

## Elementary Algebra Review for Test 2 Fall 2005 Mike Huff

### Exponents and the Order of Operations

**Exercise 1:** Evaluate each expression.

a)  $-3^2 \cdot 5 - 3^2 \div 3$

d)  $-4^3 \div 4^2 - 2(3 - 7)^3$

b)  $\left(\frac{5}{3} - \frac{2}{5}\right)^2 - 3 \cdot \frac{1}{2}$

e)  $3[6 - (4 - 3^2)] - 30$

c)  $[(2 - 3)^3 - 3^2] \cdot 3 - 4$

### Evaluating Variable Expressions

**Exercise 2:** Evaluate each expression for the given value of the variable.

a)  $3x - 5 + 4x$  for  $x = -\frac{1}{2}$

c)  $-x^2 - 6x + 2$  for  $x = -1$

b)  $3x^2 - 6x - 4$  for  $x = -\frac{1}{2}$

d)  $(2x^2 - 1)(x - 1)$  for  $x = -2$

### Algebraic Expressions - Combining Like Terms

**Exercise 3:** Distribute and Combine Like Terms

a)  $-2(-2 - 4x)$

a)  $-(3 - x) - 2(-2x + 3)$

b)  $-2\left(-2x - 2 - \frac{3}{2}y\right)$

b)  $-\frac{1}{2}(4 - 8x) - \frac{1}{3}(-3x - 6)$

c)  $-2(2 - 3x) - 3(-x + 2)$

### Solving Equations Containing Grouping Symbols

**Exercise 4:** Solving Equations

a)  $10(x - 3) = 5(-2x + 3)$

d)  $2(x - 2) + 3 = 6x + 1 + 4x$

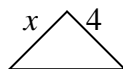
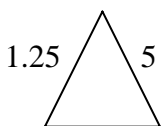
b)  $0 = 3(x + 2) - 3(x - 5)$

e) Solve:  $\frac{2}{3}\left(\frac{7}{8} - 4x\right) - \frac{5}{8} = \frac{3}{8}$

c)  $3(x - 1) - 5(x - 2) = 4(x - 2)$

### Exercise 5: Ratios and Proportions

1. Write as a rate in lowest terms: 20 people to 16 square miles.
2. Write the answer to the question above as a unit rate.
3. A 12-lb bag of fertilizer will cover an area of 1500 square feet. How many pounds will be needed to cover an area of 18,000 square feet?
4. If Cecile made \$11.50 after working 2 hours at her job, how much does she earn if works 23 hours?
5. Assume the figures are similar and solve for the indicated lengths.



6. If you can travel 315 miles on 14 gallons of gas, how many gallons will you need to travel 525 miles?

### Exercise 6: Formulas

- a) Solve for  $x$ :  $y = mx + b$
- b) Solve for  $d$ .  $F = \frac{c + 2d}{3}$
- c) Solve for  $t$ :  $A = P + Prt$
- d) Solve for  $P$ :  $A = P + Prt$
- e) Solve for  $l$ :  $P = 2l + 2w$
- f) Given  $C = \frac{5}{9}(F - 32)$ , find  $F$  when  $C = 71$
- g) Given  $A = P(1 + rt)$ , find  $A$  when  $t = 5$ ,  $r = 0.05$ , and  $P = 1000$ .
- h) Given  $y = mx + b$  find  $x$  when  $y = 15$ ,  $b = 5$ , and  $m = 2$ .

### Translation

**Exercise 7: Translate to a mathematical expression carefully labeling the variable.**

- a) Three less than twice a number
- b) The difference between five and a number.
- c) Five times the sum of seven and a number.
- d) One more than four times a number.



### Special Cases:

1. The graph of  $x = a$  is a **vertical line** that passes through  $(a, 0)$ .
2. The graph of  $y = b$  is a **horizontal line** that passes through  $(0, b)$ .

