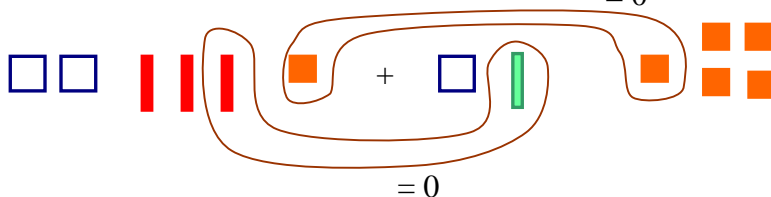


1. [20pts] Draw the following using Algebra Tiles. Use the correct colors of the tiles.

a) $(2x^2 - 3x + 1) + (x^2 + x - 5) = 0$



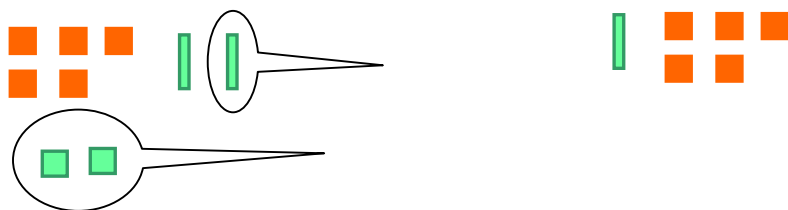
Solution: $3x^2 - 2x - 4$

$3x^2 - 2x - 4$

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

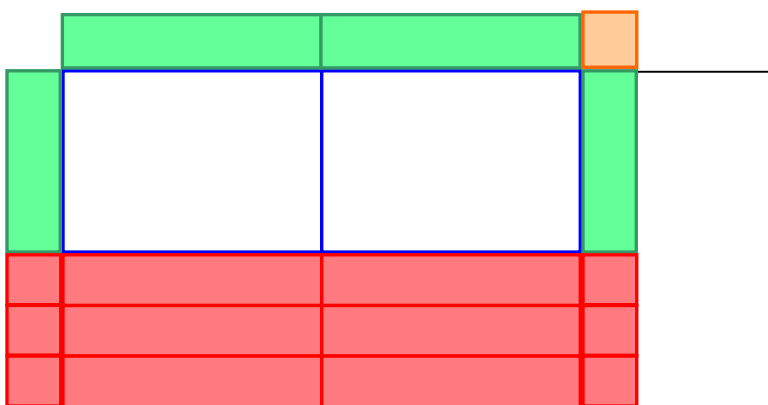


work



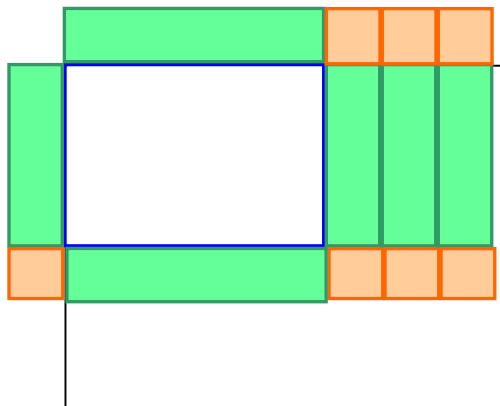
Solution: $x - 5$

c) $(2x + 1)(x - 3)$



Solution: $2x^2 - 5x - 3$

d) Illustrate the factoring of $x^2 + 4x + 3$



Solution: $(x + 3)(x + 1)$

2. [12pts] Perform the following problems using order of operations. Show each step as if you were teaching the order of operations.

a. $3 + 2 - 4 \times 3 + 7 \times 2$

Solution:
$$\begin{aligned} &3 + 2 - 12 + 14 \\ &5 - 12 + 14 \\ &-7 + 14 \\ &7 \end{aligned}$$

b.) $\frac{-4 - 12(2 + 7)^2}{8 + 4^2 - 2}$

Solution:
$$\begin{aligned} &\frac{-4 - 12(9)^2}{8 + 16 - 2} \\ &\frac{-4 - 12(81)}{24 - 2} \\ &\frac{-4 - 972}{22} \\ &\frac{-976}{22} = -\frac{488}{11} \end{aligned}$$

c. $(6 \times 5) \div [35 \div 7] - 4$

Solution:
$$\begin{aligned} &30 \div 5 - 4 \\ &6 - 4 \\ &2 \end{aligned}$$

3. [10pts] Factor $6x^2 - 11x - 10$ using the ac method of factoring. Show all possible pairs of factors.

