Background: The exercises below cover concepts and skills that are pre-requisites for success in Honors Algebra 2. If you are unfamiliar with the content of any of these exercises, you may be at a disadvantage in the course. There will be a quiz on this material during the 2nd week of class.

1. **Evaluate** each expression below.

   a. $(4053)^0$ b. $(-6)^2$ c. -6^2 d. $5^3 \div 2^5$

2. State an approximate value for each radical expression below.

   a. $\sqrt{60}$ b. $\sqrt{15}$ c. $\sqrt{347}$

3. Classify each number below as rational (Q) or irrational $(\overline{Q})$. Explain your reasoning.

   a. $\frac{10}{3}$ b. $\sqrt{5}$ c. π d. 0.8769

4. Explain the difference between the set of Integers (Z) and the set of Natural numbers (N).

5. Always, Sometimes, Never? $\frac{1}{3} = .33$

6. **Simplify** each expression below.

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

   b. $(a-4)(a+6)$

   c. $(3h+7)(h+9)$

   d. $(4n-10)(3n-1)$

   e. $\sqrt{32}+\sqrt{18}$

   f. $\sqrt{6}\cdot\sqrt{18}$

   g. $\frac{a^2b^4}{a^5b^3}$

   h. x^2x^3

   i. $(x^2)^3$

7. **Solve** each equation and inequality below algebraically and graphically.

   a. $2x+1=x$ c. $4(x-3)=x$

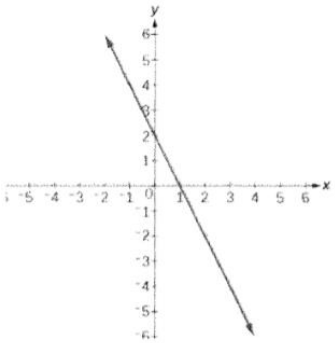
   b. $5x-7>2x$ d. $6(x-5)=4(2x-1)$

8. **Factor** each expression below.

   a. x^2-2x-3 c. $4a^2-9$

   b. $12x^2-11x-5$ d. $25x^2+10x+1$

9. **Write an equation** for each situation described below. Then, identify both the x- and y-intercepts for each line.

A – Write an equation in **slope-intercept** form for the line graphed below.	B
	Write an equation in **point-slope** form for the line that is perpendicular to the line on the right and passes through the point (3, 2).
C	D
Write an equation in **point-slope** form for the line that is parallel to the line above and passes through the point (-1, 3).	Write an equation in **slope-intercept** form for a line that passes through the points (3, 5) and (-2, 7).

10. **Identify the solution** to the following system of inequalities:

$$x + y < 5$$
$$-\frac{1}{2}x + y > 1$$

11. **Write an equation** to represent each situation described below.

a. Maria currently has 200 songs in her music collection. Starting in January, at the end of every month, she adds 15 new songs.

i. Write a formula for the number of songs, N, in her collection as a function of time, t, where t = # of months after December 31.

ii. How many songs will Maria have at the beginning of September?

b. Kim sells necklaces to earn spending money. From past experience, she knows that if she charges $20 per necklace, she will sell about 12 necklaces per week. If she raises her price to $25, her weekly sales will fall to 10 necklaces per week.

i. Build a linear function in slope-intercept form to model the number of necklaces that Kim can sell as a function of price. Define all variables, including units.

ii. What is the slope of your function? What does the slope value mean in this particular context?

c. The number of rats in a particular rat population is shown below. Let w = # of weeks and r = # of rats.

# weeks	0	2	4	6
# rats	400	480	560	640

i. Describe in words how the population is changing over time.

ii. Write a formula to model how the population is changing over time.

iii. If this trend continues, what would the population be in Week 15?

Answers:

1. **Evaluate** each expression below.

a. $(4053)^0 = 1$

b. $(-6)^2 = 36$

c. $-6^2 = -36$

d. $5^3 \div 2^5 = \frac{125}{32}$ or 3.90625

2. State an approximate value for each radical expression below.

a. $\sqrt{60}$ between 7 and 8, closer to 8

b. $\sqrt{15}$ between 3 and 4, closer to 4

c. $\sqrt{347}$ between 18 and 19

3. Classify each number below as rational (Q) or irrational ($\overline{Q}$) . Explain your reasoning.

a. $\frac{10}{3}$ rational

b. $\sqrt{5}$ irrational

c. π irrational

d. 0.8769 rational

4. Explain the difference between the set of Integers (Z) and the set of Natural numbers (N).

The set of Natural numbers is a subset of the set of Integers. It includes only the positive integers.

