



ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

Pre-Test Examination – 2018



Sub: Mathematics

Class: X

F.M 75

Duration: 2 Hrs. 30 Min.

Date: 06.08.2018

GROUP - I

1. Choose the correct option in each case (any five).

(5 x 1 = 5)

(i) If $\sqrt{12} - \sqrt{8} = a$, then the value of $\sqrt{12} + \sqrt{8}$ is:

(a) $\frac{1}{a}$ (b) $\frac{2}{a}$ (c) $\frac{4}{a}$ (d) $a + \frac{1}{a}$

(ii) A person deposited Rs. 100 in a bank and got the amount Rs. 121 for two years. The rate of compound interest is:

(a) 10% (b) 20% (c) 5% (d) 10½%

(iii) ABCD is a cyclic parallelogram, then $\angle B$ is:

(a) 45° (b) 90° (c) 75° (d) 100°

(iv) Given $A + B = 90^\circ$ and $\tan a = \frac{3}{4}$, value of $\cot B$ is:

(a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

(v) If volume of two solid right circular cylinder are same and their height are in the ratio 1:2, then the ratio of length of radii is:

(a) $1:\sqrt{2}$ (b) $\sqrt{2}:1$ (c) 1:2 (d) 2:1

(vi) A tangent drawn to a circle with centre O from an external point A touches the circle at the point B. If $OB = 5$ cm, $AO = 13$ cm, then the length of AB is:

(a) 12 cm (b) 13 cm (c) 6.5 cm (d) 6 cm.

2. Fill up the blanks.

(5 x 1 = 5)

(i) The ratio of capitals of three persons is 3:8:5 and the profit of 1st person is RS. 60

less of the 3rd person then the total profit is _____.

(ii) The equation $(a - 2)x^2 + 3x + 5 = 0$, will not be a quadratic equation for $a =$ _____.

(iii) If two circles do not intersect or touch each other, then the maximum number of common tangents can be drawn is _____.

(iv) In ΔABC $\sin \frac{B+C}{2} =$ _____.

(v) The number of surfaces of a solid hemisphere is _____.

3. Write True or False (any four).

(4 x 1 = 4)

(i) The compound interest will be always less than simple interest for some money at fixed rate of interest for fixed time.

(ii) The two roots of the equation $x^2 + x + 1 = 0$ are real.

(iii) Two chord AB and AC of a circle with its centre O are situated on opposite sides of the radius OA, then $\angle OAB = \angle OAC$.

(iv) If $0^\circ \leq \theta < 90^\circ$ then the least value of $(\sec^2 \theta + \cos^2 \theta)$ is 2.

(v) The total surface area of the cone $= \pi r(r + L)$.

GROUP - II

4. Answer the following.

(8 x 2 = 16)

(i) The rate of simple interest per annum reduces of 4% to $3\frac{3}{4}$ % and for this a person's annual income decreases by Rs. 60. Determine the principal of that person.

(ii) If $\frac{p}{q} = \frac{5}{7}$ and $p - q = -2$, then what is the value of $p + q$?

- (iii) If $x = \sqrt{2} + \sqrt{3} + \sqrt{5}$ and $y = \sqrt{2} + \sqrt{3} - \sqrt{5}$ show that $(x - y)^2 = 20$.
- (iv) Find the distance between two parallel chords of length 8 cm each of a circle of diameter 10 cm.
- (v) Find the measurement of the first and third angles if the ratio of three angles of a cyclic quadrilateral is 1:2:3.
- (vi) Express 18° in radian.
- (vii) If $\tan \theta = \cot \theta$, what is the value of $\sin 2\theta$?
- (viii) If the sum of the edges of a cube is 60 cm, find its volume.

GROUP - III

5. Answer the following (any nine). (9 x 5 = 45)

- (i) The difference of compound interest and simple interest for Rs. 15000 for 2 years at the same rate is Rs. 150. Find the rate of interest.
- (ii) At the starting of the year A and B jointly start a business with Rs. 24000 and 30000. After 5 months A invested Rs. 12000 more in the business. At the end of the year if the profit in the business is Rs. 14030, find the part of the profit of each of them.
- (iii) Solve $(x + 4)(2x - 3) = 6$.

