Sample Question Paper – 2 (TERM - I)

Class X (Session - 2021-22)

Subject- Mathematics (Standard)

Time Allowed: 90 minutes **Maximum Marks: 40**

General Instructions:

1. The question paper contains three parts A, B and C.
2. Section A consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.
3. Section B consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.
4. Section C consists of 10 questions based on two Case Studies. Attempt any 8 questions.
5. There is no negative marking.

SECTION - A

1. The value of k for which the lines $5x + 6y = 3$ and $15x + 18y = k$ coincide is:

(a) 9

(b) 8

(c) 10

(d) 7

2. Three fair coins are tossed. What is the probability of getting at the most one head?

(a) $\frac{3}{4}$

(b) $\frac{1}{4}$

(c) $\frac{1}{2}$

(d) $\frac{3}{8}$

3. $\triangle ABC \sim \triangle PQR$. If AM and PN are altitudes of $\triangle ABC$ and $\triangle PQR$ respectively and $AB^2 : PQ^2 = 4 : 9$, then $AM : PN =$

(a) 16: 81

(b) 4: 9

(c) 3: 2

(d) 2: 3

4. If $4\sin^2\beta - 2\cos^2\beta = 4$, then β is:

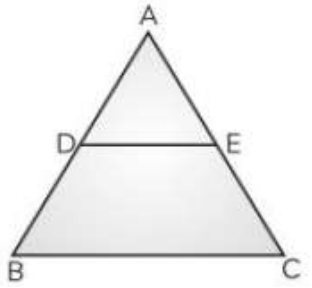
(a) 0°

(b) 90°

(c) 45°

(d) 30°

5. In the figure, if DE ∥ BC, AD = 4 cm, BD = 7 cm and BC = 11 cm, then DE equals :



(a) 7 cm

(b) 6 cm

(c) 4 cm

(d) 3 cm

6. If $4\tan\beta = 3$, then $\frac{4\sin\beta - 3\cos\beta}{4\sin\beta + 3\cos\beta} =$

(a) 0

(b) $\frac{1}{3}$

(c) $\frac{2}{3}$

(d) $\frac{3}{4}$

7. A letter of English alphabet is chosen at random. What is the probability that it is a letter of the word 'EPITOME'?

(a) $\frac{3}{13}$

(b) $\frac{9}{26}$

(c) $\frac{5}{13}$

(d) $\frac{11}{26}$

8. A ladder which is 17 m long, reaches the window of a building which is 15 m above the ground. What is the distance of the foot of the ladder from the building?

   (a) 8 m

   (b) 12 m

   (c) 10 m

   (d) 13 m

9. A Bag Contains 3 Red Balls and 5 Black Balls. A Ball is Drawn at Random from the Bag. What is the Probability that the Ball Drawn is Not Red?

   (a) $\frac{7}{8}$

   (b) $\frac{5}{8}$

   (c) $\frac{3}{8}$

   (d) $\frac{4}{9}$

10. Basketball players John, Vasim, Akash were practising the ball drop in the basket. The probabilities of success for John, Vasim and Akash are $\frac{4}{5}, 0.83$ and 58% respectively. Who had the greatest probability of success?

    (a) John

    (b) Vasim

    (c) Akash

    (d) akash and john has same probability

11. What is the value of x in the following equation:

    $\sin 2x = \sin 45°\cos 45° + \sin 30°$

    (a) 30°

    (b) 45°

    (c) 60°

    (d) 75°

12. The probability of selecting a red ball at random from a jar that contains only red, blue and orange balls is 1/4. The probability of selecting a blue ball at random from the same jar 1/3. If the jar contains 10 orange balls, find the total number of balls in the jar.

