SAMPLE PAPER

1

CBSE - Class 10

MATHEMATICS

(STANDARD)

Time Allowed: 3 Hours   *Maximum Marks: 80*

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 40 questions divided into four sections A, B, C & D.

(iii) Section A contains **20** questions of **1** mark each, Section B comprises of **6** questions of **2** marks each. Section C comprises of **8** questions of **3** marks each. Section D comprises **6** questions of **4** marks each.

(iv) There is no overall choice. However internal choices have been provided in **two** questions of **1** marks each, **two** questions of **2** marks each, **three** 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

Q 1 – 10 are multiple choice questions. Select the most appropriate answer from the given options.

1. The HCF of 36 and 54 is: 1

    (A) 2   (B) 6   (C) 9   (D) 18

2. Which of the following is **not** a zero of the polynomial   1

$p(x) = x^3 - 7x + 6$

    (A) 1   (B) 2   (C) –2   (D) –3

3. The discriminant of the quadratic equation $x^2 - 4x + 1 = 0$ is: 1

    (A) 10   (B) 11   (C) 12   (D) 14

4. Which term of the AP: 4, 9, 14, ... is 254?   1

    (A) 50th   (B) 51th   (C) 52nd   (D) 53rd

5. The centroid of ΔABC, where A(–4, 6), B(2, –2) and C(2, 5), is: **1**

    (A) (0, 2)   (B) (0, 3)   (C) (1, 3)   (D) (1, 2)

6. A man goes 15 m due west and then 8 m due north. Now far is he from the starting point?   **1**

    (A) 15 m   (B) 8 m   (C) 17 m   (D) 16 m

7. $4 \tan^2 A - 4 \sec^2 A$ is equal to: **1**

    (A) 2   (B) 3   C) 4   (D) –4

8. If the perimeter of a semi-circular protractor is 36 cm, then its diameter is: **1**

    (A) 12 cm   (B) 13 cm   (C) 14 cm   (D) 15 cm

9. A box contains 20 balls bearing number 1, 2, 3, 4, ..., 20. A ball is drawn at random from the box. What is the probability that the number on the ball is divisible by 7?   **1**

    (A) $\dfrac{1}{10}$ (B) $\dfrac{2}{7}$ (C) $\dfrac{3}{20}$ (D) $\dfrac{1}{5}$

10. Mean of twenty observations is 15. If two observations 3 and 14 are replaced by 8 and 9 respectively, then the new mean will be: **1**

    (A) 14   (B) 15   (C) 16   (D) 17

(Q 11 – 15) Fill in the blanks:

11. The quadratic equation $2x^2 + px + 3 = 0$ has two equal roots if $p =$ **1**

12. The sum of the first 20 natural numbers is **1**

13. If $\tan \theta = \sqrt{3}$, then $\sec \theta =$ **1**

14. The probability of an impossible event is **1**

OR

An unbiased dice is rolled once. The probability of getting a prime number is **1**

15. The mean of first ten multiples of 2 is **1**

(Q 16 – 20) Answer the following:

16. If the mean and mode of a discrete data is 6 and 9, find the median of the data.   **1**

OR

If $\sum f_i = 15$, $\sum f_i x_i = 3p + 36$ and the mean of the distribution is 3, then find the value of p.   **1**

17. Find the probability of getting doublet in a single throw of a pair of dice.   **1**

18. Determine the **degree** of the polynomial $(x + 1)(x^2 - x - x^4 + 1)$.   **1**

19. If $2x$, $x + 10$, $3x + 2$ are in A.P, find the value of x.   **1**

20. Find the value of cos 15°, using the result cos (A – B) = cos A cos B + sin A sin B.   **1**

SECTION - B

Read the following question carefully and answer the questions that follow.

21. Two unbiased coins are tossed. Find the probability of getting: (i) two heads (ii) at least one head. **2**

22. Find the quotient and the remainder when $p(x) = x^3 - 4x$ is divided by $g(x) = x^2 - 2x$ **2**

23. Usman asked her classmate Mamta to calculate the value of **2**

"sin 60° cos 30° + cos 60° sin 30°".

Mamta calculated the value as shown below:

sin 60° cos 30° + cos 60° sin 30°= sin (60°+ 30°) + cos (60° + 30°)

$$= \sin 90° + \cos 90°$$

$$= 1 + 0$$

$$= 1$$

   i.   Examine if Mamta's calculation is correct or not.

   ii.   If not, point out the inaccuracy and give the correct calculation. If yes, calculate if the answer will still be "1" if angles 60° and 30° in the equation were changed to 45°.

24. Find a relationship between x and y such that the point (x, y) is equidistant from the points (3, 6) and (–3, 4). **2**

OR

Show that the points (4, 2), (7, 5) and (9, 7) are collinear. **2**

25. If the circumference of a circle increases from 4π to 8π, then find the percentage increase in the area of the circle. **2**

26. If 0.3528 is expressed in the form $\dfrac{p}{2^m\,5^n}$, find the smallest values of m, n and p. **2**

OR

Using prime factorisation, find the LCM of 150 and 210. **2**

SECTION - C

Read the following question carefully and answer the questions that follow.

27. If the HCF of 657 and 963 is expressible in the form $657 \times 22 + 963y$, then find the value of y. **3**

28. Anjali places a mirror on level ground to determine the height of a tree (see the diagram). She stands at a certain distance so that she can see the top of the tree reflected from the mirror. Ajnjali's eye level is 1.8 m above the ground. The distance of Anjali and the tree from the mirror are 1.5 m and 2.5 m respectively.

