DELHI PUBLIC SCHOOL, VIJAYAWADA

PRE-BOARD EXAMINATIONS - 2023-24

CLASS- X **PB 1 – 041 / A**

SUBJECT - MATHEMATICS (041)

Time Allowed: 3Hrs **Maximum Marks: 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 Short answer type questions carrying 02 marks each.
4. Section C has 6 Short answer type questions carrying 03 marks each.
5. Section D has 4 long answer type questions carrying 05 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 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided.

SECTION- A **20×1=20M**

1. If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$, then HCF(a, b) is

(A) xy (B) xy^2 (C) x^3y^2 (D) x^4y^4

2. If **n** is a natural number, then which of the following numbers end with zero?

(A) $(3\times5)^n$ (B) $(2\times3)^n$ (C) $(2\times5)^n$ (D) $(7\times5)^n$

3. The prime factorisation of natural number 288 is

(A) $2^4\times3^2$ (B) $2^4\times3^3$ (C) $2^5\times3^2$ (D) $2^5\times3$

4. The ratio of HCF to LCM of the least composite number and least prime number is.

(A) 1:2 (B) 1:3 (C) 1:1 (D) 2:1

5. The product of two consecutive positive integers is 360.

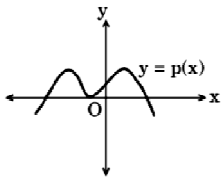
To find the integers, the above condition can be represented in the form of quadratic equation as:

(A) $x^2+x-360=0$ (B) $x^2+x+360=0$ (C) $2x^2+360<0$ (D) $x^2+x-360>0$

6. A quadratic polynomial whose zeroes are $(2+\sqrt{3})$ and $(2-\sqrt{3})$,is

(A) x^2-2x+2 (B) x^2-4x+1 (C) $x^2-\sqrt{3}x+2$ (D) $x^2-\sqrt{3}$

7. The graph of y = p(x) is given, for a polynomial p(x). The number of zeroes of p(x) from the graph is



(A) 3 (B) 1

(C) 2 (D) 0

8. The two roots of the equation $3x^2 - 2\sqrt{6}x + 2 = 0$ are:

(A) Real and distinct (B) Imaginary roots

(C) Real and equal (D) In sufficient information.

9. If p-1, p+1and 2p+3 are in AP, then the value of **p** is

(A) 4 (B) 0 (C) 2 (D) –2

10. The 8th term of an AP is 17 and it's 14^{th} term is 29, the common difference is

(A) 3 (B) 2 (C) 5 (D) –2

11. A line intersects the y -axis and x -axis at the points P and Q, respectively. If (2,-5) is the midpoint of PQ ,then the coordinates of P and Q are, respectively

(A) (0,-5) and (2,0) (B) (0,10) and(-4,0) (C) (0,4) and(-10,0) (D) (0,-10) and (4,0)

12. The fourth vertex D of a parallelogram ABCD whose three vertices are A(-2,3), B(6,7) and C(8,3) is

(A) (0,1) (B) (0,-1) (C) (-1,0) (D) (1,0)

13. $1-\left(\frac{sin^2 A}{1+cosA}\right)$ =

(A) tanA (B) sinA (C) cosecA (D) cosA

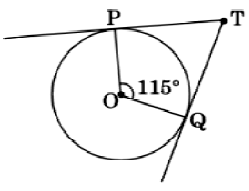
14. The angle subtended by a tower of height 200 metres at a point 200 metres from the base is

(A) 30° (B) 45° (C) 60° (D) 90°

15. A circle is of radius 3cm. The distance between two of its parallel tangents is

(A) 3cm (B) 4cm (C) 6cm (D) 9cm

16. In the given figure, TP and TQ are tangents drawn to the circle with centre at O. If ∠POQ = 115^o then ∠ PTQ is:



(A) 65° (B) 100°

(C) 32.5° (D) 180°

17. If P(E) = 0.005,then the probability of "not E" is:
(A) 0.002 (B) 0.95 (C) 0.995 (D) 0.095

18. The area of circle that can be inscribed in a square of side 6 cm is
(A) 36π sq cm (B) 18π sq cm (C) 12π sq cm (D) 9π sq cm.

19. Assertion(A): The total surface area of a lattu (top) (as shown in fig) is the sum of curved surface area of cone and curved surface area of hemisphere.