Solution: $a = 6, b = -11, c = -10$
 $ac = 6(-10) = -60$ sum -11

-60 & 1

-30 & 2

-20 & 3

-15 & 4

-12 & 5

-10 & 6

$$6x^2 - 15x + 4x - 10$$

$$3x(2x - 5) + 2(2x - 5)$$

$$(2x - 5)(3x + 2)$$

4. [8pts] A survey was conducted at the Student Center asking how much money did the students spend on books for the Fall semester. The prices were recorded as \$420, \$328, \$389, \$220, \$189, \$428, \$299, \$139, \$425, \$220, \$375, and \$279. Calculate the following statistics.

5.

a) Mode $\$220$

b) Median $\frac{299 + 328}{2} = \frac{627}{2} = \$313\frac{1}{2}$ $\$313.50$

c) Mean $\frac{3711}{12} = 309.25$

d) These are called measures of _____ .

central tendency

5. [6pts] Write the equation of a line that meets each of the following conditions. You will write a different equation for each portion.

a) A line that is parallel to $y = -\frac{2}{3}x + 7$ and has the y-intercept of -1 .

$$\text{Solution: } y = -\frac{2}{3}x - 1$$

b) The line that passes through the points $(-2, 5)$ and $(-2, 9)$.

$$\text{Solution: } x = -2$$

c) The vertical line that passes through the point (2, 1).

Solution: $x = 2$

6. [12pts] Determine the next two terms of the sequences. State the type of sequence. Find the nth term of each sequence. Show work.

a) 11, 16, 21, 26, 31 nth term $11+5(n-1)$ Type of sequence arithmetic
 $5n+6$

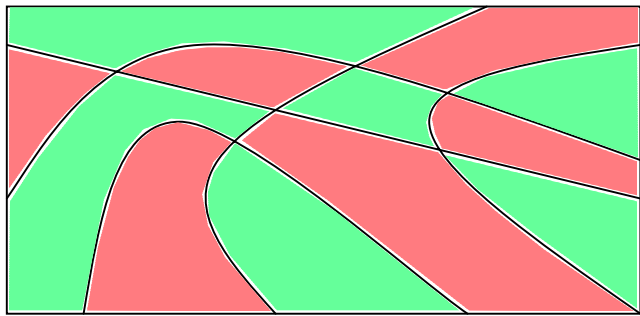
b) 3, 12, 48, 192, 768 nth term $3(4^{n-1})$ Type of sequence geometric

c) 25, 36, 49, 64, 81 nth term $(n+4)^2$ Type of sequence sight

7. [5pts] Find the next three terms of a Fibonacci Sequence if the first two terms are:

7, 11, 18, 29, 47

8. [4pts] Color the map below using the minimum amount of colors. Use your first two colors the most and if necessary keep additional colors to the minimum.



b) [2pts] What is the maximum number of colors that are needed to color any map?

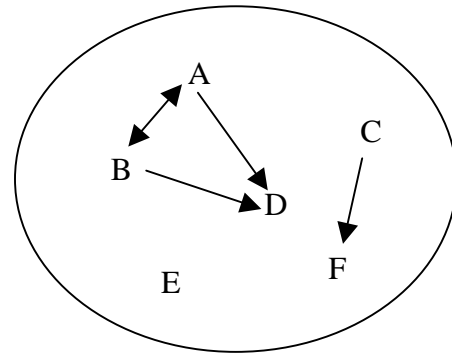
Solution: 4 colors

9. [9pts] The arrow diagram shows the relation “Is a sister of”.

a) Which letters represent male? D and F

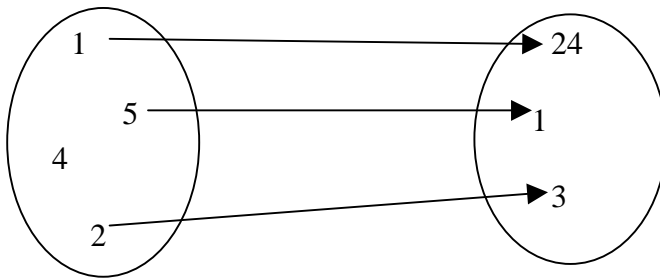
b) Which letters represent females? A, B, and C

c) Which letters could represent male or female? E



10. [9pts] Which of the following relations are functions? For each, state the domain and **range IF it is a function. If the relation is not a function, give the reason why.**

a)

