1.0 Prerequisite Skills for Unit 1

Linear Relations

1. Graph each of the following lines:

a) $y = -x + 5$ b) $3x + 5y - 15 = 0$ c) $x = -4$

$m = \dfrac{-1}{1}$ down
right

$b = 5$

$5y = -3x + 15$
$y = \dfrac{-3}{5}x + 3$

b) Intercept
   Method

x-int	y-int
set $y = 0$, Solve for x.	set $x = 0$, Solve for y.

$3x + 5(0) - 15 = 0$
$3x = 15$
$x = 5$
$(5, 0)$

$3(0) + 5y - 15 = 0$
$5y = 15$
$y = 3$
$(0, 3)$

$y = -x + 5$
$3x + 5y - 15 = 0$
$x = -4$
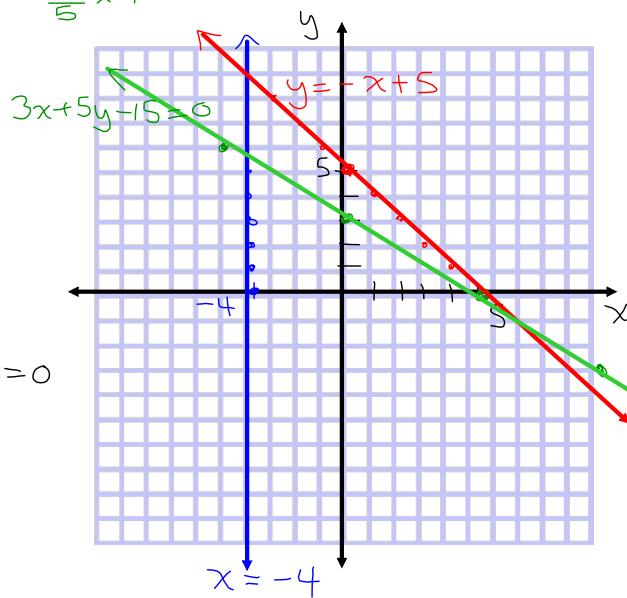
2. Determine the equation in slope y-intercept form of a line passing through the points (-2, 5) and (6, -1).

m	b

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{-1 - 5}{6 - (-2)}$

$= \dfrac{-6}{8}$

$= \dfrac{-3}{4}$

$y = mx + b$
$y = -\dfrac{3}{4}x + b$

Use $(6, -1)$,

$-1 = \dfrac{-3}{4}(6) + b$

$-1 = -\dfrac{9}{2} + b$

$-1 + \dfrac{9}{2} = b$

$-\dfrac{2}{2} + \dfrac{9}{2} = b$

$\dfrac{7}{2} = b$

$\therefore$ The eqn is $y = -\dfrac{3}{4}x + \dfrac{7}{2}$.

3. Use the methods of substitution and elimination to solve the following linear system: ① $y = 2x + 1$ and ② $x + 2y = 7$

Subst

Sub. $y = 2x+1$, into ②:

$x + 2(2x+1) = 7$

$x + 4x + 2 = 7$

$5x + 2 = 7$

$5x = 5$

$x = 1$

Sub. $x = 1$, into ①:

$y = 2(1) + 1$

$y = 3$

∴ The sol'n is $(1, 3)$.

Elimination

① $2x - y = -1$

×2 ② $2x + 4y = 14$

$-5y = -15$

$y = 3$

etc.

