# SAMPLE PAPER
## (SELF ASSESSMENT)

12

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.** If two positive integers $p$ and $q$ are expressed as $p = a^2b^3$ and $q = a^4b^2$, $a$, $b$ being prime numbers, then LCM $(p, q)$ is: **1**

(A) $a^2b^2$ (B) $a^4 + b^3$ (C) $a^4b^3$ (D) $a^6 + b^5$

**2.** $x^2 - 1$ is divisible by 8, if $n$ is: **1**

(A) an integer (B) a natural number

(C) an odd integer (D) an even number

**3.** The number of polynomials having zeros –3 and 7 is: **1**

(A) one (B) two (C) three (D) more than three

**4.** Graphically, the pair of equations: **1**

$6x - 3y + 10 = 0$ ; $2x - y + 9 = 0$

(A) intersect at exactly one point (B) intersect at exactly two points

(C) are parallel (D) are coincident

**5.** The perpendicular bisector of the line segment joining the points A(1, 5) and B(4, 6) cuts the $y$-axis at: **1**

(A) (0, 13) (B) (0, –13) (C) (0, 12) (D) (13, 0)

**6.** If $\sin A = \frac{1}{2}$, then the value of $\left(\tan A + \frac{1}{\tan A}\right)$ is: **1**

(A) $1 + \frac{1}{\sqrt{3}}$ (B) $\frac{4}{\sqrt{3}}$ (C) $1 + \sqrt{3}$ (D) $\frac{\sqrt{3}}{2}$

**7.** Value of $[(\sin 12° - \cos 78°) + \sec^2 \theta - \cot^2 (90° - \theta)]$ is: **1**

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

**8.** If the perimeter of a circle is equal to that of a square, then the ratio of their areas is: **1**

(A) 22 : 7 (B) 14 : 11 (C) 7 : 22 (D) 11 : 14

**9.** Number of rounds that a wheel of diameter $\frac{7}{11}$ m will make in moving distance of 2 km, is: **1**

(A) 300 (B) 500 (C) 800 (D) 1000

**10.** In the formula: **1**

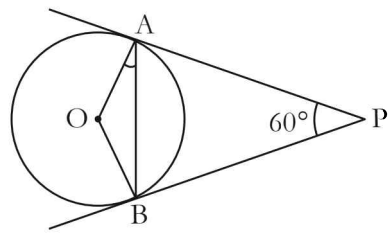
$$\bar{x} = A + \frac{\sum f_i u_i}{\sum f_i} \times h,$$

for determining the **mean** of a grouped frequency distribution, $u_i$ equal to:

(A) $\frac{x_i + A}{h}$ (B) $h(x_i - A)$ (C) $\frac{x_i - A}{h}$ (D) $\frac{A - x_i}{h}$

**(Q 11 – 15) Fill in the blanks:**

**11.** In the figure, if PA and PB are tangents to the circle with centre O such that $\angle APB = 60°$, then $\angle OAB$ is equal to ..... **1**




**12.** If radii of two concentric circles are 4 cm and 5 cm, then the length of each chord of one circle which is tangents to the other circle is ..... . **1**

**OR**

Larger of two chords in a circle is ……. to the centre. **1**

**13.** If $\alpha$, $\beta$ are the zeros of the polynomial $p(x) = ax^2 + bx + c$, $a \neq 0$, then $\alpha + \beta =$ ..... . **1**

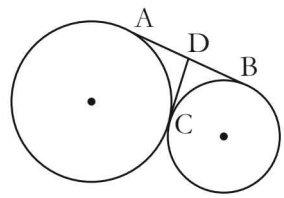
**14.** Probability of getting a doublet in a single throw of a pair of dice is ..... . **1**

**15.** If the height of a cone is tripled and radius is doubled, then its volume will become ..... . times. **1**

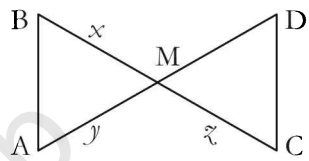
**(Q 16 – 20) Answer the following:**

**16.** If the quadratic equation $16x^2 + 6kx + 4 = 0$ has equal roots, then determine the value of $k$. **1**

**17.** In the given figure, AB and CD are two common tangents to two touching circles. If DC = 4 cm, find the length AB. **1**