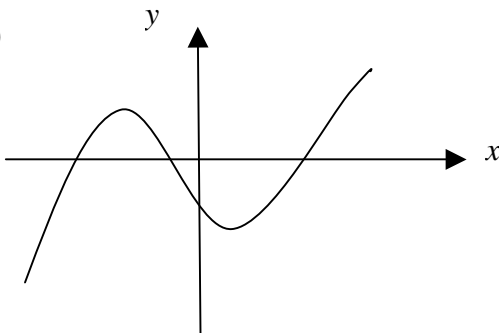


Not a function.
4 does not go to anything in the range.

b) $\{(3, 17), (-3, 9), (12, 4), (7, 8)\}$

Yes, it is a function.

c)



Yes, it is a function.

x-coordinate represents the domain.
y-coordinate represents the range.
Passes the vertical line test.

11. [12pts] Your class is collecting cans. You start with 9 cans and your collection triples every week.

a. Construct a table representing the number of cans collected for the first 5 weeks.

Solution:

Week	Cans Collected	Total
1	9	9
2	27	36
3	81	117
4	243	360
5	729	1089
6	2187	3276

b. How many cans will you have collected after week 6?

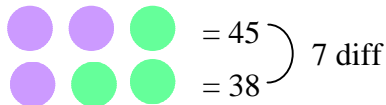
3276

c. Write an equation representing the number of cans collected during the week x .

$9(3^{x-1})$

12. Tracy has two blue disks plus one green disk that equals 45. He has one blue disk and two green disks that equals 38,

[2pts] Draw a picture using circles as disks to represent the problem.

Solution:  = 45
= 38) 7 diff

[2pts] Write algebraic equations to represent the statements in the problem.

Solution: $2B + g = 45$
 $1B + 2g = 38$

[2pts] What does one blue disk equal?

Solution: $3B = 45 + 7 \Rightarrow 3B = 52 \Rightarrow B = 17 \frac{1}{3}$

[2pts] What does one green disk equal?

Solution: $3g = 38 - 7 \Rightarrow 3g = 31 \Rightarrow g = 10 \frac{1}{3}$

Check: $34 \frac{2}{3} + 10 \frac{1}{3} = 45$
 $17 \frac{1}{3} + 20 \frac{2}{3} = 38$

13. [10pts] Solve the Quadratic Equation $6x^2 - 11x - 8 = 0$ by using the Quadratic Formula.
Write the Quadratic Formula in the box.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Solution: $a = 6$, $b = -11$, $c = -8$

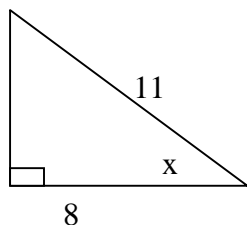
$$\frac{11 \pm \sqrt{121 - 4(6)(-8)}}{2(6)}$$

$$\frac{11 \pm \sqrt{121 + 192}}{12}$$

$$\frac{11 \pm \sqrt{313}}{12}$$

$$\frac{11 + \sqrt{313}}{12} \quad \text{and} \quad \frac{11 - \sqrt{313}}{12}$$

14. [8pts] Write the six trig ratios of x in the right triangle below.



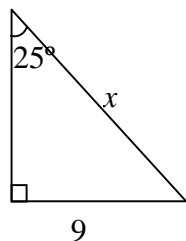
Solutions:

$$\sin x = \frac{\sqrt{57}}{11} \quad \csc x = \frac{11}{\sqrt{57}}$$

$$\cos x = \frac{8}{11} \quad \sec x = \frac{11}{8}$$

$$\tan x = \frac{\sqrt{57}}{8} \quad \cot x = \frac{8}{\sqrt{57}}$$

15. [6pts] Solve for x in the following triangle. State an equation using trig function that would be used to solve for the variable in each of the following right triangle.



$$\sin 25^\circ = \frac{9}{x}$$

Solution: $x = 21.28$

$$x = \frac{9}{\sin 25^\circ}$$

$$x = \frac{9}{0.423}$$

16.[10pts] The scores for the first exam in Mrs. Mandrell's algebra class of ten students were 98, 67, 72, 88, 71, 65, 99, 77, 83, and 80. The mean for this class is 80. Calculate the variance and standard deviation for this exam. Make a table and show your work.

