ROSEBUD SCHOOL
Buddhanagar, Kathmandu

2nd TERMINAL EXAMINATION - 2077

Name of the student: Anuj Sapkota Class: 8

Section: Gallica Roll No: 6 Subject: Opt. Maths Date: 2077/9/7

Symbol No.: Symbol No. In words:

To be filled by Examiner:

Obtained Marks: Marks in words:

Date: Examiner:

Start from here:

Group 'A' [11x2=22]

1)

→ Soln

Here,

Straight angle = 180°

So, $\frac{2}{5}$ th of a straight angle is = $\frac{2}{5} \times 180° = 72°$

We know,

Turning Degree into grade,

$1° = \frac{10}{9}^g$ or, $72° = \frac{10}{9} \times 72^g = 80^g$

Turning Degree into radian,

$1° = \frac{\pi^c}{180}$ or, $72° = \frac{\pi}{180} \times 72^c = \frac{2\pi}{5}$

$$\begin{array}{r} 36 \\ \times 2 \\ \hline 72 \end{array}$$

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2.)

→ Soln,

Here,

$(3x+2, -14) = (5, 3y+1)$

or,

From the above condition,

$3x+2 = 5$	$-14 = 3y+1$
or, $3x = 5-2$	or, $3y+1 = -14$
or, $3x = 3$	or, $3y = -14-1$
or, $x = \frac{\cancel{3}\,1}{\cancel{3}\,1}$	or, $3y = -15$
$\therefore x = 1$	or, $y = \frac{-\cancel{15}\,5}{+\cancel{3}\,1}$
	$\therefore y = -5$

3.) → Soln,

Here,

$d = \{2, 3, 5\}$

relation $f = \{(x, y), y = 10-3x\}$

Now,

When $x = 2$, $y = 10-3\times2 = 10-6 = 4$

When $x = 3$, $y = 10-3\times3 = 10-9 = 1$

When $x = 5$, $y = 10-3\times5 = 10-15 = -5$

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$\therefore$ the range of the relation is $\{4, 1, -5\}$

4. → Soln,

Here,

$= x(x^4 + y^2 + x^2y^3)$

$= x^5 + xy^2 + x^3y^3$

Now,

Degree of 1st term = 5

Degree of 2nd term = 1+2 = 3

Degree of 3rd term = 3+3 = 6

$\therefore$ Highest degree = 6 #

5 → Soln,

Here,

$L.H.S = \sec^4A - \sec^2A$

$= \sec^2A(\sec^2A - 1)$

$= (1 + \tan^2A) \times \tan^2A$

$= \tan^2A + \tan^4A$

$= \tan^4A + \tan^2A$

$= R.H.S$ proved

6 → Soln,

Here,

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6) → Soln,

Here,

Let $f(x) = 5x^3+2x^2-12$ & $g(x) = 3x^3-12x^2+5x-5$

Now,

$$f(x)-g(x) = 5x^3+2x^2-12-(3x^3-12x^2+5x-5)$$
$$= 5x^3+2x^2-12-3x^3+12x^2-5x+5$$
$$= 5x^3-3x^3+12x^2+2x^2-5x+5-12$$
$$= 2x^3+14x^2-5x-7$$

∴ the polynomial needed is $2x^3+14x^2-5x-7$.

7) → Soln,

Here,

$d = ?$

$P(a+b, a-b)$ —— $Q(a-b, a+b)$

The distance between $P(\overset{x_1}{a+b}, \overset{y_1}{a-b})$ and $Q(\overset{x_2}{a-b}, \overset{y_2}{a+b})$ is;

$$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$
$$= \sqrt{\{(a-b)-(a+b)\}^2+\{(a+b)-(a-b)\}^2}$$
$$= \sqrt{\{\cancel{a}-b-\cancel{a}-b\}^2+\{\cancel{a}+b-\cancel{a}+b\}^2}$$
$$= \sqrt{\{-2b\}^2+\{2b\}^2}$$
$$= \sqrt{\cancel{2b^2+2b}\ 4b^2+4b^2}$$
$$= \sqrt{8b^2}$$
$$= \sqrt{2^2\times2\times b^2}$$
$$\cancel{= \sqrt{}} = 2b\sqrt{2} \text{ units}$$

