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SAMPLE PAPER TEST 05 (2017-18)

SUBJECT: MATHEMATICS
CLASS : X

MAX. MARKS : 80
DURATION : 3 HRS

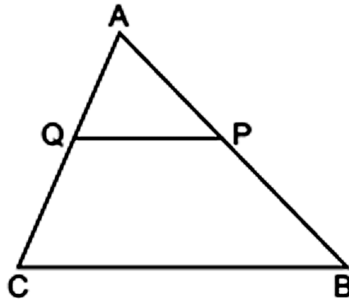
General Instruction:

- (i) All questions are compulsory.
- (ii) This question paper contains **30** questions divided into four Sections A, B, C and D.
- (iii) **Section A** comprises of 6 questions of **1 mark** each. **Section B** comprises of 6 questions of **2 marks** each. **Section C** comprises of 10 questions of **3 marks** each and **Section D** comprises of 8 questions of **4 marks** each.
- (iv) There is no overall choice. However, an internal choice has been provided in four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
- (v) Use of Calculators is not permitted

SECTION – A

Questions 1 to 6 carry 1 mark each.

1. In the fig., P and Q are points on the sides AB and AC respectively of $\triangle ABC$ such that $AP = 3.5$ cm, $PB = 7$ cm, $AQ = 3$ cm and $QC = 6$ cm. If $PQ = 4.5$ cm, find BC.



2. Find the distance between the points $(a \cos 35^\circ, 0)$ and $(0, a \cos 55^\circ)$.
3. If $\sec A = \frac{15}{7}$ and $A + B = 90^\circ$, find the value of $\operatorname{cosec} B$.
4. Write the nature of roots of quadratic equation $4x^2 + 4\sqrt{3}x + 3 = 0$.
5. Write the sum of exponents of prime factors in the prime factorisation of 250.
6. If the sum of first p terms of an AP is $ap^2 + bp$, find its common difference.

SECTION – B

Questions 6 to 12 carry 2 marks each.

7. Two different dice are tossed together. Find the probability
 - (i) that the number on each dice is even
 - (ii) that the sum of numbers appearing on two dice is 5.
8. The king, queen and jack of diamonds are removed from a pack of 52 cards and then the pack is wellshuffled. A card is drawn from the remaining cards. Find the probability of getting a card of
 - (i) diamonds, (ii) a jack

9. There are 576 boys and 448 girls in a school that are to be divided into equal sections of either boys or girls alone. Find the total number of sections thus formed.
10. Find the value of m for which the pair of linear equations:
 $2x + 3y - 7 = 0$ and $(m - 1)x + (m + 1)y = (3m - 1)$ has infinitely many solutions.
11. Find the ratio in which the point $(2, y)$ divides the line segment joining the points $A(-2, 2)$ and $B(3, 7)$. Also find the value of y .
12. In an AP, the sum of first n terms is $\frac{5n^2}{2} + \frac{3n}{2}$. Find its 20th term.

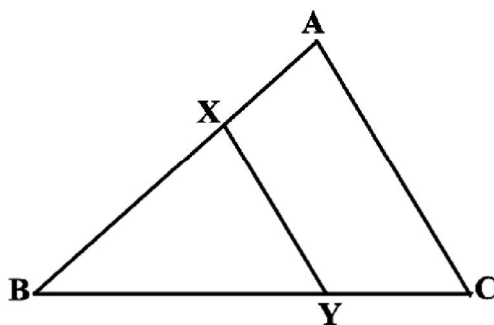
SECTION – C

Questions 13 to 22 carry 3 marks each.

13. Prove that $\sqrt{3} + \sqrt{5}$ is an irrational number.
14. D and E are points on the sides CA and CB respectively of a triangle ABC right angled at C . Prove that $AE^2 + BD^2 = AB^2 + DE^2$.

OR

In the below figure, the line segment XY is parallel to side AC of ΔABC and it divides the triangle into two parts of equal areas. Find the ratio $\frac{AX}{AB}$.

