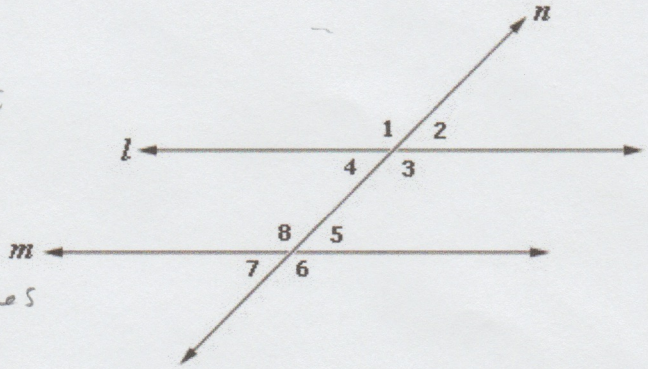Geometry Chapter 3 Pre-Test

1.) (2 pts each, 10 pts total) Use the following illustration to define the relationship between each of the angles listed. Please include both the type of angles and whether they are congruent, supplemental, or complementary.

a) ∠1 & ∠8

corresponding angles
congruent

b) ∠5 & ∠7

vertical angles
congruent

c) ∠4 & ∠5

alternate interior angles
congruent

d) ∠4 & ∠8

same-side interior angles
supplemental

e) ∠5 & ∠8

linear pair
supplemental

(diagram: two horizontal lines ℓ and m cut by a transversal n. Angles 1, 2, 4, 3 at the intersection with ℓ; angles 8, 5, 7, 6 at the intersection with m.)
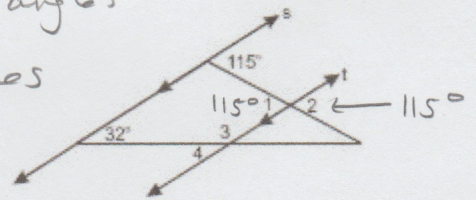
2.) (10 pts) Find the value of x and y.

Same-side interior

$$4y + 8 + 3y - 10 = 180°$$
$$7y - 2 = 180°$$
$$\quad +2 \quad +2$$
$$\frac{7y}{7} = \frac{182}{7}$$
$$\boxed{y = 26}$$

vertical angles

$$3x + 9 = 4y + 8$$
$$3x + 9 = 4(26) + 8$$
$$3x + 9 = 104 + 8$$
$$3x + 9 = 112$$
$$\quad -9 \quad -9$$
$$\frac{3x}{3} = \frac{103}{3}$$
$$\boxed{x = \frac{103}{3}}$$

(diagram: transversal crossing two lines with labeled angles $(3x + 9)°$, $(4y + 8)°$, $(3y - 10)°$)

3.) (2.5 pts each, 10 pts total) Find the angle measure of each of the indicated angles.

a) ∠1 = 115° alternate interior angles

b) ∠2 = 115° corresponding angles

c) ∠3 = $\frac{180 - 32}{\boxed{148°}}$ same-side interior angles

d) ∠4 = 32° alternate interior angle

(diagram: triangle with transversal lines, labeled angles 115°, 32°, and marked angles 1, 2, 3, 4, with line s and t; 115° marked)

4.) (5 pts each, 10 pts total) Use the properties of triangles to find the missing angles and/or variables.

a) Find "?"

$$88° + 71° + ? = 180°$$

$$159° + ? = 180°$$
$$-159° \qquad -159°$$

$$\boxed{? = 21°}$$

88° linear pair
92°
? 71 — vertical angles
71°
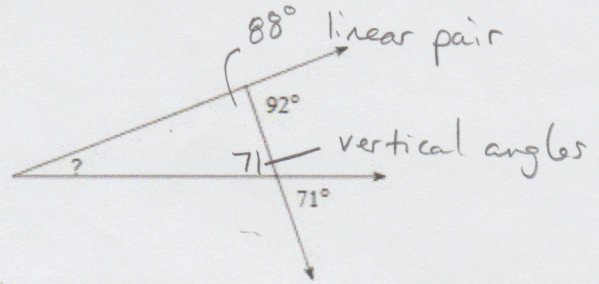
b) Find x

$$18x + 3 + 70 = 127$$

$$18x + 73 = 127$$
$$-73 \quad -73$$

$$\frac{18x}{18} = \frac{54}{18} \quad \boxed{x = 3}$$

70°
180 - 127
53
18x + 3   127°

or
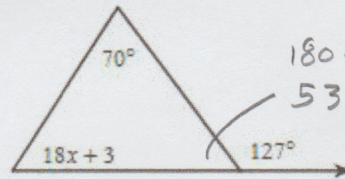
$$18x + 3 + 70 + 53 = 180$$
$$18x + 126 = 180 \qquad \frac{18x}{18} = \frac{54}{18}$$
$$-126 \quad -126$$
$$x = 3$$