### **Graphing by Plotting Points**

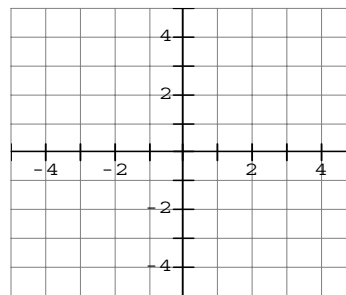
One way to draw the graph of an equation is to make a table of values containing some of the ordered pairs in the solution set and then drawing the graph.

**Exercise 11:** Graphing by plotting points. Sketch a graph of the following equations by making a table of values and plotting the point.

1. Fill in the table of values and graph:

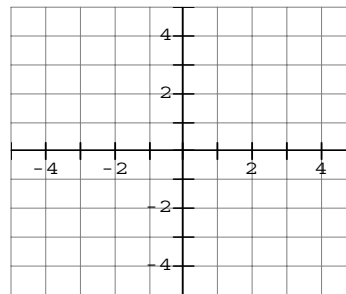
a)  $y = 2x - 2$

$x$	$y$
0	0



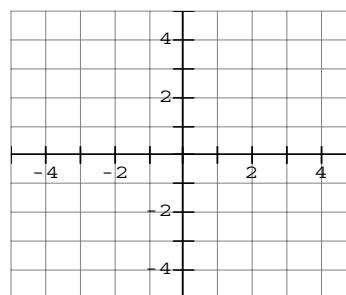
b)  $2x + 4y = 8$

$x$	$y$
0	0



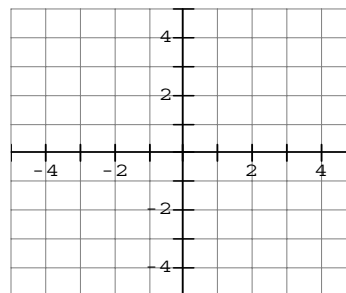
c)  $y = -\frac{1}{2}x + 2$

Graph making a table of values.



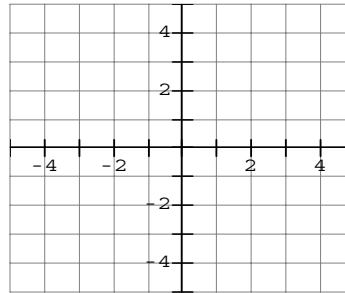
d)  $4x - y = 8$

$x$	$y$
0	0



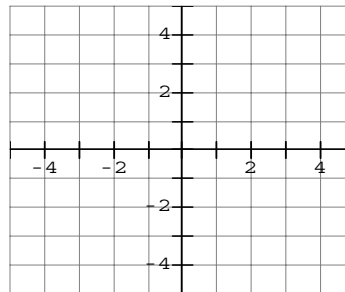
e)  $-2x - 4y = 8$

$x$	$y$
0	0

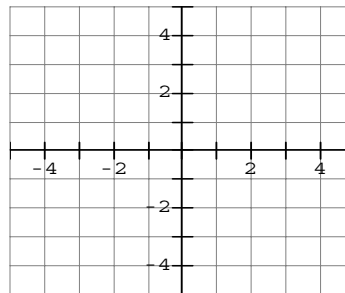


f)  $y = \frac{3}{2}x - 2$

Graph making a table of values.



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



**Definitions:** The **x-intercept** of a line is the point where its graph meets the  $x$ -axis. To find the  $x$ -intercept, set  $y = 0$  and solve for  $x$ . The **y-intercept** of a line is the point where its graph meets the  $y$ -axis. To find the  $y$ -intercept, set  $x = 0$  and solve for  $y$ .

**Exercise 12:** Finding  $x$ - and  $y$ -intercepts.

- Find the  $x$ - and  $y$ -intercepts of  $2x - 4y = 8$ .
- Find the  $x$ - and  $y$ -intercepts of  $-x + 2y = 5$ .
- Find the  $x$ - and  $y$ -intercepts of  $y = -\frac{1}{2}x + 2$ .

