First Mock Examination – January 2018

Roll No. | | | | | | | |

Series XXX / 5 **Code No. 041 / 1 / 2**

Please check that this question paper contains 6 printed pages.

Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

Please check that this question paper contains 30 questions.

Please write down the serial number of the question before attempting it.

MATHEMATICS

Class : X
Date : 14-01-2018

Time allowed : 3 hrs.
Maximum marks : 80

General Instructions :

1. All questions are compulsory.
2. The question paper consists of 30 questions into four sections A,B, C and D.
   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;
   Section-D comprises of 8 questions of 4 marks each.
3. 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.
4. Use of calculator is not permitted.

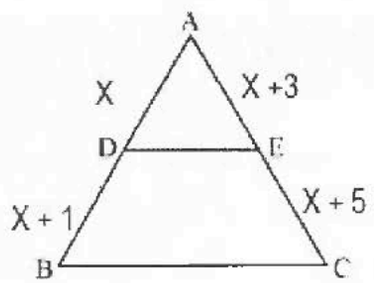
SECTION-A

Question numbers 1 to 6 carry ***one*** mark each

1. If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$; a, b being prime numbers then find the LCM (p , q).

2. Find the area of a triangle whose vertices are A (3,0) , B (7,0) and C (8,4).

3. In ΔABC , DE $\parallel$ BC then, find the value of x.



4. If $A + B = 90^0$ and $\sec A = \frac{5}{3}$, then find the value of cosec B.

5. A shuttle cock used for playing badminton has the shape of the combination of :

6. Find the probability that a non-leap year selected at random will contain 53 Sundays.

SECTION-B

Question numbers 7 to 12 carry ***two*** marks each

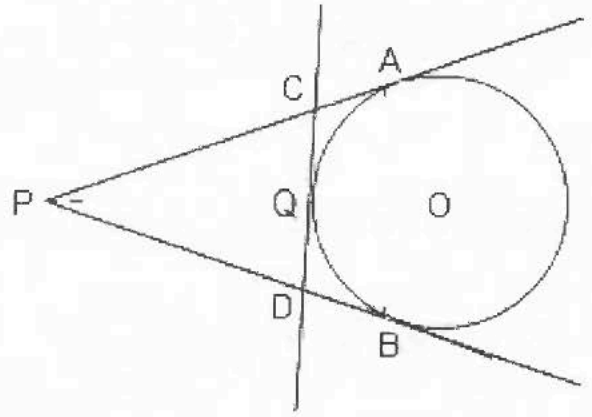
7. Using Euclid's algorithm , find the HCF of 240 and 228.

8. Show that the cube of any positive integer is of the form 4m , 4m+1 or 4m+3 for some integer m.

9. Solve the following quadratic equation for x:
$4\sqrt{3}\, x^2 + 5x - 2\sqrt{3} = 0$

10. If the 9th term of an A.P is zero , prove that its 29th term is twice its 19th term.

11. In the figure given below , PA and PB are tangents to the circle drawn from an external point P. CD is a third tangent touching the circle at Q if PB = 10 cm, and CQ =2cm, what is the length of PC +PD.



12. Two circular pieces of equal radii and maximum area, touching each other are cut out from a rectangular card board of dimensions 14 cm X 7 cm. Find the area of the remaining card board.(use $\pi = 22/7$)

SECTION- C

Question numbers 13 to 22 carry **three** marks each

13. Prove that $5-2\sqrt{3}$ is an irrational number.

14. Solve for x and y : $\frac{1}{2x} - \frac{1}{y} = -1$; $\frac{1}{x} + \frac{1}{2y} = 8$ where $x, y \neq 0$

15. Construct a circle of radius 6 cm. From a point 10 cm away from its center, construct the pair of tangents to the circle and measure their lengths. Mention the steps of construction.

16. The line joining the points (2, -1) and (5, -6) is bisected at P. If P lies on the line $2x + 4y + K = 0$, find the value of K.

OR

The vertices of a triangle are A (-1, 3), B (1, -1) and C (5, 1). Find the length of the median through the vertex C.

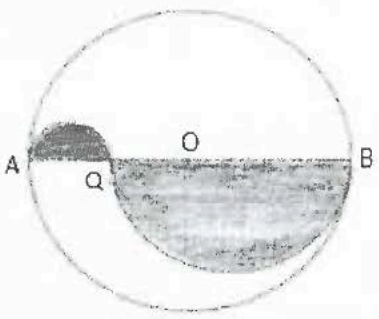
17. Prove that : $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \sec\theta + \tan\theta$

OR

Evaluate the following : $\frac{\cos 45^\circ}{\sec 30^\circ + \operatorname{cosec} 30^\circ}$

18. On a straight line passing through the foot of a tower, two point C and D are at distances of 4 and 16 m from the foot respectively. If the angles of elevation from C and D of the top of the tower are complementary, then find the height of the tower.

