

Brushing up on Essential Algebra Skills to get you ready for Algebra-2 Summer Packet

(For students entering Algebra 2 and Honors Algebra 2)

Students entering Algebra 2 should complete the problems in this packet before returning to school from Summer Break. All the material in this packet will be used at some point this year. These topics should have been covered in previous years (not necessarily last year). The entirety of this packet should be completed without the use of a calculator unless noted.

Students will be held responsible for understanding these concepts and teachers will check for completion and assess understanding.

Answers to all problems are included at the end of this packet. Make note of any questions you have on these topics; your teacher will address any questions within the first few classes and then there will be an assessment on the material.

Need help on some of the topics? For each section, a link to an instructional video has been provided!

Have a great summer and see you in the fall! 😊

Section 1: Linear Functions

- [Solutions-to-linear-equations](#)
- [Solving-for-a-variable](#)
- [Solving-more-complicated-equations](#)

1. Solving Linear Equations:

a. $6 - x = 9$

b. $3x + 2x + 6 = -15$

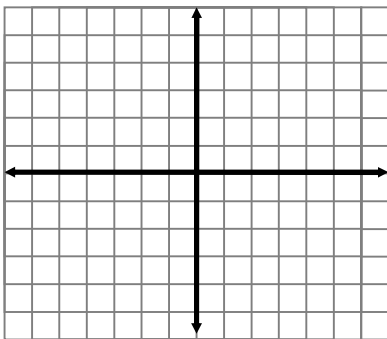
c. $3(x - 2) = 6$

d. $9x - 6 = -3x + 30$

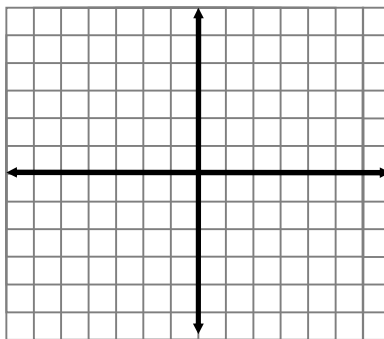
e. $\frac{4x+5}{6} = \frac{7}{2}$

2. Graphing Linear Functions:

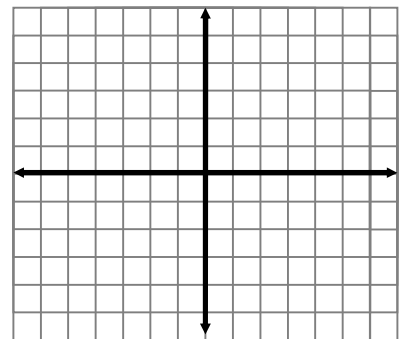
a. $y = 2x - 3$



b. $y = -3x + 2$



c. $6x + 24 = -12y$



3. Solving Systems:

System of Equations Tutorials

[Solving-linear-systems-by-graphing](#)

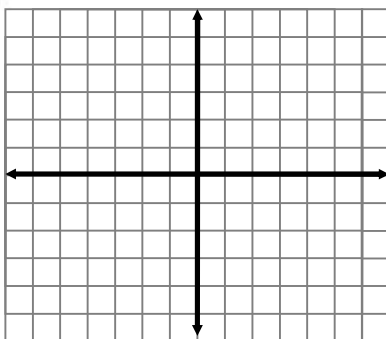
[Special-types-of-systems-of-equations](#)

[Solving-systems-by-substitution](#)

[Solving-systems-by-elimination/combination](#)

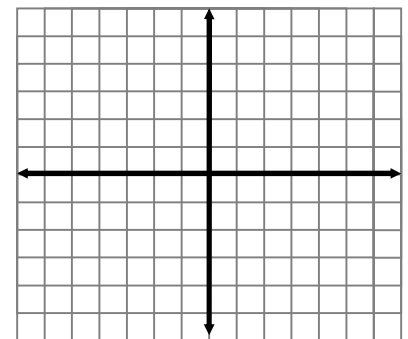
Solve the system by graphing.

