



## Model Question Paper

### Class X Session (2023-2024)

### Mathematics Standard (Code No. 041)

Time: 3 hours

Maximum marks: 80

#### General Instructions:

1. The question paper has five sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 case based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 2 and 1 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take  $\pi = 22/7$  wherever necessary.

#### Section-A

(20 questions in this section of 1 mark each)

Q 1. The largest number which divides 60 and 75, leaving remainders 8 and 10 respectively, is

- (a) 12                      (b) 16                      (c) 13                      (d) 8

Q 2. If  $\alpha$  and  $1/\alpha$  are the zeros of the polynomial  $4x^2 - 2x + (k - 4)$ , then the value of k is

- (a) -1                      (b) 8                      (c) 4                      (d) -3

Q 3. The missing terms in AP ---, 13, ---, 3 are

- (a) 20 and 9                      (b) 19 and 6                      (c) 19 and 7                      (d) 18 and 8



Q 4. If the pair of linear equations  $3x+2y-1=0$  and  $3kx+8y+8=0$  are parallel, then value of  $k$  is

- (a) 4                      (b) 1                      (c) -1                      (d) 2

Q 5. The graph of  $y = 3x$  is a line

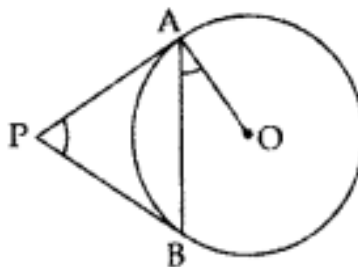
- (a) parallel to x-axis                      (b) parallel to y-axis  
(c) perpendicular to x-axis                      (d) passing through the origin

Q 6. The difference in the 19<sup>th</sup> and 15<sup>th</sup> term of an AP is 36, the common difference is

- (a) 7                      (b) 9                      (c) 6                      (d) 8

Q 7. PA and PB are tangents to the circle with centre O. If  $\angle APB = 60^\circ$ , then  $\angle OAB$  is equal to

- (a) 30 deg                      (b) 45 deg                      (c) 60 deg                      (d) 40 deg

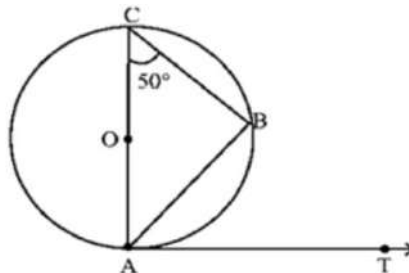


Q 8. If  $3\sec \theta - 5 = 0$  then the value of  $\cot \theta$  is

- (a)  $\frac{1}{3}$                       (b)  $\frac{1}{2}$                       (c)  $\frac{3}{4}$                       (d)  $\frac{1}{4}$

Q 9. AB is a chord of the circle and AOC is its diameter such that  $\angle ACB = 50^\circ$ . If AT is the tangent to the circle at the point A, then  $\angle BAT$  is equal to

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





Q 10. The point on the x-axis which is equidistant from (7, 6) and (-3, 4) is

- (a) (4,0)                      (b) (1,0)                      (c) (2,0)                      (d) (3,0)

Q 11. Mean of ten items is 50. It was observed that an item was by mistake read as 40 instead of 60 in calculating the mean. The correct mean is

- (a) 52                      (b) 51                      (c) 48                      (d) 54

Q 12. Consider the following frequency distribution of the heights of 60 students of a class. The class mark of the modal class is

- (a) 155                      (b) 150                      (c) 152.5                      (d) 157.5

Height (in cm)	150 – 155	155 – 160	160 – 165	165 – 170	170 – 175	175 – 180
Number of students	15	13	10	8	9	5

Q 13. The volumes of the two spheres are in the ratio 8:27. The ratio of their surface areas are

- (a) 2:3                      (b) 4:9                      (c) 3:27                      (d) 3:16

Q 14. Two cubes each of volume  $8 \text{ cm}^3$  are joined end to end to form a solid. The surface area of the resulting cuboid is

- (a)  $20 \text{ cm}^2$                       (b)  $40 \text{ cm}^2$                       (c)  $30 \text{ cm}^2$                       (d)  $50 \text{ cm}^2$