19. Find the area of the shaded region of the figure, if the diameter of the circle with centre O is 28 cm and AQ = 1/4 AB.

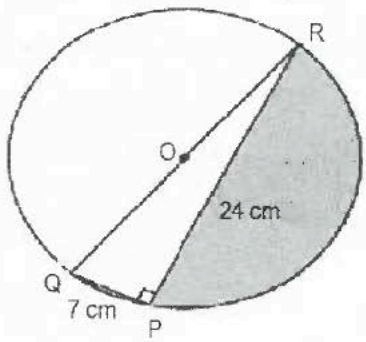


20. A wooden toy is in the form of a cone surmounted on a hemisphere the diameter of the base of the cone is 6 cm and its height is 4 cm. Find the cost of painting the toy at the rate of Rs 5 per 1000 Sq. cm

OR

A canal is 300cm wide and 120cm deep. The water in the canal is flowing with a speed of 20km/h. How much area will it irrigate in 20 minutes if 8cm of standing water is desired?

21. Find the area of the shaded region from the given fig. if PR = 24 cm PQ = 7 cm and O is the center of the circle .(Use $\pi = \frac{22}{7}$) If angle QPR = 90^0.



OR

In an equilateral triangle ABC, D is a point on side BC such that $BD = \frac{1}{3} BC$. Prove that $9AD^2 = 7\ AB^2$.

22. Two dice are thrown simultaneously. Find the probability of getting
(i) the sum of at least ten.
(ii) a doublet.
(iii) six as a product.

SECTION- D

Question numbers 23 to 30 carry ***four*** marks each

23. A train takes 2 hours less for a journey of 300km if its speed is increased by 5km/hr. from its usual speed then find the usual speed of the train.

OR

Check whether the equation $2x^2 + x - 4 = 0$ has real roots and if it has, then the find them by the method of completing the square. Also verify that roots obtained satisfy the given equation.

24. If S_n denotes the sum of first n terms of an A.P. Prove that $S_{30}=3(S_{20}-S_{10})$

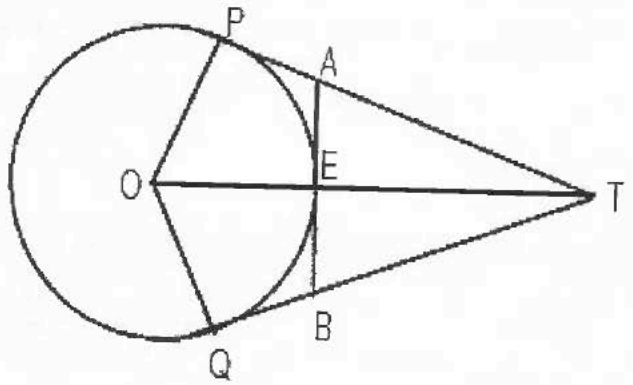
25. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

OR

A point O in the interior of a rectangle ABCD is joined with each of the vertices A,B,C and D, then prove that $OA^2 + OC^2 = OB^2 + OD^2$

26 From a point 100 m above a lake the angle of elevation of a stationary helicopter is 30° and the angle of depression of reflection of the helicopter in the lake is 60° . Find the height of the helicopter above the lake.

27. In the figure given below, 'O' is the center of a circle of radius 5 cm, T is a point such that OT = 13 cm and OT intersects the circle at E. If AB is the tangent to the circle at E. Find the length of AB, where TP and TQ are two tangents to the circle.



28. Draw a line segment AB of length 8 cm. Taking A as center, draw a circle of radius 4 cm and taking B as center, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle. Give the justification and steps of construction.

29. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the volume and total surface area of the remaining solid.

(Use $\pi = \frac{22}{7}$)

30. The weights of tea in 70 packets are shown in the following table :

Weight (in gram)	*Number of packets*
200-201	13
201-202	27
202-203	18
203-204	10
204-205	01
205-206	01

Draw a less than type and a more than type ogive from the given data. Hence obtain the median weight from the graph.

OR

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

Class Interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	*Total*
Frequency	5	x	20	15	y	5	60

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