a) $y = -\frac{5}{3}x + 3$
 $y = \frac{1}{3}x - 3$



x = ____ y = ____

b) $y = 4x + 3$
 $y = -x - 2$



x = ____ y = ____

Solve each System by **Elimination**.

c) $x - y = 11$

$$2x + y = 19$$

$$x = \underline{\hspace{1cm}} \quad y = \underline{\hspace{1cm}}$$

d) $-4x - 2y = -12$

$$4x + 8y = -24$$

$$x = \underline{\hspace{1cm}} \quad y = \underline{\hspace{1cm}}$$

Solve each System by **Substitution**.

e) $4x - 8y = 20$

$$x = 3y$$

$$x = \underline{\hspace{1cm}} \quad y = \underline{\hspace{1cm}}$$

f) $3x - 3y = -18$

$$y = 2x + 3$$

$$x = \underline{\hspace{1cm}} \quad y = \underline{\hspace{1cm}}$$

Section 2: Quadratics

UNLESS OTHERWISE NOTED ALL PROBLEMS SHOULD BE DONE WITHOUT THE AID OF A CALCULATOR.

Factoring: With leading coefficient of 1: <https://www.youtube.com/watch?v=nOZTe8jU2g4>

With leading coefficient not equal to 1: <https://www.youtube.com/watch?v=ISPxJ6JXT8o>

With common factors: https://www.youtube.com/watch?v=GMoqg_s4Dl4

Perfect Square Trinomials: https://www.youtube.com/watch?v=liRNTieIU_k

Difference of Perfect Squares:: <https://www.youtube.com/watch?v=VgOABFwNhVg>

Factor each of the following completely:

1. $f(x) = x^2 + 5x + 6$

2. $f(x) = x^2 - 5x + 6$

3. $g(x) = x^2 - 7x - 18$

4. $g(x) = x^3 - 16x^2 + 63x$

5. $h(x) = 2x^2 + 5x + 2$

6. $r(x) = x^2 - 9$

7. $k(x) = 4x^2 + 24x - 64$

8. $t(x) = 6x^2 - 17x + 5$

Solving Quadratics: Solving by Quadratic Formula: <http://www.youtube.com/watch?v=i7idZfS8t8w>
 Solving by taking square roots: <https://www.youtube.com/watch?v=RMwoe8sRYvg>
 Solving using the zero product property (factoring):
<https://www.youtube.com/watch?v=jgHPXoh5MPs>

9. Find the solution(s) by taking the square root:

a. $2x^2 = 18$

b. $(x - 5)^2 = 36$

c. $2(x - 3)^2 - 32 = 0$

10. Find the roots using the quadratic formula: $3x^2 - 2x - 4 = 0$

11. Find the zeros using the zero-product property (factoring):

a. $2x^2 + 5x - 12 = 0$

b. $x^2 + 3x - 40 = 0$

Graphing Quadratics: In Vertex/Graphing Form: <https://www.youtube.com/watch?v=7QMoNY6FzvM>
 In Standard Form: <https://www.youtube.com/watch?v=ty4Ohya4hdE>
 In Intercept/Factored Form: <https://www.youtube.com/watch?v=IR56CnowYuA>

Graph each and list: x and y intercepts (estimate any that are not integers) and vertex

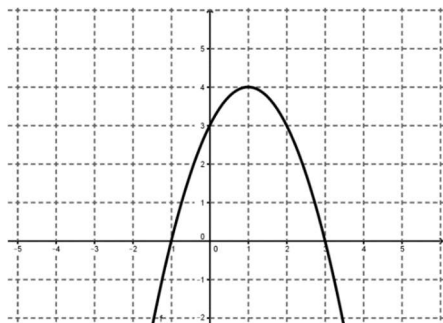
12. $f(x) = \frac{1}{2}(x - 3)^2 + 2$

13. $f(x) = 2(x + 3)(x - 1)$

14. $f(x) = -x^2 + 4x - 4$

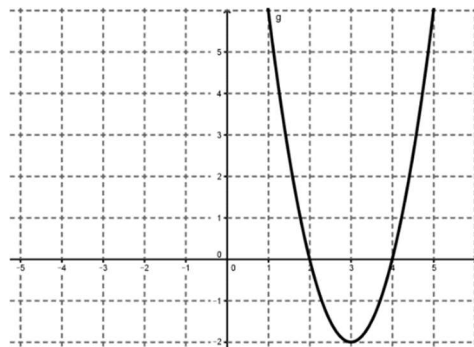
Writing the quadratic given a graph: Vertex Form: <https://www.youtube.com/watch?v=R77QHCTIpbg>
 Intercept Form:
<https://www.youtube.com/watch?v=jmHQcTU4riI>

