ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

FOR GOD AND COUNTRY

First Term Examination – 2018

Class : 8

SUB : Algebra Geometry

F.M.: 80

DURATION: 2 Hrs30Mins

DATE:28.04.2018

Group – I

1. Choose the correct answer: (5 x 1 = 5)

(i) The sum of the additive inverse and multiplicative inverse of 2 is :

(a) $\frac{3}{2}$ (b) $\frac{1}{2}$ (c) $\frac{-3}{2}$ (d) $-\frac{1}{2}$

(ii) $(x-y)(x-y)-(x+y)(x+y)$ equals:

(a) $2x^2-4xy$ (b) $2x^2-2y^2$ (c) $4xy+2y^2$ (d) $-4xy$.

(iii) If $-15\,mn^4p^2$ is divided by $\frac{1}{6}m^4n^4p^2$, the quotient is:

(a) $\frac{-5}{3m^3}$ (b) $\frac{-90}{m^3}$ (c) $-90m^3$ (d) none of them

(iv) For a Δ ABC which one of the following is a true statement:

(a) $AC^2 = AB^2 + BC^2$ (b) $AC = AB + BC$ (c) $AC > AB + BC$
(d) $AC < AB + BC$

(v) The measures of three angles of a triangle are in the ratio 1: 2 : 3. Then, the triangle is:

(a) right-angled (b) equilateral (c) isosceles (d) obtuse angled.

2. Write True or False: (5 x 1 = 5)

(i) In Δ ABC, <c is an acute angle, then we have $AB^2 < BC^2 + AC^2$.

(ii) $a^m \times b^m = (ab)^{2m}$.

(iii) $x^2 + \frac{1}{x^2}$ is a polynomial.

(iv) The difference of – 8ab from -18ab is 10ab.

(v) In a triangle, bisector of a vertical angle is called angle bisector of a triangle.

3. Fill in the blanks. (5 x 1 = 5)

(i) If two sides of a triangle are unequal, the longer side has ________ angle opposite to it.

(ii) $2^3 \times (-9)^0 \times 3^3$ equals to ___________.

(iii) The simplified value of $p - (p - q) - q - (q - p)$ is ______________.

(iv) In Δ ABC $\angle A = 79^0$, $\angle B = 31^0$, $\angle C = 70^0$, then smallest side is ____________.

(v) In SAS congruency, angle must be ____________ angle.

GROUP II

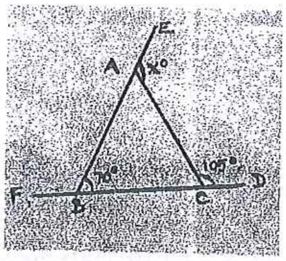
4. Answer the following. (5 x 2 = 10)

(i) Simplify: $4k^2 (4^{-1}k + 4k^{-2})$

(ii) Add $3mn^2$, $-5mn^2$, $\frac{2}{3}mn^2$ and $-4mn^2$.

(iii) Multiply: $5x^2 - 3x + 2$ by $7x$.

(iv) Find x.



(v) The three angles of a triangle measure $(2x - 10^0)$, $(x + 31^0)$ and $(5x + 7^0)$. Find x.

5. Answer the following (any FIVE). (5 x 3 = 15)

(i) Prove that the sum of the exterior angles of a triangle taken in order is 360^0.

(ii) Express as a positive power of 3

$$\frac{(9)^{-1} \times (27)^{-2}}{(81)^{-2} \times 3^6}$$

(iii) Show that

$$\left(\frac{x^a}{x^b}\right)^c \times \left(\frac{x^b}{x^c}\right)^a \times \left(\frac{x^c}{x^a}\right)^b = 1$$

(iv) Subtract $a^2 - b^2 - c^2$ from the sum of $2a^2 + 3b^2 - c^2$ and $4a^2 - 3b^2 + 5c^2$.

(v) Multiply: $4a^2 - 6a + 5$ by $3a + 2$.

(vi) Divide: $14x^2 - 53x + 45$ by $7x - 9$.

(vii) If $x = 2^k$ and $y = 2^{k+3}$, what is the value of $\frac{x}{y}$?.