Q 15. In  $\Delta PQR$ ,  $PQ = 3$  and,  $PR = 4$  cm and PS is the bisector of  $\angle P$ . Then,  $QS : SR$  is

- (a) 3:4                      (b) 4:3                      (c) 2:3                      (d) 3:2

Q 16. If  $\sin \theta = \frac{a}{b}$  then  $\tan \theta =$

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

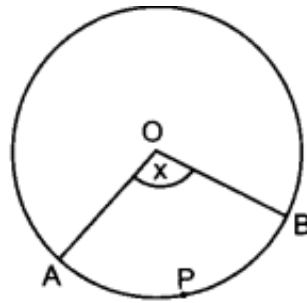
Q 17. The curved surface area (in  $\text{cm}^2$ ) of a right circular cone of base radius 8 cm and height 15 cm is

- (a)  $100\pi$                       (b)  $26\pi$                       (c)  $136\pi$                       (d)  $36\pi$



Q 18. In the figure, O is the centre of a circle. The area of sector OAPB is  $\frac{5}{18}$  of the area of the circle. Then  $x =$

- (a) 100 deg                      (b) 120 deg                      (c) 110 deg                      (d) 140 deg



Q 19. The distance between two parallel tangents of a circle is 18 cm, then the area of the circle (in  $\text{cm}^2$ ) is

- (a)  $36\pi$                       (b)  $81\pi$                       (c)  $9\pi$                       (d)  $16\pi$

Q 20. Two dice are thrown together. The probability of getting same number on both dice is

- (a)  $\frac{1}{6}$                       (b)  $\frac{1}{3}$                       (c)  $\frac{1}{4}$                       (d)  $\frac{1}{5}$

**Section-B**

Q 21. Show that  $4\sqrt{5}$  is an irrational number.

(2 mark)

Q 22. If  $7\sin^2\theta + 3\cos^2\theta = 4$  then show that  $\tan\theta = \frac{1}{\sqrt{3}}$

OR

If  $\sin\theta + \cos\theta = \sqrt{3}$  then find the value of  $\tan\theta + \cot\theta$

(2 mark)

Q23. If A(-2, 1), B(a, 0), C(4, b) and D(1, 2) are the vertices of a parallelogram ABCD, find the values of a and b.

(2 mark)

Q24. If one diagonal of a trapezium divides the other diagonal in the ratio of 1:3. Prove that one of the parallel sides is three times the other.

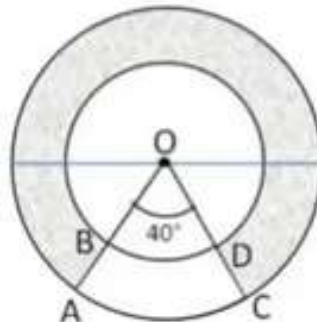
(2 mark)



Q25. A calf is tied with a rope of length 6 m at the corner of a square grassy lawn of side 20 m. If the length of the rope is increased by 5.5 m, find the increase in area of the grassy lawn in which the calf can graze.

OR

Find the area of the shaded region, enclosed between two concentric circles of radii 7 cm and 14 cm where  $\angle AOC = 40^\circ$



(2 mark)

### Section-C

Q 26. There are 25 trees at equal distances of 5 metres in a line with a well, the distance of the well from the nearest tree being 10 metres. A gardener waters all the trees separately starting from the well and he returns to the well after watering each tree to get water for the next. Find the total distance the gardener will cover in order to water all the trees.

(3 mark)

Q 27. In a seminar, the number of participants in hindi, English and mathematics are 60,84 and 108 respectively.find the maximum number of rooms required if in each room the same number of participants are to be seated and all of them being in the same subject.

(3 mark)

Q28. Draw the graph of  $2x + y = 6$  and  $2x - y + 2 = 0$ . Shade the region bounded by these lines and x-axis. Find the area of the shaded region.

OR

The taxi charges in a city comprise of a fixed charges together with charge for the distance covered. For a journey of 10 km, the charges paid is Rs.75 and for a journey of 15 km, the charges paid is Rs.110. What will a person has to pay for travelling a distance of 35 km?

(3 mark)



Q29. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length TP.



OR

Prove that the line segment joining the point of contact of two parallel tangents of a circle passes through its centre.

