VELAMMAL BODHI CAMPUS

(A CBSE IIT/NEET Integrated Sr. Sec. School)

Grade: X Batch II **Grand Test – 4** **Marks:** 80

Sub: Maths **Duration:** 3 hours

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

Section A consists of 20 questions of 1 mark each.

1. The 5th term of an AP is 20 and the sum of its 7th and 11th terms is 64. The common difference of the AP is

   (a) 4 (b) 5 (c) 3 (d) 2

2. If a chord AB subtends an angle of 60^o at the centre of a circle, then the angle between the tangents to the circle drawn from A and B is

   (a) 30^o (b) 60^o (c) 90^o (d) 120^o

3. The roots of the equation $2x^2 - 6x - 7 = 0$ are

   (a) real and equal (b) real, unequal (c) Imaginary (d) none of these

4. The perimeter of the triangle with vertices (0, 4), (0, 0) and (3, 0) is

   (a) $(7 + \sqrt{5})$ (b) 5 (c) 10 (d) 12

5. If $2 \sin 2\theta = \sqrt{3}$ then θ = ?

   (a) 30^o (b) 45^o (c) 60^o (d) 90^o

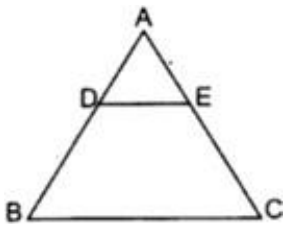
6. The length of the minute hand of a clock is 21 cm. The area swept by the minute hand in 10 minutes is

   (a) 231 cm^2 (b) 210 cm^2 (c) 126 cm^2 (d) 252 cm^2

7. A box contains 90 discs, numbered from 1 to 90. If one disc is drawn at random from the box, the probability that it bears prime number less than 23 is

   (a) 7/90 (b) 1/9 (c) 4/45 (d) 8/89

8. In figure, if DE || BC, AD=3 cm, BD= 4 cm and BC= 14 cm, then DE equals



   (a) 7 cm (b) 6 cm (c) 4 cm (d) 3 cm

9. If a pair of linear equations is consistent then their graph lines will be
(a) parallel (b) always coincident
(c) always intersecting (d) intersecting or coincident

10. Weights of 40 eggs were recorded as given below:

Weights (in gms)	85 – 90	90 – 95	95 – 100	100 –105	105- 110
No. of eggs	10	12	12	4	2

The lower limit of the median class is
(a) 90 (b) 95 (c) 100 (d) 105

11. The distance of P(-3,-4) from the $x-axis$ is
(a) 3 units (b) 4 units (c) 5 units (d) 1 unit

12. The length of the tangent from an external point P to a circle of radius 5 cm is 10 cm. The distance of the point from the center of the circle is
(a) 8 cm (b) $\sqrt{104}$ cm (c) 12 cm (d) $\sqrt{125}$ cm

13. How many terms of the AP 3, 7, 11, 15, ……. will make the sum 406?
(a) 10 (b) 12 (c) 14 (d) 20

14. A quadratic polynomial whose zeros are 5 and –3, is
(a) $x^2 + 2x - 15$ (b) $x^2 - 2x - 15$ (c) $x^2 - 2x + 15$ (d) $x^2 - 5x - 3$

15. A maximum diameter of sphere is carved out from the cube of edge 6 cm. The diameter of sphere is:
(a) 3 cm (b) 6 cm (c) 12cm (d) 9 cm

16. A vertical stick 1.8 m long casts a shadow 45 cm long on the ground. At the same time, what is the length of the shadow of a pole 6 m high?
(a) 2.4 m (b) 1.35 m (c) 1.5 m (d) 13.5 m

17. The value of $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$ is
(a) 1 (b) –1 (c) 0 (d) none of these

18. The HCF of two numbers is 27 and their LCM is 162. If one of the numbers is 54, what is the other number?
(a) 36 (b) 45 (c) 9 (d) 81