x	$x - \bar{x}$	$(x - \bar{x})^2$
99	19	361
98	18	324
88	8	64
83	3	9
80	0	0
77	-3	9
72	-8	64
71	-9	81
67	-13	169
65	-15	225

$$v = \frac{1306}{10} = 130.6$$

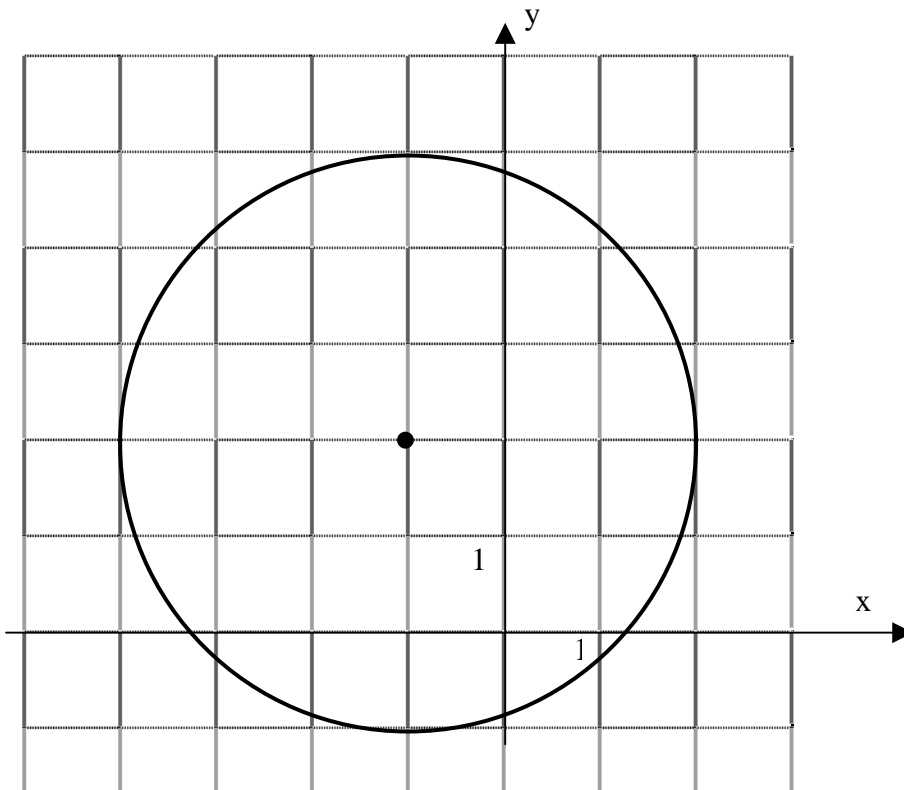
$$s = \sqrt{130.6} \approx 11.43$$

Find the z-score for the student with 88 and how is this student's performance?

$$z\text{-score} = \frac{88 - 80}{11.43} = \frac{8}{11.43} \approx 0.6999 \approx 0.7$$

This student is average and is doing okay.

17. Consider the circle sketched below.



- a) [1pt] What point is the center of the circle?

Solution: $(-1, 2)$

- b) [1pt] Find the radius of the circle.

Solution: $r = 3$

- c) [5pts] Write the equation of the circle in standard form.

Solution: $(x + 1)^2 + (y - 2)^2 = 9$

18. [8pts] State the properties of the following examples. Write the entire name of the property with no abbreviations.

a) $3 + (4 + 5) = (3 + 4) + 5$

Associative Property of Addition

b) $a(bc) = (bc)a$

Commutative Property of Multiplication

c) $5(x + 2) = 5x + 10$

Distributive Property of Multiplication over Addition

d) $4 + 3 = 3 + 4$

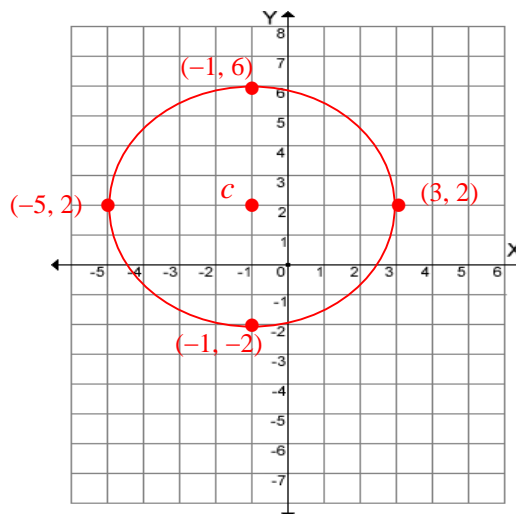
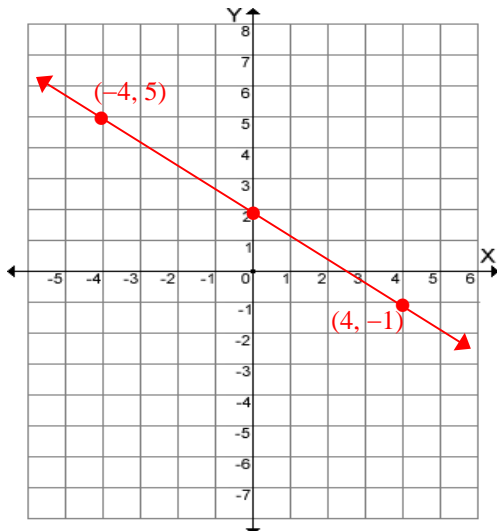
Commutative Property of Addition