15. Write the equation in vertex/graphing form



Equation: _____

16. Write the equation in intercept/factored form



Equation: _____

17. Simplifying Square Roots: <https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-numbers-operations/cc-8th-roots/v/understanding-square-roots>

a) $\sqrt{75}$

b) $\sqrt{45}$

c) $\sqrt{32}$

d) $\sqrt{96}$

e) $\sqrt{54}$

f) $\sqrt{200}$

Solving Modeling Problems: You may use calculators. But will also need to be able to solve without graphing calculator.

18. A football is kicked into the air with an initial upward velocity of 29.4 meters per seconds. Using $h(t) = -4.9t^2 + 29.4t$:

- Calculate the height after 1) 2 seconds and 2) 3 seconds
- When will the ball be at its maximum height and what is the maximum height?
- When will the ball hit the ground?
- What is the domain and range for this function?

Section 3: Functions

Determining whether a function exists, stating domain and range:

Domain and Range Given Graph: <https://www.youtube.com/watch?v=RK2EM7lKmbw>

Is it a function?: <https://www.youtube.com/watch?v=ryQJa8ybxVY>

Are the following relations function? State why or why not! Then state the domain and range!

1. $\{(5,1), (-3,5), (8,1), (2,-7), \}$

2. $\{(3,1), (-2,4), (3,3), (1,0), \}$

Function: _____

Function: _____

Domain: _____

Domain: _____

Range: _____

Range: _____

Mapping Diagram: Identify the domain and range. Then tell whether the relation is a function.

3. Input Output

-3 → 3

-2 → 0

4 → 1

4

Function: _____

Domain: _____

Range: _____

4. Input Output

-3 → 3

1 → 4

3 → 4

4 → -2

Function: _____

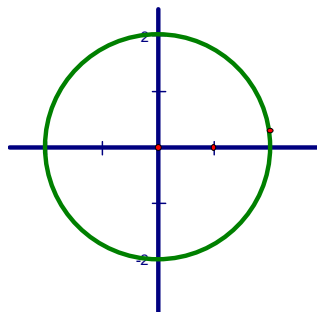
Domain: _____

Range: _____

Graphs: Identify the domain and range in interval notation, as well as, x-intercept(s) and y-intercept(s). Then tell whether the graph represents a function.

Interval Notation

5.



Function: _____

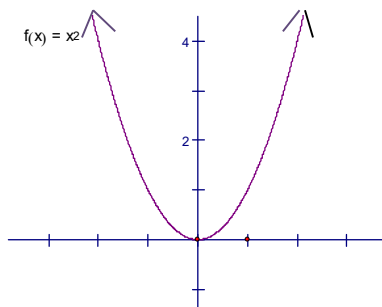
Domain: _____

Range: _____

x-intercept _____

y-intercept _____

6.



Function: _____

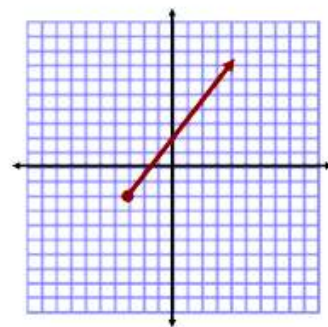
Domain: _____

Range: _____

x-intercept _____

y-intercept _____

7.