Group - C

6. Answer any eight. 5x8=40

a) Divide : $(x^2 + 8x + 15)$ by $(x + 3)$

b) Multiply : $(4a^2 - 6a + 5)$ by $(3a + 2)$

c) Add together : $7a^3 - 3a^2b + 5ab^2 - b^3$, $2a^3 - 3ab^2 - 4a^2b$ and $b^3 - 4a^3 + ab^2$.

d) Subtract : $23xy - 6x^2 + 8a^2 - 1$ from $35x^2 + 8xy - 4b^2 - 2$.

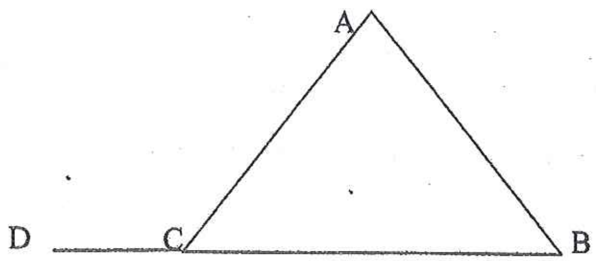
e) Divide: $18x^4y^2 + 15x^2y^2 - 27x^2y$ by $-3xy$.

f) Classify triangles based on angles.

g) What are the differences between Median and altitude of a triangle. Give diagram.

h) Prove that if two sides of a triangle are equal, then the angles opposite those sides are equal.

i) The adjoining figure shows a triangle ABC with $\angle ACD = 105°$ and $\angle CAB = 55°$. Show that AB > AC.



j) Simplify: $[(^2/_3)^2]^3 \times (^1/_3)^{-4} \times 3^{-1} \times {}^1/_6$

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FOR GOD AND COUNTRY

ST. LAWRENCE HIGH SCHOOL

FIRST TERM - 2018

Subject: ALGEBRA & GEOMETRY **Class: VIII** **F. M. 80**

MODEL ANSWERS

Group –I

1. Choose the correct answer: (5 x 1 = 5)

(I) The sum of the additive inverse and multiplicative inverse of 2 is :

(a) $\frac{3}{2}$ (b) $\frac{1}{2}$ (c) $\frac{-3}{2}$ (d) - $\frac{1}{2}$

Sol.: (c) - $\frac{3}{2}$

(ii) (x-y) (x – y) - (x + y) (x + y) equals:

(a) $2x^2 - 4xy$ (b) $2x^2 - 2y^2$ (c) $4xy + 2y^2$ (d) -4xy.

Sol.: (d) -4xy

(iii) If $-15\ mn^4p^2$ is divided by $\frac{1}{6}m^4n^4p^2$, the quotient is:

(a) $\frac{-5}{3m^3}$ (b) $\frac{-90}{m^3}$ (c) $-90m^3$ (d) none of them

Sol.: (b) $\frac{-90}{m^3}$

(iv) For a Δ ABC which one of the following is a true statement:

(a) $AC^2 = AB^2 + BC^2$ (b) AC = AB + BC (c) AC>AB + BC (d) AC < AB + BC

Sol.: (c) AC> AB + BC

(v) The measures of three angles of a triangle are in the ratio 1: 2 : 3. Then, the triangle is:

(a) right-angled (b) equilateral (c) isosceles (d) obtuse angled.

Sol.: (a) right-angled.

2. Write True or False: (5 x 1 = 5)

(i) In Δ ABC, <c is an acute angle, then we have $AB^2 < BC^2 + AC^2$. Sol.: True

(ii) $a^m \times b^m = (ab)^{2m}$.Sol.: False

(iii) $x^2 + \frac{1}{x^2}$ is a polynomial. Sol.: False

(iv) The difference of – 8ab from -18ab is 10ab. Sol. False

(v) In a triangle exterior angle is equal to two opposite interior angles. Sol.: True

3. Fill in the blanks. (5 x 1 = 5)

(i) If two sides of a triangle are unequal, the longer side has __________ angle opposite to it. Sol.: Greater

(ii) $2^3 \times (-9)^0 \times 3^3$ equals to __________. Sol.: 216

(iii) The simplified value of p – (p – q) – q – (q – p) is __________. Sol.: p-q.

(iv) In Δ ABC $<A = 79^0$, $<B = 31^0$, $<C = 70^0$, then smallest side is __________. Sol.: AC

(v) In SAS congruency, angle must be __________ angle. Sol.: Including

GROUP II

4. Answer the following. (5 x 2 = 10)

(i) Simplify: $4k^2 (4^{-1}k + 4k^{-2})$.