19. [12pts] Sketch a graph for the following equations. Label the vertex and the y-intercept for a parabola, and five points for a circle. Show work. **Do not use a table when graphing a parabola or circle. Use the transformation properties to find the vertex of the parabola and the center of the circle.**

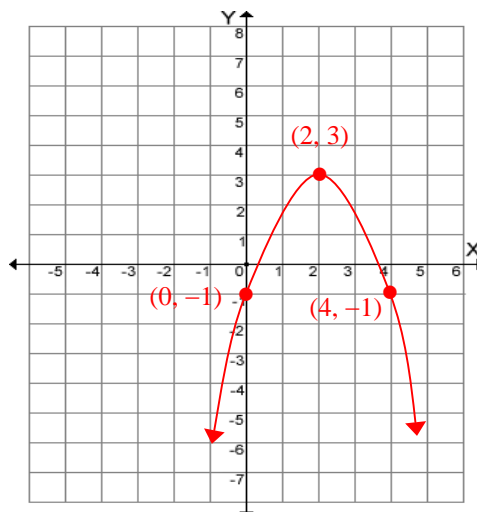
a) $y = -\frac{3}{4}x + 2$ $\frac{\text{rise}}{\text{run}} = -\frac{3}{4} = (4, -1)$

b) $(x + 1)^2 + (y - 2)^2 = 16$

$c = (-1, 2), r = 4$



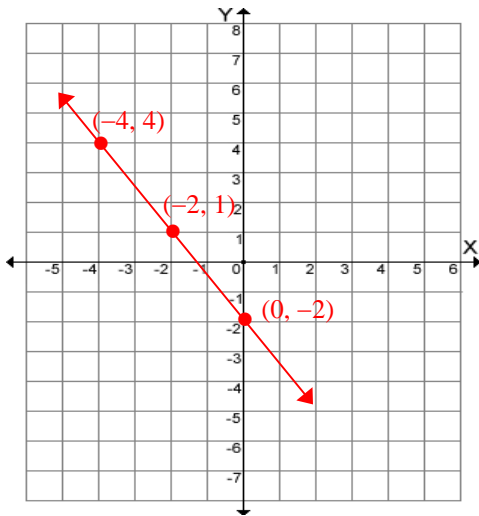
c) $y = -(x - 2)^2 + 3$



$v = (2, 3)$

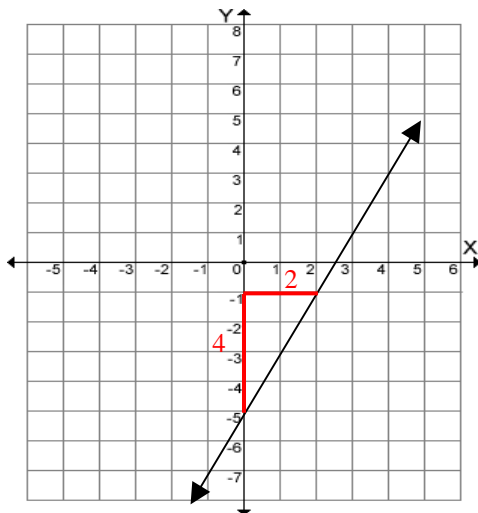
$y\text{-int} = -(-2)^2 + 3$
 $-4 + 3 = -1$
 $(0, -1)$

20. [5pts] Graph the line that passes through the point $(-2, 1)$ and has a slope of $-\frac{3}{2}$. Label at least two points.



$$\frac{\text{rise}}{\text{run}} = -\frac{3}{2}$$

21. [5pts] Find the slope of the line in the following graph, using the stairstep method.



$$\text{Slope} = \frac{-2}{-1} = 2$$