(a) 23

(b) 24

(c) 25

(d) 26

13. A car travels 1 km distance in which each wheel makes 450 complete revolutions. Find the radius of wheel.

(a) $\frac{1000}{9\pi}$ cm

(b) $\frac{1010}{9\pi}$ cm

(c) $\frac{1050}{9\pi}$ cm

(d) $\frac{1100}{9\pi}$ cm

14. The area enclosed between the concentric circles is 770 cm^2. If the radius of outer circle 21 cm. find the radius of inner circle

(a) 17 cm

(b) 16 cm

(c) 14 cm

(d) 15 cm

15. A circular pond is 17.5 m in diameter. It is surrounded by a 2 m wide path, Find the cost of constructing the path at the rate of Rs 25 per m^2

(a) Rs 3091.5

(b) Rs 3061.5

(c) Rs 3081.5

(d) Rs 3071.5

16. Find the distance between the following pair of points: $(a\sin\alpha - b\cos\alpha)$ and $(-a\cos\alpha, b\sin\alpha)$

(a) $(\sin\alpha + \cos\alpha)\sqrt{(a^2 - b^2)}$

(b) $(\sin\alpha - \cos\alpha)\sqrt{(a^2 + b^2)}$

(c) $(\sin\alpha + \cos\alpha)\sqrt{(a^2 + b^2)}$

(d) $(\sin\alpha - \cos\alpha)\sqrt{(a^2 - b^2)}$

17. Find the value of x such that PQ = QR where the coordinates of P, Q and R are $(6, -1)$, $(1,3)$ and $(x, 8)$ respectively.

(a) 5 or -3

(b) 6 or -4

(c) 7 or -2

(d) 8 or -6

18. Find a point on y-axis which is equidistant from the points $(5, -2)$ and $(-3,2)$.

(a) $(0, -3)$.

(b) $(0, -2)$.

(c) $(0, -4)$.

(d) $(0, -5)$.

19. An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

(a) 10

(b) 11

(c) 8

(d) 9

20. 144 cartons of Coke Cans and 90 cartons of Pepsi Cans are to be stacked in a Canteen. If each stack is of the same height and is to contain cartons of the same drink, what would be the greatest number of cartons each stack would have?

(a) 18

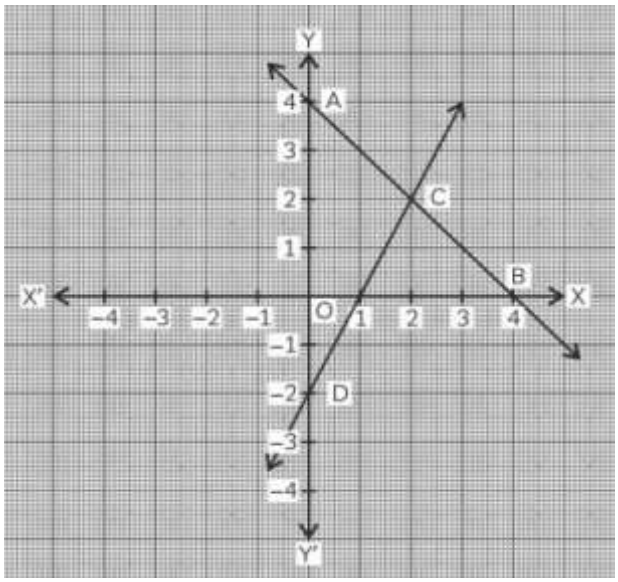
(b) 19

(c)17

(d) 16

SECTION B

21. Given below is the graph representing two linear equations by lines AB and CD respectively. What is the area of the triangle formed by these two lines and the line $x = 0$?



(a) 3 sq. units

(b) 4 sq. units

(c) 6 sq. units

(d) 8 sq. units

22. 105 goats, 140 donkeys and 175 cows have to be taken across a river. There is only one boat which will have to make many trips in order to do so. The lazy boatman has his own conditions for transporting them. He insists that he will take the same number of animals in every trip and they have to be of the same kind. He will naturally like to take the largest possible number each time. Can you tell how many animals went in each trip?