OR

Five times of a positive integer is 3 less than twice its square. Find the number.

- (iv) Simplify: $\frac{3\sqrt{7}}{\sqrt{2}+\sqrt{5}} - \frac{5\sqrt{5}}{\sqrt{2}+\sqrt{7}} + \frac{2\sqrt{2}}{\sqrt{5}+\sqrt{3}}$
- (v) If y is the mean proportional of x and z , then prove that $xy + yz$ is the mean proportional of $x^2 + y^2$ and $y^2 + z^2$.
- (vi) Prove that if the angle formed at the centre of a circle by an arc, is the double of the angle formed by the same arc at any point on the circle.

OR

Prove that if two circles touch each other, then the point of contact will lie on the line segment joining the two centres.

(vii) AB is a chord of the circle with center O. The tangent at B intersects produced AO at T. If $\angle BAT = 25^\circ$ then find, (i) $\angle ABT$ and (ii) $\angle BTA$.

(viii) Construct a circle with radius 4.5 cm and draw two tangents to the circle from the external point at a distance 7.5 cm from the center (only traces of construction are to be given).

OR

Draw a triangle with sides 5 cm, 6 cm and 7 cm respectively and construct the circumcircle of the triangle. (only traces of construction are to be given).

(ix) From $x = a \cos \theta$ and $y = b \cot \theta$ eliminate θ .

(x) The breadth of the canvas required to make a right circular conical tent is 22 metre. The height of the tent is 28 metre and area of the base is 1386 sq.metre. Find the length of the canvas in metre to make the tent.

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7-8-18.

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Pre-Test Examination - 2018

Sub: Mathematics

Class: X

F.M 75

Duration: 3 Hrs.

SOLUTIONS

Date: 06.08.2018

GROUP - A

1. Choose the correct option in each case (any five).

(5 x 1 = 5)

(i) (c) $\frac{4}{a}$

(ii) (d) 10½%

(iii) (b) 90°

(iv) (a) $\frac{3}{4}$

(v) (b) $\sqrt{2}:1$

(vi) (a) 12 cm

2. Fill up the blanks.

(5 x 1 = 5)

(i) Rs.480

(ii) a = 2

(iii) 4

(iv) $\cos \frac{A}{2}$

(v) 2

3. Write True or False (any four).

(4 x 1 = 4)

(i) False

(ii) False

(iii) False

(iv) True

(v) True

GROUP - B

4. Answer the following.

(8 x 2 = 16)

(i) Let Principal be Rs. P

$$\frac{4}{100} P - \frac{15}{400} P = 60$$

$$\text{Or } \frac{16P - 15P}{400} = 60$$

$$\text{Or } P = 60 \times 400 = 24000$$

Principal = Rs. 24000.

$$(ii) P = \frac{5}{7} q, \text{ now } P - q = -2, P + q = 12.$$

$$(iii) (x - y)^2 = (2\sqrt{5})^2 = 20.$$

(iv) The distance of the centre from one chord = 3 unit

∴ Dist between two parallel chord = 6 unit.

$$(v) \frac{\text{1st Angle}}{\text{3rd Angle}} = \frac{1}{3} = \frac{x}{3x}$$

$$\text{Now } x + 3x = 180^\circ \text{ or } x = 45^\circ$$

$$1^{\text{st}} \text{ angle} = 45^\circ \quad 3^{\text{rd}} \text{ angle} = 135^\circ.$$

$$(vi) 18^\circ = \frac{\pi}{180} \times 18^c = \frac{\pi c}{10}$$

$$(vii) \theta = 90 - \theta$$

$$\therefore \theta = 45^\circ \quad \sin 2\theta = \sin 90^\circ = 1.$$

$$(viii) \text{ Each edge} = \frac{60}{12} = 5 \text{ cm. Volume} = 5^3 = 125 \text{ cu cm.}$$