3

3
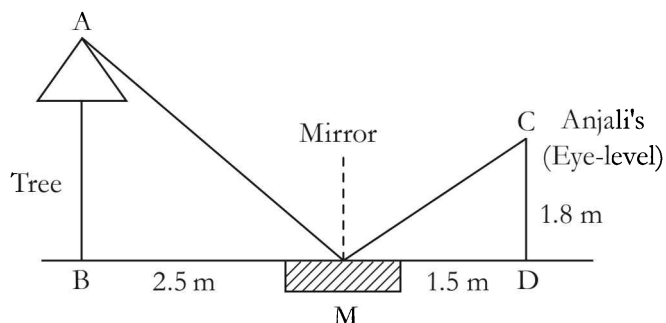
i. Name the two similar triangles that are formed in the diagram.

ii. State the criterion of similarity that is applicable to here.

iii. Find the height of the tree.

29. Without using tables, evaluate:

$$\sin(50° + θ) − \cos(40° − θ) + \tan 1° \tan 10° \tan 20° \tan 70° \tan 80° \tan 89°$$ **3**

<div align="center">

OR

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Show that:

$$\frac{\cot 30° \cot 60° − 1}{\cot 30° + \cot 60°} = \cot 90°$$ **3**

30. In a circle of radius 7 cm, a chord makes an angle of 60° at the centre of the circle. Find: (a) area of the circle (b) area of sector AOB (c) area of minor segment APB

(Take $\sqrt{3}$ = 1.73)   **3**

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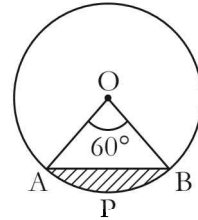
OR

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Draw a line segment of length 8 cm. Divide it into three equal parts.   **3**

31. Solve for x and y:

$$3x + 2y = 11, \quad 2x + 3y = 4$$ **3**

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OR

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Determine the AP whose 3rd term is 5 and the 7th term is 9.   **3**

32. In what ratio is the line segment joining the points (−2, −3) and (3, 7) divided by the y-axis? Also, find the coordinates of the point of division.   **3**

33. A solid wooden toy is in the shape of a right circular cone mounted an a hemi-sphere of radius 4.2 cm. The total height of the toy is 10.2 cm. Find the volume of the toy.   **3**

$$\left(\text{Take } π = \frac{22}{7} \right)$$

34. Find the mode from the following: **3**

Age (in years)	0-10	10-20	20-30	30-40	40-50	50-60
Number of persons	6	11	21	23	14	5

SECTION - D

35. Construct a ΔABC in which AB = 6.5 cm, ∠B = 60° and BC = 5.5 cm. Also, construct a triangle A′ BC′ similar to ΔABC, whose sides are $\frac{2}{5}$ the corresponding sides of ΔABC.   **4**

36. Given the 1 is a zero of the polynomial $2x^3 + x^2 − 2x − 1$, find all the zeros.   **4**

37. State and prove the **converse** of Pythagoras Theorem.   **4**

OR

In a $\triangle ABC$, $\angle B$ is an acute-angle and $AD \perp BC$.   **4**

Prove that

(i) $AC^2 = AB^2 + BC^2 - 2\,BC \times BD$

(ii) $AB^2 + CD^2 = AC^2 + BD^2$

38. The shadow of the tower, standing on a level ground is found to be 40 m longer when the sun's altitude is 30° than what it is 60°. Find the height of the tower.   **4**

OR

Two pillars of equal height, stand on either side of a roadway which is 150 m wide. From a point on the roadway between the pillars, the elevations of the top of the pillars are 60° and 30°. Find the height of the pillars and the position of the point. [Use $\sqrt{3} = 1.73$]   **4**

39. An umbrella has 8 ribs which are equally spaced, as shown in the figure. Assuming the umbrella to be a flat circle of radius 45 cm, find the area between the two consecutive ribs of the umbrella.   **4**
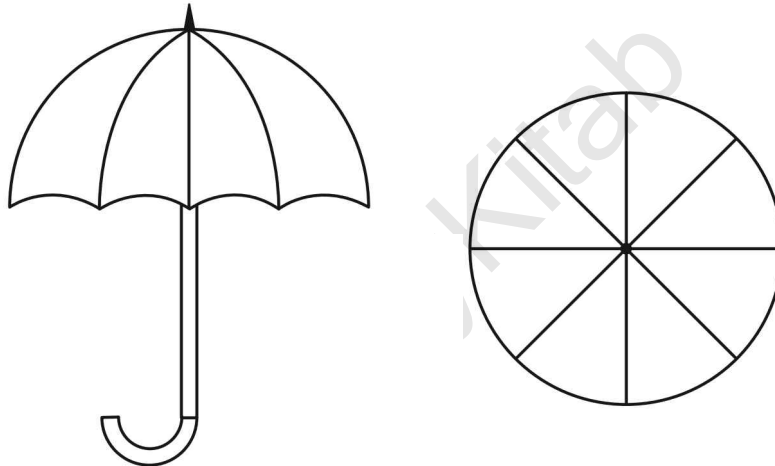
40. Show graphically that the following system of equations has no solutions:

$x - 2y = 6; \quad 3x - 6y = 0$ **4**

OR

Using the quadratic formula, solve for x:

$3x^2 + 2\sqrt{5}\,x - 5 = 0$ **4**