Sample/Pre-Board Paper 21

Class X Term 1 Exam Nov -Dec 2021

Mathematics (Standard) 041

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

Section A consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.
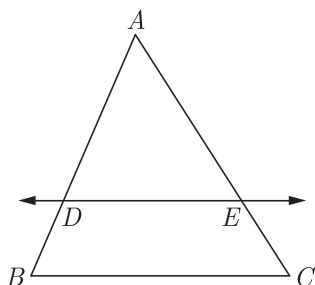
1. The sum of exponents of prime factors in the prime-factorisation of 1764 is

(a) 3   (b) 4

(c) 5   (d) 6

2. For what value of p does the pair of linear equations given below has unique solution ?
$4x + py + 8 = 0$ and $2x + 2y + 2 = 0$.

(a) $p = 1$ (b) $p = 2$

(c) $p \neq 4$ (d) $p \neq 2$

3. In Figure, in $\Delta\,ABC$, $DE \parallel BC$ such that $AD = 2.4$ cm, $AB = 3.2$ cm and $AC = 8$ cm, then what is the length of AE?


(a) 2 cm   (b) 4 cm

(c) 5 cm   (d) 6 cm

4. Two poles of height 6 m and 11 m stand vertically upright on a plane ground. If the distance between their foot is 12 m, then distance between their tops is

(a) 12 m   (b) 14 m

(c) 13 m   (d) 11 m

5. The probability that a two digit number selected at random will be a multiple of 3 and not a multiple of 5 is

(a) $\frac{2}{15}$ (b) $\frac{4}{15}$

(c) $\frac{1}{15}$ (d) $\frac{4}{90}$

6. In Figure, $DE \parallel BC$ and given that $AE = 1.8$ cm, $BD = 7.2$ cm and $CE = 5.4$ cm. The length of side AD will be
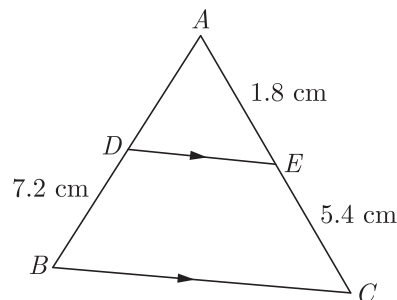
(a) 1.6 cm   (b) 1.9 cm

(c) 2.1 cm   (d) 2.4 cm

7. If $\sin\alpha = \frac{1}{2}$ and $\cos\beta = \frac{1}{2}$, then the value of $(\alpha + \beta)$ is

(a) $0°$ (b) $30°$

(c) $60°$ (d) $90°$

8. Which of the following are the HCF and LCM of 404 and 96 ?

(a) 4 and 9696   (b) 6 and 38784

(c) 8 and 1486   (d) 6 and 9648

9. What are the values of x and y for the following system of linear equations ?
$$2x - y = 2$$
$$x + 3y = 15$$

(a) 4 and 5   (b) 3 and 4

(c) 5 and 4   (d) 4 and 4

10. The centroid of the triangle whose vertices are $(3, -7)$, $(-8, 6)$ and $(5, 10)$ is

(a) $(0, 9)$ (b) $(0, 3)$

(c) $(1, 3)$ (d) $(3, 5)$

11. If one zero of the polynomial $2x^2 + 3x + \lambda$ is $\frac{1}{2}$, what is the value of λ and the other zero?

(a) –2 and –2
(b) –3 and –3
(c) –2 and –3
(d) –3 and –2

12. The rational number of the form $\frac{p}{q}$, $q \neq 0$, p and q are positive integers, which represents $0.1\overline{34}$ i.e., $(0.1343434 \ldots\ldots)$ is

(a) $\dfrac{134}{999}$
(b) $\dfrac{134}{990}$
(c) $\dfrac{133}{999}$
(d) $\dfrac{133}{990}$

13. $\dfrac{3\tan^2 30° + \tan^2 60° + \operatorname{cosec} 30° - \tan 45°}{\cot^2 45°} = \, ?$
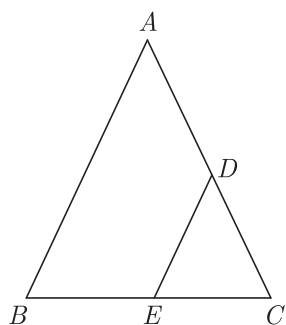
(a) 2
(b) 3
(c) 4
(d) 5