GROUP - C

5. Answer the following (any nine).

(9 x 5 = 45)

$$(i) CI = 15000 \left(2 + \frac{r}{100} \right) \times \frac{r}{100}$$

$$\text{Or } 15000 \left(2 + \frac{r}{100} \right) \times \frac{r}{100} - \frac{15000 \times 2 \times r}{100} = 150$$

$$\therefore r^2 = 100 = 10^2 \quad \therefore r = 10.$$

(ii) Ratio of the profit = 372000:360000 = 31:30

$$\text{Profit of A} = \frac{31}{31+30} \times 14030 = \text{Rs. } 7130$$

$$\text{Profit of B} = \frac{30}{61} \times 14030 = \text{Rs. } 6900$$

$$\text{(III) } 2x^2 + 8x - 3x - 12 - 6 = 0$$

$$\text{Or } x(2x + 9) - 2(2x + 9) = 0$$

$$\text{Or } (2x + 9)(x - 2) = 0$$

$$\therefore x = -\frac{9}{2} \text{ or } x = 2$$

OR

$$5X = 2X^2 - 3$$

$$2X^2 - 5X - 3 = 0$$

$$\text{Or, } (x-3)(2x+1) = 0$$

$$\text{Or, } x=3, x = -\frac{1}{2}$$

As the number is positive therefore $x=3$

$$\text{(iv) } \frac{3\sqrt{7}}{\sqrt{2}+\sqrt{5}} - \frac{5\sqrt{5}}{\sqrt{2}+\sqrt{7}} + \frac{2\sqrt{2}}{\sqrt{5}+\sqrt{3}}$$

$$= -\sqrt{7}(\sqrt{2} - \sqrt{5}) + \sqrt{5}(\sqrt{2} - \sqrt{7}) + \sqrt{2}(\sqrt{5} - \sqrt{3}) = 2\sqrt{10} - \sqrt{14} - \sqrt{6}$$

$$\text{(v) Given } y = \sqrt{xz} \text{ or } y^2 = xz$$

$$\text{To show } (xy + yz) = \sqrt{(x^2 + y^2)(y^2 + z^2)}$$

$$\text{RHS} = \sqrt{xz(x+z)^2}$$

$$= \sqrt{y^2(x+z)^2}$$

$$=y(x+z) = xy + yz = \text{LHS.}$$

(vi) Page No 123 Theorem 34 in Ganit Prakash.

OR

Page No 215 Theorem 42 in Ganit Prakash.

(vii) $\angle OAB = 25^\circ$ (given)

$$\therefore \angle OAB = 25^\circ \text{ (as } OA = OB \text{)}$$

$$\angle OBT = 90^\circ \text{ (OB is radius through B, BT is the tangent)}$$

$$\therefore \angle ABT = \angle OBA + \angle OBT = 25^\circ + 90^\circ = 115^\circ$$

$$\angle BTA = 180^\circ - (50^\circ + 90^\circ) = 40^\circ$$

(viii) Construction in page no. from Ganit Prakash.

OR

Construction in page no 172 from Ganit Prakash.

$$(ix) \frac{x}{a} = \cos\theta \quad \frac{y}{b} = \cot\theta$$

$$\therefore \sec\theta = \frac{a}{x} \quad \therefore \frac{b}{y} \tan\theta$$

$$a^2 \quad b^2$$

$$\therefore \frac{\quad}{x^2} - \frac{\quad}{y^2} = \sec^2\theta - \tan^2 = 1$$

(x) Area of the base = $\pi r^2 = 1386$

$$r^2 = 1386 \times \frac{7}{22} = 3^2 \times 7^2$$

$$l = \sqrt{28^2 + 21^2} = \sqrt{1225} = 35$$

$$\pi r l = \frac{22}{7} \times 21 \times \frac{5}{35} = 22 \times 21 \times 5 \text{ sq.m length needed} = 105 \text{ m.}$$