Function: _____

Domain: _____

Range: _____

x-intercept _____

y-intercept _____

Function Notation:

Function Notation and Composite Functions: <https://www.youtube.com/watch?v=RSIZTgHKSg>

Evaluate the following expressions given the functions below:

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

$$f(x) = x^2 + 7$$

$$h(x) = \frac{12}{x}$$

$$j(x) = 2x + 9$$

8. $g(10) =$

9. $f(3) =$

10. $h(-2) =$

11. $j(7) =$

12. $h(a) =$

13. $g(b+c) =$

14. Find x if $g(x) = 16$

15. Find x if $h(x) = -2$

16. Find x if $f(x) = 23$

17. Evaluate each using the given graph:

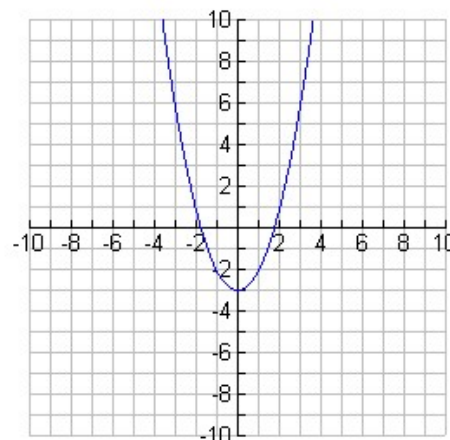
Find:

$f(1) =$

$f(-2) =$

$f(0) =$

$f(x) = 6$



Section 4: Properties of Exponents

[Properties of Exponents](#)

[Negative Exponents](#)

[Zero Exponent Property](#)

Simplify the following:

a) $x^2 \cdot x^3 =$

b) $\frac{x^8}{x^5} =$

c) $3x^6 \cdot 5x^7 =$

d) $\frac{x^4}{x^{10}} =$

e) $(4x)^2 =$

f) $y^0 =$

g) $t^{-1} =$

h) $2x^{-3} =$

Section 5: Mean, Median, and Mode

Measures of Center: <https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-data-statistics/mean-and-median/v/mean-median-and-mode>

IQR: <https://www.khanacademy.org/math/ap-statistics/summarizing-quantitative-data-ap/measuring-spread-quantitative/v/calculating-interquartile-range-iqr?modal=1>

Graphical Displays: Box and Whisker: <https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-data-statistics/cc-6th-box-whisker-plots/v/constructing-a-box-and-whisker-plot>

Histogram: <https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-data-statistics/cc-6th-box-whisker-plots/v/constructing-a-box-and-whisker-plot>

CALCULATOR ALLOWED:

1. Determine the mean, median, mode(s), IQR and range for the data.

4, 5, 7, 7, 7, 8, 10, 11, 11, 13, 13, 14

2. The ages of people at a concert are 48, 18, 51, 26, 33, 37, 35, 24, 39, 29, 32. Make a stem and leaf and box-and-whisker plot of the data.

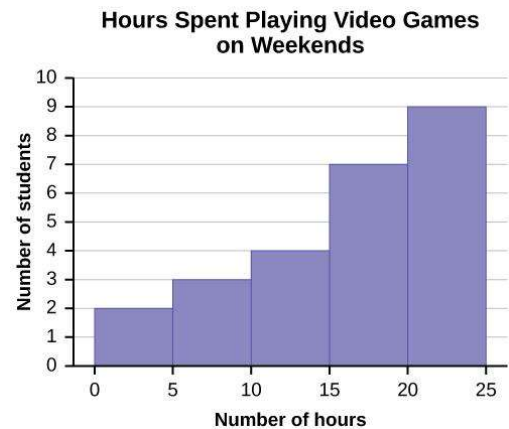
3. Determine whether the questions below are statistical questions. Explain.

a. What is the capital of Connecticut?