14. If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = \dfrac{1}{\sqrt{3}}$, $A > B$, then the value of A is ....

(a) 45°
(b) 60°
(c) 90°
(d) 30°

15. If the sum of the areas of two circles with radii R_1 and R_2 is equal to the area of a circle of radius R, then
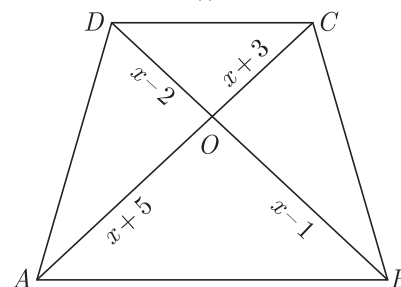
(a) $R_1 + R_2 = R$
(b) $R_1^2 + R_2^2 = R^2$
(c) $R_1 + R_2 < R$
(d) $R_1^2 + R_2^2 < R^2$

16. In the figure of ΔABC, the points D and E are on the sides CA, CB respectively such that $DE \,||\, AB$, $AD = 2x, DC = x+3, BE = 2x-1$ and $CE = x$. Then, value of x will be

17. In the given figure, if $AB \,||\, DC$, the value of x will be

(a) $\frac{4}{5}$
(b) $\frac{1}{5}$
(c) $\frac{3}{5}$
(d) $\frac{2}{5}$

(a) 3
(b) 6
(c) 7
(d) 8

18. $\left(\cot\theta - \operatorname{cosec}\theta\right)^2 = \, ?$

(a) $\frac{1-\cos\theta}{1+\cos\theta}$
(b) $\frac{1+\cos\theta}{1-\cos\theta}$
(c) $\frac{\cos\theta+1}{\cos\theta-1}$
(d) $\frac{\cos\theta-1}{\cos\theta+1}$

19. Given the linear equation $2x + 3y - 8 = 0$, select another linear equation in two variables such that the geometrical representation of the pair so formed is intersecting lines.

(a) $5x + 2y - 9 = 0$
(b) $6x + 9y + 7 = 0$
(c) $4x + 6y - 16 = 0$
(d) above all

20. A bag contains lemon flavoured candies only. Shalini takes out one candy without looking into the bag. What is the probability that she takes out an orange flavoured candy?

(a) 0
(b) 0.50
(c) 0.10
(d) 0.20

SECTION B

Section B consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.

21. Tina has 39 pairs of headphones and 13 music players. Tina wants to sell all of the headphones and music players in identical packages. What is the greatest number of packages Tina can make?
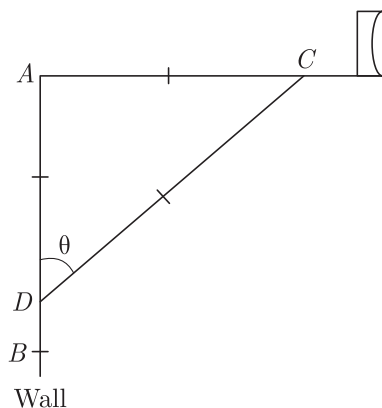
(a) 4   (b) 9

(c) 13   (d) 26

22. If $A(-1,0)$, $B(3,1)$, $C(2,2)$ and $D(-2,1)$ to be four point in plane then $ABCD$ is a $\_\_\_\_\_$

(a) rhombus   (b) square

(c) parallelogram   (d) rectangle

23. The rod of TV disc antenna is fixed at right angles to wall AB and a rod CD is supporting the disc as shown in Figure. If $AC = 3\,\text{m}$ long and $CD = 5\,\text{m}$, the value of $\tan\theta$ will be

(a) 1   (b) $\frac{3}{4}$

(c) $\frac{4}{5}$ (d) $\frac{3}{5}$

24. If a bag containing red and white balls, half the number of white balls is equal to one-third the number of red balls. Thrice the total number of balls exceeds seven times the number of white balls by 6.
How many balls of white colour does the bag contain ?

