DAV PUBLIC SCHOOLS, ODISHA
PRE-BOARD EXAMINATION
(2023-24)

- Please check that this question paper contains 6 printed pages.
- Please check that this question paper contains 38 questions.
- Please write down the Serial Number of the question before attempting it.
- 15 minutes time has been allotted to read this question paper. The students will read the question paper only during this time and will not write any answer on the answer-book during this period.

CLASS –X
SUBJECT: MATHEMATICS (BASIC-241)

Time allowed :3 Hours   **MaximumMarks:80**

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 1,1and 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 Qs 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 π =22/7 wherever required if not stated.

SECTION -A

(Section A consists of 20 questions of 1 mark each)

1. The HCF of the least prime number and the least composite number is

    (a) 1   (b) 2   (c) 3   (d) 4

2. The prime factorisation of 256 is

    (a) 2^6 (b) 2^7 (c) 2^8 (d) 2^9

3. If $x^2 + 2kx + 4 = 0$ has a root $x = 2$, then the value of k is

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

4. For what value of k , do the equations $3x - y + 8 = 0$ and $6x - ky = -16$ represent infinite solutions?

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

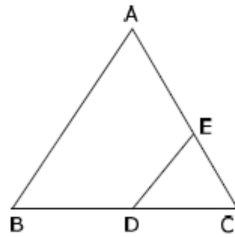5. The roots of equation $3x^2 - 7x - 5 = 0$ are

   (a) real and equal   (b) imaginary

   (c) real and unequal   (d) none of these

6. The distance between the points $(0, 3)$ and $(-2, 0)$ is

   (a) $\sqrt{14}$ (b) $\sqrt{15}$ (c) $\sqrt{13}$ (d) $\sqrt{5}$

7. In the figure, $\triangle ABC \sim \triangle EDC$, if AB = 4cm, ED= 3cm, CE = 4.2 cm and CD = 4.8cm, then the values of CA

   (a) 6cm   (b) 4.8cm   (c) 5.4cm   (d) 5.6cm

8. If $\triangle ABC \sim \triangle PQR$, perimeter of $\triangle ABC$ = 32 cm, perimeter of $\triangle PQR$ = 48 cm and PR = 6 cm, the the length of AC is equal to:

   (a) 9 cm   (b) 4 cm   (c) 8 cm   (d) 18 cm

9. The distance between the points of contact of two parallel tangents of a given circle of radius 6 cm is

   (a) 6 cm   (b) 9 cm   (c) 18 cm   (d) 12 cm

10. If $\theta = 45°$, then the value of $\frac{1-\cos^2\theta}{\sin^2\theta}$ is

   (a) 0   (b) 1   (c) 2   (d)3

11. In a triangle PQR, right-angled at Q, PQ = 3 cm and PR = 6 cm, then $\angle QPR = $?

   (a) 0°   (b) 30°   (c) 45°   (d) 60°

12. Find the length of the shadow of 10 m high tree if the angle of elevation of the sun is 30˚.

   (a) 10 m   (b) $\frac{10}{\sqrt{3}}$ m   (c) $10\sqrt{3}$ m   (d) 20 m.

13. If the sum of the circumferences of two circles with radii R_1 and R_2 is equal to the circumference of a circle of radius R, then

   (a) $R_1 + R_2 = R$ (b) $R_1 + R_2 > R$ (c) $R_1 + R_2 < R$ (d) Can't say

14. If the diameter of a semicircular protractor is 14 cm, then its perimeter is:

   (a) 27 cm   (b) 36 cm   (c) 18 cm   (d) 9 cm

15. If an event occurs surely, then its probability is

   (a) 0   (b) 1   (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

16. The total surface area of a solid hemisphere of radius r is

(a) $4\pi r^2$ (b) $2\pi r^2$ (c) $\frac{4}{3}\pi r^3$ (d) $3\pi r^2$

17. For the following distribution median class is

Class	0 – 10	10 – 20	20 – 30	30 – 40
Frequency	05	04	06	01

(a) (20 – 30)   (b) (30 – 40)   (c) (40 – 50)   (d) (10 – 20)

18. The class with maximum frequency is called

(a) Median class   (b) modal class   (c) mean class   (d) average class

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.