5.) (5 pts each, 15 pts total) Answer each of the following using your understanding of polygons.

a) What is the total interior angle measure of a 15-sided regular polygon? What is the measure of each angle within the 15-sided regular polygon?

$$(n-2)(180) \quad n = 15$$

$$(15-2)(180)$$

$$(13)(180)$$

total interior angles = $\boxed{2340°}$

Individual interior angle

$$\frac{2340°}{15} = 156°$$

# of sides

b) Find x.

$$(n-2)(180) \qquad n = 5$$

$$(5-2)(180)$$

$$3(180) = 540°$$
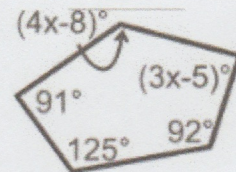
$$4x - 8 + 3x - 5 + 92 + 125 + 91 = 540$$

$$4x - 8 + 3x - 5 + 308 = 540$$

$$7x - 13 + 308 = 540$$

$$7x + 295 = 540$$
$$-295 \quad -295$$

$$\frac{7x}{7} = \frac{245}{7}$$

$$\boxed{x = 35}$$

(4x-8)°
(3x-5)°
91°
92°
125°

2

c) Find x. $(n-2)(180)$ $n=7$

$(7-2)(180)$

$5(180) = 900°$
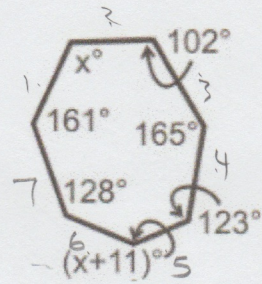
$X + 102 + 165 + 123 + X + 11 + 128 + 161 = 900$

$2x + 690 = 900$

$-690 \quad -690$ $\dfrac{2x}{2} = \dfrac{210}{2}$ $\boxed{X = 105}$

6.) (5 pts each, 10 pts total) Find the slope of each of the following sets of ordered pairs.

a) (5, 3) (7, -5) $slope = \dfrac{y_2 - y_1}{x_2 - x_1}$

   $x_1 y_1 \ x_2 y_2$

$\dfrac{-5 - 3}{7 - 5} = \dfrac{-8}{2} = \boxed{-4}$

b) (8, -2) (2, 10)

   $x_1 \ y_1 \ x_2 y_2$

$\dfrac{y_2 - y_1}{x_2 - x_1}$ $\dfrac{10 - (-2)}{2 - 8} = \dfrac{10 + 2}{2 - 8} = \dfrac{12}{-6} = \boxed{-2}$

7.) (5 pts) Write an equation for the line with the given slope that contains the given point. Graph the line.
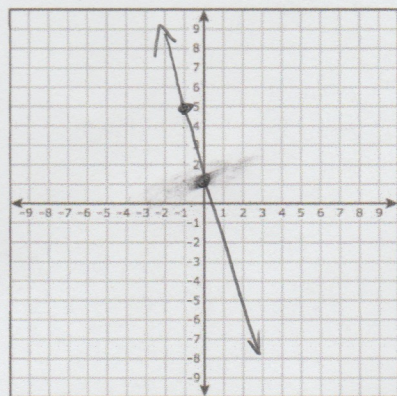
slope -4, (-1, 5)

Point-slope

$y - y_1 = m(x - x_1)$

$y - 5 = -4(x - (-1))$

$y - 5 = -4(x + 1)$

3

8.) (5 pts each, 10 pts total) Write the equation for the line containing the given points in both point-slope and slope-intercept forms. Graph each line.
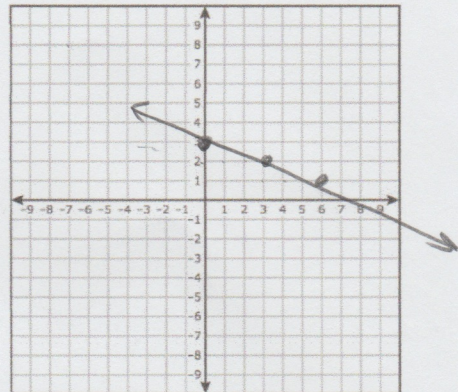
a) $x_1\ y_1\quad x_2\ y_2$
   $(-3,4)\ (6,1)$

slope $= \dfrac{y_2 - y_1}{x_2 - x_1}$ $\dfrac{1-4}{6-(-3)} = \dfrac{-3}{9} = -\dfrac{1}{3}$