(a) 10   (b) 12

(c) 14   (d) 18

25. If one root of the equation $(k-1)x^2 - 10x + 3 = 0$ is the reciprocal of the other then the value of k is ....

(a) 2   (b) 3

(c) 4   (d) 5

26. Two different dice are rolled together once. What is the probability of numbers coming on the tops whose product is a perfect square?

(a) $\frac{7}{36}$ (b) $\frac{7}{9}$

(c) $\frac{2}{9}$ (d) $\frac{5}{36}$

27. Two different dice are thrown together. What is the probability of getting a total of 6 or 7 of the numbers on two dice?

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

(b) $\frac{11}{36}$

(c) $\frac{5}{36}$

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

28. Venus rotates in a nearly circular orbit around the sun. The largest angle formed by Venus, Earth, and the sun is $45°$. The distance from Earth to the sun is approximately 149 million kilometers. See the following figure. What is the orbital radius r of Venus? Round to the nearest million kilometers.
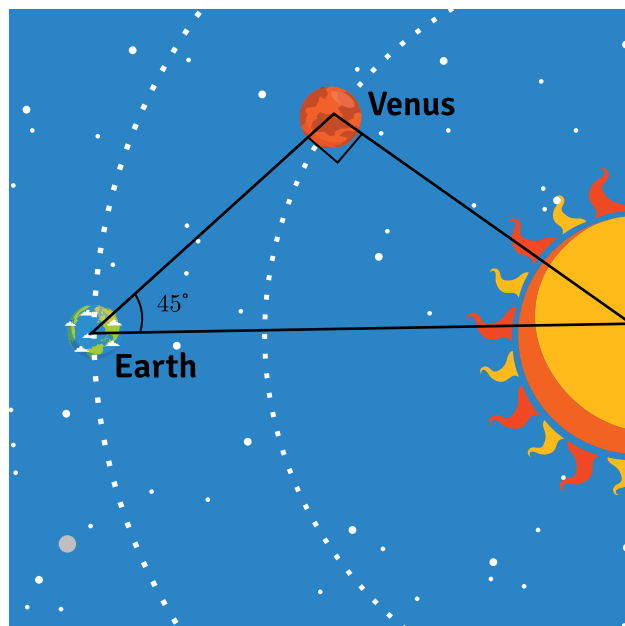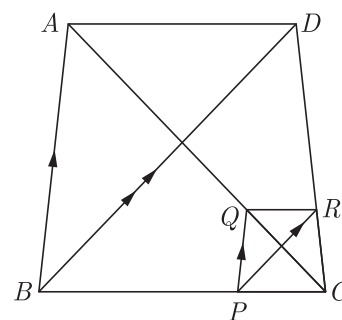

(a) 48   (b) 105

(c) 56   (d) 145

29. Locate a point Q on line segment AB such that $BQ = \frac{5}{7} \times AB$. What is the ratio of line segment in which AB is divided?

(a) $2 : 5$ (b) $6 : 7$

(c) $2 : 7$ (d) $7 : 2$

30. In the given figure, two triangles ABC and DBC lie on the same side of BC such that $PQ \parallel BA$ and $PR \parallel BD$. Which of the following is correct option ?

(a) $PR \parallel BD$ (b) $QR \parallel AD$

(c) (a) and (b)   (d) none

31. The points $(3,0)$, $(6,4)$ and $(-1,3)$ are the vertices of a

(a) equilateral triangle

(b) scalene triangle

(c) isosceles triangle

(d) right angled isosceles triangle

32. If $\sin\theta + \cos\theta = \sqrt{3}$, then $\tan\theta + \cot\theta = ?$

(a) 1   (b) 2

(c) $2\sqrt{2}$ (d) $2\sqrt{3}$

33. Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together?