Q19 – Q20 consists of two statements, namely, Assertion (A) and Reason (R). Select the correct answer:
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).
(c) Assertion (A) is true and Reason (R) is false.
(d) Assertion (A) is false and Reason (R) is true

19. **Assertion (A):** The line of sight is the line drawn from the eye of an observer to the point in the object viewed by the observer.
Reason (R): Trigonometric ratios are used to find height or length of an object or distance between two distant

20. **Assertion (A):** In a circle of radius 6 cm, the angle of a sector is 60°. Then the area of the sector is 132/7 cm^2.
Reason (R): Length of the arc of circle with radius r is $\frac{\theta}{360^\circ}\ 2\pi r$.

SECTION B

Section B consists of 5 questions of 2 mark each:

21. Find the largest four-digit number which when divided by 4, 7 and 13 leaves a remainder 3 in each case.

22. If $\text{cosec}^2\theta\ (1 + \cos\theta)\ (1 - \cos\theta) = \lambda$, then find the value of λ.

(Or)

If $(1 + \cos A)\ (1 - \cos A) = 3/4$, find the value of sec A.

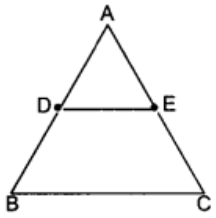
23. Find the length of the arc of a circle of diameter 42 cm which subtends an angle of 60° at the centre.

(Or)

Find the area of a sector of a circle with radius 6 cm, if the angle of the sector is 60^o.

24. Prove that the tangent to a circle is perpendicular to the radius through the point of contact.

25. In Fig., DE || BC. If AD = x, DB = x – 2, AE = x + 2 and EC = x – 1, find the value of x.



SECTION C

Section C consists of 6 questions of 3 marks each:

26. Show that reciprocal of $3+2\sqrt{2}$ is an irrational number.

27. Find the zeroes of the quadratic polynomial $9t^2 - 6t + 1$ and verify the relationship between the zeroes and the coefficients.

28. Solve the following pair of linear equations:
$y - 4x = 1;\ 6x - 5y = 9$

(Or)

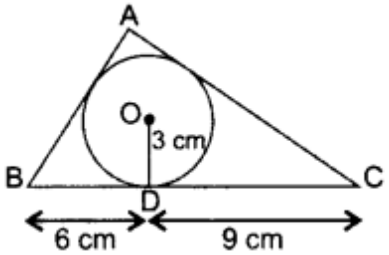
Solve the following system of linear equations graphically.
$3x + y - 12 = 0;\ x - 3y + 6 = 0$ Shade the region bounded by the lines and x-axis. Also, find the area of shaded region.

29. If $x = p \sec\theta + q \tan\theta$ and $y = p \tan\theta + q \sec\theta$, prove that $x^2 - y^2 = p^2 - q^2$.

30. Prove that the parallelogram circumscribing a circle is a rhombus.

(Or)

In the figure, a ΔABC is drawn to circumscribe a circle of radius 3 cm, such that the segments BD and DC are respectively 6 cm 9 cm of lengths 6 cm and 9 cm. If the area of ΔABC is 54 cm^2, then find the lengths of sides AB and AC.



31. A card is drawn at random from a well shuffled deck of playing cards. Find the probability that the card drawn is:
(i) a card of space or an ace
(ii) neither a jack nor a king
(iii) either a king or a queen

SECTION D

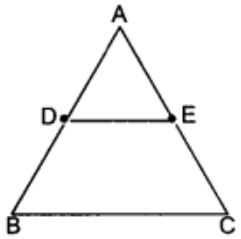
Section D consists of 4 questions of 5 mark each:

32. A train covers a distance of 300 km at a uniform speed. If the speed of the train is increased by 5 km/hour, it takes 2 hours less in the journey. Find the original speed of the train.

