مدرسة الألـــفـــيـــة

The Millennium School

CHAMPIONING CARE. INSPIRING EXCELLENCE

Academic Session: 2025-26

Model Examination

Subject: Mathematics Standard	Grade: X	Max Marks: 80
Date: 24/11/2025	Duration: 3 Hours	No. of Pages: 8

General Instruction:

- All questions are compulsory. There are 38 questions in all.

- This question paper has five sections: Section A, Section B, Section C, Section D and Section E

- Section A contains 20 questions of one mark each, Section B contains 5 questions of two marks each, Section C contains 6 questions of three marks each, Section D contains 4 questions of five marks each and Section E contains 3 case based integrated units of assessment (04 marks) with subparts of the values of 1, 1 and 2 marks.

- There is no overall choice. However, internal choices have been provided in 2 questions of two marks, 3 questions of three marks, 2 questions of five marks weightage. You have to attempt only one of the choices in such questions.

- Use of calculators is not permitted.

SECTION A

1. If the HCF of 85 and 153 is expressible in the form $85n - 153$, then the value of n is: 1
   (a) 3   (b) 2   (c) 4   (d) 1

2. The perimeter of the triangle is formed by the points $(0, 0)$, $(1, 0)$ and $(0, 1)$ is: 1
   (a) $1 - \sqrt{2}$ (b) $1 + \sqrt{2}$ (c) 3   (d) $2 + \sqrt{2}$

3. If the system of equations $2x + 3y = 7$; $2ax + (a + b) y = 28$ represent coincident lines, then: 1
   (a) $a = 2b$ (b) $b = 2a$ (c) $a + 2b = 0$ (d) $2a + b = 0$

4. If $\alpha + \beta = 90°$ and $\alpha = 2\beta$, then $\cos^2\alpha + \sin^2\beta$ is equal to:

(a) 0   (b) $\frac{1}{2}$ (c) 1   (d) 2

5. If the area of the base of a right circular cone is $51cm^2$ and its volume is $85cm^3$, then the height of the cone is given as:

(a) $\frac{5}{6}cm$ (b) $\frac{5}{3}cm$ (c) $\frac{5}{2}cm$ (d) $5cm$

6. If the sum of first m terms of an AP is $2m^2 + 3m$, then its second term is:

(a) 10   (b) 9   (c) 12   (d) 4

7. The greatest number which divides 70 and 125, leaving remainders 5 and 8 respectively, is:
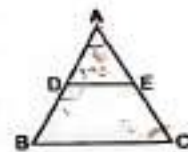
(a) 13   (b) 65   (c) 875   (d) 1750

8. If the difference of Mode and Median of a data is 24, then the difference of median and mean is:

(a) 8   (b) 12   (c) 24   (d) 36

9. In the given figure, $\frac{AD}{BD} = \frac{AE}{EC}$ and the measure of $\angle ADE = 70°$, $\angle BAC = 50°$ then the measure $\angle BCA$:

(a) 70°   (b) 50°   (c) 80°   (d) 60°

10. A tangent PQ at point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Length PQ is:

(a) 12 cm   (b) 13 cm   (c) 8.5 cm   (d) $\sqrt{119}$ cm

11. For the following distribution, the upper limit of the median class is:

Class	0 – 5	6 – 11	12 – 17	18 – 23	24 – 29
Frequency	13	10	15	8	11

(a) 18.5   (b) 23.5   (c) 29.5   (d) 17.5

12. Expression of the ratio tan A in terms of sin A is:

(a) $\frac{\sin A}{\cos A}$ (b) $\frac{1}{\sqrt{1-\sin^2 A}}$ (c) $\frac{\sin A}{\sqrt{1-\sin^2 A}}$ (d) $\frac{\sin A}{1-\sin A}$

13. Two dice are thrown at the same time. The probability of not getting a doublet is: 1

    (a) $\frac{1}{5}$ (b) $\frac{2}{3}$ (c) $\frac{5}{6}$ (d) $\frac{1}{3}$

14. The point R divides the line segment AB, where A$(-4, 0)$ and B$(0, 6)$ such that AR $= \frac{3}{4}$ AB.   1
    The coordinates of R are:

    (a) $(-1, 4.5)$ (b) $(1, \frac{9}{2})$ (c) $(-\frac{16}{7}, \frac{18}{7})$ (d) $(\frac{16}{7}, \frac{18}{7})$

15. Value of k for which the $kx^2 - 2kx + 6 = 0$ has two equal roots is: 1

    (a) 2   (b) 3   (c) 4   (d) 6

16. If the length of a shadow cast by a pole be $\sqrt{3}$ time the length of the pole, the angle of   1
    elevation of the sun is:

    (a) 60°   (b) 45°   (c) 30°   (d) 90°

17. The next term of the AP $\sqrt{18}$, $\sqrt{50}$, $\sqrt{98}$, ... is: 1

    (a) $\sqrt{146}$ (b) $\sqrt{128}$ (c) $\sqrt{162}$ (d) $\sqrt{200}$

18. If α and β are the zeroes of polynomial $3x^2 + 6x + k$ such that   1

    $\alpha + \beta + \alpha\beta = \frac{-2}{3}$, then the value of k is:

    (a) -8 (b) 8   (c) -4 (d) 4

DIRECTION: In question numbers 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option.

(a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

19. Assertion (A): If the LCM of two numbers is 2475 and their product is 12375, then their HCF is 5.

Reason (R): $HCF(a, b) \times LCM(a, b) = a \times b$.

20. Assertion (A): If the radius of a circle is 5 cm and distance of a point outside the circle from its centre is 13 cm, then the length of the tangent drawn from that external point to the circle is 12 cm.

Reason (R): In a circle, tangent is always perpendicular to its radius at the point of contact.

SECTION B

21. In the given figure, there are two concentric circles, with centre O and of radius 5 cm and 3 cm. From an external point P, tangents PA and PB are drawn to these circles. If AP = 12 cm, find the length of BP.
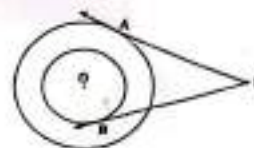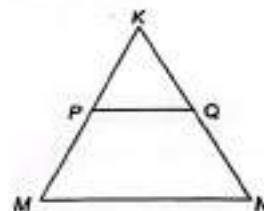
22. Find the point on x-axis which is equidistant from the points $(2, -5)$ and $(-2, 9)$.

23. (a) If $\triangle ABC \sim \triangle PQR$ in which $AB = 6\ cm, BC = 4\ cm, AC = 8\ cm$ and $PR = 6\ cm$, then find the length of $(PQ + QR)$.

OR

(b) In the figure, PQ is parallel to MN. If $\dfrac{KP}{PM} = \dfrac{4}{13}$ and $KN = 20.4\ cm$. Find the value of KQ.

24. The line segment AB joining the points $A(3, -4)$ and $B(1, 2)$ is trisected at the points $P(p, -2)$ and $Q(\frac{5}{3}, q)$. Find the values of p and q.

25. (a) If $x\cos 60° + y\cos 0° + \sin 30° - \cot 45° = 5$, then find the value of $x + 2y$.

OR

(b) Solve the equation for θ : $\dfrac{\sin^2\theta}{\tan^2\theta - \sin^2\theta} = 3$
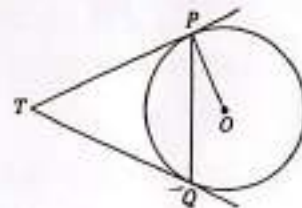
SECTION C

26. (a) Solve the following system of linear equations graphically:
    $x - y = 1, 2x + y = 8$. Shade the area bounded by these two lines and the y-axis.   **3**

    OR

    (b) Places A and B are 80 km apart from each other on a highway. A car starts from A and another from B at the same time. If they move in the same direction, they meet in 8 hours and if they move in opposite directions, they meet in 1 hour 20 minutes. Find the speed of the two cars.

27. Find the zeros of the polynomial $p(x) = 4\sqrt{3}x^2 + 5x - 2\sqrt{3}$ and verify the relationship between the zeros and its coefficients.   **3**

28. The queen and jack of clubs are removed from a pack of 52 cards and then the remaining cards are well shuffled. A card is selected from the remaining cards. Find the probability that the card drawn is: **3**
    (a) either a red card or a king
    (b) neither a red card nor a queen
    (c) a black face card

29. (a) Prove that a parallelogram circumscribing a circle is a rhombus.   **3**

    OR

    (b) In the given figure, two tangents TP and TQ are drawn to circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.