19. **Assertion(A):** The point (0,4) lies on Y-axis.

Reason (R): The y-coordinate of a point on x-axis is zero.

(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 but 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

20. **Assertion(A) :** The HCF of two numbers is 10 and their product is 1000, then their LCM is 100

Reason(R) : For any two positive integers *a* and *b*, HCF (*a*, *b*) $\times$ LCM (*a*, *b*) = *a*$\times$*b*.

(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 but 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.

SECTION- B
(Section B consists of 5 questions of 2 marks each)

21. Solve the following system of linear equations : 4x - 5y - 20 = 0 ;3x + 5y - 15 = 0
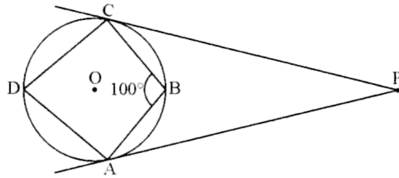
22. In the given Figure , if LM || CB and LN || CD, prove that $\frac{AM}{AB} = \frac{AN}{AD}$
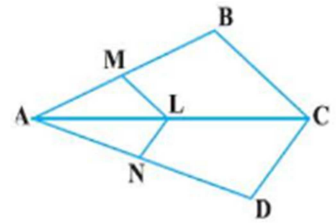
OR

If two triangles are congruent, then prove that the triangles are similar.

23. In the given figure, ABCD is a cyclic quadrilateral. The tangents at the points A and C of the circle meet each other at the point P.

If ∠ABC = 100°, then find the measure of ∠APC .

24. If $\tan(A - B) = \frac{1}{\sqrt{3}}$ and $\tan(A + B) = \sqrt{3}$, then find the value of A and B.

25. The length of the arc of a sector of a circle of radius 5.2 cm is 16.4 cm. Find the area of the sector.

OR

In a circle of radius 21 cm, an arc subtends an angle of 60° at centre. Find the length of arc.

SECTION-C

(Section C consists of 6 questions of 3 marks each)

26. Prove that $\sqrt{2}$ is an irrational number.

27. Find the zeroes of the quadratic polynomial $5x^2 + 8x - 4$ and verify the relationship between the zeroes and the coefficients of the polynomial.

28. Sum of the ages of a father and the son is 40 years. If father's age is three times that of his son, then find their present ages.

OR

A and B are two places 150 km apart on a highway. Two cars start from A and B at the same time. If they move in the same direction they meet in 15 hours. But if they move in the opposite directions, they meet in 1 hour. Find their speeds.

29. In the figure given below, two tangents TP and TQ are drawn to the circle with centre O from an external point T . Prove that ∠PTQ = 2∠OPQ.
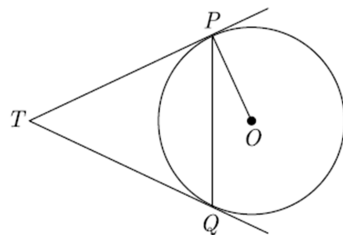
30. Prove that: $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = 2\sec\theta$

OR

Prove the identity: $\dfrac{1+secA}{secA} = \dfrac{sin^2A}{1-cosA}$.

31. A bag contains 5 black, 7 red & 3 white balls. A ball is drawn from the bag at random. Find the probability that the ball drawn is

 (i) red ball   (ii) black or white ball   (iii) not black ball

SECTION-D
(Section D consists of 4 questions of 5 marks each)

32. In a class test, the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English ,the product of their marks would have been 210. Find her marks in the two subjects.

OR

 The difference of squares of two numbers is 180. The square of the smaller number is 8 times the largest number. Find the two numbers.

33. (a) Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio.

