

## CLASS 10 MATH BASIC MATH TEST PAPER 1

## Class 10 - Mathematics

Time Allowed: 3 hours

Maximum Marks: 80

## General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion-Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study-based questions carrying 4 marks each with sub-parts of the values of 1,1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take  $\pi = 22/7$  wherever required if not stated.
11. Use of calculators is not allowed.

## Section A

1. 180 can be expressed as a product of its prime factors as [1]  
a)  $4 \times 9 \times 5$  b)  $2^2 \times 3^2 \times 5$   
c)  $10 \times 2 \times 3^2$  d)  $25 \times 4 \times 3$
2. Prime factorisation of 424 is: [1]  
a)  $2 \times 53 \times 2$  b)  $2 \times 53 \times 4$   
c)  $2^3 \times 53$  d)  $2^4 \times 53$
3. If one root of  $5x^2 + 13x + k = 0$  be the reciprocal of the other root then the value of k is [1]  
a) 0 b) 5  
c) 1 d) 2
4. The pair of equations  $ax + 2y = 9$  and  $3x + by = 18$  represent parallel lines, where a, b are integers, if: [1]  
a)  $a = b$  b)  $2a = 3b$

c)  $3a = 2b$

d)  $ab = 6$

5. If the equation  $4x^2 - 3kx + 1 = 0$  has equal roots then  $k = ?$  [1]

a)  $\pm \frac{3}{4}$

b)  $\pm \frac{4}{3}$

c)  $\pm \frac{2}{3}$

d)  $\pm \frac{1}{3}$

6. The distance between the points  $\left(\frac{-5}{2}, 7\right)$  and  $\left(\frac{-1}{2}, 7\right)$  is: [1]

a) 4

b) 9

c) 2

d) 3

7. In  $\triangle LMN$  and  $\triangle PQR$ ,  $\angle L = \angle P$ ,  $\angle N = \angle R$  and  $MN = 2QR$ . Then the two triangles are [1]

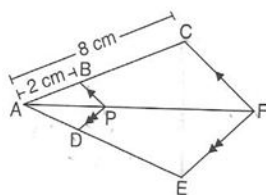
a) Similar but not congruent

b) Congruent but not similar

c) Congruent as well as similar

d) neither congruent nor similar

8. In the given figure if  $BP \parallel CF$ ,  $DP \parallel EF$ , then  $AD : DE$  is equal to [1]



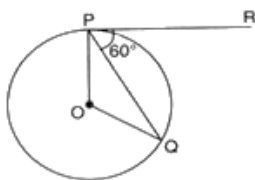
a) 1 : 3

b) 1 : 4

c) 3 : 4

d) 2 : 3

9. If O is the centre of a circle, PQ is a chord and tangent PR at P makes an angle of  $60^\circ$  with PQ, then  $\angle POQ$  is equal to [1]



a)  $110^\circ$

b)  $120^\circ$

c)  $100^\circ$

d)  $90^\circ$

10. If  $\cos A + \cos^2 A = 1$ , then  $\sin^2 A + \sin^4 A =$  [1]

a) -1

b) 1

c) 0

d) 2

11. An observer 1.5 m tall is 28.5 m away from a tower and the angle of elevation of the top of the tower from the eye of the observer is  $45^\circ$ . The height of the tower is [1]

a) 30 m

b) 26.5 m

c) 28.5 m

d) 27 m

12. If  $6\cot \theta + 2\operatorname{cosec} \theta = \cot \theta + 5\operatorname{cosec} \theta$ , then  $\cos \theta$  is [1]