∴ distance between $2b\sqrt{2}$ units

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8) → Soln

Here,

Here,

$(x_1, y_1) = (2, -4)$

$(x_2, y_2) = (\cancel{6,2}\ -3, 6)$

In the ratio: $m_1 : m_2 = 2:3$

We know,

Let $C(x,y)$ be the required point, then

$$C(x,y) = \left[\frac{m_1x_2 - m_2x_1}{m_1 - m_2}, \frac{m_1y_2 - m_2y_1}{m_1 - m_2}\right]$$

$$= \left[\frac{2\times -3 - 3\times 2}{2-3}, \frac{2\times 6 - 3\times -4}{2-3}\right]$$

$$= \left[\frac{-6-6}{-1}, \frac{12+12}{-1}\right]$$

$$= \left[\frac{\cancel{-}12}{\cancel{-}1}, \frac{24}{-1}\right]$$

$$= [12, -24]$$

∴ The required point is [12, -24]
coordinates of the

9) → Soln

Here,

Let,

$(x_1, y_1) = (a, 2)$

$(x_2, y_2) = (2, -2)$

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AB = 5 units

We know,

$AB^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$

$5^2 = (2 - a)^2 + (-2 - 2)^2$

or, $5^2 = 4 - 4a + a^2 + 16$

or, $5^2 = a^2 - 4a + 20$

or, $a^2 - 4a + 20 - 25 = 0$

or, $a^2 - 4a \cancel{+15 = 0} - 5 = 0$

~~or, $a^2 - (\quad) a + 15 = 0$~~

or, $a^2 - (5 - 1)a - 5 = 0$

or, $a^2 - 5a + a - 5 = 0$

or, $a(a-5) + 1(a-5) = 0$

or, $(a-5)(a+1) = 0$

Either,

$a - 5 = 0$ or, $a = 5$

Or,

$a + 1 = 0$ $\therefore a = -1$

$\therefore a = 5$ or -1

15 | 1 | 15 | 3 | 5 | 1

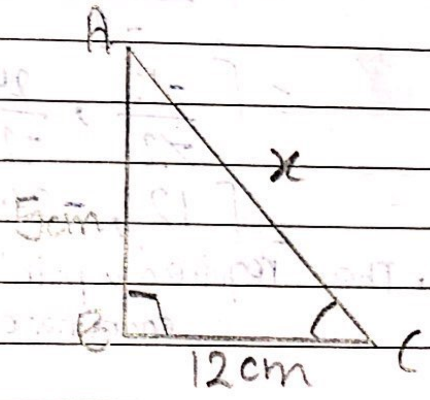
10) → Soln, Here,

In $\triangle ABC$,

$h = ?$

$p = 5cm$

$b = 12cm$



We know,

$h^2 = p^2 + b^2$ [$\because$ pythagoras theorem]

or, $h^2 = 5^2 + 12^2$

or, $h = \sqrt{5^2 + 12^2}$

or, $h = \sqrt{25 + 144}$

or, $h = \sqrt{169}$

$\therefore h = 13$ units

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Now,

$\therefore \cot C = \frac{b}{p} = \frac{12}{5}$ cm

$\therefore h = 13$cm

11. → Soln

Here,

$= \cos^4 A + \sin^3 A \times \cos A$

$= \cancel{\cos\theta\ (\cos^3\theta + \sin}$

$= \cos A(\cos^3 A + \sin^3 A)$

$= \cos A(\cos A + \sin A)(\cos^2 A - \cos A \sin A + \sin^2 A)$

Group 'B'

12.)

→ Soln,

Here,

$f(x) = 4x^4 - 3x^2 + 2x - 1$

$g(x) = x^2 - 3$

We know,

→

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12) (continued)

$$x^2-3 \overline{) 4x^4-3x^2+2x-1} \; (4x^2+9$$

$$\underline{\cancel{4x^4} - 12x^2}$$

$$9x^2+2x$$

$$\underline{\cancel{9x^2} - 27}$$

$$= 2x+26$$

$\therefore$ Quotient $= 4x^2+9$

$\therefore$ Remainder $= 2x+26$

$\frac{4x^2}{x^2} = 4x^2$

(x^2-3)

$4x^4-12x^2$

$\frac{9x^2}{x^2}$

$9x^2-27$

13) → Soln,

Here,

$A = \{1,3,4,5\}$

$B = \{1,2,3\}$

$A \times B = \{(1,1),(1,2),(1,3),(3,1),(3,2),(3,3),(4,1),(4,2),(4,3),(5,1),(5,2),(5,3)\}$

Now, ~~R: A → B = {~~

R = a relation from A to B such that x is the square of y.