 Using above theorem solve the question below.
 (b) In the adjoining figure, if ST || QR, then find the length of PS .
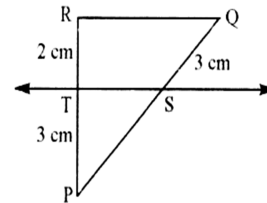
34. A toy is in the form of a cone of radius 3.5cm , mounted on a hemisphere of same radius. The total height of the toy is 15.5cm.Find the total surface area of the toy.

OR

A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm & the total height of the vessel is 13 cm. Find the inner surface area of the vessel.

35. The median of the following data is 27. Find the value of x & y, if the total frequency is 68.

CI	0-10	10-20	20-30	30-40	40-50	50-60
F	5	x	20	14	y	8

SECTION- E
Case study based questions are compulsory.

36. In a class the teacher asks every student to write an example of A.P. Two friends Gopa and Simran writes their progressions as -5, -2, 1,4, ... and 187, 184, 181, ... respectively. Now, the teacher asked the students the following questions on these two progressions. Help students to find the answers of the questions.

(i) Find the 34th term of the progression written by Simran. (1)
(ii) Find the 19th term of the progression written by Gopa. (1)
(iii) Find the sum of first 10 terms of the progression written by Gopa. (2)

OR

Which term of the two progressions will have the same value?

37. In order to conduct Sports Day activities in your School, lines have been drawn with chalk powder at a distance of 1 m each, in a rectangular shaped ground ABCD, 100 flowerpots have been placed at a distance of 1m from each other along AD, as shown in given figure below. Bindu runs $\frac{1}{4}$th the distance AD on the 2nd line and posts a green flag. Preet runs $\frac{1}{5}$th the distance AD on the eighth line and posts a red flag.
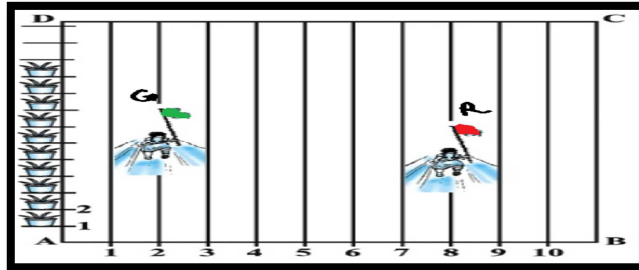

(i) Find the position of green flag. (1)
(ii) Find the distance between both the flags? (1)
(iii) If Rashmi has to post a blue flag exactly half way between the line segment joining the two flags, where should she post her flag? (2)

OR

If Joy has to post a flag at one-fourth distance from green flag, in the line segment joining the green and red flags, then where should he post his flag?

38. Ravish got a clinometer from school lab and started measuring elevation angle in surrounding. He saw a building on which society logo is painted on wall of building. From a point P on the ground level, the angle of elevation of the roof of the building is 45^0. The angle of elevation of the centre of logo is 30^0 from same point. The point P is at a distance of 24 m from the base of the building. On the basis of the above information, answer the following
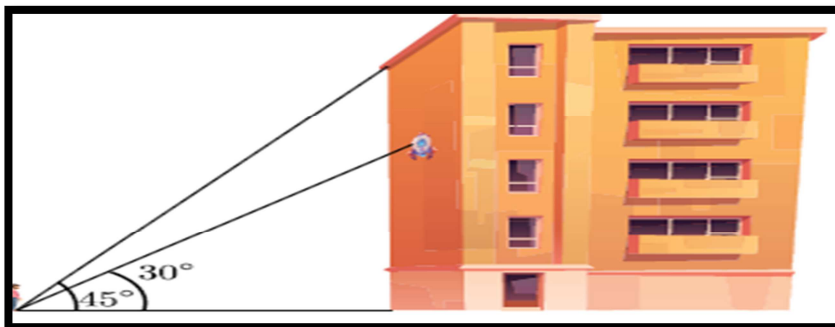
(i) Find the height of the building logo from the ground ? (1)
(ii) Find the height of the building from ground ? (1)
(iii) Find the distance of the point P from the top of the building ? (2)

OR

If the point of observation P is moved 16 m towards the base of the building, then find the angle of elevation θ of the logo on building.

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