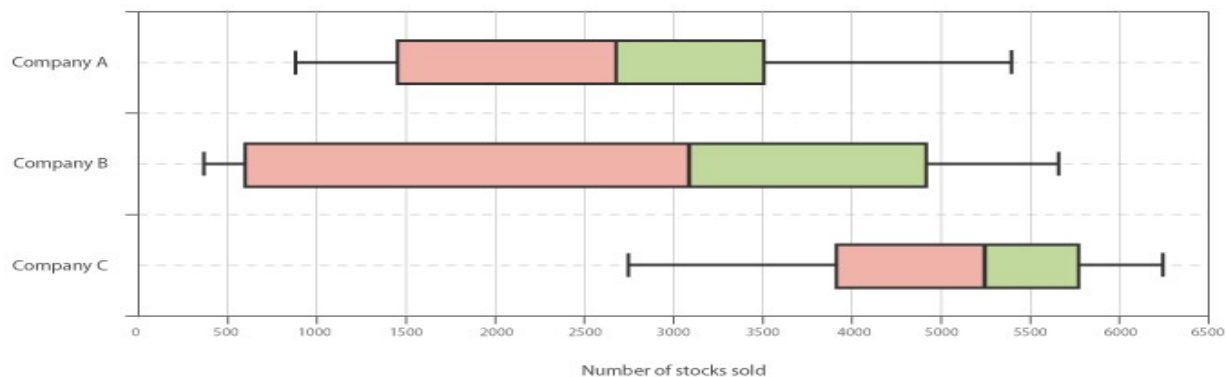
b. How many students attend your school?

#4-6 Use the histogram that shows the number of hours spent playing video games on the weekend.

4. Which interval contains the most data?
5. How many students were asked?
6. Determine the percent of students that spend less than 15 hours playing video games on the weekend.



#7-9 Use the box-and-whisker plot to answer the questions.



7. Identify the shape of each distribution.
8. What percent for Company A falls at 3500 Stocks sold or more?
9. What company has the largest range of number of stocks sold?

Section 6: Trigonometry

Pythagorean Theorem

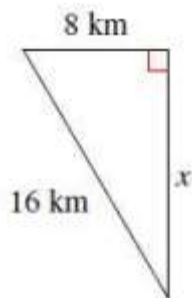
[Find the measure of an angle using trigonometry](#)

[Find the measure of a side using trigonometry](#)

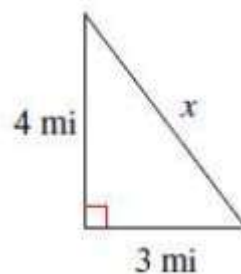
CALCULATOR ALLOWED

1. Find the length of the missing side in each diagram. Round your answers to the nearest hundredth.

a)

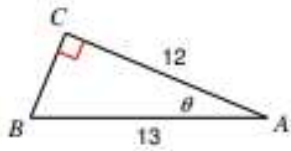


b)

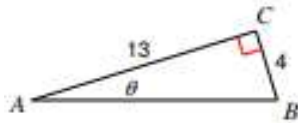


2. Find the measure of each angle. Round your answers to the nearest hundredth.

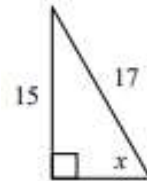
a)



b)

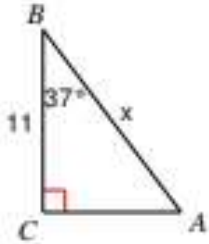


c)

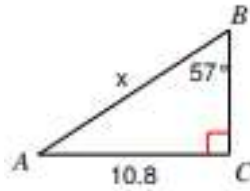


3. Find the measure of each side indicated. Round your answers to the nearest tenth.

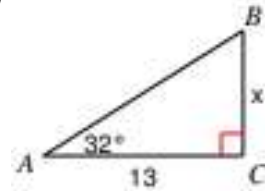
a)



b)



c)