Reason(R): $\pi r^2h+\pi rl-\pi r^2$

(A) Both A and R are true and R is correct explanation of A
(B) Both A and R are true and R is not correct explanation of A
(C) A is true, but R is false.
(D) A is false, but R is true.

20. Assertion(A) : If $\tan(A+B)=\sqrt{3}$ and $\tan(A-B)=\frac{1}{\sqrt{3}}$,$0°<A+B\leq 90°$,$A>B$.

Reason (R) : $A=60°,B=30°$

(A) Both A and R are true and R is correct explanation of A
(B) Both A and R are true and R is not correct explanation of A
(C) A is true, but R is false.
(D) A is false, but R is true.

SECTION - B **(5×2=10M)**

21. Prove that $\sqrt{2}$ is irrational.

OR

Explain why $7\times6\times5\times4\times3\times2\times1+7$ is a composite number?

22. Find zeroes of polynomial $3\sqrt{2}x^2-5x-\sqrt{2}$. Also verify relation between zeroes and the coefficients.

23. If AD and PM are medians of triangles ABC and PQR, respectively where ΔABC~ΔPQR, prove that $\frac{AB}{PQ}=\frac{AD}{PM}$.

24. Evaluate: $\cos^2 30°+\sin^2 45°-\frac{1}{3}\tan^2 60°+\sin 90°$

25. The king, queen , jack and ace of clubs are removed from a deck of 52 playing cards and then well shuffled. Now one card is drawn at random from the remaining cards. Determine the probability that the card is
(i) a heart. (ii) a king. (iii) a club. (iv) jack of clubs

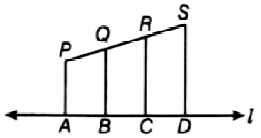
OR

A child's game has 8 triangles of which 3 are blue and rest are red, and 10 squares of which 6 are blue and rest are red. One piece is taken at random. Find the probability that it is a
(i) triangle. (ii) square. (iii) square of blue colour. (iv) triangle of red colour.

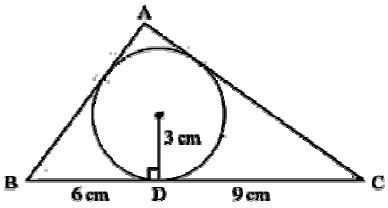
SECTION - C **(6×3= 18M)**

26. Draw the graphs of the pair of linear equations **x-y+2=0** and **4x-y-4=0**.
Also write vertices of triangle formed by these lines with x-axis.

27. In figure PA, QB, RC and SD are all perpendiculars to a line '***l***' , *AB =6cm, BC=9cm, CD=12cm and SP=36cm. Find PQ, QR and RS.*

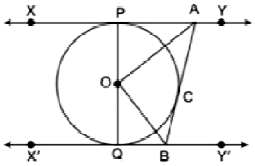


28. In figure, a triangle ABC is drawn to circumscribe a circle of radius 3 cm, such that the segments BD and DC are respectively of lengths 6 cm and 9 cm. If the area of ΔABC is 54 sq cm , then find the lengths of sides AB and AC.



OR

In the following figure XY and X' Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X' Y' at B. Prove that ∠AOB=90°.

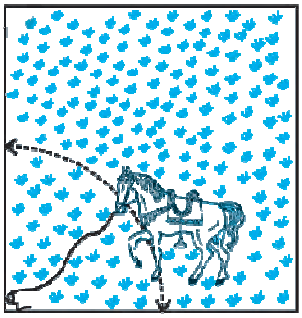


29. Prove that : $\frac{(cosA - sinA + 1)}{(cosA + sinA - 1)} = cosecA + cotA$

OR

Prove that : $(\sin^4 A - \cos^4 A + 1)\ \mathrm{cosec}^2 A = 2$

30. A horse is tied to a peg at one corner of a square shaped grass field of side 15m by means of a 5m long rope.



Find :

(i) The area of that part of the field in which the horse can graze?

(ii) The increase in grazing area if the rope were 10m long instead of 5m.

31. The median of the following distribution is 14.4. Find the values of x and y, if the total frequency is 20.

Class interval	0-6	6-12	12-18	18-24	24-30
Frequency	4	X	5	Y	1

SECTION - D (5×4= 20M)

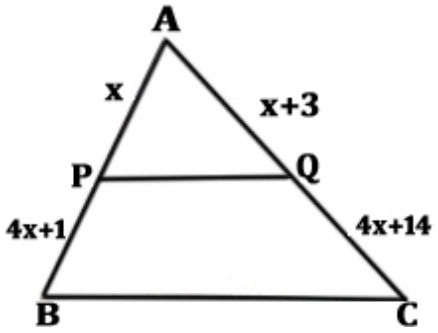
32. A train travels 180 km at a uniform speed. If the speed had been 9 km/hour more, it would have taken 1 hour less for the same journey. Find the speed of the train.