Working with Polynomials

1. Expand and simplify.

a) $(x-3)(x+8)$

$= x^2 + 8x - 3x - 24$

$= x^2 + 5x - 24$

b) $(x+5)^2$

$= x^2 + 10x + 25$ pst

$(x+5)(x+5)$

$= x^2 + 5x + 5x + 25$

$= x^2 + 10x + 25$

c) $(x-10)(x+10)$

$= x^2 - 100$

2. Factor completely.

a) $x^2 + x - 30$

M -30
A 1
N $-5, 6$

$= (x-5)(x+6)$

b) $4x^2 - 36$

$= 4(x^2 - 9)$

$= 4(x+3)(x-3)$

c) $12x^2 + 5x - 3$

$= (4x+3)(3x-1)$

M -36
A 5
N $9, -4$

$\frac{12}{9} \cdot \frac{4}{3}, \frac{12}{-4} \cdot \frac{3}{-1}$

d) $49x^2 - 28x + 4$

$= (7x-2)^2$

3. What value of k makes this quadratic expression a perfect square trinomial?
$x^2 - 20x + k$

$k = \left(\frac{-20}{2}\right)^2$

$= (-10)^2$

$= 100$

4. Factor out the coefficient of the quadratic term of the following polynomial:
$$-\frac{3}{5}x^2 - 6x$$

Aside

$-6 \div \left(-\frac{3}{5}\right) = -\frac{3}{5}\left(x^2 + 10x\right)$

$= -\overset{2}{\cancel{6}} \times \left(-\frac{5}{\cancel{3}}\right)$

$= 10$

Quadratic Relations

1. For the given quadratic relation, state:
a) the coordinates of the vertex
b) the equation of the axis of symmetry
c) the direction of opening
d) the y-intercept

Then, sketh a graph of the relation.

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

$y = a(x-h)^2 + K$

$y = ax^2 + bx + c$

$+ \;\; \bigcirc$

a) V $(-2, 0)$

b) $x = -2$

$a = -\frac{1}{2}$

$\rightarrow 1 \quad \downarrow \frac{1}{2}$
$\rightarrow 2 \quad \downarrow 2$
$\rightarrow 3 \quad \downarrow 4.5$
$\rightarrow 4 \quad \downarrow 8$

c) opens down

d) sub. $x=0$, solve for y.
$$y = -\frac{1}{2}(0+2)^2$$
$$y = -\frac{1}{2}(4)$$
$$y = -2$$

$y = -\frac{1}{2}(x+2)^2$
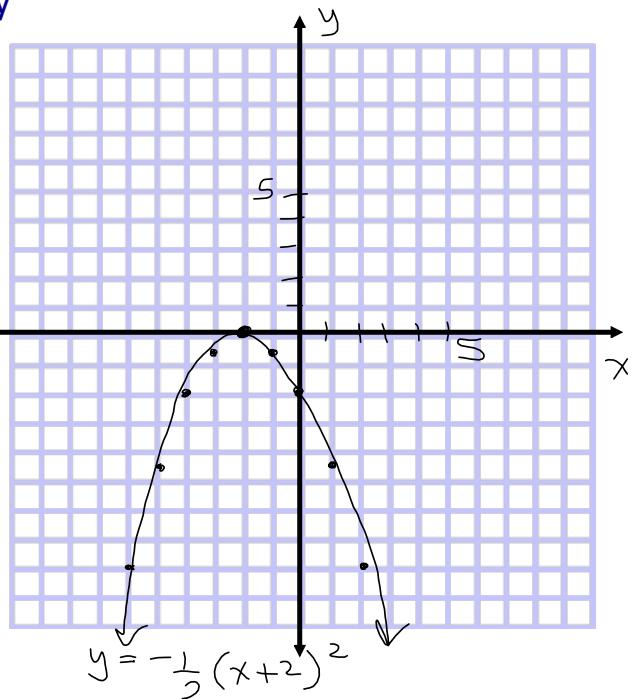
2. Complete the square in order to express the following quadratic relation in vertex form:

$$y = x^2 - 6x + 2$$

Aside

$\left(\dfrac{-6}{2}\right)^2$

$y = x^2 - 6x + 9 - 9 + 2$

$y = (x-3)^2 - 7$

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Homework

- pg. 2 #1 - 15 (Pick and Choose)
- Parent Info Form
- Print 1.1 blank for tomorrow