$= \{(1,1),(4,2)\}$

We know,

Representing R in:

i) Table form

→

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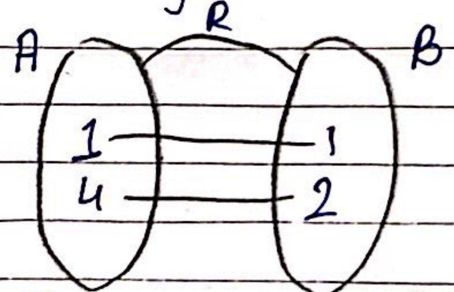
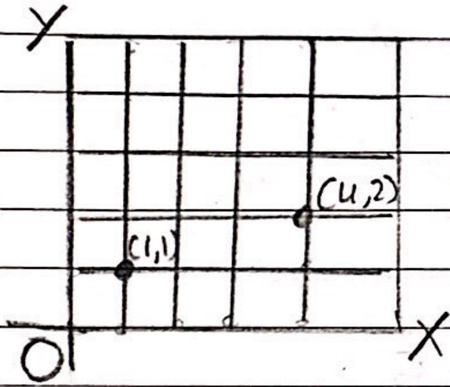
(i)

x	1	4
y	1	2

(ii) Arrow diagram;



(iii) Cartesian plane;



14) → Solⁿ,

Here,

Let the points be $A(\overset{x_1}{5},\overset{y_1}{4})$, $B(\overset{x_2}{5},\overset{y_2}{-3})$, $C(0,-3)$ and $D(0,4)$.

Now,

$$AB^2 = (5-5)^2 + (-3-4)^2$$
$$= (0)^2 + (-7)^2$$
$$\therefore AB = 0 + 49 = \sqrt{49} = 7 \text{ units}$$

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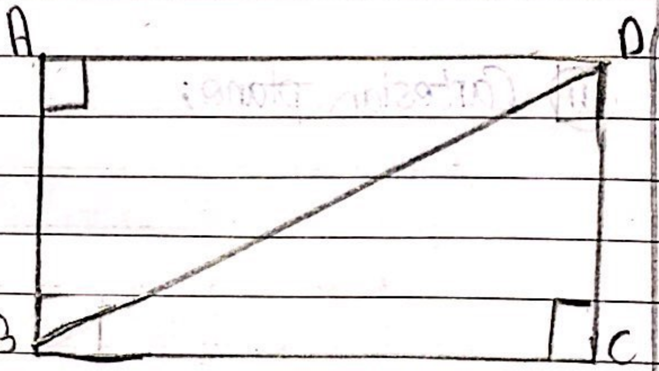
$BC^2 = (0-5)^2 + (-3+3)^2$
$= (-5)^2 + (0)^2$
$= 25 + \cancel{36}0$
$= \cancel{\sqrt{25}}\sqrt{25}$
$\therefore BC = 5$ units

$- CD^2 = (0-0)^2 + (4+3)^2$
$= 0 + 49$
$= \sqrt{49}$
$\therefore CD = 7$ units

$- DA^2 = (0-5)^2 + (4-4)^2$
$= (-5)^2 + (0)^2$
$= 25+0$
$= \sqrt{25}$
$\therefore DA = 5$ units



Since,

$AB = CD = 7, BC = DA = 5$

And,

$BD^2 = (0-5)^2 + (4+3)^2$
$= (-5)^2 + (7)^2$
$= 25 + 49$
$= \sqrt{74}$

So, [In ΔBCD]

$H^2 = P^2 + B^2$ [Using pythagoras theorem]

or, $(\sqrt{74})^2 = (5)^2 + (7)^2$

or, $74 = 25 + 49$

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$\therefore 74 = 74$

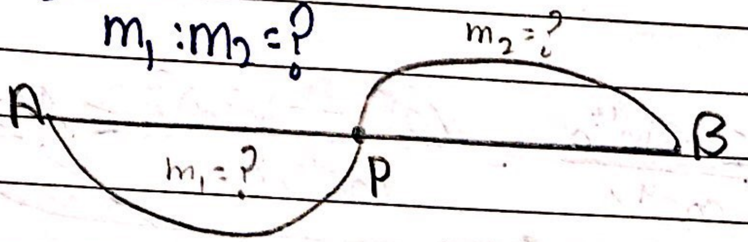
$\therefore$ ~~ABCD is a re~~

$\therefore$ A, B, C and D are the vertices of a rectangle.

