

DATE : 07/03/2019



SET-1

Code No. 30/1/1

# Aakash

Medical | IIT-JEE | Foundations

(Divisions of Aakash Educational Services Limited)

Regd. Office : Aakash Tower, 8, Pusa Road, New Delhi-110005. Ph.: 011-47623456

Time : 3 Hrs.

## Class X Mathematics (CBSE 2019)

Max. Marks : 80

### GENERAL INSTRUCTIONS :

- (i) All questions are compulsory.
- (ii) This question paper consists of 30 questions divided into four sections - A, B, C and D.
- (iii) Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each. Section D contains 8 questions of 4 marks each.
- (iv) There is no overall choice. However, an internal choice has been provided in **two** questions of 1 mark, **two** questions of 2 marks, **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 calculator is not permitted.

### Section-A

Question numbers 1 to 6 carry 1 mark each.

1. Find the coordinates of a point A, where AB is diameter of a circle whose centre is (2, -3) and B is the point (1, 4). [1]
2. For what values of k, the roots of the equation  $x^2 + 4x + k = 0$  are real? [1]

OR

Find the value of k for which the roots of the equation  $3x^2 - 10x + k = 0$  are reciprocal of each other.

3. Find A if  $\tan 2A = \cot(A - 24^\circ)$  [1]

OR

Find the value of  $(\sin^2 33^\circ + \sin^2 57^\circ)$

4. How many two digits numbers are divisible by 3? [1]

5. In Fig. 1,  $DE \parallel BC$ ,  $AD = 1$  cm and  $BD = 2$  cm. What is the ratio of the  $\text{ar}(\triangle ABC)$  to the  $\text{ar}(\triangle ADE)$ ? [1]

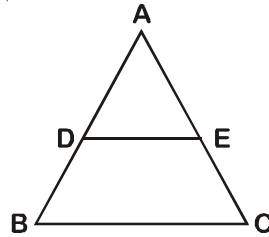


Fig. 1

6. Find a rational number between  $\sqrt{2}$  and  $\sqrt{3}$ . [1]

### Section-B

Question numbers 7 to 12 carry 2 marks each.

7. Find the HCF of 1260 and 7344 using Euclid's algorithm. [2]

OR

Show that every positive odd integer is of the form  $(4q + 1)$  or  $(4q + 3)$ , where  $q$  is some integer.

8. Which term of the AP 3, 15, 27, 39, .... will be 120 more than its 21st term? [2]

OR

If  $S_n$ , the sum of first  $n$  terms of an AP is given by  $S_n = 3n^2 - 4n$ , find the  $n^{\text{th}}$  term.

9. Find the ratio in which the segment joining the points  $(1, -3)$  and  $(4, 5)$  is divided by x-axis? Also find the coordinates of this point on x-axis. [2]
10. A game consists of tossing a coin 3 times and noting the outcome each time. If getting the same result in all the tosses is a success, find the probability of losing the game. [2]
11. A die is thrown once. Find the probability of getting a number which (i) is a prime number (ii) lies between 2 and 6. [2]
12. Find  $c$  if the system of equations  $cx + 3y + (3 - c) = 0$ ;  $12x + cy - c = 0$  has infinitely many solutions? [2]

### Section-C

Question numbers 13 to 22 carry 3 marks each.

13. Prove that  $\sqrt{2}$  is an irrational number. [3]
14. Find the value of  $k$  such that the polynomial  $x^2 - (k + 6)x + 2(2k - 1)$  has sum of its zeros equal to half of their product. [3]
15. A father's age is three times the sum of the ages of his two children. After 5 years his age will be two times the sum of their ages. Find the present age of the father. [3]

OR

A fraction becomes  $\frac{1}{3}$  when 2 is subtracted from the numerator and it becomes  $\frac{1}{2}$  when 1 is subtracted from the denominator. Find the fraction.

16. Find the point on y-axis which is equidistant from the points (5, - 2) and (- 3, 2). [3]

OR

The line segment joining the points A(2, 1) and B(5, - 8) is trisected at the points P and Q such that P is nearer to A. If P also lies on the line given by  $2x - y + k = 0$ , find the value of k.

