



ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

Second Term Examination - 2018



Sub : Algebra & Geometry

Class: 8

FM: 8 0

Duration: 2hrs 30 Mins.

Date: 07.08.2018

Group - A

(I) Choose the correct option:-

(5 X 1 = 5)

- 1) What is the coefficient of x^2y in the product $(7x^2 - 5y)(x^2 + 3y)$?
a) -16 b) 16 c) 26 d) -26
- 2) What is the solution set to $4x - 6 < 90$, where x is a multiple of 4 less than 20?
a) { 4, 8, 16 } b) { 8, 16, 20 } c) { 8, 16 } d) { 4, 8, 16, 20 }
- 3) The fourth angle of the quadrilateral that has three acute angles is
a) Acute b) right c) obtuse d) straight
- 4) Distance of a chord of a circle from the centre is 12 cm and the length of the chord is 10 cm. The diameter of the circle is
a) 22 cm b) 26 cm c) 13 cm d) 44 cm
- 5) In a circle if the angle at the centre is 80° , then the value of the angle at the circumference standing on the same segment is
a) 80° b) 40° c) 180° d) 160°

(II) Fill in the blanks :-

(5 X 1 = 5)

- 1) $(a - b)^2 + 2ab =$ _____
- 2) $a(b - c) - d(c - b) =$ _____
- 3) If the sides of a quadrilateral are produced in order, the sum of the exterior angles so formed is _____
- 4) The opposite angles of a cyclic quadrilateral are _____
- 5) Angle in a semi circle is _____ angle.

(III) Write True or False :-

(5 X 1 = 5)

- 1) A constant is a polynomial of degree 0.
- 2) On dividing $p/3$ by $3/p$, the quotient is 9.
- 3) ABCD is a quadrilateral with angles $90^\circ, 90^\circ, 110^\circ, 80^\circ$.
- 4) The line joining the centre of the circle to the midpoint of the chord is perpendicular to the chord.
- 5) $25q^2 - 40q + 16$ is a perfect square.

Group - B

(For this group explanation and diagrams are needed where applicable)

IV. Very Short Answer Type Questions. 5x2=10

- i) Solve: $\frac{x}{2x-3} = 1$.
- ii) Find the solution set for 'y', when $\frac{y}{2} + 6 < 11$; and y is not a prime number.
- iii) Without actual multiplication, find the square of 99.99
- iv) Determine the value of x , if $16x = (62)^2 - (26)^2$.
- v) Sum of three consecutive even numbers is 90. Find out the numbers.

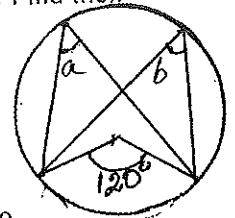
V Short answer type question.

- i) What should be added with $(9 - 6x)$ to make it a perfect square number?
- ii) Expand: $(x^2 - \frac{1}{2y^2})^2$.
- iii) Find a number whose one-fifth part increased by 4 is equal to its one-fourth part diminished by 10.
Or
Solve: $\frac{(1-3y)(4-y)}{(2-3y)(1-y)} = 1$.

- iv) Solve the in-equation and show the solution on a number line : $13 - y < 9$.
Or

4 years ago, the ratio of the ages of A and B was 2:3 and after 4 years it becomes 5:7. Find their present ages.

- v) Calculate the angles $\angle a$ and $\angle b$ as shown in the adjacent figure.