$$\boxed{y - 1 = -\dfrac{1}{3}(x - 6)}$$

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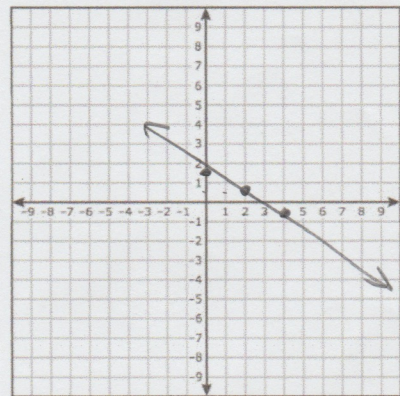$+1 \qquad\qquad +1$

$$\boxed{y = -\dfrac{1}{3}x + 3}$$

b) $x_1\ y_1\quad x_2\ y_2$
   $(7,-2)\ (-1, 2)$

slope $= \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{2 - (-2)}{-1 - 7} = \dfrac{2+2}{-1-7} = \dfrac{4}{-8} = -\dfrac{1}{2}$

$y - 2 = -\dfrac{1}{2}(x - (-1))$
$y - 2 = -\dfrac{1}{2}(x + 1)$
$y - 2 = -\dfrac{1}{2}x - \dfrac{1}{2}$ $y = -\dfrac{1}{2}x + \dfrac{3}{2}$
$+2 \qquad\qquad +2$

9.) (5 pts each, 10 pts total) Graph each line.

a) $2x - 4y = 12$

$x = 0$ y-intercept $(0,-3)$
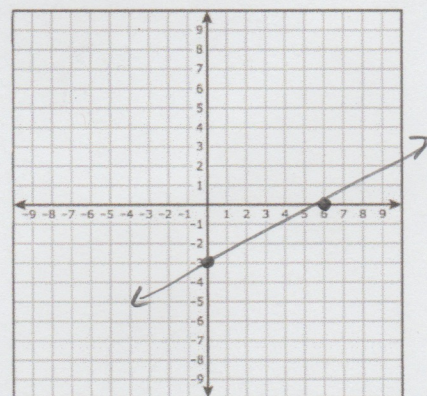 $2(0) - 4y = 12$
   $\dfrac{-4y}{-4} = \dfrac{12}{-4}$
   $y = -3$

x-intercept
$y = 0$ $2x - 4(0) = 12$
$(6,0)$ $\dfrac{2x}{2} = \dfrac{12}{2}$
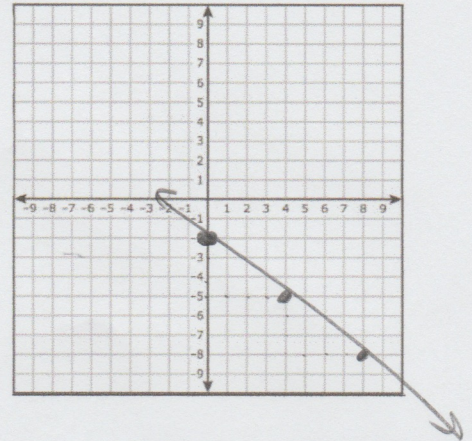 $x = 6$

4

b) $y = \frac{-3}{4}x - 2$

Graph y-intercept : -2
Then use slope : $-\frac{3}{4}$

Down 3,
 over to the right 4

10.) (5pts each, 10 pts total) Write the specified equation.

a) Write an equation for the line perpendicular to the line $y = \frac{3}{2}x + 5$ that contains the point (-6,3).

perpendicular lines have opposite inverse slopes.

Since $y = \frac{3}{2}x + 5$ has a slope of $\frac{3}{2}$

Use this point

Opposite inverse = $\left(\frac{3}{2}\right) \longrightarrow \boxed{-\frac{2}{3}}$

Now use point-slope form

$y - 3 = -\frac{2}{3}(x - (-6))$

$\boxed{y - 3 = -\frac{2}{3}(x + 6)}$

or

$y - 3 = -\frac{2}{3}(x + 6)$

$y - 3 = -\frac{2}{3}x - 4$
$\quad +1 \qquad\qquad +1$

$\boxed{y = -\frac{2}{3}x - 3}$

b) Write an equation for the line parallel to the line $12x + 3y = 6$ that contains the point (1,-2).

parallel lines have equal slopes.

Since the line is $y = -4x + 2$, it has a slope of -4 $\longrightarrow$ use that value.

$12x + 3y = 6$

rearrange to slope-intercept form

$12x + 3y = 6$
$-12x \qquad\quad -12x$

$\frac{3y}{3} = \frac{-12x}{3} + \frac{6}{3}$

$y = -4x + 2$

Now use point-slope form

$y - (-2) = -4(x - 1)$

$\boxed{y + 2 = -4(x - 1)}$

or

$y + 2 = -4(x - 1)$

$y + 2 = -4x + 4$
$\quad -2 \qquad\qquad -2$

$\boxed{y = -4x + 2}$

fun fact: they happen to be the same line — because...
well... math.

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