GEMS Millennium School
Sharjah

Model Examination- November 2025
Mathematics (041) - SET 1

Grade:10
Date: 17/11/25

Max. Marks: 80
Time: 3 Hours

This question paper contains 8 printed pages

General Instructions:

(i) This question paper contains 38 questions. All questions are compulsory.
(ii) This question paper is divided into five Sections A, B, C, D and E.
(iii) In Section A, Questions no. 1 to 18 are multiple choice questions (MCQs) and questions number 19 and 20 are Assertion-Reason based questions of 1 mark each.
(iv) In Section B, Questions no. 21 to 25 are very short answer (VSA) type questions, carrying 2 marks each.
(v) In Section C, Questions no. 26 to 31 are short answer (SA) type questions, carrying 3 marks each.
(vi) In Section D, Questions no. 32 to 35 are long answer (LA) type questions carrying 5 marks each.
(vii) In Section E, Questions no. 36 to 38 are case study-based questions carrying 4 marks each.
(viii) All Questions are compulsory. However, an internal choice in 2 Question of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
(ix) Draw neat and clean figures wherever required.
(x) Take $\pi = 22/7$ wherever required if not stated.
(xi) Use of calculators is not allowed.

SECTION A

(Section A consists of 20 questions of 1 mark each.)

1. If $a = 2^3 \times 3$; $b = 2 \times 3 \times 5$; $c = 3^n \times 5$ and LCM $(a,b,c) = 2^3 \times 3^2 \times 5$, find the value of n. 1

a) 1 b) 2 c) 3 d) 4

2. For what value of k, do the equations $3x - y + 8 = 0$ and $6x - ky + 16 = 0$ represent coincident lines? 1

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

3. Find the quadratic equation whose one root is 2 and the sum of whose roots is zero. 1

a) $4x^2 - 1 = 0$ b) $x^2 - 4 = 0$ c) $x^2 - 2 = 0$ d) $x^2 + 4 = 0$

4. If α and β are the zeroes of the polynomial $ax^2 - 5x + c$ and $\alpha + \beta = \alpha\beta = 10$, then the values of and b are respectively; 1

a) $5, \frac{1}{2}$ b) $1, \frac{5}{2}$ c) $\frac{5}{2}, 1$ d) $-\frac{1}{2}, 5$

5. The ratio of LCM and HCF of the least composite number and the least prime number is: 1

a) 1:2 b) 1:1 c) 2:1 d) 1:3

6. Three bells ring at intervals of 4, 7 and 14 minutes. All the three rang at 6 am. When will they ring together again? 1

a) 6:07 am b) 6:14 am c) 6:28 am d) 6:25 am

7. If the coordinates of one end of a diameter of a circle are (2,3) and the coordinates of its centre are (-2,5), find the coordinates of the other end point. 1

a) (-6,7) b) (6,-7) c) (6,7) d) (-6,-7)

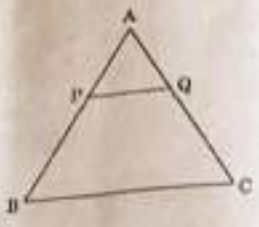
8. A bag contains 5 red, 8 blue and 7 yellow balls. One ball is drawn at random from the bag. What is the probability of getting neither a blue nor a red ball? 1

a) $\frac{1}{4}$ b) $\frac{2}{5}$ c) $\frac{7}{20}$ d) $\frac{13}{20}$

9. If $\Delta ABC \sim \Delta DEF$ such that DE = 3 cm, EF = 2cm, DF = 2.5cm, BC =4cm, then the perimeter of ΔABC is: 1

a)18cm b) 20cm c) 2cm d) 15cm

10. In the given figure, PQ ∥ BC. If $\frac{AP}{PB} = \frac{4}{13}$ and AC = 20·4 cm, then the length of AQ is: 1

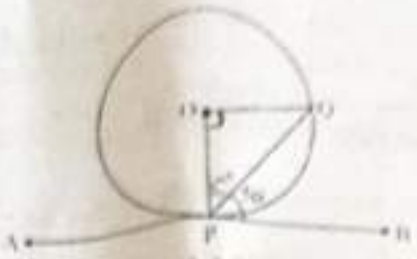


a) 2.8 cm b) 5.8cm c) 3.8 cm d) 5.8 cm

11. If 16 cot x = 12, then the value of $\frac{\sin x - \cos x}{\sin x + \cos x}$ is: 1

a) $\frac{1}{7}$ b) $\frac{3}{7}$ c) $\frac{2}{7}$ d) 1

12 In the given figure, APB is a tangent to a circle with centre O at point P. If $\angle QPB = 50^0$, then the measure of $\angle POQ$ is: 1



a) 150^0 b) 140^0 c) 120^0 d) 100^0 1

13. If $x\tan45^0\cos60^0 = \sin60^0\cot60^0$, then the value of x is:
a) 1 b) $\sqrt{3}$ c) $\frac{1}{2}$ d) $\frac{1}{\sqrt{2}}$ 1