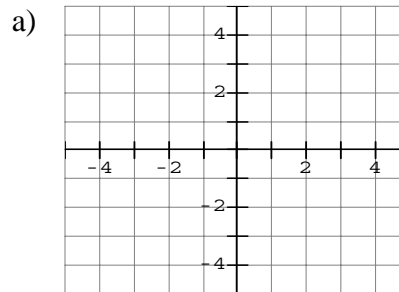
**We will use two basic techniques of graphing:**

- Find the intercepts and graph the line.
2. Make a table of values by substituting in several values of  $x$ , plot the points, and then draw the line.

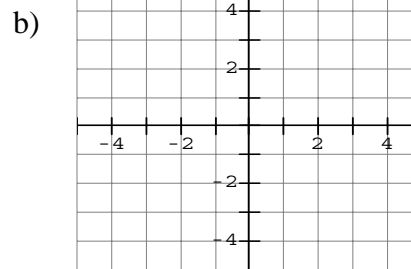
**Exercise 13: Graphing by using intercepts.**

For each of the following, find the  $x$ -intercept and  $y$ -intercept and graph.

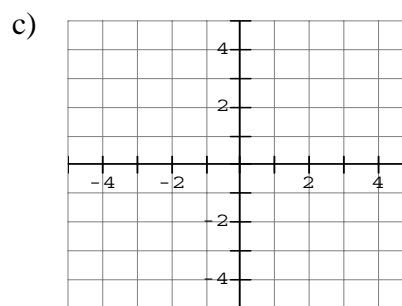
a)  $2x - 4y = 6$



b)  $-3x - 2y = 6$



c)  $3x + 4y = 12$



**Special Cases: Horizontal and Vertical Lines**

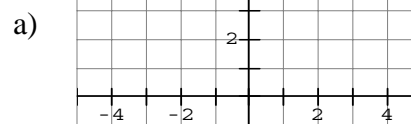
The graph of  $x = a$  is a **vertical line** that passes through  $(a, 0)$ .

The graph of  $y = b$  is a **horizontal line** that passes through  $(0, b)$ .

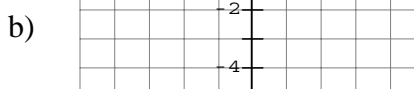
**Exercise 14: Graphing horizontal and vertical lines**

Graph the following lines.

a)  $x = 3$



b)  $y = -2$



## Slope

**Definition:** The **slope** of a line through two points is the ratio of the vertical change to the horizontal change. The slope of the line through the points  $(x_1, y_1)$  and  $(x_2, y_2)$  is

$$\text{slope} = m = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

### Exercise 15:

- Find the **slope** of the line joining the points  $(7, -2)$  and  $(3, -1)$ .
- Find the **slope** of the line joining the points  $(-2, -1)$  and  $(-5, 5)$ .

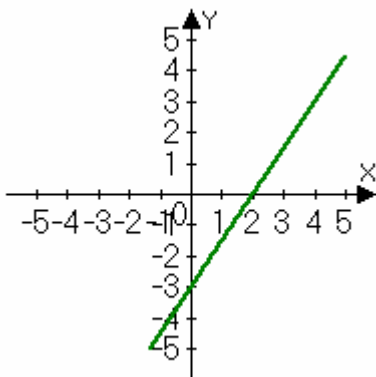
### Facts about Slope:

- The slope of a horizontal line is zero.
- A line that rises going from left to right has **positive slope**.
- A line that falls going from left to right has **negative slope**.
- The slope of a vertical line does not exist. Why?

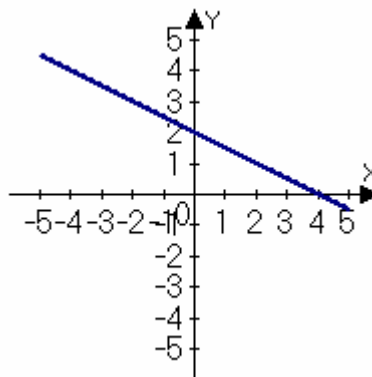
### Exercise 16:

- Find the **slope** of the line joining the points  $(5, -1)$  and  $(5, -2)$ .
- Find the **slope** of the line joining the points  $(-2, -2)$  and  $(-3, -2)$ .