**18.** In the given figure, $\Delta AMB \sim \Delta CMD$. Determine MD in terms of $x$, $y$ and $z$. **1**




**19.** If the perimeter of a semi-circular protractor is 66 cm, find the radius of the protractor. **1**

**20.** In a lottery, there are 10 prizes and 25 blanks. Determine the probability of getting a prize. **1**

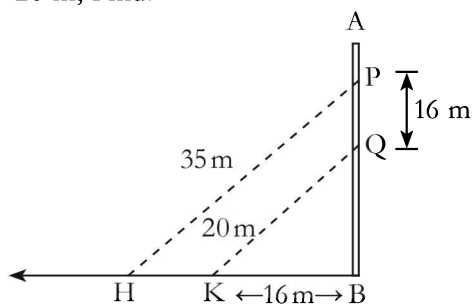
**OR**

A box contains 90 tickets which are numbered from 1 to 90. One ticket is drawn at random from the box. Find the probability that the drawn ticket bears a 2-digit number. **1**

## SECTION - B

**21.** Two tangents segments BC, BD are drawn to a circle with centre O such that $\angle DBC = 120°$. Prove that BO = 2 BC. **2**

**22.** Two spotlights, P and Q are mounted on a vertical pole AB as shown. Light beams from P and Q shine to two points on the ground, H and K, respectively. Given that PQ = 16 m, KB = 16 m, PH = 35 m and QK = 20 m, Find: **2**




i. BQ, the height above the ground at which the spotlight Q is mounted;

ii. HK, the distance between the projections of the light beams. **2**

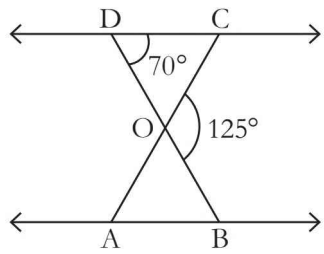
**23.** Find the greatest number which when divides 245 and 1029 leaves remainder 5 in each case. **2**

**OR**

Express 3825 as a product of its prime factors. **2**

**24.** Do the points P(2, 3), Q(3, 2) and R(–2, –3) form a triangle? If so, name the type of the triangle. **2**

**25.** In the figure, $\Delta ODC \sim \Delta OBA$, **2**




$\angle BOC = 125°$ and $\angle CDO = 70°$.

Find the measures of $\angle DOC$ and $\angle DCO$.

**OR**

AD is the bisector of $\angle A$ in $\Delta ABC$. If AB = 8 cm, BD = 5 cm and DC = 4 cm, then find AC. **2**

**26.** Draw the graph of $x^2 - 4x + 4$. Also, find its zeros. **2**

**OR**

Find the remainder when $p(x) = x^3 - ax^2 + 6 - a$ is divided by $(x - a)$ **2**

## SECTION - C

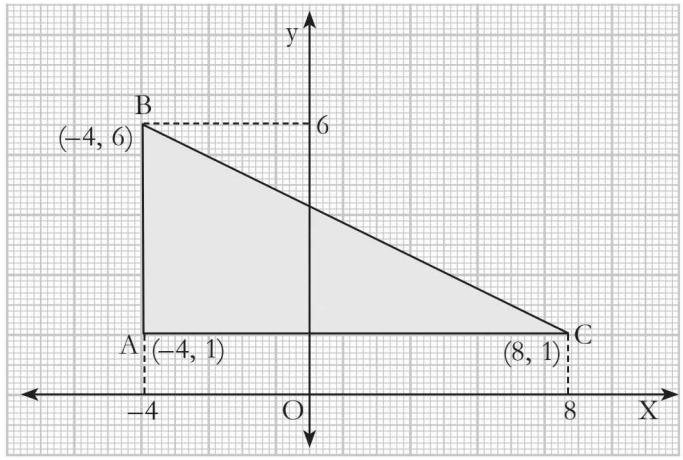
**27.** The perimeter of a rectangle is 44 cm. Its length exceeds twice its breadth by 4 cm. Find the length and the breadth of the rectangle. **3**