14. If the area of a sector of a circle bounded by an arc of length 5π cm is equal to 20 πcm^2, then the radius of the circle is:
a) 12cm b) 16cm c) 8cm d) 10cm 1

15. A solid consists of a right circular cylinder surmounted by a right circular cone. The height of the cone is h. If the total volume of the solid is 3 times the volume of the cone, then the height of the cylinder is:
a) 2h b) $\frac{3h}{2}$ c) $\frac{h}{2}$ d) $\frac{2h}{3}$ 1

16. What is the lower limit of the modal class?

Marks	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60	Less than 70
No of studens	2	5	9	14	20	23	25

a) 30 b) 40 c) 60 d) 50 1

17. If the distance between the points (4, p) and (1,0) is 5 units, then the value of p is:
a) 4 b) ∓ 4 c) -4 d) 0 1

18. The probability of happening of an event is denoted by p and the probability of non-happening of the event is denoted by q, the relation between p and q is:
a) p+q =1 b) p=1, q=1 c) p= q-1 d) p+q+1 =0

DIRECTION: In the question number 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 and 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: For any acute angle θ, the value of $\sin\theta$ cannot be greater than 1. 1
REASON: Hypotenuse is the longest side in any right angled triangle

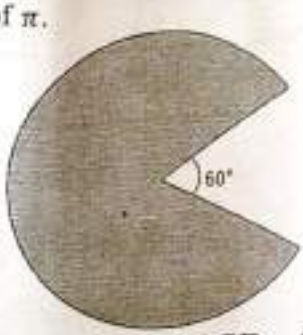
20. ASSERTION: if the length of a minute hand of a clock is 7 cm, then the area swept by it in 5minutes is $\frac{77}{6}$ cm^2. 1
REASON: The length of an arc of a sector of angle θ and radius r is given by $l = \frac{\theta}{360} 2\pi r$.

SECTION B

(Section B consists of 5 questions of 2 marks each.)

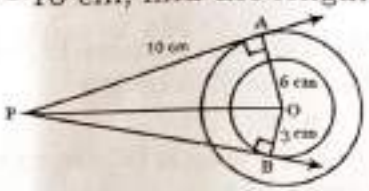
21. Wasim made a model of Pac-Man, after playing the famous video game of the same name. The area of the model is 120π cm^2. Pac-Man's mouth forms an angle of 60° at the centre of the circle. 2
A picture of the model is shown below.

Wasim wants to decorate the model by attaching a coloured ribbon to the entire boundary of the shape. What is the minimum length of the ribbon required in terms of π.



22. Diagonals AC and BD of a trapezium ABCD with AB ∥ DC intersect each other at the point O. Show that $\frac{OA}{OC} = \frac{OB}{OD}$ 2

23. a) Two concentric circles with centre O are of radii 6 cm and 3 cm. From an external point P, tangents PA and PB are drawn to these circles as shown in the figure. If AP = 10 cm, find the length of BP 2



OR

b) Prove that the parallelogram circumscribing a circle is a rhombus. 2

24. Solve the following system of equations for x and y. 2

$$\frac{x}{2}+\frac{2y}{3}=-1,\quad x-\frac{y}{3}=3$$

25. a) Evaluate:

$$\frac{3\tan^2 30^\circ+\tan^2 60^\circ+\operatorname{cosec} 30^\circ-\tan 45^\circ}{\cot^2 45^\circ}$$

OR

b) In ΔPQR, right-angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determine the values of sin P and cos P

SECTION C

(Section C consists of 6 questions of 3 marks each.)

26. CD and GH are respectively the bisectors of $\angle ACB$ and $\angle EGF$ such that D and H lie on sides AB and FE of Δ ABC and Δ EFG respectively. If Δ ABC ~ Δ FEG, show that 3

(i) Δ DCA ~ Δ HGF

(ii) $\frac{CD}{GH}=\frac{AC}{FG}$

27. Prove that $\sqrt{3}$ is irrational. 3

28. If α and β are the zeroes of $x^2 - x - 2$ form a quadratic polynomial, form a quadratic polynomial whose zeroes are $2\alpha + 1$ and $2\beta + 1$. 3

OR

If one zero of a polynomial $3x^2 - 8x + (2k+1)$ is seven times the other, find the value of k and hence find the zeroes of the polynomial. 3

29. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = q$, show that $q(p^2 - 1) = 2p$

OR

Prove that: $(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$ 3

30. All three face cards of spades are removed from a well shuffled pack of 52 cards. A card is then drawn at random from the remaining pack. Find the probability of getting
i) a black face card
ii) a queen
iii) a black card

31. Solve the following system of equations graphically and find the vertices of the triangle bounded by these lines and the x – axis. 3

$x - y - 1 = 0$; $2x - 3y - 4 = 0$

SECTION D

(Section D consists of 4 questions of 5 marks each.)

