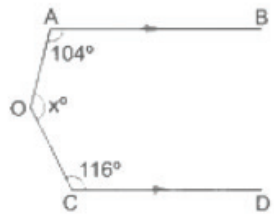
32. If $a = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ and $b = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, find the value of $a^2 + b^2 - 5ab$. **[5]**

OR

If x is a positive real number and exponents are rational numbers, simplify $\left(\frac{x^b}{x^c}\right)^{b+c-a} \cdot \left(\frac{x^c}{x^a}\right)^{c+a-b} \cdot \left(\frac{x^a}{x^b}\right)^{a+b-c}$.

33. What must be added to $x^3 - 3x^2 - 12x + 19$ so that the result is exactly divisible by $x^2 + x - 6$ **[5]**

34. In the given figure, AB || CD and $\angle AOC = x^\circ$. If $\angle OAB = 104^\circ$ and $\angle OCD = 116^\circ$, find the value of x. **[5]**



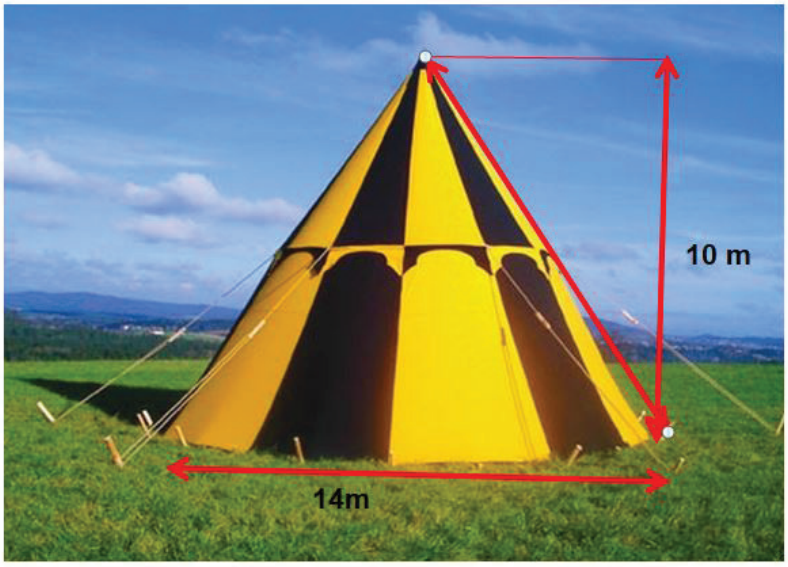
35. Give the geometric representation of 2x + 9 = 0 as an equation in two variables. **[5]**

SECTION E-CASE BASED QUESTIONS

36. **Read the passage given below and answer any four questions:** **[4]**

Once four friends Rahul, Arun, Ajay and Vijay went for a picnic at a hill station. Due to peak season, they did not get a proper hotel in the city. The weather was fine so they decided to make a conical tent at a park. They were carrying 300 m² cloth with them. As shown in the figure they made the tent with height 10 m and diameter

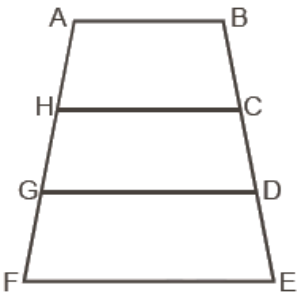
14 m. The remaining cloth was used for the floor.



1. How much Cloth was used for the floor?
2. What was the volume of the tent?
3. What was the area of the floor?
4. What was the total surface area of the tent?
5. What was the latent height of the tent?

37. **Read the Source/Text given below and answer any four questions:** **[4]**

Sohan wants to show gratitude towards his teacher by giving her a card made by him. He has three pieces of trapezium pasted one above the other as shown in fig. These pieces are arranged in a way that AB || HC || GD || FE. Also BC=CD=DE and AH=HG=GF=6 cm. He wants to decorate the card by putting up a colored tape on the nonparallel sides of the trapezium.



i. Find the total length of colored tape required if DE = 4cm.

ii. ABHC is a trapezium in which AB || HC and ∠A = ∠B = 45°. Find angles C and H of the trapezium.

iii. What is the difference between trapezium and parallelogram?

1. Trapezium has 2 sides, and parallelogram has 4 sides
2. Trapezium has 4 sides, and parallelogram has 2 sides
3. Trapezium has 1 pair of parallel sides, and parallelogram has 2 pairs of parallel sides
4. Trapezium has 2 pairs of parallel sides, and parallelogram has 1 pair of parallel sides

iv. Diagonals in isosceles trapezoid are _____.

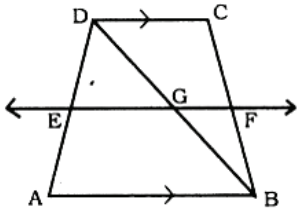
a. parallel

b. opposite

c. vertical

d. equal

v. ABCD is a trapezium where AB||DC, BD is the diagonal and E is the midpoint of AD. A line is drawn through E parallel to AB intersecting BC at F. Which of these is true?



a. BF = FC

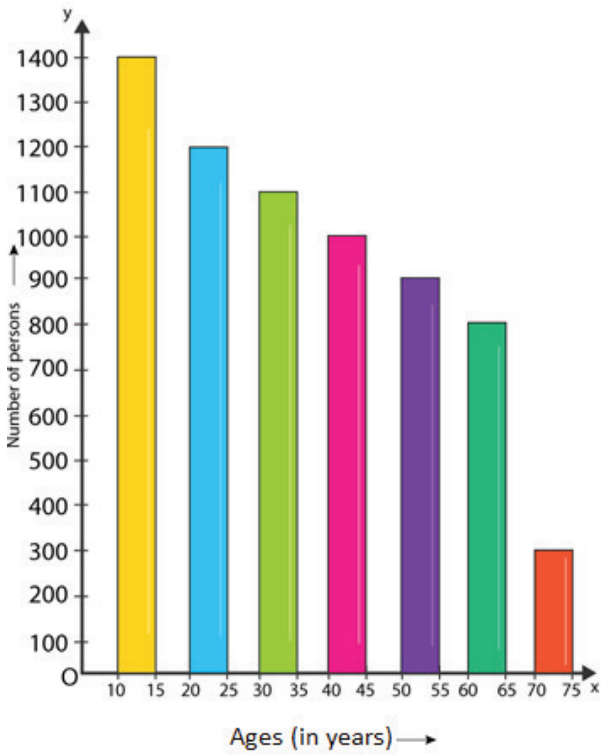
b. EA = FB

c. CF = DE

d. None of these

38. **Read the Source/Text given below and answer any four questions:** **[4]**

A healthcare survey was done by the state health and family welfare care board of the state of Punjab. The data is collected by forming age groups; i.e; 10-15, 20-25 .... and so on. The overall data from a town is given below in the form of a bar graph.



i. What is the percentage of the youngest age-group persons over those in the oldest age group?

ii. What is the total population of the town?

iii. How many persons are more in the age-group 10-15 than in the age group 30-35?

iv. What is the age-group of exactly 1200 persons living in the town?

v. What is the total number of persons living in the town in the age-groups 10-15 and 60-65?