DAYANAND ANGLO VEDIC PUBLIC SCHOOL, AIROLI
FIRST TERM EXAMINATION (2024-25)
SUBJECT : MATHEMATICS
(SAMPLE PAPER)

Class: X

Duration: 3 Hrs. **Maximum Marks: 80**

General Instructions:

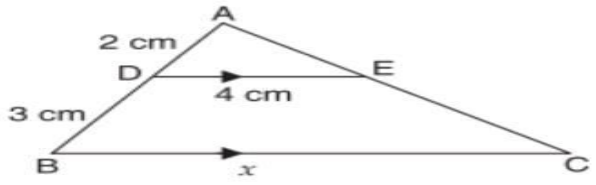
1. This Question Paper has 5 Sections A − E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1,1 and 2 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.
8. An internal choice has been provided in the 2 marks questions of Section E.
9. Draw neat figures wherever required.
10. Take $\pi = 22/7$ wherever required if not stated.

	SECTION A	
	Section A consists of 20 questions of 1 mark each.	
1.	The LCM of smallest two-digit composite number and smallest composite number is: (a) 12 (b). 4 (c) 20 (d) 44	**(1)**
2.	The number of polynomials having zeroes as – 2 and 5 is: (a) 1 (b) 2 (c) 3 (d) more than 3	**(1)**
3.	Consider the frequency distribution. <table><tr><td>Class</td><td>0 – 5</td><td>6 – 11</td><td>12 – 17</td><td>18 – 23</td><td>24 – 29</td></tr><tr><td>Frequency</td><td>13</td><td>10</td><td>15</td><td>8</td><td>11</td></tr></table> The upper limit of median class is (a) 17 (b) 17.5 (c) 18 (d) 18.5	**(1)**
4.	A quadratic polynomial whose zeroes are -3 and 4 is: (a) $x^2 – x + 12$ (b)) $x^2 + x + 12$ (c) $x^2 – x - 12$ (d) $2x^2 + 2x - 24$	**(1)**
5.	If -4 is a zero of the quadratic polynomial $x^2 – x – (2k + 2)$. Find the value of k. (a) 7 (b) 8 (c) 9 (d) 1	**(1)**
6.	The pair of equations x + 2y-5 = 0 and -4x-8y+20=0 have: (a) Unique solution (b) Exactly two solutions (c) Infinitely many solutions (d) No solution	**(1)**
7.	If the lines 3x + 2ky – 2 = 0 and 2x +5y + 1 = 0 are parallel, then what is the value of k? (a) 4/15 (b) 15/4 (c) 4/5 (d) 5/4	**(1)**
8.	If ½ is a root of the quadratic equation $x^2 + kx – 5/4 = 0$ then the value of the k is: (a) 2 (b) -2 (c) 3 (d) -3	**(1)**
9.	Equation $(x +1)^2 – x^2 = 0$ has _____ real roots (a) 1 (b) 2 (c) 3 (d) 4	**(1)**

10. In the given figure DE || BC, then x equals: **(1)**

a) 6 cm (b) 8 cm

(c) 12 cm (d) 10 cm



11. Δ ABC and ΔDEF are similar such that 2 AB = DE and BC = 8 cm, then the value of EF is **(1)**

(a) 15 cm (b) 16 cm (c) 18 cm (d) 20 cm

12. If cos $\theta = \frac{a}{b}$, then cosec θ is equal to **(1)**

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

13. In ΔABC right angled at B, if tan A= √3, then cos A cos C- sin A sin C is: **(1)**

(a) -1 (b) 0 (c) 1 (d) √3/2

14. A pole of 6m high casts a shadow $2\sqrt{3}$ m long, then sun's elevation is : **(1)**

(a) 60° (b) 45° (c) 30° (d) 90°

15. If 4 tanβ = 3, then $\frac{4\sin\beta - 3\cos\beta}{4\sin\beta + 3\cos\beta}$ = **(1)**

(a) 0 (b) 1/3 (c) 2/3 (d) ¾

16. For the following distribution, **(1)**

Class	0-5	5-10	10-15	15-20	20-25
Frequency	10	15	12	20	9

The sum of lower limits of median class and modal class is:

(a) 15 (b) 25 (c) 30 (d) 35

17. The _____ of a class is the frequency obtained by adding the frequencies of all the classes preceding the given class. **(1)**

(a) Class mark (b) Class height (c) Average frequency (d) Cumulative frequency

18. If a number x is chosen from the numbers 1, 2, 3 and a number y is selected from the numbers 1, 4, 9. Then P (xy < 9) is **(1)**

$(a)\frac{3}{9}$ (b) $\frac{4}{9}$ (c) $\frac{1}{9}$ (d) $\frac{5}{9}$

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(A)** : The roots of the quadratic equation $2x^2 + x + 4 = 0$ are imaginary. **(1)**

Reasons(R): If discriminant $D = b^2 - 4ac < 0$ then the roots of quadratic equation $ax^2 + bx + c = 0$ are imaginary.

20. (Assertion): 6^n ends with digit zero, where n is natural number. **(1)**

(Reason): Any number ends with digit zero, if its prime factor is of the form $2^m \times 5^n$, where m, n are natural numbers.

SECTION B

Section B consists of 5 questions of 2 marks each.

21. (a) Find a quadratic polynomial whose product and the sum of zeroes are ¼ and – 1 respectively. **(2)**

OR

(b) If one zero of the polynomial $(a^2 + 9)\,x^2 + 13\,x + 6a$ is reciprocal of the other, find the value of a.

22. Find whether the following pair of linear equations is consistent or inconsistent: **(2)**

$3x + 2y = 8$; $6x – 4y = 9$

23. Find the value of the p so that the quadratic equations $px(x – 3) + 9 = 0$ has two equal roots. **(2)**

OR

Find the values of k so that the quadratic equation $x^2 – 4kx + k = 0$ has equal roots.

24. Prove that : $\sec A\,(1 – \sin A)\,(\sec A + \tan A) = 1$ **(2)**

25. Evaluate the following: $\frac{\cos 45°}{\sec 30° + \operatorname{cosec} 30°}$ **(2)**

SECTION C

Section C consists of 6 questions of 3 marks each.

26. Prove $\sqrt{5}$ is an irrational number. **(3)**

OR

Three bulbs red, green and yellow flash at intervals 80 seconds, 90 seconds and 110 seconds. All three flash together at 8 am. When will these three bulbs flash together again?

27. If α *and* β are the zeroes of the quadratic polynomial $p(x) = ax^2 + bc + c$, then find the value of **(3)**

$\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$.

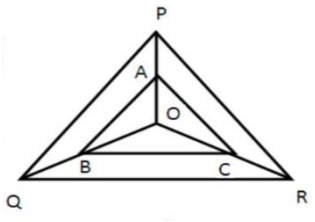
28. Draw the graph of the equations x-y+1=0 and 3x+2y-12=0.Using this graph find the values of x and y which satisfy both the equations. **(3)**

29. **(3)**

Legs (sides other than the hypotenuse) of a right triangle are of lengths 16cm and 8 cm. Find the length of the side of the largest square that can be inscribed in the triangle.

OR

In given figure, A, B and C are points on OP, OQ and OR respectively such that AB ||PQ and BC||QR. Show that AC||PR



30. If the mean of the following distribution is 54, find the missing frequency x : **(3)**

Class	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Frequency	16	14	24	26	x

31. In a single throw of two dice, find the probability of **(3)**

(a) A doublet (b)A number less than 3 on each die (c) An odd number as a sum

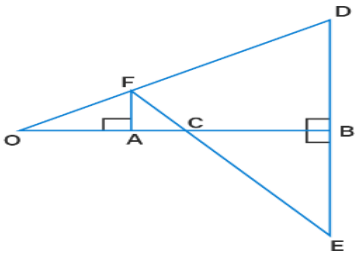
SECTION D

Section D consists of 4 questions of 5 marks each.

