# Mathematics - 2012

**Time : 3 Hours ]**      **Class : 10th**      **| M. M. : 100**

**Instructions–** ( i ) All questions are complusory. ( ii ) Read the instructions of question paer carefully and answer the questions. ( iii ) There are two parts–Section–A and Section–B in the question paper. ( iv ) Q.No. 1 is objective type question in Section–A. Do as directed. ( v ) Internal options are given in Q.Nos. 2 to 17 of Section–B. ( vi ) Draw neat and clean diagram wherever required. ( vii ) Marks allotted to each question are mentioned against the question.

### Section–A ( Objective Type Questions )

Q. 1.      ( A )      Choose the correct option and write it in your answer-book–

$$1 \times 5 = 5$$

(i)      The sum of two numbers is 25 and their different is 7. then the numbers are–
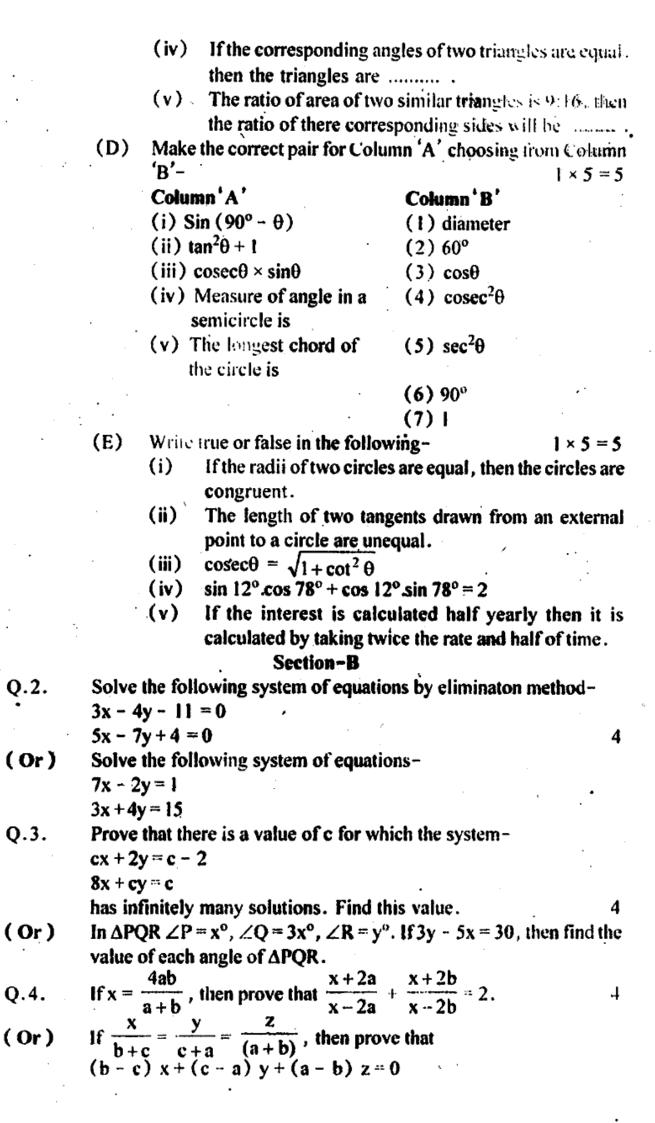
(a) 20 and 5      (b) 18 and 7

(c) 15 and 10      (d) 9 and 16

**PTO...**

(ii) For what value of 'k' the system of equations $kx + 2y = 5$ and $3x + y = 1$ has no solution?
(a) $k = 3$ (b) $k = 6$ (c) $k \neq 6$ (d) $k = 4$

(iii) The sum of two rational expressions $\dfrac{x+1}{x-2}$ and $\dfrac{x-1}{x-2}$ is–

(a) $\dfrac{2x}{x-2}$ (b) $\dfrac{-2x}{x-2}$ (c) $\dfrac{x}{x-2}$ (d) $\dfrac{x+2}{x-2}$

(iv) The power of Numerator of the rational expression $\dfrac{x^7 - 6x^2 - 2}{x^2 + 4}$ is.
(a) 6 (b) 7 (c) 2 (d) 4