(Or)

Solve for x: $\frac{x-4}{x-5}+\frac{x-6}{x-7}=\frac{10}{3}\ ;x\ \neq 5,7$

33. Prove that, if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
Using the above result, do the following:
In Fig., DE || BC and BD = CE. Prove that ΔABC is an isosceles triangle.



34. A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm, which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 g mass. (Use $\pi = 3.14$).

(Or)

Due to sudden floods, some welfare associations jointly requested the government to get 100 tents fixed immediately and offered to contribute 50% of the cost. If the lower part of each tent is of the form of a cylinder of diameter 4.2 m and height 4 m with the conical upper part of same diameter but of height 2.8 m, and the canvas to be used costs 100 per sq. m, find the amount, the associations will have to pay. (Use $\pi = 22/7$)

35. The following table shows the ages of the patients admitted in a hospital during a year:

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
Number of patients	6	11	21	23	14	5

Find the mode and the mean of the data given above. Compare and interpret the two measures of central tendency.

(Or)

Some students of class X donated for the welfare of old age persons. Their contributions are shown in the following frequency distribution:

Amount (Rs.)	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
No. of Students	5	8	12	11	4

Find median and mode for their contribution.

SECTION - E

CASE STUDY QUESTIONS:

36. To raise social awareness about hazards of cancer, an organisation decided to start a campaign. 5 students were asked to prepare campaign banners in the shape of a triangle. The vertices of the triangle are, A (0, 6), B (6, 6) and C(1, 1).
Based on the above information, answer the following questions.

(i) If S be the mid-point of line joining A and B, then find the coordinates of S?

(ii) If T be the mid-point of the line joining C and B, then find the coordinates of T?

(Or)

If U be the mid-point of line joining C and A then find the coordinates of U?

(iii) Find the coordinates of centroid of ΔSTU?

37. Amit was playing a number card game. In the game, some number cards (having both + ve or – ve numbers) are arranged in a row such that they are following an arithmetic progression. On his first turn, Amit picks up 6th and 14thcard and finds their sum to be -76. On the second turn he picks up 8th and 16thcard and finds their sum to be – 96.
Based on the above information, answer the following questions.

1) What is the difference between the numbers on any two consecutive cards?

2) What is the number on the 19th card?

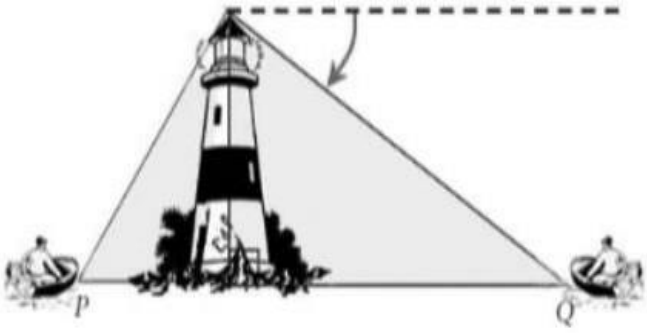
(Or)

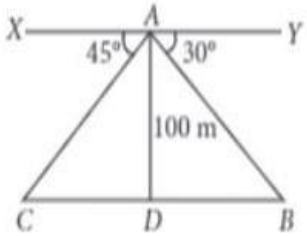
What is the number on the 23rd card?

3) Find the sum of numbers on the first 15 cards?

38. **LIGHT HOUSE**

A boy is standing on the top of light house. He observed that boat P and boat Q are approaching to light house from opposite directions. He finds that angle of depression of boat P is 45^0 and angle ofdepression of boat Q is 30^0. He also knows that height of the light house is 100m.





Based on the above information, answer the following questions.

1) Measure of $\angle A$? If $\angle$YAB = 30^0, then $\angle ABD \; is \; also \; 30^0$, why?

2) Find the length of CD?

(Or)

Find the length of BD?

3) Find the length of AC?

****** ALL THE BEST ******