32. a) Show that, if the roots of the equation $x^2 (a^2 + b^2) + 2 (ac + bd) x + (c^2 + d^2) = 0$ are equal, then $ad = bc$ 5

OR

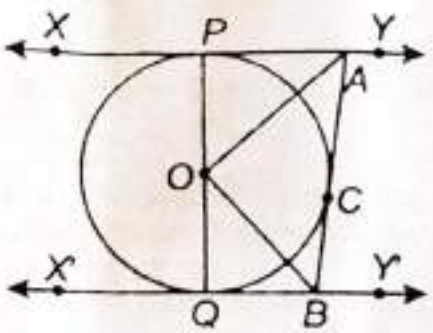
b) A person on tour has ₹4200 for his expenses. If he extends his tour for 3 days, he has to cut down his daily expenses by ₹70. Find the original duration of the tour.

33. Find the mean and median of the given data. 5

Class	0 -10	10 -20	20 -30	30 -40	40 -50	50 -60	60 -70
Frequency	8	7	15	20	12	8	10

34. (a) Prove that the lengths of the tangents from an external point to a circle are equal. 5

(b) XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90°$.



35. a) An empty cone is of radius 3 cm and height 12 cm. Ice-cream is filled in it so that lower part of the cone which is (1/6)th of the volume of the cone is unfilled but a hemisphere is formed on the top. Find volume of the ice-cream. (Take $\pi = 3.14$) 5

OR

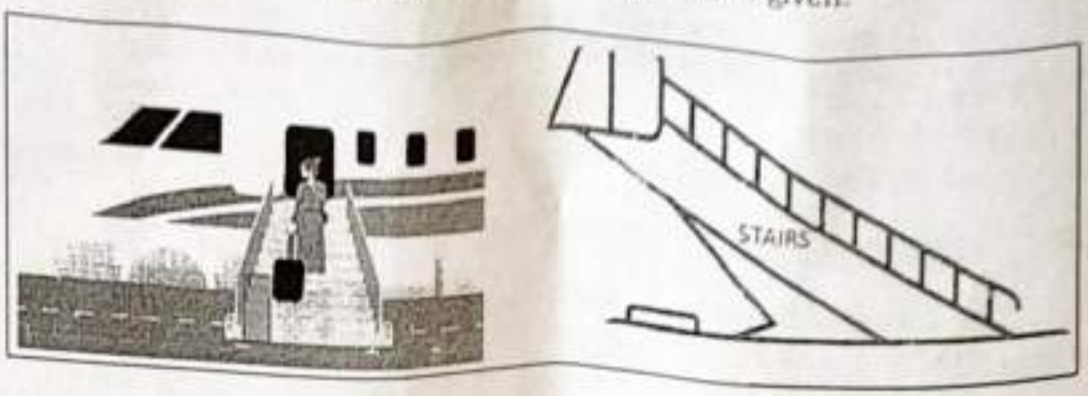
b) From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid

SECTION E

(Section E has 3 case study based questions carrying 4 marks each.)

36. **CASE STUDY 1**

An aircraft has a door sill at a height of 15 feet above the ground. A stair car is placed at a horizontal distance of 15 feet from the plane. Based on given information, answer the questions given.



(i) Find the angle at which stairs are inclined to reach the door sill 15 feet high above the ground. 1

(ii) Find the length of stairs used to reach the door sill. 1

(iii) (a) If the 20 feet long stairs is inclined at an angle of 60^0 to reach the door sill, then find the height of the door sill above the ground. ($\sqrt{3}$ =1.732) 2

OR

(iii) (b) What should be the shortest possible length of stairs to reach the door sill of the plane 20 feet above the ground, if the angle of elevation cannot exceed 30^0? Also, find the horizontal distance of base of stair car from the plane. 2

37. **CASE STUDY 2**

Cable cars at hill stations are one of the major tourist attractions. On a hill station, the length of cable car ride from base point to top most point on the hill is 5000 m. Poles are installed at equal intervals on the way to provide support to the cables on which car moves.

The distance of first pole from base point is 200 m and subsequent poles are installed at equal interval of 150 m. Further, the distance of last pole from the top is 300 m.
Based on above information, answer the following questions.

(i) Find the distance of 10^{th} pole from the base. 1

(ii) Find the distance between 15^{th} pole and 25^{th} pole. 1

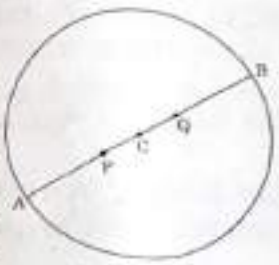
(iii) (a) Find the time taken by cable car to reach 15^{th} pole from the top if it is moving at the speed of 5 m/sec and coming from top. 2

OR

(iii) (b) Find the total number of poles installed along the entire journey. 2

38. **CASE STUDY 3**

In a society, there is a circular park having two gates. The gates are placed at points A(10, 20) and B(50, 50), as shown in the figure below. Two fountains are installed at points P and Q on AB such that AP = PQ = QB.



Based on the above information, answer the following questions :
(i) Find the coordinates of the centre C. 1

(ii) Find the radius of the circular park. 1

(iii) (a) Find the coordinates of the point P. 2

OR

(b) Find the distance of the fountain at Q from gate A 2