(v) The mean proportional of 36 and 49 is–
(a) 6 (b) 7 (c) 42 (d) 36

(B) Choose the correct option and write it in your answer-book–
(i) If the height of a tower and the length of its shadow is equal, then the value of the angle of elevation of the sun is–
(a) $30°$ (b) $45°$ (c) $60°$ (d) None of these

(ii) The length of diagonal of a cube is $15\sqrt{2}$ cm, then the length of its side is–
(a) $30\sqrt{2}$ cm (b) 15 cm (c) $5\sqrt{2}$ cm (d) 30 cm

(iii) The slant height of a cone is 13 cm. and radius is 5 cm. then its height is–
(a) 5 cm. (b) 22 cm. (c) 12 cm. (d) 18 cm.

(iv) One coin is tossed, the probability of getting head is–
(a) 0 (b) $\dfrac{1}{4}$ (c) $\dfrac{1}{2}$ (d) $\dfrac{1}{3}$

(v) The mode of the following number is–
15, 14, 19, 20, 14, 15, 16, 14, 15, 18, 14, 19, 15, 17, 15
(a) 14 (b) 16 (c) 19 (d) 15

(C) Fill up the blanks– $1 \times 5 = 5$
(i) The formula of discriminant of quadratic equation $ax^2 + bx + c = 0$ is D = .........
(ii) Reduction in price of vehicle and machinery with time is called ....... .
(iii) Formula of compound interest is C.I. = .........

(iv) If the corresponding angles of two triangles are equal, then the triangles are .......... .

(v) The ratio of area of two similar triangles is 9:16, then the ratio of there corresponding sides will be .......... .

(D) Make the correct pair for Column 'A' choosing from Column 'B'— $1 \times 5 = 5$

| Column 'A' | Column 'B' |
|---|---|
| (i) $\sin(90° - \theta)$ | (1) diameter |
| (ii) $\tan^2\theta + 1$ | (2) $60°$ |
| (iii) $\operatorname{cosec}\theta \times \sin\theta$ | (3) $\cos\theta$ |
| (iv) Measure of angle in a semicircle is | (4) $\operatorname{cosec}^2\theta$ |
| (v) The longest chord of the circle is | (5) $\sec^2\theta$ |
| | (6) $90°$ |
| | (7) 1 |

(E) Write true or false in the following— $1 \times 5 = 5$

(i) If the radii of two circles are equal, then the circles are congruent.

(ii) The length of two tangents drawn from an external point to a circle are unequal.

(iii) $\operatorname{cosec}\theta = \sqrt{1 + \cot^2\theta}$

(iv) $\sin 12° . \cos 78° + \cos 12° . \sin 78° = 2$

(v) If the interest is calculated half yearly then it is calculated by taking twice the rate and half of time.

### Section-B

Q.2. Solve the following system of equations by eliminaton method—

$3x - 4y - 11 = 0$

$5x - 7y + 4 = 0$      4

(Or) Solve the following system of equations—

$7x - 2y = 1$

$3x + 4y = 15$

Q.3. Prove that there is a value of c for which the system—

$cx + 2y = c - 2$

$8x + cy = c$

has infinitely many solutions. Find this value.      4

(Or) In $\triangle PQR$ $\angle P = x°$, $\angle Q = 3x°$, $\angle R = y°$. If $3y - 5x = 30$, then find the value of each angle of $\triangle PQR$.

Q.4. If $x = \dfrac{4ab}{a+b}$, then prove that $\dfrac{x+2a}{x-2a} + \dfrac{x+2b}{x-2b} = 2$.      4

(Or) If $\dfrac{x}{b+c} = \dfrac{y}{c+a} = \dfrac{z}{(a+b)}$, then prove that

$(b - c) x + (c - a) y + (a - b) z = 0$

Q.5. Solve the following quadratic equation by formula method–
$3x^2 + 8x - 3 = 0$. 4

(Or) Find the value of P in the equation $2Py^2 - 8y + P = 0$, so that the equation has equal roots.