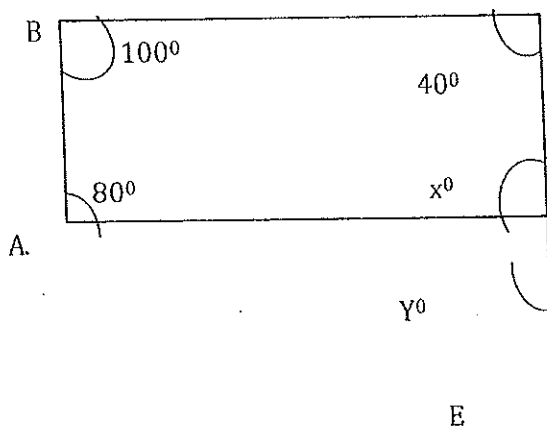


Group-C

5 x 8 = 40

6. Attempt any eight questions:

- a) The denominator of a fraction is 3 more than its numerator. If the numerator is increased by 7 and the denominator is decreased by 2 the fraction is equal to 2. What is the sum of the numerator and denominator of the fraction?
- b) The present age of a father is 3 years more than three times the age of his son. 3 years hence, father's age will be 10 years more than twice the age of the son. What is the father's present age?
- c) A motor boat goes downstream and covers a distance between two places in 3 hours. It covers the same distance upstream in 4 hours. If the stream flows at 2 km/h, find the speed of the motor boat downstream.
- d) Find the value of $x^4 + 1/x^4$, when i) $x+1/x=3$, ii) $x-1/x=4$.
- e) The angles of a quadrilateral are in the ratio 2:3:5:8. Find the measure of each of the four angles.
- f) Prove that sum of the angles of a quadrilateral is 360°
- g) In a circle of radius 13 cm, a chord is drawn at a distance of 12 cm from the centre. Find the length of the chord.
- h) In the adjoining figure, O is the centre of the circle and $\angle Q = 60^\circ$. Find $\angle P$.
- i) Multiply $(x^2 + xy - y^2)$ by $(x^2 - xy + y^2)$
- j) Find the value of x^0 and y^0 from the following figure:





Sub: Algebra

Class: VIII

F. M. : 80

Group - A

1. 1) b)16 2) a){4,8,16} 3) c)obtuse 4)b)26cm 5)c) 40
- ⁰

- II. 1.
- $a^2 + b^2$
- 2.
- $ab - ac - cd + bd$
- 3.
- ~~36~~
- 0
- ⁰
4. Supplementary 5. Right

- III. 1. True 2. False 3. False 4. True 5. True

Group - B

IV. i). Given, $\frac{x}{2x-3} = 1$

or, $x = 2x - 3$ [by cross multiplication]

or, $2x - 3 = x$

or, $2x - x = 3$

or, $x = 3$ (Ans)

ii) Given, $\frac{y}{2} + 6 < 11$;

or, $\frac{y}{2} < 11 - 6$

or, $y < 10$

Hence the solution set for y will be $y = \{1,4,6,8,9\}$ (Ans)

iii) $(99.99)^2$

$= (100 - 0.01)^2$

$= (100)^2 - 2 \times 100 \times 0.01 + (0.01)^2$

$= 10000 - 2 + 0.0001$

$= 9998.0001$ (Ans)

iv) Given, $16x = (62)^2 - (26)^2$

or, $16x = (62 + 26)(62 - 26)$

or, $x = \frac{88 \times 36}{16}$

or, $x = 198$ (Ans)

v) Let the numbers be $(x - 2)$, x and $(x + 2)$.

Then, according to the sum, $(x - 2) + x + (x + 2) = 90$

Or, $3x = 90$

Or, $x = 30$

So, the numbers are 28, 30 and 32. (Ans)

V. i) Given expression is $(9 - 6x)$. It can also be written as $3^2 - 2 \times 3 \times x$

Now, if we add $+x^2$ to it, it becomes, $3^2 - 2 \cdot 3 \cdot x + x^2 = (3 - x)^2$, which is a perfect square number. So, $+x^2$ should be added with $(9 - 6x)$ to make it a perfect square number.

ii) $\left(x^2 - \frac{1}{2y^2}\right)^2 = (x^2)^2 - 2 \cdot x^2 \cdot \frac{1}{2y^2} + \left(\frac{1}{2y^2}\right)^2$

$= x^4 - \frac{x^2}{y^2} + \frac{1}{4y^4}$ (Ans)

iii) Let the number be x . According to the sum, the equation will be -

$\frac{x}{5} + 4 = \frac{x}{4} - 10$

Or, $\frac{x}{4} - 10 = \frac{x}{5} + 4$

$$\text{Or, } \frac{x}{4} - \frac{x}{5} = 4 + 10$$

$$\text{Or, } \frac{5x-4x}{20} = 14$$

$$\text{Or, } \frac{x}{20} = 14$$

$$\text{Or, } x = 280$$

Hence the required number is 280. (Ans) .

Or

$$\frac{(1-3y)(4-y)}{(2-3y)(1-y)} = 1$$

$$\text{Or, } (1-3y)(4-y) = (2-3y)(1-y) \quad [\text{by cross multiplication}]$$

$$\text{Or, } 4-y-12y+3y^2 = 2-2y-3y+3y^2$$

$$\text{Or, } -y-12y+3y^2+2y+3y-3y^2 = 2-4$$

$$\text{Or, } -8y = -2$$

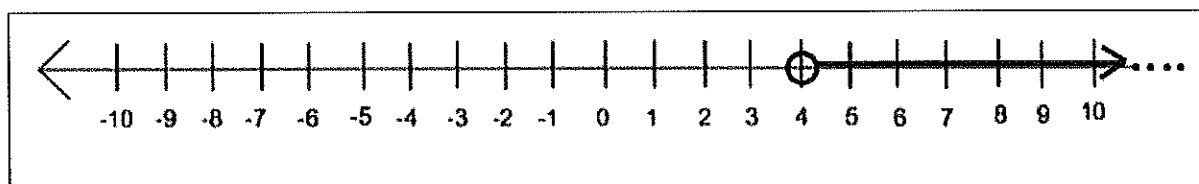
$$\text{Or, } y = \frac{1}{4} \text{ (Ans)}$$

$$\text{iv) } 13-y < 9.$$

$$\text{Or, } 9 > 13-y$$

$$\text{Or, } y > 13-9$$

Or, $y > 4$ i.e. y will be greater than 4 and extended to $+\infty$. So the number line will be –



