

# MODEL EXAMINATION (2018–2019)

## MATHEMATICS

Duration: 3 Hours

Class: X

Max. Marks: 80

### General Instructions:

- All the questions are compulsory and must be answered in the serial order.
- The question paper consists of 30 questions divided into four sections A, B, C, D.
- Section A consists 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.
- There is no overall choices. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, four questions of 3 marks each, three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
- Use of calculator is not permitted

### SECTION – A

Question numbers 1 to 6 carry 1 mark each

1. If  $\frac{p}{q}$  is a rational number ( $q \neq 0$ ), what is the condition on  $q$  so that the decimal representation of  $\frac{p}{q}$  is terminating?

OR

Find the HCF of the numbers given below:  $k$ ,  $2k$ ,  $3k$ ,  $4k$  and  $5k$  where  $k$  is a positive integer.

2. The graph of  $y = f(x)$  is given below. Find the number of zeroes of  $f(x)$ .

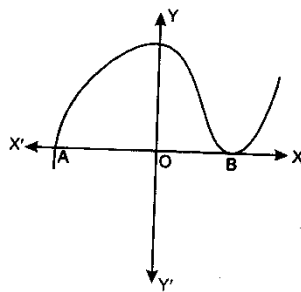


Fig. 1

3. For what values of  $k$ , the following pair of linear equations has infinitely many solutions?

$$10x + 5y - (k - 3) = 0$$

$$20x + 10y - k = 0$$

4. Find the common difference of an AP in which  $a_{16} - a_{12} = 16$ .
5. Two tangents TP and TQ are drawn from an external point T to a circle with center O, as shown in Fig.2. If they are inclined to each other at an angle of  $100^\circ$  then what is the value of  $\angle POQ$ ?

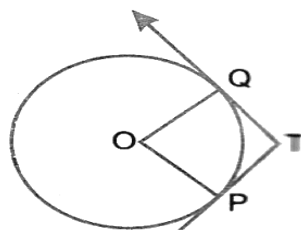


Fig. 2

**OR**

If ratio of corresponding sides of two similar triangles is 5 : 6 , then find ratio of their areas.

6. A bag contains 5 red and 4 black balls. A ball is drawn at random from the bag. What is the probability of getting a black ball?

**SECTION – B**

*Question numbers 7 to 12 carry 2 marks each*

7. Find the HCF of 96 and 404 by prime factorization method. Hence find their LCM.  
8. Find the zeroes of the quadratic polynomial  $6x^2 - 3 - 7x$  and verify the relationship between the zeroes and the coefficients of the polynomial.

**OR**

Find the quotient and remainder on dividing  $p(x)$  by  $g(x)$

$$p(x) = 4x^3 + 8x^2 + 8x + 7; \quad g(x) = 2x^2 - x + 1$$

9. If  $x = \frac{2}{3}$  and  $x = -3$  are roots of the quadratic equation  $ax^2 + 7x + b = 0$ , find the values of a and b.  
10. Without using the trigonometric tables, evaluate the following:

$$\frac{11}{7} \frac{\sin 70^\circ}{\cos 20^\circ} - \frac{4}{7} \frac{\cos 53^\circ \operatorname{cosec} 57^\circ}{\tan 15^\circ \tan 35^\circ \tan 55^\circ \tan 75^\circ}$$

11. If  $3\cot\theta = 4$  find the value of  $\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 3\cos\theta}$

12. In Fig.3, find the perimeter of the shaded region, if ABCD is a square of side 21cm and APB and CPD are semicircles. [Use  $\pi = \frac{22}{7}$ ]

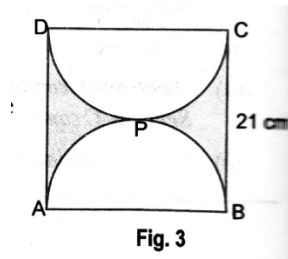


Fig. 3

**OR**

A paper is in the form of a rectangle ABCD in which  $AB = 20 \text{ cm}$ ,  $BC = 14 \text{ cm}$ . A semicircular portion with BC as diameter is cut off. Find the area of the remaining part.

**SECTION – C**

*Question numbers 13 to 22 carry 3 marks each*

13. Prove that  $5 + \sqrt{2}$  is an irrational number.  
14. Find the zeroes of the quadratic polynomial  $x^2 + 5x + 6$  and verify the relationship between the zeroes and the coefficients.

**OR**

Find all the zeroes of the polynomial  $3x^4 + 6x^3 - 2x^2 - 10x - 5$  if two of its zeroes are

$$\sqrt{\frac{5}{3}} \text{ and } -\sqrt{\frac{5}{3}}$$

15. Represent the following system of linear equations graphically. From the graph, find the points where the lines intersect  $x$  - axis.