**Exercise 17:** Find the slope of a line given the graph.



a)



b)

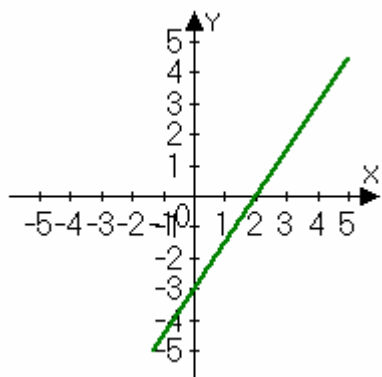
### Slope-Intercept Form of the Equation of a Line

**Definition:** The **slope-intercept form** of the equation of a line is  $y = mx + b$ , where  $m$  is the slope and  $b$  is the y-intercept.

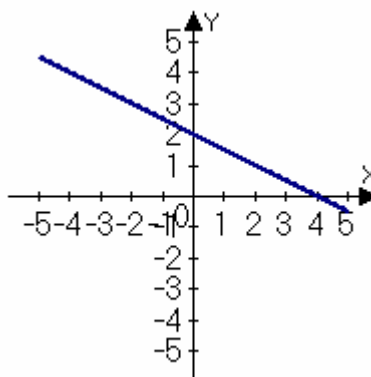
**Exercise 18:** Slope-intercept form.

- Determine the slope and y-intercept of  $2y - 6x = 6$ .
- Determine the slope and y-intercept of  $-7y + 5x = -4$ .
- Give the slope-intercept equation for the line that passes through the point  $(0, -2)$  with slope  $m = -\frac{3}{4}$ .

d) Find the slope-intercept equation for the line whose graph is given.



i)

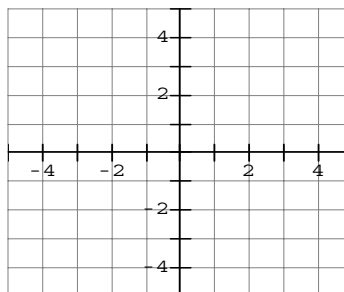
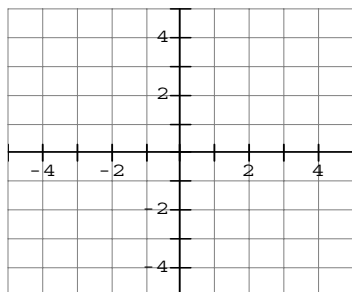


ii)

**Exercise 19:** Graphing using slope and y-intercept.

Graph the line from the given information.

- Graph the line with slope  $\frac{2}{5}$  and y-intercept  $(0, -2)$
- Determine the slope and y-intercept of  $4y - 2x = 8$  and then graph.



**Important Facts:**

- Two lines are **parallel** lines if they have the same slope.
- Two lines are **perpendicular** lines if the product of the slopes is  $-1$ . That is  $m_1 \cdot m_2 = -1$

**Exercise 20:**

- Write an equation for the line that passes through the points  $(2, -5)$  and  $(5, -2)$ .
- Write an equation for the line that passes through the points  $(-3, 4)$  and  $(-2, -2)$ .
- Write an equation for the line that passes through the points  $(-1, 1)$  and  $(-1, 7)$ .
- Write an equation for the line that passes through the points  $(-1, 4)$  and  $(-4, 4)$ .
- Write an equation of the line parallel to the line  $-2x + 4y = 8$  and passing through  $(-1, 1)$ .
- Write an equation of the line perpendicular to the line  $-4x - 6y = 8$  and passing through  $(-1, 1)$ .

Note: The test also has a few questions from chapter 4 which are not on here!!!