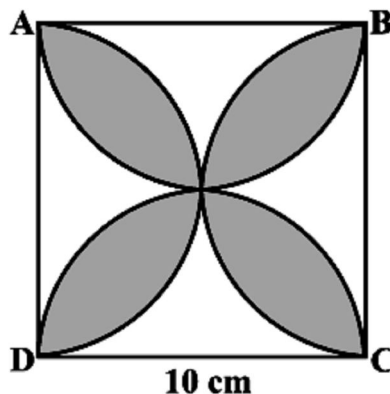


15. If A , B and C are interior angles of a triangle ABC , then show that $\cot\left(\frac{A+C}{2}\right) = \tan\frac{B}{2}$

OR

If $\sin(A - B) = \frac{1}{2}$, $\cos(A + B) = \frac{1}{2}$, $0^\circ < A + B \leq 90^\circ$, $A > B$, find A and B .

16. Find the area of the shaded design in below figure, where $ABCD$ is a square of side 10 cm and semicircles are drawn with each side of the square as diameter. (Use $\pi = 3.14$)



17. Prove that the intercept of a tangent between two parallel tangents to a circle subtends a right angle at the centre.

18. If the points (10, 5), (8, 4) and (6, 6) are the mid-points of the sides of a triangle, find its vertices.

OR

Point P divides the line segment joining the points A(-1, 3) and B(9, 8) such that $\frac{AP}{PB} = \frac{k}{1}$. If P lies on the line $x - y + 2 = 0$, find the value of k.

19. A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank in her field, which is 10 m in diameter and 2 m deep. If water flows through the pipe at the rate of 3 km/h, in how much time will the tank be filled?

OR

A solid consisting of a right circular cone of height 120 cm and radius 60 cm standing on a hemisphere of radius 60 cm is placed upright in a right circular cylinder full of water such that it touches the bottom. Find the volume of water left in the cylinder, if the radius of the cylinder is 60 cm and its height is 180 cm.

20. Divide $3x^4 - 10x^3 + 5x^2 + 11x - 12$ by $3x^2 - 10x + 8$ and verify the division algorithm.

21. Draw the graphs of the equations: $4x - y - 8 = 0$ and $2x - 3y + 6 = 0$
Also, determine the vertices of the triangle formed by the lines and x-axis.

22. Find the mean age of the patients from the following distribution:

Age(in years)	5-14	15-24	25-34	35-44	45-54	55-64
No. of patients	6	11	21	23	14	5

SECTION – D

Questions 23 to 30 carry 4 marks each.

23. A highway leads to the foot of 300 m high tower. An observatory is set at the top of the tower. It sees a car moving towards it at an angle of depression of 30° . After 15 seconds angle of depression becomes 60° .

- (a) Find the distance travelled by the car during this time.
(b) How this observatory is helpful to regulate the traffic on the highway?

24. Nine times the side of one square exceeds a perimeter of a second square by one metre and six times the area of the second square exceeds twenty nine times the area of the first by one square metre. Find the side of each square.

OR

A man bought a certain number of toys for 180, he kept one for his own use and sold the rest for one rupee each more than he gave for them, besides getting his own toy for nothing he made a profit of 10. Find the number of toys.

25. Prove that “The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.”

OR

Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

26. A metallic bucket, open at the top, of height 24 cm is in the form of the frustum of a cone, the radii of whose lower and upper circular ends are 7 cm and 14 cm respectively. Find:
 (i) the volume of water which can completely fill the bucket
 (ii) the area of the metal sheet used to make the bucket.
27. If the p th terms of an AP is $\frac{1}{q}$ and the q th term is $\frac{1}{p}$, show that the sum of pq terms is $\frac{1}{2}(pq+1)$.
28. Draw a triangle ABC with side BC = 6 cm, AB = 5 cm and $\angle ABC = 60^\circ$. Then construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of the triangle ABC.
29. If $\operatorname{cosec} \theta - \sin \theta = m$ and $\sec \theta - \cos \theta = n$, prove that $(m^2n)^{2/3} + (mn^2)^{2/3} = 1$.
30. The median of the following data is 525. Find the values of x and y , if the total frequency is 100.

C.I	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
F	2	5	x	12	17	20	y	9	7	4

OR

The table given below shows the frequency distribution of the cores obtained by 200 candidates in a BCA examination.

Score	200-250	250-300	300-350	350-400	400-450	450-500	500-550	550-600
No. of students	30	15	45	20	25	40	10	15

Draw cumulative frequency curves by using (i) less than type and (ii) more than type. Hence find median