OR

The difference of squares of two natural numbers is 45. The square of smaller number is four times the larger number. Find the numbers.

33. (a) State and Prove Basic Proportionality theorem. **(3m)**

(b) In the given figure, PQ is parallel to BC, then find value of **x**. **(2m)**



34. Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively offered to the state government to provide a place and the canvas for 1500 tents to be fixed by the government and decided to share the whole expenditure equally. The lower part of each tent is cylindrical of base radius 2.8 m and height 3.5 m, with conical upper part of same base radius but of height 2.1 m. If the canvas used to make the tents costs Rs 120 per sq. m, find the amount shared by each school to set up the tents.

35. Find mean and mode of the following data .

Classes	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	4	8	10	12	10	4	2

SECTION - E (4×3=12M)

36. Two trees are standing on flat ground. The angle of elevation of the top of both the trees from a point X on the ground is 60^{o}. If the horizontal distance between X and the smaller tree is 10 m and the distance of the top of the two trees is 30m.

Based on given information, answer the following questions.

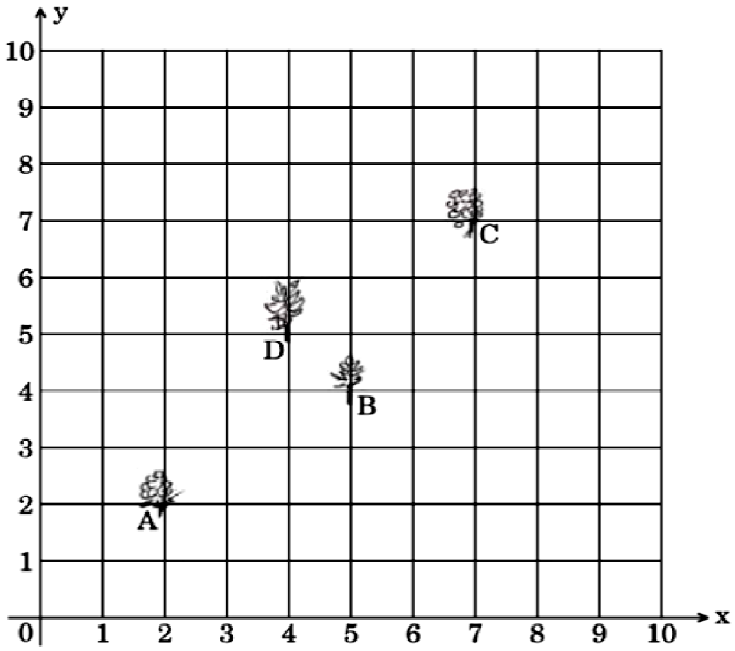
1. Draw a neat figure to represent given information. **(1m)**
2. Calculate distance from X to top of big tree. **(1m)**
3. Calculate horizontal distance between two trees. **(2m)**

OR

Find the height of big tree. **(2m)**

37. Payal has an apple orchard which has a 10 m × 10 m sized kitchen garden attached to it. She divides it into a 10 × 10 grid and puts soil and manure into it. She grows a lemon plant at A, a coriander plant at B, an onion plant at C and a tomato plant at D. Her husband Ram praised her kitchen garden and points out that on joining A, B, C and D they may form a special quadrilateral.

Look at the below figure carefully and answer the following questions :



1. Write coordinates of B and. D. **(1m)**
2. If P divides AC in the ratio, 2:3, find coordinates of P . **(2m)**

OR

Is ABCD a rectangle or rhombus? Justify your answer. **(2m)**

3. Find midpoint of AC. **(1m)**

38. The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one.

Based on the above information, answer the following questions.

1) If the first circular row has 30 seats, how many seats will be there in the 10^{th} row? **(1m)**
2) For 1500 seats in the auditorium, how many rows need to be there? **(2m)**

OR

If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 11^{th} row? **(2m)**

3) If there were 15 rows in the auditorium, how many seats will be there in the middle row/s. **(1m)**

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