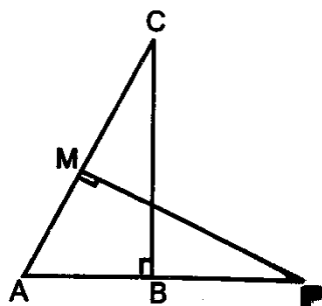
$$2x - y = 2 ; 4x - y = 8$$

16. In an AP the sum of first  $n$  terms is  $\frac{3n^2}{2} + \frac{13n}{2}$ . Find the 25<sup>th</sup> term.

**OR**

Determine an AP whose 3<sup>rd</sup> term is 16 and when 5<sup>th</sup> term is subtracted from 7<sup>th</sup> term, we get 12.

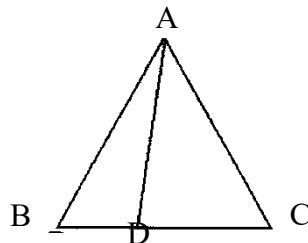
17. The line joining the points  $(2, -1)$  and  $(5, -6)$  is bisected at  $P$ . If  $P$  lies on the line  $2x + 4y + k = 0$ , find the value of  $k$ .
18. If the distance of  $P(x,y)$  from the points  $A(3,6)$  and  $B(-3,4)$  are equal. Prove that  $3x + y = 5$ .
19. If in Fig 4. Triangles  $ABC$  and  $AMP$  are right angled at  $B$  and  $M$  respectively prove that  $CA \times MP = PA \times BC$ .



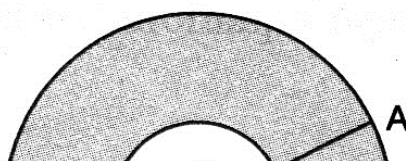
**Fig. 4**

**OR**

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



20. In Fig. 5 the radii of two concentric circles are 13cm and 8cm.  $AB$  is diameter of the bigger circle.  $BD$  is the tangent to the smaller circle touching it at  $D$ .



Find the length of AD.

21. In a single throw of a pair of different dice, what is the probability of getting (i) a prime number on each dice (ii) a total of 9 or 11.
22. A life insurance agent found the following data for distribution of ages of 100 policy holders. Calculate the median age, if policies are given only to persons having age 18years onwards but less than 60 years.

Age (in years)	Number of policy holders
Below 20	2
Below 25	6
Below 30	24
Below 35	45
Below 40	78
Below 45	89
Below 50	92
Below 55	98
Below 60	100

(OR)

Find the Mode of the following distribution of marks obtained by the students in an Examination.

Marks Obtained	0-20	20-40	40-60	60-80	80-100
Number of Students	15	18	21	29	17

Given the mean of the above distribution is 53, using empirical relationship estimate the value of its median.

#### SECTION – D

*Question numbers 23 to 30 carry 4 marks each*

23. A Train travels 360 km at a uniform speed. If the speed of the train had been 5 km/hr more it would have taken one hour less for the same journey. Find the original speed of the train.

OR

Solve:  $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$ ,  $(a + b) \neq 0$

24. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. Use the above theorem in the following If ABC is an equilateral triangle with AD  $\perp$  BC, then prove that  $AD^2 = 3DC^2$

**OR**

Prove that the ratio of the areas of two similar triangles is equal to the ratios of the squares of their corresponding sides.

25. Draw an equilateral triangle of side 6cm. Then construct a triangle whose sides are  $\frac{4}{3}$  times the corresponding sides of triangle ABC.
26. A statue 1.46m tall, stands on the top of a pedestal. From a point on the ground the angle of elevation of the top of the statue is  $60^\circ$  and from the same point the angle of elevation of the top of the pedestal is  $45^\circ$ . Find the height of the pedestal (use  $\sqrt{3}=1.732$ ).
27. If  $\tan A = n \tan B$  and  $\sin A = m \sin B$ , prove that  $\cos^2 A = \frac{m^2-1}{n^2-1}$
28. If the ratio of the sum of first n terms of two A.P's is  $(7n + 1) : (4n + 27)$ . Find the ratio of their  $m^{\text{th}}$  terms.
29. A cone of radius 10 cm is divided into two parts by a plane parallel to its base through the mid- point of its base through the midpoint of its height. Compose the volume of the two parts.
30. Find the mean, mode and median for the following data.

Class	Frequency
0-10	8
10-20	16
20-30	36
30-40	34
40-50	6
<b>Total</b>	<b>100</b>

**OR**

The following frequency distribution shows the distance (in metres) thrown by 68 students in a javelin throw competition.

<b>Distance(in m)</b>	0-10	10-20	20-30	30-40	40-50	50-60	60-70
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<b>Number of Students</b>	4	5	13	20	14	8	4
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Draw a less than type Ogive for the given data and find the median distance thrown using this curve.

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