Answer Key

Section 1: Linear Functions

1. Solving Linear Equations:

1a) $x = -3$

1b) $x = -\frac{21}{5}$

1c) $x = 4$

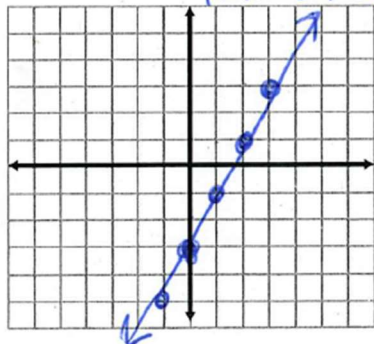
1d) $x = 3$

1e) $x = 4$

2. Graphing Linear Functions:

a. $y = 2x - 3$

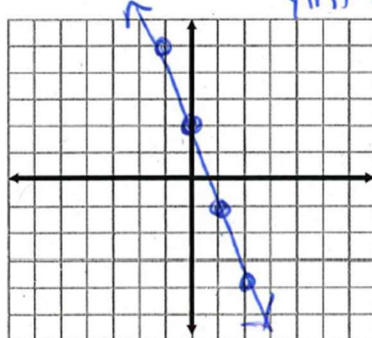
slope = 2/1
y-int = (0, -3)



b.

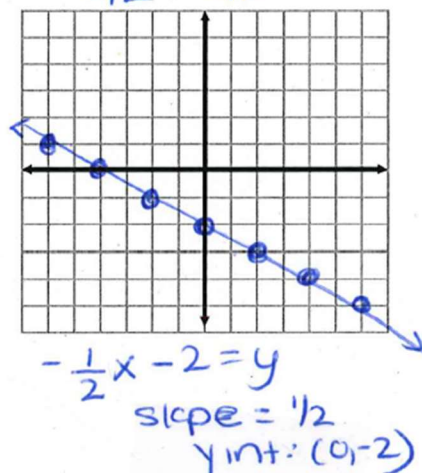
$y = -3x + 2$

slope = -3/1
y-int (0, 2)



c.

$\frac{6x + 24}{-12} = \frac{-12y}{-12}$



3. Solving Systems:

a) (3, -2)

b) (-1, -1)

c) (10, -1)

d) (6, -6)

e) (15, 5)

f) (3, 9)

Section 2: Quadratics

1) $f(x) = (x + 3)(x + 2)$

2) $f(x) = (x - 3)(x - 2)$

3) $f(x) = (x - 9)(x + 2)$

4) $f(x) = x(x - 9)(x - 7)$

5) $h(x) = (2x + 1)(x + 2)$

6) $r(x) = (x - 3)(x + 3)$

7) $k(x) = 4(x + 8)(x - 2)$

8) $t(x) = (3x - 1)(2x - 5)$

9a) $x = \pm 3$

9b) $x = 11, x = -1$

9c) $x = 7, x = -1$

10) $x = 1 \pm \sqrt{13}$

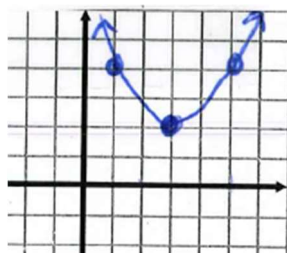
11a) $x = \frac{3}{2}, x = -4$

11b) $x = -8, x = 5$

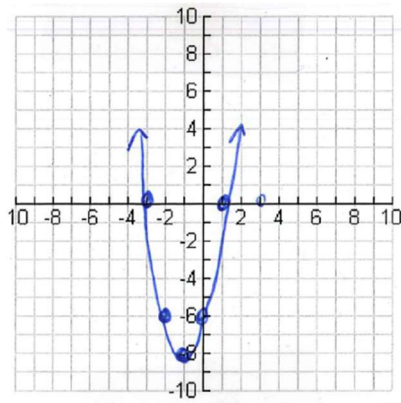
12) x-int: none

y-int: (0, 6.5)

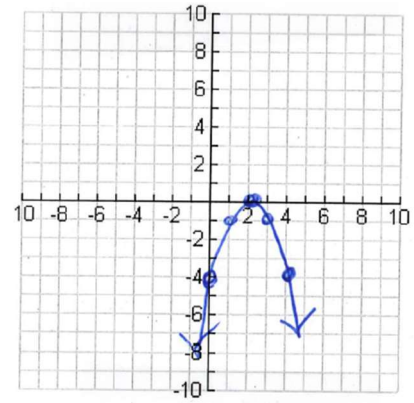
vertex: (3, 2)