5. Always, Sometimes, Never? $\frac{1}{3} = .33$ NEVER, $\frac{1}{3}$ is an exact value; 0.33 is only an approximation

6. **Simplify** each expression below.

a. $(x+3)(x+2) = x^2+5x+6$

b. $(a-4)(a+6) = a^2+2a-24$

c. $(3h+7)(h+9) = 3h^2+34h+63$

d. $(4n-10)(3n-1) =$
$12n^2-34n+10$

e. $\sqrt{32}+\sqrt{18} =$
$4\sqrt{2}+3\sqrt{2}=7\sqrt{2}$

f. $\sqrt{6}\cdot\sqrt{18} = \sqrt{108}=6\sqrt{3}$

g. $\dfrac{a^2b^4}{a^5b^3} = \dfrac{b}{a^3}$

h. $x^2x^3 = x^5$

i. $\left(x^2\right)^3 = x^6$

7. **Solve** each equation and inequality below algebraically and graphically.

a. $2x+1=x \rightarrow x=-1$

b. $5x-7>2x \rightarrow x>\dfrac{7}{3}$

c. $4(x-3)=x \rightarrow x=4$

d. $6(x-5)=4(2x-1) \rightarrow x=-13$

8. **Factor** each expression below.

a. $x^2-2x-3 = (x-3)(x+1)$

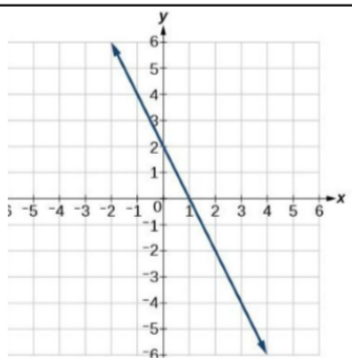
b. $12x^2-11x-5 =$
$(4x-5)(3x+1)$

c. $4a^2-9 = (2a+3)(2a-3)$

d. $25x^2+10x+1 = (5x+1)^2$

9. **Write an equation** for each situation described below. Then, identify both the x- and y-intercepts for each line.

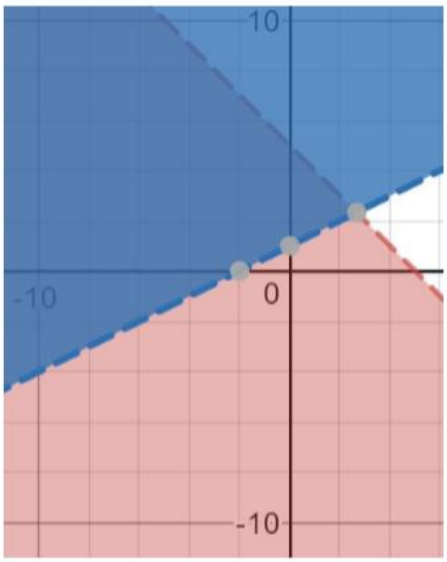
Write an equation in **slope-intercept** form for the line graphed below.	B

	e an equation in **point-slope** form for the line that is perpendicular to the line on the right and passes through the point (3, 2).
$y=-2x+2$	$(y-2)=\frac{1}{2}(x-3)$
C	D
e an equation in **point-slope** form for the line that is parallel to the line above and passes through the point (-1, 3).	an equation in **slope-intercept** form for a line that passes through the points (3, 5) and (-2, 7).
$y=-2x+1$	$y=-\frac{2}{5}x+\frac{31}{5}$

10. **Identify the solution** to the following system of inequalities:

$$x+y<5$$
$$-\frac{1}{2}x+y>1$$

Answer: The darkest shaded area below between the dotted lines.



11. **Write an equation** to represent each situation described below.

a. Maria currently has 200 songs in her music collection. Starting in January, at the end of every month, she adds 15 new songs.

i. Write a formula for the number of songs, N, in her collection as a function of time, t, where t = # of months after December 31.

Answer: $N = 200 + 15t$

ii. How many songs will Maria have at the beginning of September?

Answer: Maria will have 320 songs at the beginning of September

b. Kim sells necklaces to earn spending money. From past experience, she knows that if she charges $20 per necklace, she will sell about 12 necklaces per week. If she raises her price to $25, her weekly sales will fall to 10 necklaces per week.

i. Build a linear function in slope-intercept form to model the number of necklaces that Kim can sell as a function of price. Define all variables, including units.

Let y = # of necklaces Kim sells per week and x = price per necklace (in $)

Answer: $y = -\frac{2}{5}x + 20$

ii. What is the slope of your function? What does the slope value mean in this particular context?

Answer: slope = $-\frac{2}{5}$ or -0.4

Meaning: On average, every $5 increase in price reduces weekly sales by 2 necklaces.

c. The number of rats in a particular rat population is shown below. Let w = # of weeks and r = # of rats.

# weeks	0	2	4	6
# rats	400	480	560	640

i. Describe in words how the population is changing over time.

Answer: On average, the population increases by 40 rats per week.

ii. Write a formula to model how the population is changing over time.

Answer: $r = 400 + 40w$

iii. If this trend continues, what would the population be in Week 15?

Answer: If this trend continues, there will be 1000 rats in Week 15.