**28.** If 3 cot A = 4, check whether $\frac{1-\tan^2 A}{1+\tan^2 A} = \cos^2 A - \sin^2 A$ or not **3**

**OR**

Evaluate: $2\sqrt{2}\ \cos 45° \cos 60° + 2\sqrt{3}\ \sin 30° \tan 60° - \cos 0°$ **3**

**29.** The figure drawn on the graph paper shows a $\Delta ABC$ with vertices A(−4, 1), B(−4, 6) and C(8, 1). **3**

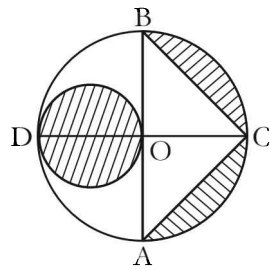


i. Find the length of BC;

ii. Find (a) sin ∠ABC (b) cos ∠BCA;

iii. Find the area of ΔABC.

**30.** In the figure, AB and CD are two diameters of a circle (with centre O) perpendicular to each other and OD is the diameter of the smaller circle. If OA = 7 cm, find the area of the shaded region. **3**




**31.** Find the sum of the AP: –37, –33, –29, ..... to 12 terms. **3**

**OR**

The product of A's age 5 years ago with his age 9 years later is 15. Find his present age. **3**

**32.** If $\cot\theta + \tan\theta = x$ and $\sec\theta - \cos\theta = y$, prove that **3**

$$(x^2y)^{\frac{2}{3}} - (xy^2)^{\frac{2}{3}} = 1$$

**33.** Draw a circle of radius 2 cm. From a point 6 cm away from its centre, construct the pair of a tangents to the circle. Measure the lengths of tangents. **3**

**34.** The height of a right circular cone is trisected by two planes drawn parallel to its base. Show that the volume of three portions starting from bottom are in the ratio 19 : 7 : 1 **3**

**OR**

How many cubic centimetres of iron is required to construct an open box whose external dimensions are 36 cm, 25 cm and 16.5 cm provided the thickness of the iron is 1.5 cm. If one cubic centimetre of iron weighs 7.5 grams, then find the weight of box. **3**



## SECTION - D

**35.** If the sum of first seven terms of an AP is 49 and that of seventeen terms is 289, find the sum of *n* terms. **4**

**36.** Prove the following: **4**

"If a line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the two sides in the same ratio."

**OR**

ABC is an equilateral triangle of side 2*a*. Find the length of its each altitude. **4**

**37.** Find the **mode** and the **mean** of the following distribution: **4**

| **Class** | 5-15 | 15-25 | 25-35 | 35-45 | 45-55 | 55-65 | 65-75 |
|---|---|---|---|---|---|---|---|
| **Frequency** | 2 | 3 | 5 | 7 | 4 | 2 | 2 |

**38.** If $1 + \sin^2 \theta = 3 \sin \theta \cos \theta$, then prove that: **4**

$$\tan \theta = 1 \quad \text{or} \quad \frac{1}{2}$$

**OR**

The angle of elevation of the top of a vertical tower from a point on the ground is 60°. From another point 10 m vertically above the first, its angle of elevation is 45°. Find the height of the tower. **4**

**39.** If on dividing the polynomial $p(x) = 6x^4 + 8x^3 + 17x^2 + 21x + 7$ by the polynomial $g(x) = 3x^2 + 4x + 1$, the remainder is $(ax + b)$, then find the values of $a$ and $b$. **4**

**OR**

Solve for $x$: **4**

$$\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30} \quad (x \neq -4, 7)$$

**40.** In a game, the entry fee is of ₹5. The game consists of a tossing a coin 3 times. If one or two heads show, Shweta gets her entry fee back. If she throws 3 heads, she receives double the entry fee, otherwise she will lose. For tossing a coin three times, find the probability that she **4**

(i) loses the entry fee; (ii) gets double entry fee; (iii) just get her entry fee back.