Zyllabo

Class 10 Mathematics (Standard) – SET 5

Time Allowed: 3 Hours **Maximum Marks: 80**

General Instructions

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

Section A

Section A consists of 20 questions of 1 mark each.

1 The exponent of 2 in the prime factorisation of 144 is **[1]**

(a) 3 (b) 2

(c) 6 (d) 4

2 If the sum of the zeroes of the polynomial $kx^2 + 2x + 3k$ is equal to their product, then k is **[1]**

(a) $-\frac{2}{3}$ (b) $\frac{2}{3}$

(c) $\frac{3}{2}$ (d) $-\frac{3}{2}$

3 If $2x + 3y = 12$ and $3x - 2y = 5$, then the value of xy is **[1]**

(a) 5 (b) 6

(c) 1 (d) 8

4 The quadratic equation $2x^2 - \sqrt{5}\,x + 1 = 0$ has **[1]**

(a) two distinct real roots (b) two equal real roots

(c) no real roots (d) infinitely many roots

5 The sum of the first 15 multiples of 8 is **[1]**

(a) 480 (b) 120

(c) 1020 (d) 960

6 The centre of a circle whose diameter has end points $(-6, 3)$ and $(6, 4)$ is **[1]**

(a) $(0, 7)$ (b) $\left(0, \frac{7}{2}\right)$

(c) $\left(6, -\frac{1}{2}\right)$ (d) $\left(0, \frac{1}{2}\right)$

7 If the sides of a triangle are 7 cm, 24 cm and 25 cm, then the triangle is **[1]**

(a) right-angled (b) acute-angled

(c) obtuse-angled (d) equilateral

8 Which of the following is not a criterion for similarity of triangles? **[1]**

(a) AA (b) SSS

(c) SSA (d) SAS

9 A quadrilateral $ABCD$ is drawn to circumscribe a circle. If $AB = 6$ cm, $CD = 4$ cm and $AD = 7$ cm, then BC is **[1]**

(a) 5 cm (b) 13 cm

(c) 3 cm (d) 17 cm

10 If $\cot\theta = \frac{7}{8}$, then $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$ is equal to **[1]**

(a) $\frac{49}{64}$ (b) $\frac{64}{49}$

(c) $\frac{7}{8}$ (d) $\frac{8}{7}$

11 The value of $\sin^2 22^\circ + \sin^2 68^\circ + \cot^2 30^\circ$ is **[1]**

(a) 3 (b) 4

(c) 1 (d) 2

12 The value of $(\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2$ is **[1]**

(a) 1 (b) 0

(c) 4 (d) 2

13 The angle of depression of a car from the top of a 75 m high tower is 30°. The distance of the car from the foot of the tower is **[1]**

(a) 75 m (b) $75\sqrt{3}$ m

(c) $25\sqrt{3}$ m (d) 150 m

14 The perimeter of a semicircle of radius 7 cm is (Take $\pi = \frac{22}{7}$) **[1]**

(a) 22 cm (b) 44 cm

(c) 29 cm (d) 36 cm

15 The total surface area of a solid hemisphere of radius 7 cm is (Take $\pi = \frac{22}{7}$) **[1]**

(a) 308 cm^2 (b) 154 cm^2

(c) 462 cm^2 (d) 616 cm^2

16 The point of intersection of the 'less than' ogive and the 'more than' ogive of a distribution gives its **[1]**

(a) median (b) mean

(c) mode (d) range

17 The mean of the following distribution is **[1]**

Class	0–10	10–20	20–30	30–40
Frequency	3	5	8	4

(a) 22.5 (b) 20.5

(c) 21.5 (d) 25

18 A letter is chosen at random from the word MATHEMATICS. The probability that it is the letter M is **[1]**

(a) $\frac{2}{11}$ (b) $\frac{1}{11}$

(c) $\frac{3}{11}$ (d) $\frac{2}{9}$

19 Assertion (A): If the HCF of 9 and 12 is 3, then their LCM is 36. **[1]**

Reason (R): HCF × LCM = product of the two numbers.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

20 Assertion (A): The sequence 2, 4, 8, 16, ... is an AP. **[1]**

Reason (R): In an AP, the difference between any two consecutive terms is constant.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

Section B

Section B consists of 5 questions of 2 marks each.