30. (a) Prove that $\dfrac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} + \dfrac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \dfrac{2}{2\sin^2\theta - 1}$ **3**

    OR

    (b) $\left(1 + \dfrac{1}{\tan^2 A}\right)\left(1 + \dfrac{1}{\cot^2 A}\right) = \dfrac{1}{\cos^2 A - \cos^4 A}$

31. Given that $\sqrt{3}$ is an irrational number, prove that $\dfrac{2\sqrt{3}+5}{7}$ is an irrational number.   **3**

SECTION D

32. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio. Use this result to prove the following:

In figure, D and E are points on AB and AC respectively, such that $DE \parallel BC$. If $AD = \frac{1}{3} BD$, $AE = 4.5\ cm$, find EC.

5
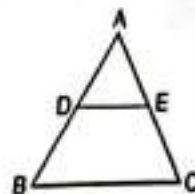
33. (a) A toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of the base of the cone is 21 cm and its volume is $\frac{2}{3}$ of the volume of the hemisphere. Calculate the height of the cone and the surface area of the toy.

5

OR

(b) From a cuboidal solid metallic block of dimensions 15 cm × 10 cm × 5 cm, a cylindrical hole of diameter 7 cm is drilled out. Find the surface area of the remaining block.
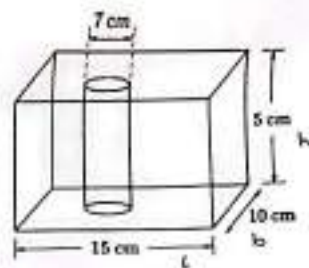
34. (a) A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/h more than its original speed. If it takes 3 hours to complete the total journey, what is its original average speed?

5

OR

(b) Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

35. A survey regarding the heights (in cm) of 50 girls of class X of a school was conducted, and the following data was obtained. Find the mean, median and mode of the given data.

5

Heights (in cm)	120 – 130	130 – 140	140 – 150	150 – 160	160 – 170
No. of Girls	2	8	12	20	8

SECTION E

36. In an annual day function of a school, the organizers wanted to give a cash prize along with a memento to their best students. Each memento is made as shown in the figure and its base ABCD is shown from the front side. The rate of silver plating is 20 per cm^2.
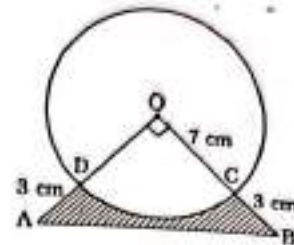
Based on the above, answer the following questions:

    (i)   Find the area of the quadrant ODCO.   1

    (ii)   Find the area of ΔAOB.   1

    (iii)   (a) Find the total cost of silver plating the shaded part ABCD?   2

              OR

        (b) Find the length of an arc CD?

37. In a pathology lab, a culture test has been conducted. In the test, the number of bacteria taken into consideration in various samples are all 3-digit numbers that are divisible by 6, taken in order.

Based on the above information, answer the following questions:

    (i)   How many bacteria are considered in the seventh sample?   1

    (ii)   How many samples should be taken into consideration?   1

    (iii)   (a) Find the total number of bacteria in the first 15 samples.   2

              OR

        (b) Find the number of samples in which the sum of bacteria is 840.

38. A lighthouse is a structure, usually with a tower, built onshore or on the seabed to serve as an aid to maritime coastal navigation, warning mariners of hazards, establishing their position, and guiding them to their destinations. While they are declining in relevance, the truth is that there's still no substitute for the active aid that these shining beacons provide. There

are still hundreds of lighthouses in the US that remain operational, with a few modern additions to improve their efficiency.

An observer on the top of a 40m tall lighthouse (including the height of the observer) observes a ship at an angle of depression $30°$ coming towards the base of the light house along straight line joining the ship and the base of the light house. The angle of depression of the ship changes to $45°$ after 8 seconds. (*Use* $\sqrt{3} = 1.73$)

(i)   Draw a labelled diagram to represent the situation.   1

(ii)   (a) Find the distance between the two positions of the ship.   2
              (OR)
      (b) Find the distance between the observer and the initial position of the ship.

(iii)   Find the speed of the ship in km/h.   1

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