15) → Soln,

Here,

$m_1 : m_2 = ?$



We have,

$$P(5,3) = \left(\frac{m_1 \times 8 + m_2 \times 3}{m_1 + m_2}, \frac{m_1 \times 6 + m_2 \times 1}{m_1 + m_2}\right)$$

$$\text{or, } P(5,3) = \left(\frac{8m_1 + 3m_2}{m_1 + m_2}, \frac{6m_1 + m_2}{m_1 + m_2}\right)$$

From the above condition,

Taking x component, $5 = \frac{8m_1 + 3m_2}{m_1 + m_2}$

or, $5(m_1 + m_2) = 8m_1 + 3m_2$

or, $5m_1 + 5m_2 = 8m_1 + 3m_2$

or, $5m_2 - 3m_2 = 8m_1 - 5m_1$

or, $2m_2 = 3m_1$

or, $\frac{m_2}{m_1} = \frac{3}{2}$

$\therefore m_1 : m_2 = 2 : 3$

$\therefore$ The ratio is ~~m~~ 2:3.

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16) → Soln,

Here,

$L.H.S = (a\cos\beta + b\sin\beta)^2 + (a\sin\beta - b\cos\beta)^2$

$= a^2\cos^2\beta + \cancel{2ab\cos\beta\sin\beta} + b^2\sin^2\beta + a^2\sin^2\beta - \cancel{2ab\sin\beta\cos\beta} + b^2\cos^2\beta$

$= a^2(\sin^2\beta + \cos^2\beta) + b^2(\sin^2\beta + \cos^2\beta)$

$= a^2 \times 1 + b^2 \times 1$

$= a^2 + b^2$

$= R.H.S$ proved

17) → Soln, Here,

$L.H.S = \dfrac{1-\sin^4\alpha}{\cos^4\alpha}$

$= \dfrac{(1+\sin^2\alpha)(1-\sin^2\alpha)}{\cancel{\cos^4\alpha}\ \cos^2\alpha \cdot \cos^2\alpha}$

$= \dfrac{(1+\sin^2\alpha)\cancel{(1-\sin^2\alpha)}}{\cancel{(1-\sin^2\alpha)}(1-\sin^2\alpha)}$

$= \dfrac{(1+\sin^2\alpha)}{\cos^2\alpha}$

$= \dfrac{1}{\cos^2\alpha} + \dfrac{\sin^2\alpha}{\cos^2\alpha}$

$= \sec^2\alpha + \tan^2\alpha$

$= 1 + \tan^2\alpha + \tan^2\alpha$

$= 1 + 2\tan^2\alpha$

$= R.H.S$ proved

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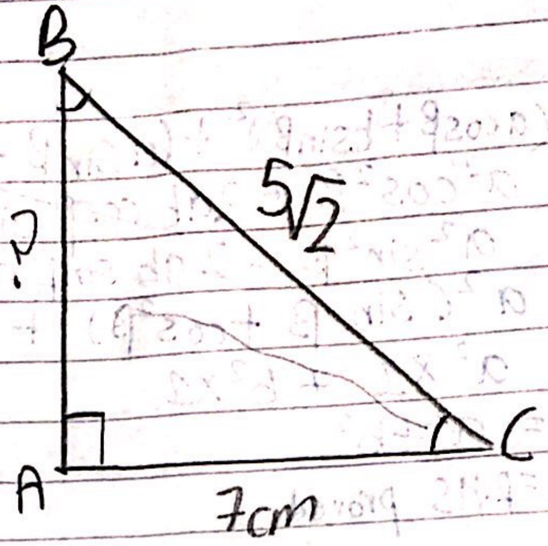
18) → Soln,
Here,



$h = 5\sqrt{2}$ cm
$p = 7$cm
$b = ?$

Now,
$h^2 = p^2 + b^2$ [Using pythagoras theorem]
or, $5\sqrt{2}^2 = 7^2 + b^2$
or, $\cancel{10}\ 50 = 49 + b^2$
or, $50 - 49 = b^2$
~~or, 1~~ = or, $1 = b^2$
or, $b = \sqrt{1}$
$\therefore b = 1$

We know,
$\sec B = \frac{h}{b} = \frac{5\sqrt{2}}{1} = 5\sqrt{2}$ cm
[Ref. angle at C] $\operatorname{cosec} C = \frac{h}{p} = \frac{5\sqrt{2}}{1} = 5\sqrt{2}$ cm
$\tan B = \frac{p}{b} = \frac{7}{1} = 7$cm

~~16 & 17~~