Sol.: $4k^2 \left(\frac{k}{4} + \frac{4}{k^2} \right)$

$= 4k^2 \times \frac{K^3 + 16}{4k^2} = k^3 + 16$

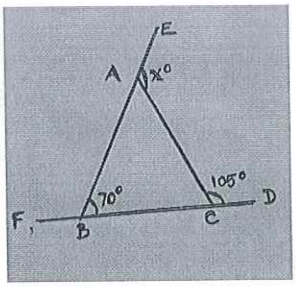
(ii) Add $3mn^2$, $- 5mn^2$, $\frac{2}{3} mn^2$ and $-4mn^2$.

Sol.: $\left(\frac{9-15+2-12}{3}\right)mn^2 = \frac{-16}{3} mn^2$

(iii) Multiply: $5x^2 - 3x + 2$ by $7x$.

Sol.: $35x^3 - 21x^2 + 14x$

(iv) Find x.



Sol.: $<ACB = 180^0 - 105^0 = 75^0$

$<EAC = x = 70^0 + 75^0 = 145^0$

(v) The three angles of a triangle measure ($2x - 10^0$), ($x + 31^0$) and ($5x + 7^0$). Find x.

Sol.: $2x - 10 + x + 31 + 5x + 7 = 180^0$

Or $8x + 28 = 180^0$

Or $x = 19^0$

5. Answer the following (any FIVE). (5 x 3 = 15)

(i) Prove that the sum of the exterior angles of a triangle taken in order is 360^0.

Sol.: Let exterior angle of $<A = a^0$ be x^0

" $<B = b^0$ be y^0

" $<C = c^2$ be z^0

Now $x = a + b$, $y = b + c$, $z = c + a$

$\therefore x + y + z = 2 (a + b + c) = 2 \times 180^0 = 360^0$.

(ii) Express as a positive power of 3

$$\frac{(9)^{-1} \times (27)^{-2}}{(81)^{-2} \times 3^6}$$

Soln: $\frac{3^{-2} \times 3^{-6}}{3^{-8} \times 3^6} = \frac{3^{-8}}{3^{-2}} = \frac{1}{3^6}$

(iii) Show that

$$\left(\frac{x^a}{x^b}\right)^c \times \left(\frac{x^b}{x^c}\right)^a \times \frac{x^c}{x^a}\Big)^b = 1$$

Sol.: $x^{ac-bc+ab-ac+bc-ab} = x^0 = 1.$

(iv) Subtract $a^2 - b^2 - c^2$ from the sum of $2a^2 + 3b^2 - c^2$ and $4a^2 - 3b^2 + 5c^2$.

Sol.: $2a^2 + 3b^2 - c^2$

$4a^2 - 3b^2 + 5c^2$

$6a^2 + 0 + 4c^2$

$-a^2 - b^2 - c^2$

$5a^2 + b^2 + 5c^2$

(v) Multiply: $4a^2 - 6a + 5$ by $3a + 2$.

Sol.: $(4a^2 - 6a + 5)(3a + 2)$

$= 12a^3 - 18a^2 + 15a + 8a^2 - 12a + 10$

$= 12a^3 - 10a^2 + 3a + 10$

(vi) Divide: $14x^2 - 53x + 45$ by $7x - 9$.

Sol.: Quotient $-2x - 5$ and reminder = 0

(vii) If $x = 2^k$ and $y = 2^{k+3}$, what is the value of $\frac{x}{y}$?.

Sol.: $\frac{x}{y} = \frac{2^k}{2^k \times 2^3} = \frac{1}{2^3} = \frac{1}{8}$.

