SM121 LESSON 1 HW – 3/6/7/12/19/25/28/29/36/41/59 20 AUG 2008

COORDINATE GEOMETRY & LINES

(3) $(6,-2)\ (-1,3)$

$$|P_1P_2| = \sqrt{(6--1)^2+(-2-3)^2} = \sqrt{49+25} = \boxed{\sqrt{74}}$$

(6) $(a,b)\ (b,a)$

$$|P_1P_2| = \sqrt{(a-b)^2+(b-a)^2} = \sqrt{(a^2-2ab+b^2)+(b^2-2ab+a^2)} = \sqrt{2a^2+2b^2}$$

$$= \sqrt{2(a^2+b^2)}$$

$$= \sqrt{(a-b)^2+(a-b)^2} = \sqrt{2(a-b)^2} = \boxed{\sqrt{2}\,|a-b|}$$

(7) $P(1,5)$
$Q(4,11)$

$$m = \frac{5-11}{1-4} = \frac{-6}{-3} = \boxed{2}$$

(12) a)

$$|AB| = \sqrt{(6-11)^2+(-7-(-3))^2} = \sqrt{-5^2+-4^2} = \sqrt{41}$$

$$|BC| = \sqrt{(11-2)^2+(-3-(-2))^2} = \sqrt{9^2+1^2} = \sqrt{82}$$

$$|AC| = \sqrt{(6-2)^2+(-7-(-2))^2} = \sqrt{4^4+-5^2} = \sqrt{41}$$

$$|BC|^2 = |AB|^2 + |AC|^2$$

$$(\sqrt{82})^2 = (\sqrt{41})^2 + (\sqrt{41})^2$$

$$82 = 41+41$$

a) $\boxed{\therefore\ \Delta ABC \text{ IS A RIGHT TRIANGLE}}$

b)

$$m_{|AB|} = \frac{-7-(-3)}{6-11} = \frac{4}{5}$$

$$m_{|BC|} = \frac{-3-(-2)}{11-2} = \frac{-1}{9}$$

$$m_{|AC|} = \frac{-7-(-2)}{6-2} = \frac{-5}{4}$$

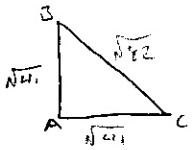
$$(m_{|AB|})(m_{|AC|}) = -1$$

$$\left(\frac{4}{5}\right)\left(\frac{-5}{4}\right) = -1$$

$$-1 = -1$$

$\boxed{|AB| \text{ AND } |AC| \text{ ARE PERPENDICULAR} \quad \therefore\ \Delta ABC \text{ IS A RIGHT TRIANGLE}}$

c)



$$A = \frac{1}{2}bh$$

$$= \frac{1}{2}(\sqrt{41})(\sqrt{41})$$

$$= \frac{1}{2}(41)$$

$$\boxed{A = \frac{41}{2}}$$

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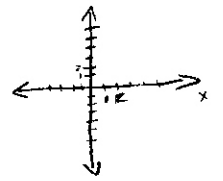
(19) SKETCH $xy = 0 \iff x = 0$ OR $y = 0$

$\therefore$ GRAPH IS THE COORDINATE AXES



(25) LINE THROUGH $(2,1)$ & $(1,6)$

$$m = \frac{1-6}{2-1} = \frac{-5}{1} = -5$$

$$\boxed{\begin{array}{c} y - 1 = -5(x-2) \\ \text{OR} \\ y = -5x + 11 \\ \text{OR} \\ 5x + y - 11 = 0 \end{array}}$$

(28) LINE WITH $m = \frac{2}{5}$ AND y-INTERCEPT $= 4$

$$\boxed{\begin{array}{c} y = \frac{2}{5}x + 4 \\ \text{OR} \\ y - 0 = \frac{2}{5}(x + 10) \\ \text{OR} \\ -\frac{2}{5}x + y - 4 = 0 \end{array}}$$

(29) LINE WITH x-INTERCEPT $= 1$ & y-INTERCEPT $= -3$

$\therefore (1,0)$ & $(0,-3)$ ARE ON THE LINE

$$m = \frac{0-(-3)}{1-0} = \frac{3}{1} = 3$$

$$\boxed{\begin{array}{c} y - 0 = 3(x-1) \\ \text{OR} \\ y = 3x - 3 \\ \text{OR} \\ -3x + y + 3 = 0 \end{array}}$$

(36) LINE THROUGH $\left(\frac{1}{2}, -\frac{2}{3}\right)$, PERPENDICULAR TO LINE $4x - 8y = 1$

$y = \frac{1}{2}x - \frac{1}{8}$ $\therefore$ PERPENDICULAR $m = -2$

$$y + \frac{2}{3} = -2\left(x - \frac{1}{2}\right)$$

OR

$$y = -2x + \frac{1}{3}$$

OR

$$2x + y - \frac{1}{3} = 0$$

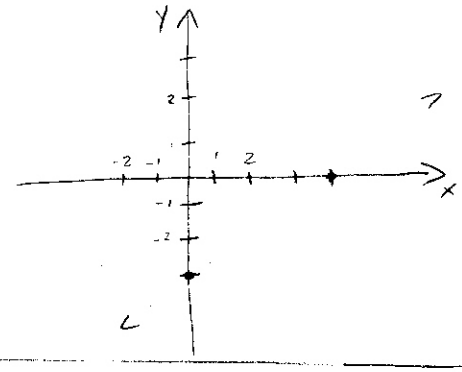
(41) FIND m, y-INTERCEPT, & GRAPH $3x - 4y = 12$

$$-4y = -3x + 12$$

$$y = \frac{3}{4}x - 3$$

$m = \frac{3}{4}$

y-INTERCEPT IS -3



(59) EQUATION OF PERPENDICULAR BISECTOR OF LINE SEGMENT |AB|

$A(1, 4)$ $B(7, -2)$

$m_{|AB|} = \frac{4-(-2)}{1-7} = \frac{6}{-6} = -1$ $\therefore$ PERPENDICULAR $m = 1$

MIDPOINT OF |AB| IS $\left(\frac{1+7}{2}, \frac{4+(-2)}{2}\right) = (4, 1)$

$$y - 1 = 1(x - 4)$$

OR

$$y = x - 3$$

OR

$$-x + y + 3 = 0$$