32. Students of a class are made to stand in rows. If 4 students are extra in a row, there would be 2 rows less . If 4 students are less in a row ,there would be 4 more rows. Find the number of students in the class. **(5)**

33. OB is perpendicular bisector of the line segment DE. FA is perpendicular to OB and FE intersects OB at point C. **(5)**

Prove that $\frac{1}{OA} + \frac{1}{OB} = \frac{1}{OC}$.



34. Prove that: **(5)**

$$\frac{tan\theta + Sec\theta - 1}{tan\theta - Sec\theta + 1} = \frac{Cos\theta}{1 - Sin\theta}$$

OR

If sin θ + cos θ = m and sec θ + cosec θ = n then show that n (m^2 – 1) = 2m.

35. Find the mean, median and mode of the following data: **(5)**

Class	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	100 - 120	120 - 140
Frequency	6	8	10	12	6	5	3

OR

In a retail market, fruit vendor were selling mangoes in packing boxes. These boxes contained varying number of mangoes. The following was the distribution:

No. of Mangoes	50 - 52	53 - 55	56 - 58	59 - 61	62 - 64
No. of boxes	15	110	135	115	25

Find the mean and median number of mangoes kept in a packing box.

SECTION E

Case study based questions are compulsory.

36. Case Study 1:

A vegetable seller has 420 potatoes and 130 tomatoes. He wants to stack them in such a way that each stack has same summer and they take up the least area of the tray.

Based on the above information of a vegetable shop, answer the following questions

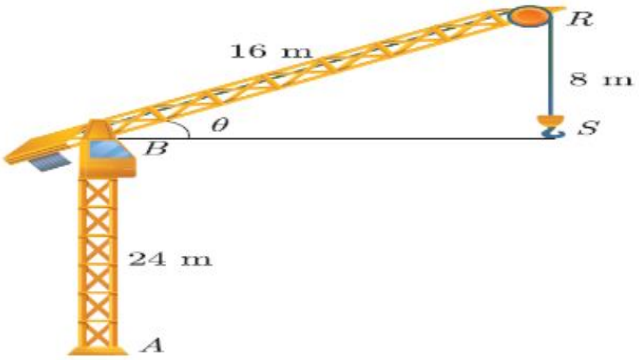
(i) What is the number of vegetables that can be placed in each stack for this purpose? **(1)**

(ii) What is the minimum number of stacks in which vegetables can be placed? **(1)**

(iii) Find the product of exponents of the prime factors of total number of vegetables.

OR **(2)**

(iii)What is the total number of rows in which they can be placed?

37.	**Case Study 2-** India is one of the largest importers of crude oil. Oil companies produce crude oil in barrels. Suppose the maximum oil produced by a company is 300 barrels and profit made from sale of these barrels is given by the function P (x) = $-10x^2 + 3500x - 66000$, where P(x) is profit in rupees and x is the number of barrels produced and sold.  Based on the above information, answer the following questions: (i) When no barrel is produced, then find the profit or loss. (ii) How many barrels should be produced by the company for no profit or no loss? (iii) If 100 barrels are produced, then find the profit or loss. OR (iii) If 400 barrels are produced, then find the profit or loss.	**(1)** **(1)** **(2)**
38.	**Case Study 3- Plan Strategy** Tower cranes are a common fixture at any major construction site. They're pretty hard to miss – they often rise hundreds of feet into the air, and can reach out just as far. The construction crew uses the tower crane to lift steel, concrete, large tools like acetylene torches and generators, and a wide variety of other building materials. A crane stands on a level ground. It is represented by a tower AB, of height 24 m and a jib BR. The jib is of length 16 m and can rotate in a vertical plane about B. A vertical cable, RS, carries a load S. The diagram shows current position of the jib, cable and load. Based on the above information answers the following questions.  (i) Find is the distance BS ? (ii) What is the measure of the ∠BRS ? (iii) What is the angle that the jib, BR, makes with the horizontal? OR (iii) What is the angle between BR and SR?	**(1)** **(1)** **(2)**