13) x-int: $(-3, 0)$ & $(1, 0)$, y-int: $(0, -6)$, vertex: $(-1, -8)$



14) x-int: $(2, 0)$, y-int: $(0, -4)$, vertex: $(2, 0)$



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

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

17a) $5\sqrt{3}$

17b) $3\sqrt{5}$

17c) $4\sqrt{2}$

17d) $4\sqrt{6}$

17e) $3\sqrt{6}$

17f) $10\sqrt{2}$

18a) $h(2) = 39.2 \text{ m}$

$h(3) = 44.1 \text{ m}$

18b) Max Height: at 3 seconds, height = 44.1 m

18c) $t = 6$ seconds

18d) Domain: $[0, 6]$ Range: $[0, 44.1]$

Section 3: Functions

1) Function: Yes, for each input there is exactly one output. Domain: $\{-3, 2, 5, 8\}$ Range: $\{-7, 1, 5\}$

2) Function: No, 3 has two outputs. Domain: $\{-2, 1, 3\}$ Range: $\{0, 1, 3, 4\}$

3) Function: No, -2 has two outputs. Domain: $\{-3, -2, 4\}$ Range: $\{0, 1, 3, 4\}$

4) Function: Yes, for each input there is exactly one output. Domain: $\{-3, 1, 3, 4\}$ Range: $\{-2, 3, 4\}$

5) Function: No, fails the Vertical Line Test. Domain: $[-2, 2]$ Range: $[-2, 2]$

x-int: $(-2, 0)$ & $(2, 0)$ y-int: $(0, -2)$ & $(0, 2)$

6) Function: Yes, passes the Vertical Line Test. Domain: $(-\infty, \infty)$ Range: $[0, \infty)$

x-int: $(0, 0)$ y-int: $(0, 0)$

7) Function: Yes, passes the Vertical Line Test. Domain: $[-3, \infty)$ Range: $[-2, \infty)$

x-int: $\approx(-1, 0)$ y-int: $(0, 2)$

8) $g(10) = -29$

9) $f(3) = 16$

10) $h(-2) = -6$

11) $j(7) = 23$

12) $h(a) = \frac{12}{9}$ 13) $g(b + c) = -3b - 3c + 1$ 14) $x = -5$ 15) $x = -6$ 16) $x = \pm 4$
 17) $f(1) = -2$ $f(-2) = 0$ $f(0) = -3$ $f(x) = 6: x = \pm 2$

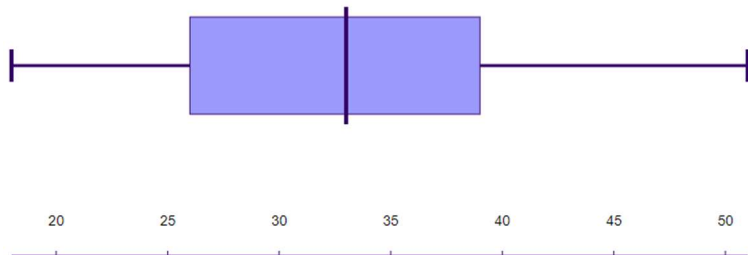
Section 4: Properties of Exponents

a) x^5 b) x^3 c) $15x^{13}$ d) $\frac{1}{x^6}$
 e) $16x^2$ f) 1 g) $\frac{1}{t}$ h) $\frac{2}{x^3}$

Section 5: Mean, Median, and Mode

1) Mean = 9.16 Median = 9 Mode = 7 IQR = 5 Range = 10
 2)

Stem	Leaf
1	8
2	4 6 9
3	2 3 5 7 9
4	8
5	1



- 3a) Not, since not a numerical answer 3b) Yes, since based on data
 4) 20-25 students 5) 25 students 6) 36%
 7) Company A: skewed right Company B: skewed right Company C: skewed left
 8) 25% 9) Company B

Section 6: Trigonometry

1a) $x = 13.86$ km 1b) $x = 5$ mi
 2a) $\theta = 22.62^\circ$ 2b) $\theta = 17.10^\circ$ 2c) $x = 61.93^\circ$
 3a) $x = 13.8$ 3b) $x = 12.9$ 3c) $x = 6.9$