a)  $\frac{4}{5}$

b)  $\frac{5}{3}$

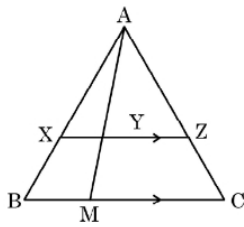
c)  $\frac{5}{4}$

d)  $\frac{3}{5}$

13. If a chord of a circle of radius 28 cm makes an angle of  $90^\circ$  at the centre, then the area of the major segment is [1]  
 a)  $1456 \text{ cm}^2$  b)  $1848 \text{ cm}^2$   
 c)  $392 \text{ cm}^2$  d)  $2240 \text{ cm}^2$
14. The length of an arc that subtends an angle of  $24^\circ$  at the centre of a circle with 5 cm radius is [1]  
 a)  $\frac{3\pi}{2} \text{ cm}$  b)  $\frac{5\pi}{3} \text{ cm}$   
 c)  $\frac{\pi}{3} \text{ cm}$  d)  $\frac{2\pi}{3} \text{ cm}$
15. Cards marked with numbers 2 to 101 are placed in a box and mixed thoroughly. One card is drawn from the box. [1]  
 The probability that the number on the card is a prime number less than 20 is  
 a)  $\frac{8}{25}$  b)  $\frac{4}{25}$   
 c)  $\frac{12}{25}$  d)  $\frac{2}{25}$
16. The marks obtained by 9 students in Mathematics are 59, 46, 30, 23, 27, 40, 52, 35 and 29. The median of the [1]  
 data is  
 a) 29 b) 35  
 c) 40 d) 30
17. The radius (in cm) of the largest right circular cone that can be cut out from a cube of edge 4.2 cm is [1]  
 a) 2.1cm b) 4.2cm  
 c) 1.05cm d) 8.4cm
18. If every term of the statistical data consisting of n terms is decreased by 2, then the mean of the data: [1]  
 a) decreases by 1 b) remains unchanged  
 c) decreases by 2 d) decreases by 2n
19. **Assertion (A):** The distance of P(a, b) from origin is  $a^2 + b^2$ . [1]  
**Reason (R):** The distance between two points A( $x_1$ ,  $y_1$ ) and B( $x_2$ ,  $y_2$ ) is  $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ .  
 a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.  
 c) A is true but R is false. d) A is false but R is true.
20. **Assertion (A):** 3 is a rational number. [1]  
**Reason (R):** The square roots of all positive integers are irrationals.  
 a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.  
 c) A is true but R is false. d) A is false but R is true.

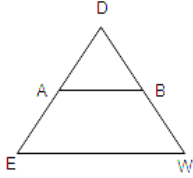
### Section B

21. On comparing the ratios  $\frac{a_1}{a_2}$ ,  $\frac{b_1}{b_2}$  and  $\frac{c_1}{c_2}$ , find out whether the lines representing the pair of linear equations [2]  
 intersect at a point, are parallel or coincident:  $9x + 3y + 12 = 0$ ;  $18x + 6y + 24 = 0$
22. In the given figure, XZ is parallel to BC. AZ = 3 cm, ZC = 2 cm, BM = 3 cm and MC = 5 cm. Find the length of [2]  
 XY.



OR

In  $\triangle DEW$ ,  $AB \parallel EW$ . If,  $AD = 4$  cm,  $DE = 12$  cm and  $DW = 24$  cm, find the value of  $DB$ .



23. Prove that the tangents drawn at the ends of a diameter of a circle are parallel. [2]
24. If  $\sqrt{2}\sin\theta = 1$ , find the value of  $\sec^2\theta - \operatorname{cosec}^2\theta$ . [2]
25. Find the area of a sector of a circle with radius 6 cm, if the angle of the sector is  $60^\circ$ . [2]

OR

The minute hand of a clock is 15 cm long. Calculate the area swept by it in 20 minutes. [Take  $\pi = 3.14$ .]

### Section C

26. Prove that  $7\sqrt{5}$  is irrational. [3]
27. If  $\alpha$  and  $\beta$  are zeroes of the quadratic polynomial  $4x^2 + 4x + 1$ , then form a quadratic polynomial whose zeroes are  $2\alpha$  and  $2\beta$ . [3]
28. Check graphically whether the pair of equations  $x + 3y = 6$  and  $2x - 3y = 12$  is consistent. If so, solve them graphically. [3]

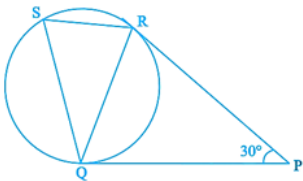
OR

Determine graphically the coordinates of the vertices of a triangle, the equations of whose sides are:

$$y = x, y = 2x \text{ and } y + x = 6$$

29. In the given figure, tangents  $PQ$  and  $PR$  are drawn to a circle such that  $\angle RPQ = 30^\circ$ . A chord  $RS$  is drawn parallel to tangent  $PQ$ . Find the  $\angle RQS$ . [3]

Hint: Draw a line through  $Q$  and perpendicular to  $QP$ .]



30. In  $\triangle OPQ$  right angled at  $P$ ,  $OP = 7$  cm,  $OQ - PQ = 1$  cm. Determine the values of  $\sin Q$  and  $\cos Q$ . [3]



OR

When is an equation called 'an identity'. Prove the trigonometric identity  $1 + \tan^2 A = \sec^2 A$ .