21 Explain why $7 \times 11 \times 13 + 13$ is a composite number. **[2]**

22 (A) Solve: $99x + 101y = 499$ and $101x + 99y = 501$. **[2]**

OR

(B) For what value of k does the pair $kx + 2y = 5$ and $3x + y = 1$ have a unique solution?

23 Solve $x^2 - 3x - 10 = 0$ by factorisation. **[2]**

24 Find the values of x for which the distance between $P(x, 7)$ and $Q(1, 15)$ is 10 units. **[2]**

25 (A) If $\sin\theta = \frac{3}{5}$, find the values of $\cos\theta$ and $\tan\theta$. **[2]**

OR

(B) Evaluate: $\sin 63^\circ \cos 27^\circ + \cos 63^\circ \sin 27^\circ$.

Section C

Section C consists of 6 questions of 3 marks each.

26 PA and PB are tangents drawn from an external point P to a circle with centre O and radius 5 cm. If $OP = 13$ cm, find the length of PA and the area of the quadrilateral $OAPB$. **[3]**

27 Prove that $5 - 2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is irrational. **[3]**

28 (A) Find the zeroes of $4s^2 - 4s + 1$ and verify the relationship between the zeroes and the coefficients. **[3]**

OR

(B) If one zero of $3x^2 - 8x + 2k + 1$ is seven times the other, find the zeroes and the value of k.

29 Prove that $\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 2\,\text{cosec}\,\theta$. **[3]**

30 (A) Show that the points $A(1, 7)$, $B(4, 2)$, $C(-1, -1)$ and $D(-4, 4)$ are the vertices of a square. **[3]**

OR

(B) Find the point on the x-axis which is equidistant from $(-2, 5)$ and $(2, -3)$.

31 5 pencils and 7 pens together cost Rs 50, whereas 7 pencils and 5 pens together cost Rs 46. Find the cost of one pencil and one pen. **[3]**

Section D

Section D consists of 4 questions of 5 marks each.

32 A takes 6 days less than B to finish a piece of work. If both together can finish it in 4 days, in how many days will each alone finish it? **[5]**

33 (A) Find the sum of the first 40 positive integers divisible by 6. **[5]**

OR

(B) The sum of the first n terms of an AP is $4n - n^2$. Find the first term, the sum of the first two terms, the second term and the nth term.

34 The angles of elevation of the bottom and the top of a 5 m high flagstaff, fixed on the top of a tower, are 30° and 45° respectively as seen from a point P on the ground. Find the height of the tower. (Use $\sqrt{3} = 1.73$) **[5]**

35 (A) Find the mean of the following distribution. **[5]**

Class	100–150	150–200	200–250	250–300	300–350
Frequency	4	6	15	17	8

OR

(B) Find the median of the same distribution.

Class	100–150	150–200	200–250	250–300	300–350
Frequency	4	6	15	17	8

Section E

Section E consists of 3 case study based questions of 4 marks each.

36 **Case study** **[4]**

A cylindrical bucket of radius 14 cm and height 24 cm is filled with sand. The sand is emptied on the ground and forms a conical heap of height 18 cm and base radius R. (Take $\pi = \frac{22}{7}$)

(i) Find the volume of sand in the bucket. **[1]**

(ii) Write the volume of the conical heap in terms of R. **[1]**

(iii) (A) Find the radius of the base of the heap. **[2]**

OR

(B) Find the curved surface area of the bucket (excluding the base).

37 **Case study** **[4]**

A rectangular park has an area of 300 m^2. Its length is 1 m more than twice its breadth. Let the breadth of the park be x m.

(i) Form the quadratic equation in x. **[1]**

(ii) Find the discriminant of the equation. **[1]**

(iii) (A) Find the length and the breadth of the park. **[2]**

OR

(B) Find the cost of fencing the park at Rs 40 per metre.

38 Case study **[4]**

Two dice, one red and one blue, are thrown together.

(i) Find the probability that the sum of the numbers is 9. **[1]**

(ii) Find the probability of getting a doublet. **[1]**

(iii) (A) Find the probability that the sum of the numbers is a prime number. **[2]**

OR

(B) Find the probability that the product of the numbers is 12.

— End of Paper — Questions? support@zyllabo.com

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Syllabus, simplified.