Q.6. Find the angle of elevation of the sun when the length of the shadow of a person is equal to $\sqrt{3}$ times of his hight. 4

(Or) From the top of 20 meters high light house, the angle of depression of the ship is 30°. Find the distance between the ship and light house.

Q.7. The area of sector is 1,540 sq.m. The sector subtends 50° at centre, then find the radius of circle. 4

(Or) If V is the volumn of cuboid whose length is 'a', breath is b and height is c and S is its surface area then prove that–

$$\frac{1}{V} = \frac{2}{S}\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right).$$

Q.8. The diameter of base of a cylinder is 14 cm and its height is 20 cm. Find the whole surface area and volume. 4

(Or) How many spheres of diameter 12 cm each, can be made from a metallic cylinder of diameter 8 cm? The height of cylinder is 90 cm.

Q.9. Compute the mean by short cut method of the following frequency distribution– 4

| Marks obtained | Number of Students |
|:---:|:---:|
| 10–20 | 6 |
| 20–30 | 8 |
| 30–40 | 13 |
| 40–50 | 7 |
| 50–60 | 4 |
| 60–70 | 2 |

(Or) If the mean of 5 data $x$, $x + 2$, $x + 4$, $x + 6$, $x + 8$ is 11, then find the value of $x$.

Q.10. Factorise $x^2 (y - z) + y^2 (z - x) + z^2 (x - y)$. 5

(Or) Which rational expreession should be added to $\dfrac{x^4 - 3x + 1}{x + 3}$ to get $\dfrac{x^2 + 1}{x - 2}$ ?

Q.11. If $\alpha$, $\beta$ are the roots of quadratic equation $ax^2 + bx + c = 0$, then find the value of $\dfrac{\alpha}{\beta} + \dfrac{\beta}{\alpha}$. 5

(Or) The sum of a number and its reciprocal is $\dfrac{50}{7}$. Find the number.

**Q.12.** Find the compound interest and amount on Rs. 1,500 at the rate of interest 5% per annum for 3 years using formula method. 5

**(Or)** A watch is sold for Rs. 960 cash or for Rs. 480 cash down payment and two monthly instalment of Rs. 245 each. Find the rate of interest charged under the instalment plan.

**Q.13.** Construct a triangle whose sides are 4 cm, 6 cm, and 8 cm, respectively. Draw the circumcircle of the triangle. 5

**(Or)** Construct the incircle of the equilateral triangle whose one side is 8 cm.

**Q.14.** Prove identify $\sin^2\theta + \cos^2\theta = 1$, geometrically. 5

**(Or)** Prove the following identity–

$$\frac{\cosec\theta}{\cosec\theta - 1} + \frac{\cosec\theta}{\cosec\theta + 1} = 2\sec^2\theta.$$

**Q.15.** In two triangles if one angle of a triagle is equal to the corresponding angle of another triangle and the side containing the angle are proportional, then prove that the triagles are similar. 6

**(Or)** In the triangle $\triangle ABC$, $\angle B$ is an acute angle, AD is an altitude, then prove that–
$$AC^2 = AB^2 + BC^2 - 2BC.BD.$$

**Q.16.** Prove that the sum of opposite angles of a cyclic quadrilatral is 180°. 6

**(Or)** If PAB is a secant to a circle of centre O intersecting the circle at A and B and PT is tangent segment, then prove that–
$$PA \times PB = PT^2$$

**Q.17.** Find the Median from the following table– 6

| Class Interval | Frequency |
|---|---|
| 0–20 | 10 |
| 20–40 | 17 |
| 40–60 | 26 |
| 60–80 | 22 |
| 80–100 | 15 |

**(Or)** Calculate the cost of living index number of the following data–

| Item | Quantity (in kg) | Cost (in Rs.) per kg. in base year | Cost (in Rs.) per kg. in current year |
|---|---|---|---|
| Suger | 5 | 17 | 16 |
| Tea | 1 | 120 | 134 |
| Pulse | 5 | 34 | 40 |
| Ghee | 2 | 180 | 190 |
| Wheat | 30 | 12 | 15 |
| Rice | 8 | 20 | 22 |

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