(a) 32

(b) 37

(c) 36

(d) 35

23. The area of sector is one-twelfth that of the complete circle. Find the angle of the sector.

(a) $45°$

(b) $60°$

(c) $30°$

(d) $90°$

24. A rectangular park is 100 m by 50 m. It is surrounding by semi-circular flower beds all round. Find the cost of levelling the semicircular flower beds at 60 paise per square metre

(a) Rs 5897.50

(b) Rs 5887.50

(c) Rs 5787.50

(d) Rs 5867.50

25. If α and β are the zeros of the quadratic polynomial $f(x) = ax^2 + bx + c$, then evaluate $\frac{\beta}{a\alpha+b} + \frac{\alpha}{a\beta+b}$

(a) $\frac{-3}{a}$

(b) $\frac{-4}{a}$

(c) $\frac{-2}{a}$

(d) $\frac{-1}{a}$

26. Solve the following systems of equations:

$\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2$

$\frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1$

(a) $x = 4, y = 9$

(b) $x = 5, y = 9$

(c) $x = 3, y = 7$

(d) $x = 2, y = 12$

27. If $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ and $\frac{x}{a}\sin\theta - \frac{y}{b}\cos\theta = 1$. Then $\frac{x^2}{a^2} + \frac{y^2}{b^2} =$

(a) 0

(b) 2

(c) 4

(d) 3

28. If $3\cos\theta = 1$, find the value of ,

$$\frac{6\sin^2\theta + \tan^2\theta}{4\cos\theta}$$

(a) 9

(b) 12

(c) 10

(d) 14

29. If A and B are $(-2,-2)$ and $(2,-4)$ respectively, find the coordinates of P such that $AP = \frac{3}{7}AB$ and P lies on the line segment AB.

(a) $\left(-\frac{2}{7}, -\frac{20}{7}\right)$

(b) $\left(-\frac{3}{7}, -\frac{23}{7}\right)$

(c) $\left(-\frac{5}{7}, -\frac{22}{7}\right)$

(d) $\left(-\frac{4}{7}, -\frac{19}{7}\right)$

30. In what ratio does y-axis divide the line of $(7,3)\&(-5,-12)$

(a) 9: 7.

(b) 8: 5.

(c) 6: 5.

(d) 7: 5.

31. The coach of a cricket team buys 7 bats and 6 balls for Rs 3800 . Later, she buys 3 bats and 5 balls for Rs 1750 . Find the cost of each bat and each ball.

(a) cost of each bat = Rs 400 and cost of each balls = Rs 45

(b) cost of each bat = Rs 550 and cost of each balls = Rs 60

(c) cost of each bat = Rs 500 and cost of each balls = Rs 50

(d) cost of each bat = Rs 580 and cost of each balls = Rs 55

32. Find the value of k for which each of the following system of equations have no solution

$kx - 5y = 2$

$6x + 2y = 7$

(a) -15

(b) -14

(c) -17

(d) -16

33. If $\sin\theta - \cos\theta = 0$ then the value of $\sin^4\theta + \cos^4\theta$

(a) $\frac{1}{3}$

(b) $\frac{1}{2}$

(c) $\frac{2}{3}$

(d) $\frac{3}{4}$

34. If $\cos A + \cos^2 A = 1$, then $\sin^2 A + \sin^4 A =$

(a) 3

(b) 5

(c) 1

(d) 2

35. Find the angle subtended at the centre of circle of radius 5 cm by an arc of length $\left(\frac{5\pi}{3}\right)$ cm

(a) $55°$

(b) $45°$

(c) $60°$

(d) $30°$

36. Find the largest number which exactly divides 280 and 1245 leaving remainders 4 and 3 , respectively.

(a) 137

(b) 138

(c) 136

(d) 135

37. A rectangular courtyard is 18 m 72 cm long and 13 m 20 cm broad. It is to be paved with square tiles of the same size. Find the least possible number of such tiles.

(a) 4270

(b) 4290

(c) 4260

(d) 4240

38. The diagonal of a rectangular field is 60 metres more than the shorter side. If the longer side is 30 metres more than the shorter side, find the sides of the field.