Or

Let their present ages are $5x$ and $7x$. So, 4 years ago, their ages were $5x-4$ and $7x-4$.

$$\text{Then, by the sum, } \left(\frac{5x-4}{7x-4}\right) = \frac{2}{3}$$

$$\text{Or, } 15x-12 = 14x-8$$

$$\text{Or, } x = 4$$

So, their present ages are : Age of A is $= 5x = 5 \cdot 4 = 20 \text{ years}$

Age of B is $= 7x = 7 \cdot 4 = 28 \text{ years}$ (Ans)

v)

$$< a = \frac{120^\circ}{2} = 60^\circ \quad [\text{as } < a \text{ is drawn from the same segment on the other part of the circle.}]$$

$$< a = < b \quad [\text{as they are drawn from the same segment on the circumference}]$$

$$\text{So, } < a = < b = 60^\circ \quad (\text{Ans})$$

Group – C

6.a) Let the fraction be $x/(x+3)$

B.T.P. $\frac{x+7}{x+3-2} = 2$ or, $x = 5$

$x+3-2$

Therefore, sum of numerator and denominator is $5+8=13$ (Ans)

b) Let son's present age be x years

Then, fathers present age is $(3x+3)$ years

After 3 years son's age = $(x+3)$ years

After 3 years father's age is $\{ (3x+3) +3 \}$ years

B.T.P $(3x+3) + 3 = 2 (x+3) +10$

Or, $x= 10$

Hence, fathers present age = $\{ 3 (10+3) \} = 33$ years (Ans)

c) Let the speed of motor boat in still water be x km / hr

Speed of stream = 2 km / hr

So, speed of motor boat down stream= $x+2$ km / hr

Speed of motor boat upstream = $x-2$ km / hr

B.T.P. $3 (x+2) = 4 (x-2) [\text{Distance} = \text{speed} \times \text{time}]$

Or, $x = 14$ km / hr

Therefore, speed of boat down stream = 16 km / hr (Ans)

d) i) $x + 1/x = 3$

or, $(x+1/x)^2 = 9$

or, $x^2 + 1/x^2 = 7$

or, $(x^2 + 1/x^2)^2 = 49$

or, $x^4 + 1/x^4 = 47$ (Ans)

ii) $x-1/x = 4$

or, $x^2 + 1/x^2 = 18$

or, $x^4 + 1/x^4 = 322$

e) Let the angles quadrilateral be $2x, 3x, 5x$ and $8x$

B.T.P. $2x + 3x + 5x + 8x = 360^\circ$ or, $x = 20^\circ$

Therefore, the required angles are $40^\circ, 60^\circ, 100^\circ$ and 160° (Ans)

f) Students will write the theorem.

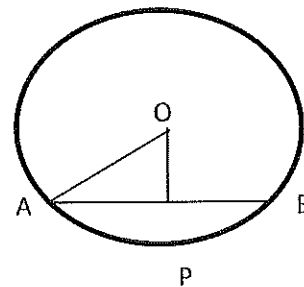
g) OA (radius) = 13 cm.

And OD = 12 cm

Therefore, $OA^2 = OD^2 + AD^2$ or, $(13)^2 - (12)^2 = AD^2$

Or, $AD = 5$ cm.

Hence, $AB = 2AD = 10$ cm (Ans)

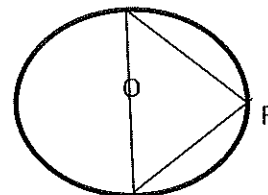


h) $\angle Q = 60^\circ$ (given)

$\angle R = 90^\circ$ (angle in a semi circle)

We know $\angle P + \angle Q + \angle R = 180^\circ$

Or, $\angle P = 180^\circ - 60^\circ - 90^\circ = 30^\circ$ (Ans)



i) $(x^2 + xy - y^2) (x^2 - xy + y^2)$

$\{x^2 + (xy - y^2)\} \{x^2 - (xy - y^2)\}$

$= x^4 - (xy - y^2)^2$

$= x^4 - x^2y^2 - y^4 + 2xy^3$ (Ans)

j) $x^\circ + 40^\circ + 80^\circ + 100^\circ = 360^\circ$

or, $x^\circ = 140^\circ$

Again, $y^\circ = 180^\circ - 140^\circ = 40^\circ$

Hence, $x = 140^\circ$ and $y = 40^\circ$ (Ans)