(3 mark)

Q 30. If  $\tan \theta + \sin \theta = m$  and  $\tan \theta - \sin \theta = n$  then show that  $m^2 - n^2 = 4\sqrt{mn}$

(3 mark)

Q31. The point P divides the line segment joining points A(2,-5) and B(5,2) in the ratio 2:3. Find the coordinates of P and in which quadrant does the point P lie.

(3 mark)

### Section-D

Q 32. At the foot of a mountain, the elevation of its summit is  $45^\circ$ , after ascending 2 km towards the mountain up a slope of  $30^\circ$  inclination, the elevation is found to be  $60^\circ$ . Find the height of the mountain.

(5 mark)

Q 33. The median of the following frequency distribution is 35. Find the value of x.

<b>Class:</b>	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
<b>Frequency:</b>	6	3	x	12	19

(5 mark)



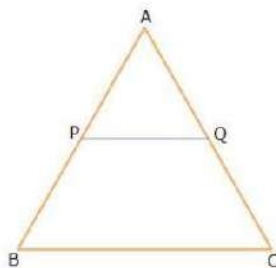
Q 34. One-fourth of a herd of camels was seen in the forest. Twice the square root of the herd had gone to mountains and the remaining 15 camels were seen on the bank of a river. Find the total number of camels.

OR

A water tap A takes 7 minutes more than water tap B for filling up a tank with water. The tap A takes 16 minutes more than the time taken by both the taps together to fill the tank. Find the time each tap alone would take to fill the tank.

(5 mark)

Q 35. In  $\triangle ABC$ , PQ is a line segment intersecting AB at P and AC at Q such that  $PQ \parallel BC$  and PQ divides  $\triangle ABC$  into two parts equal in area. Find  $\frac{BP}{AB}$



(5 mark)

### Section-E

Q 36. You would have probably seen a Roulette wheel in Casino. The wheel contains 38 slots each containing a number from 1 to 36. The remaining two slots contain number 0 and 00. The wheel is spun and a white colored ball rolls over it and has equal probability of landing at any of the 38 slots, when the wheel stops.





(i) What is the probability that ball lands at numbers 0 or 00 when the wheel stops? (1 mark)

(ii) What is the probability that ball lands at prime numbers when the wheel stops?

OR

What is the probability that ball does not land on numbers 2, 6, 10 and 16?

(2 mark)

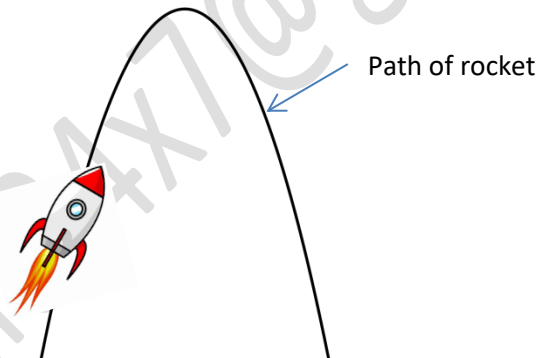
(iii) What is the probability that ball lands on a number which is a multiple of 7?

(1 mark)

Q 37. The path of a rocket is given by the equation

$$y = -16x^2 + 128x$$

where  $y$  is the altitude in meters and  $x$  is time in seconds.



(i) What is the degree of this equation?

(1 mark)

(ii) What is the altitude of rocket at 1 second into the flight?

OR

What is the altitude of rocket at 2 second into the flight?

(2 mark)

(iii) What is the shape of the path of rocket?

(1 mark)

Q 38. Students of class X were taken to the Taj Mahal. It was an educational trip. On reaching there teacher told them about the history and facts about the seventh wonder. She also told them that the structure of the monument is a combination of several solid figures. There are 4 pillars



Tips and Tricks in Mathematics

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that are assumed to be cylindrical in shape. A big dome is in the center and 2 more small domes on both sides of the big dome. The domes are hemispherical. The pillars also have domes on them.



- (i) If the ratio of radius of top and adjacent dome is 5:2, then find the ratio of their volumes.

(1 mark)

- (i) What is the surface area of 1 pillar if it has a diameter of 1.4 m and a height of 10 m?

OR

- (ii) What is the volume of 1 pillar if it has a diameter of 1.4 m and a height of 10 m?

(2 mark)

- (iii) Name the shape of the following pillar?