(a) shorter side = 85 cm , larger side = 115

(b) shorter side = 90 cm , larger side = 120

(c) shorter side = 75 cm , larger side = 105

(d) shorter side = 100 cm , larger side = 130

39. A metallic sphere of radius 4.2 cm is melted and recast into the shape of a cylinder of radius 6 cm. Find the height of the cylinder.

(a) 3.74 cm

(b) 4.74 cm

(c) 5.94 cm

(d) 2.74 cm

40. The numerator of a fraction is 4 less than the denominator. If the numerator is decreased by 2 and denominator is increased by 1, then the denominator is eight times the numerator. Find the fraction.

(a) $\frac{5}{9}$

(b) $\frac{3}{7}$

(c) $\frac{7}{11}$

(d) $\frac{1}{5}$

SECTION C

Q41 – 45 are based on Case Study-1

Case Study-1:

A boat in the river Ganga near Rishikesh covers 24 km upstream and 36 km downstream in 6 hours while it covers 36 km upstream and 24 km downstream in $6\frac{1}{2}$ hours. Consider speed of the boat in still water be x km/hr and speed of the stream be y km/hr and answer the following questions.

41. Represent the 1^{st} situation algebraically.

(a) $\frac{24}{x-y}+\frac{36}{x+y}=6$

(b) $\frac{24}{x+y}+\frac{36}{x-y}=6$

(c) $24x+36y=6$

(d)$24x-36y=6$

42. Represent the 2^{nd} situation algebraically.

(a) $\frac{36}{x+y}+\frac{24}{x-y}=\frac{13}{2}$

(b) $\frac{36}{x-y}+\frac{24}{x+y}=\frac{13}{2}$

(c) $36x-24y=\frac{13}{2}$

(d)$36x+24y=\frac{13}{2}$

43. If $u=\frac{1}{x-y}$ and $v=\frac{1}{x+y}$, then u =

(a) $\frac{1}{4}$

(b) $\frac{1}{12}$

(c) $\frac{1}{8}$

(d) $\frac{1}{6}$

44. Speed of boat in still water is

(a) 4 km/hr

(b) 6 km/hr

(c) 8 km/hr

(d) 10km/hr

45. Speed of stream is

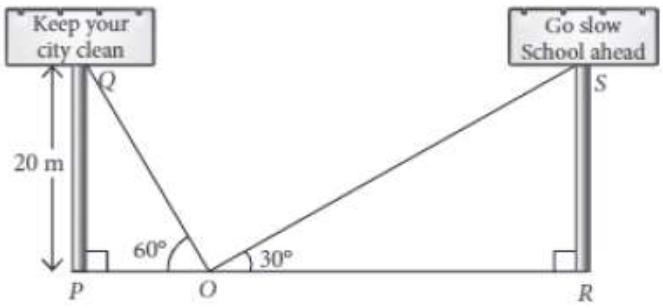
(a) 3 km/hr

(b) 4 km/hr

(c) 2 km/hr

(d) 5 km/hr

Q46 – 50 are based on Case Study-2



Case study-2:

Hoardings on the Road

Two hoardings are put on two poles of equal heights standing on either side of the road. From a point between them on the road the angle of elevation of the top of poles are 60° and 30° respectively. Height of the each pole is 20 m

46. Find the length of PO.

(a) 20 m

(b) $20\sqrt{3}$ m

(c) $\frac{20}{\sqrt{3}}$ m

(d) None of these

47. Find the length of RO.

(a) 20 m

(b) $20\sqrt{3}$ m

(c) $\frac{20}{\sqrt{3}}$ m

(d) None of these

48. The width of the road is

(a) 31.23 m

(b) 35.68 m

(c) 39.73 m

(d) 46.24 m

49. If the angle of elevation made by pole PQ is 45°, then the length of PO =

(a) 20 m

(b) $20\sqrt{3}$ m

(c) $\frac{20}{\sqrt{3}}$ m

(d) None of these

50. Angle formed by the line of sight with the horizontal when the point being viewed is above the horizontal level is known as

(a) angle of depression

(b) angle of elevation

(c) right Angle

(d) reflex angle