(a) 360 minute   (b) 18 minute

(c) 36 minute   (d) 180 minute

34. The length of side AC is

(a) 10   (b) 12

(c) 15   (d) 24

35. In a classroom, 4 friends are seated at the points A, B, C, and D as shown in Figure. Champa and Chameli walk into the class and after observing for a few minutes Champa asks Chameli, Don't you think $ABCD$ is a rhombus ? Chameli disagrees. Why Chameli disagree ?
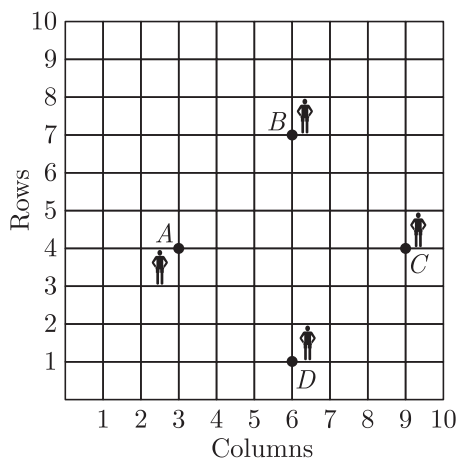
(a) because this is square

(b) because this is rectangle

(c) because this is parallelogram

(d) because this is quadrilateral

36. The area of a circular play ground is 22176 cm^2. What is the cost of fencing this ground at the rate of 50 per metre?

(a) ₹ 132   (b) ₹ 264

(c) ₹ 165   (d) ₹ 365

37. A steel wire when bent in the form of a square encloses an area or 121 cm^2. If the same wire is bent in the form of a circle, what is the circumference of the circle?

(a) 44π cm   (b) 22π cm

(c) 44 cm   (d) 22 cm

38. If one the zero of a polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, the value of k will be

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$

(c) $\frac{3}{2}$ (d) 0

39. In a circle of radius 21 cm, an arc subtends an angle of $60°$ at the centre. What is the area of sector formed by the arc?

(a) 312 cm^2 (b) 298 cm^2

(c) 402 cm^2 (d) 231 cm^2

40. For what values of a and b does the following pair of linear equations have infinite number of solution ?

$2x + 3y = 7, a(x + y) - b(x - y) = 3a + b - 2$
The value of a will be

(a) 3   (b) 4

(c) 5   (d) 6

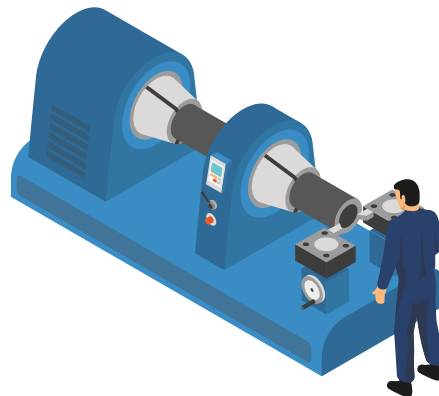# SECTION C

Case study based questions:
Section C consists of 10 questions of 1 mark each. Any 8 questions are to be attempted.

Case Based Questions: (41-45)

Satellite Images : Satellite images are images of Earth collected by imaging satellites operated by governments and businesses around the world. Satellite imaging companies sell images by licensing them to governments and businesses such as Apple Maps and Google Maps. It should not be confused for astronomy images collected by space telescope.

Barun lives in Jaipur in Vaishali. Satellite image of his colony is shown in given figure. In this view, his house is pointed out by a flag, which is situated at the point of intersection of x and y- axes. If he goes 2 cm east and 3 cm north from the house, then he reaches to a grocery store, If he goes 4 cm west and 6 cm south from the house, then he reaches to his office. If he goes 6 cm east and 8 cm south from the house, then he reaches to a food court. If he goes 6 cm west and 8 cm north from the house, he reaches to a his kid's school. Based on the above information, answer the following questions.

41. What is the distance between grocery store and food court?

(a) $\sqrt{137}$ cm

(b) $\sqrt{129}$ cm

(c) $8\sqrt{15}$ cm

(d) $16\sqrt{3}$ cm

42. What is the distance of the school from the house?

(a) 10 cm

(b) 15 cm

(c) 20 cm

(d) 25 cm

43. If the grocery store and office lie on a line, what is the ratio of distance of house from grocery store to that from office ?

(a) 2 :1

(b) 3 : 1

(c) 4 : 1

(d) 5 : 1

44. What is the ratio of distances of house from school to food court.

(a) 1 :1

(b) 2 : 1

(c) 3 : 1

(d) 4 : 1

45. What shape is formed by the coordinates of positions of school, grocery store, food court and office?

(a) square

(b) rectangle

(c) rhombus

(d) quadrilateral

Case Based Questions: (46-50)

RK Fabricators has got a order for making a frame for machine of their client. For which, they are using a AutoCAD software to create a constructible model that includes the relevant information such as dimensions of the frame and materials needed.