17. Prove that :  $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$ . [3]

OR

Prove that :  $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$

18. In Fig. 2, PQ is a chord of length 8 cm of a circle of radius 5 cm and centre O. The tangents at P and Q intersect at point T. Find the length of TP. [3]

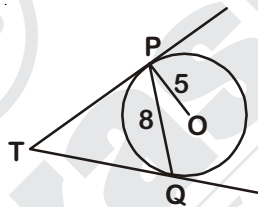


Fig. 2

19. In Fig. 3,  $\angle ACB = 90^\circ$  and  $CD \perp AB$ , prove that  $CD^2 = BD \times AD$ . [3]

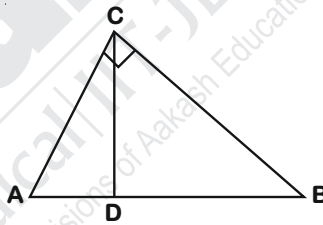


Fig. 3

OR

If P and Q are the points on side CA and CB respectively of  $\triangle ABC$ , right angled at C, prove that  $(AQ^2 + BP^2) = (AB^2 + PQ^2)$

20. Find the area of the shaded region in Fig. 4, if ABCD is a rectangle with sides 8 cm and 6 cm and O is the centre of circle. (Take  $\pi = 3.14$ ) [3]

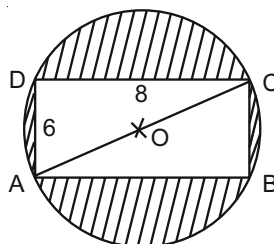


Fig. 4

21. Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/hour. How much area will it irrigate in 30 minutes; if 8 cm standing water is needed? [3]
22. Find the mode of the following frequency distribution. [3]

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Frequency	8	10	10	16	12	6	7

### Section-D

Question numbers 23 to 30 carry 4 marks each.

23. Two water taps together can fill a tank in  $1\frac{7}{8}$  hours. The tap with longer diameter takes 2 hours less than the tap with smaller one to fill the tank separately. Find the time in which each tap can fill the tank separately. [4]

OR

A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km downstream. Determine the speed of the stream and that of the boat in still water.

24. If the sum of first four terms of an AP is 40 and that of first 14 terms is 280. Find the sum of its first  $n$  terms. [4]

25. Prove that  $\frac{\sin A - \cos A + 1}{\sin A + \cos A - 1} = \frac{1}{\sec A - \tan A}$  [4]

26. A man in a boat rowing away from a light house 100 m high takes 2 minutes to change the angle of elevation of the top of the light house from  $60^\circ$  to  $30^\circ$ . Find the speed of the boat in metres per minute. [Use  $\sqrt{3} = 1.732$ ] [4]

OR

Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are  $60^\circ$  and  $30^\circ$  respectively. Find the height of the poles and the distances of the point from the poles.

27. Construct a  $\triangle ABC$  in which  $CA = 6$  cm,  $AB = 5$  cm and  $\angle BAC = 45^\circ$ . Then construct a triangle whose sides are  $\frac{3}{5}$  of the corresponding sides of  $\triangle ABC$  [4]

28. A bucket open at the top is in the form of a frustum of a cone with a capacity of  $12308.8$  cm<sup>3</sup>. The radii of the top and bottom of circular ends of the bucket are 20 cm and 12 cm respectively. Find the height of the bucket and also the area of the metal sheet used in making it. (Use  $\pi = 3.14$ ) [4]

29. Prove that in a right angle triangle, the square of the hypotenuse is equal the sum of squares of the other two sides. [4]

30. If the median of the following frequency distribution is 32.5. Find the values of  $f_1$  and  $f_2$ .

Class	0–10	10–20	20–30	30–40	40–50	50–60	60–70	Total
Frequency	$f_1$	5	9	12	$f_2$	3	2	40

[4]

OR

The marks obtained by 100 students of a class in an examination are given below.

Marks	No. of Students
0–5	2
5–10	5
10–15	6
15–20	8
20–25	10
25–30	25
30–35	20
35–40	18
40–45	4
45–50	2

Draw 'a less than' type cumulative frequency curves (ogive). Hence find median.

