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SAMPLE PAPER TEST 06 (2017–18)

SUBJECT: MATHEMATICS	**MAX. MARKS : 80**
CLASS : X	**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. Sides of two similar triangles are in the ratio 4 : 9. Find the ratio of the areas of these triangles.

2. Express 156 as a product of prime factors

3. Find the midpoint of AB of line segment where A (5, 4) and B (1, 6).

4. If sec A = $\dfrac{15}{7}$ and A + B = 90°, find the value of cosec B.

5. Find the values of k for the quadratic equations $2x^2 + kx + 3 = 0$, so that they have two equal roots.

6. If x + 1, 3x and 4x + 2 are in AP, find the value of x.

SECTION – B
Questions 6 to 12 carry 2 marks each.

7. A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be (i) red ? (ii) green or white ?

8. Cards numbered 1, 2, 3, ..., 16 are put in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the card drawn bears (i) an even number (ii) a perfect square number.

9. Use Euclid's division algorithm to find the HCF of 135 and 225

10. For which value of k will the following pair of linear equations have no solution?
    3x + y = 1
    (2k – 1) x + (k – 1) y = 2k + 1

11. Find a relation between x and y such that the point (x, y) is equidistant from the point (3, 6) and (– 3, 4).
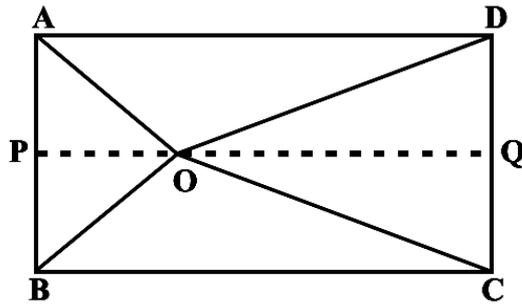
12. Find the 20th term from the last term of the AP : 4, 9 , 14, . . ., 254.

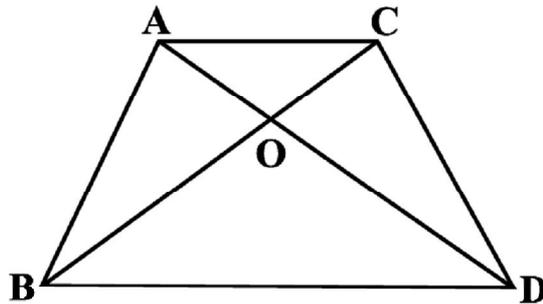# SECTION – C
Questions 13 to 22 carry 3 marks each.

13. Prove that $\sqrt{5}$ is an irrational number.

14. O is any point inside a rectangle ABCD (see below figure). Prove that $OB^2 + OD^2 = OA^2 + OC^2$.
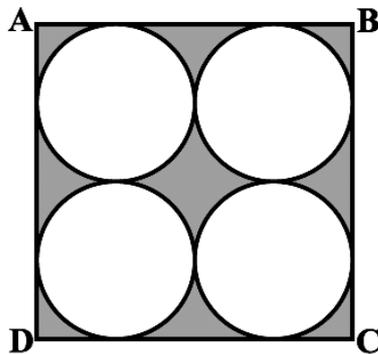

OR

In the below figure, ABC and DBC are two triangles on the same base BC. If AD intersects BC at O, show that $\dfrac{ar(\Delta ABC)}{ar(\Delta DBC)} = \dfrac{AO}{DO}$

15. In the given figure ABCD is a square of side 14 cm. Find the area of the shaded region.

16. If A, B and C are interior angles of a triangle ABC, then show that $\sin\left(\dfrac{A+B}{2}\right) = \cos\dfrac{C}{2}$

OR

If tan (A + B) = $\sqrt{3}$ and tan (A – B) = $\dfrac{1}{\sqrt{3}}$; $0° < A + B \le 90°$; A > B, find A and B.

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17. Prove that "The lengths of the two tangents from an external point to a circle are equal."

18. 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.

<div align="center">OR</div>

Find the coordinates of the points of trisection of the line segment joining the points (4, –1) and (–2, –3).

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?

<div align="center">OR</div>

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. If two zeroes of the polynomial $2x^4 - 3x^3 - 3x^2 + 6x - 2$ are $\sqrt{2}$ and $-\sqrt{2}$, find the other zeroes of the polynomial.

21. Draw the graphs of the equations $x - y + 1 = 0$ and $3x + 2y - 12 = 0$. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis, and shade the triangular region.

22. The following data gives the information on the observed lifetimes (in hours) of 225 electrical components :

Lifetimes (in hours)	0 – 20	20 – 40	40 – 60	60 – 80	80 –100	100 – 120
Frequency	10	35	52	61	38	29

Determine the modal lifetimes of the components.

SECTION – D
Questions 23 to 30 carry 4 marks each.

23. The angle of elevation of an aeroplane from a point A on the ground is 60°. After a flight of 30 seconds, the angle of elevation changes to 30°. If the plane is flying at a constant height of $3600\sqrt{3}$ m, find the speed in km/hr of the plane.

24. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

<div align="center">OR</div>

A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

25. Construct a triangle of sides 5 cm, 6 cm, 7 cm and then a triangle similar to it whose sides are $\frac{7}{5}$ of the corresponding sides of the first triangle, also write the steps of construction.

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26. Raghav buys a shop for 120000. He pays half of the amount in cash and agrees to pay the balance in 12 annual instalments of 5000 each. If the rate of interest is 12% and he pays with the instalment the interest due on the unpaid amount.
(a) Find the total cost of the shop.
(b) When Raghav visits the builder's office to pay his last instalment, he finds that company has already prepared 'No dues certificate'. It means he need not to pay any more amount to the company. It was due to some calculation errors. Should Raghav take the 'No dues certificate' without paying the last instalment? Justify your answer.

27. 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.

28. A container, opened from the top and made up of a metal sheet, is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm, respectively. Find the cost of the milk which can completely fill the container, at the rate of Rs 20 per litre. Also find the cost of metal sheet used to make the container, if it costs Rs 8 per 100 cm^2. (Take $\pi = 3.14$)

29. Prove that $\dfrac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \cos ec A + \cot A$.

30. If the median of the distribution given below is 28.5, find the values of *x* and *y*.

C. I.	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Total
F	5	x	20	15	y	5	100

OR

The following distribution gives the daily income of 50 workers of a factory.

Daily income (in Rs)	100 – 120	120 – 140	140 – 160	160 – 180	180 – 200
Number of workers	12	14	8	6	10

Convert the distribution above to a less than type cumulative frequency distribution, and draw its ogive.