The frame will have a solid base and will be cut out of a piece of steel. The final area of the frame should be 54 sq m. The digram of frame is shown below.
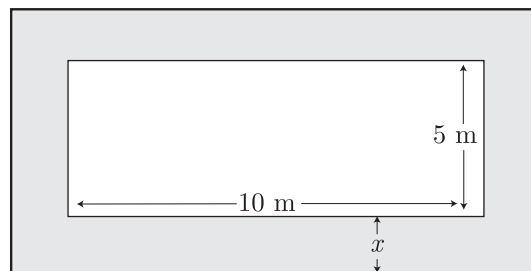
In order to input the right values in the AutoCAD software, the engineer needs to calculate some basic values.

46. What are the dimensions of the outer frame ?

(a) $(10 + x)$ and $(5 + x)$

(b) $(10 - x)$ and $(5 - x)$

(c) $(10 + 2x)$ and $(5 + 2x)$

(d) $(10 - 2x)$ and $(5 - 2x)$

47. A metal sheet of minimum area is used to make the frame. What should be the minimum area of metal sheet before cutting ?

(a) $4x^2 + 30x + 50$

(b) $x^2 + 27x + 55$

(c) $5x^2 + 30$

(d) $4x^2 + 50$

48. What is the area of required final metal frame ?

(a) $4x^2 + 30x + 50$ m^2

(b) $x^2 + 27x + 55$ m^2

(c) $4x^2 + 50x$ m^2

(d) $4x^2 + 30x$ m^2

49. If the area of the frame is 54 sq m, what is the value of x ?

(a) 0.75 m

(b) 3.0 m

(c) 1.5 m

(d) 1.8 m

50. What is the perimeter of the frame?

(a) 36 m

(b) 42 m

(c) 45 m

(d) 39 m

SAMPLE PAPER - 16 Answer Key

Paper Q. no.	Correct Option	Chapter no	Question Bank Q. no.
1	(d)	Ch-1	33
2	(c)	Ch-3	35
3	(d)	Ch-4	S-128
4	(c)	Ch-4	5
5	(b)	Ch-8	22
6	(d)	Ch-4	31
7	(d)	Ch-6	10
8	(a)	Ch-1	S-1
9	(b)	Ch-3	41
10	(b)	Ch-5	23
11	(a)	Ch-2	S-12
12	(d)	Ch-1	18
13	(d)	Ch-6	53
14	(a)	Ch-6	27
15	(b)	Ch-7	15
16	(c)	Ch-4	38
17	(c)	Ch-4	56
18	(a)	Ch-6	77
19	(a)	Ch-3	S-5
20	(a)	Ch-8	S-6
21	(c)	Ch-1	50
22	(c)	Ch-5	52
23	(b)	Ch-6	65
24	(b)	Ch-3	D-79
25	(c)	Ch-2	28

Paper Q. no.	Correct Option	Chapter no	Question Bank Q. no.
26	(c)	Ch-8	159
27	(b)	Ch-8	118
28	(b)	Ch-6	139
29	(a)	Ch-5	S-8
30	(a)	Ch-4	148
31	(d)	Ch-5	42
32	(a)	Ch-6	90
33	(d)	Ch-1	S-28
34	(b)	Ch-4	D-74
35	(a)	Ch-5	88
36	(b)	Ch-7	S-6
37	(c)	Ch-7	S-16
38	(b)	Ch-2	S-36
39	(d)	Ch-7	S-26
40	(c)	Ch-3	D-94
41	(a)	Ch-5	138
42	(a)	Ch-5	139
43	(a)	Ch-5	140
44	(a)	Ch-5	141
45	(d)	Ch-5	142
46	(c)	Ch-2	79
47	(a)	Ch-2	80
48	(d)	Ch-2	81
49	(c)	Ch-2	82
50	(b)	Ch-2	83

* S- = Self Test Question, * D- = Direction Based Question