31. Three unbiased coins are tossed simultaneously. Find the probability of getting (i) exactly 2 heads, (ii) at least 2 heads, (iii) at most 2 heads. [3]

#### Section D

32. Sum of the areas of two squares is  $544 \text{ m}^2$ . If the difference of their perimeters is 32 m, find the sides of the two squares. [5]

OR

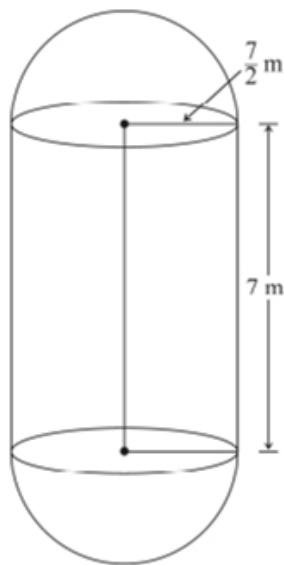
A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of toys produced in a day. On a particular day, the total cost of production was ₹ 750. We would like to find out the number of toys produced on that day. Represent the situations mathematically (quadratic equation).

33. In a  $\triangle ABC$ , XY is parallel to BC and it divides  $\triangle ABC$  into two parts of equal area. Prove that  $\frac{BX}{AB} = \frac{\sqrt{2}-1}{\sqrt{2}}$ . [5]
34. A solid iron pole consists of a solid cylinder of height 200 cm and base diameter 28 cm, which is surmounted by another cylinder of height 50 cm and radius 7 cm. Find the mass of the pole, given that  $1 \text{ cm}^3$  of iron has approximately 8 g mass. [5]

OR

The boilers are used in thermal power plants to store water and then used to produce steam. One such boiler consists of a cylindrical part in middle and two hemispherical parts at its both ends. Length of the cylindrical part is 7m and radius of cylindrical part is  $\frac{7}{2} \text{ m}$ .

Find the total surface area and the volume of the boiler. Also, find the ratio of the volume of cylindrical part to the volume of one hemispherical part.



35. The table below gives the percentage distribution of female teachers in the primary schools of rural areas of various states and union territories (U.T.) of India. Find the mean percentage of female teachers by all the three methods discussed in this section. [5]

Percentage of female teachers	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 75	75 - 85
Number of states/U.T.	6	11	7	4	4	2	1

#### Section E

36. Read the following text carefully and answer the questions that follow: [4]
- Sehaj Batra gets pocket money from his father every day. Out of pocket money, he saves money for poor people

in his locality. On 1st day he saves ₹ 27.5 On each succeeding day he increases his saving by ₹ 2.5.



- Find the amount saved by Sehaj on 10<sup>th</sup> day. (1)
- Find the amount saved by Sehaj on 25<sup>th</sup> day. (1)
- Find the total amount saved by Sehaj in 30 days. (2)

**OR**

Find in how many days Sehaj saves ₹ 1400. (2)

37. **Read the following text carefully and answer the questions that follow:**

[4]

Using Cartesian Coordinates we mark a point on a graph by how far along and how far up it is.

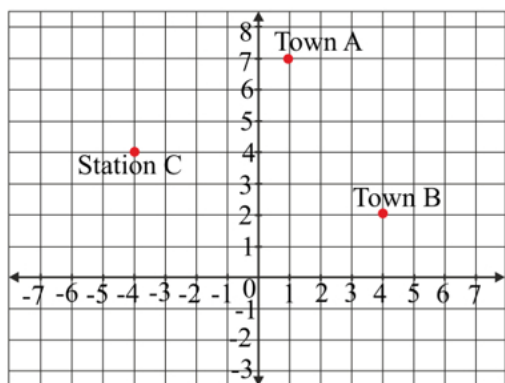
The left-right (horizontal) direction is commonly called X-axis.

The up-down (vertical) direction is commonly called Y-axis.

When we include negative values, the x and y axes divide the space up into 4 pieces.

**Read the information given above and below:**

Two friends Veena and Arun work in the same office in Delhi. In the Christmas vacations, both decided to go their hometowns represented by Town A and Town B respectively in the figure given below. Town A and Town B are connected by trains from the same station C (in the given figure) in Delhi.



- Who will travel more distance to reach their home? (1)
- Find the location of the station. (1)
- Find in which ratio Y-axis divide Town B and Station. (2)

**OR**

Find the distance between Town A and Town B. (2)

38. **Read the following text carefully and answer the questions that follow:**

[4]

Totem poles are made from large trees. These poles are carved with symbols or figures and mostly found in western Canada and northwestern United States.

In the given picture, two such poles of equal heights are standing 28 m apart. From a point somewhere between

them in the same line, the angles of elevation of the top of the two poles are  $60^\circ$  and  $30^\circ$  respectively.



- i. Draw a neat labelled diagram. (1)
- ii. Find the height of the poles. (1)
- iii. If the distances of the top of the poles from the point of observation are taken as  $p$  and  $q$ , then find a relation between  $p$  and  $q$ . (2)

**OR**

- Find the location of the point of observation. (2)