Group – C

6. a) $x+3$) $x^2 + 8x + 15$ ($x+5$

$- x^2 + 3x$

-

$5x + 15$

$5x + 15$

-

0

6. b) $(4a^2 - 6a + 5)(3a + 2)$

$= 3a(4a^2 - 6a + 5) + 2(4a^2 - 6a + 5)$

$= 12a^3 - 18a^2 + 15a + 8a^2 - 12a + 10$

$= 12a^3 - 10a^2 + 3a + 10$

c) $7a^3 - 3a^2b + 5ab^2 - b^3$

$2a^3 - 4a^2b - 3ab^2$

$-4a^3 \qquad + ab^2 + b^3$

$5a^3 - 7a^2b + 3ab^2$

d) $35x^2 + 8xy - 4b^2 - 2$

$-6x^2 + 23xy \qquad - 1 + 8a^2$

$+ \quad - \qquad\qquad + \quad -$

$41x^2 - 15xy - 4b^2 - 1 - 8a^2$

e) $\dfrac{18x^4y^2}{-3xy} + \dfrac{15x^2y^2}{-3xy} - \dfrac{27x^2y}{-3xy}$

$= -6x^3y - 5xy + 9x$

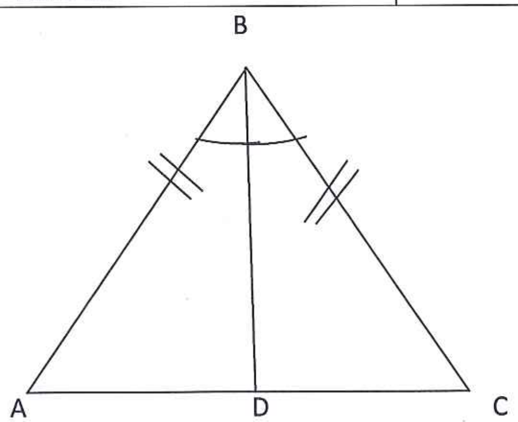
f) Acute triangle, obtuse triangle, and Right angled triangle.
Right angled triangle.
Definition and diagram required.

g) Median: It is a line segment joining a vertex to the mid-point of the side opposite to that vertex.
The point at which the medians of a triangle meet is called centroid of the triangle.
All there medians of a triangle meet at a point inside the triangle.

Altitude: It is a perpendicular drawn from a vertex to the opposite side (produced if necessary).
The point of intersection of the altitudes of a triangle is called orthocentre.
The point of intersection of the altitudes may lie inside or outside the triangle.

h) Isosceles $\triangle$ ABC is given and AB = BC. We wish to prove that <A = <C. We begin by drawing the bisector of <B, namely BD

Statements	Reasons
AB = CB	Given
<a = <b	Construction
BD=BD	Common
$\therefore \triangle$ABD & $\triangle$CBD is congruent	(SAS)
$\therefore$ <A = <C	(Corr. <s of congruent $\triangle$ s



i) $<ACB = 180^0 - 105^0 = 75^0$ Linear pair

In $\triangle ABC$, by the angle sum property of a triangle

$<ABC + <CAB + <ABC = 180^0$

$\rightarrow 75^0 + 55^0 + <ABC = 180^0$

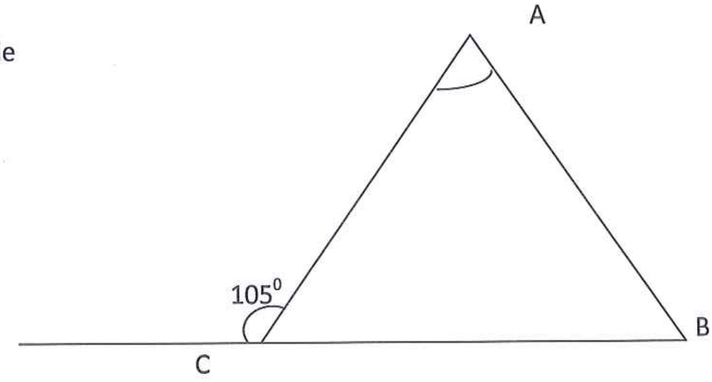
$\Rightarrow 130^0 + <ABC = 180^0$

$\Rightarrow <ABC = 180^0 - 130^0 = 50^0$

Now, $<ACB = 75^0$ and $<ABC = 50^0$

$\Rightarrow <ACB > <ABC \rightarrow AB > AC$

$\therefore$ Side opposite to <ACB is AB.



Side opposite to <ABC is AC, D

Side opposite greater angle is longer.

J) Simplify: $[(2/3)^2]^3 \times (1/3) -^4 \times 3^{-1} \times 1/6$

$= (2/3)^6 \times (3)^4 \times 1/3 \times 1/6$

$= 2^6 / 3^6 \times 3^4 \times 1/3 \times 1/6$

$= 2^6 / 3^6 \times 3^4 \times 1/3 \times ½ \times 1/3$

$= \frac{2^6 \times 3^4}{3^8 \times 2} = \frac{2^{6-1}}{3^{8-4}} = 2^5 / 3^4 = 32 / 81$