Name: _____ Period: _____ Date: _____

Algebra 1 Final Review Guide TE

1. Write an algebraic expression for the verbal expression given below.

Three times the quantity eight plus x

_____$3(8+x)$_____

2. Evaluate the expression for the given value of the variable.

$\frac{9}{10} \cdot y - \frac{3}{10}$ when $y = \frac{1}{2}$

$= \frac{9}{10} \cdot \frac{1}{2} - \frac{3}{10}$

$= \frac{9}{20} - \frac{3}{10}$

$= \frac{9}{20} - \frac{6}{20}$

$= \frac{3}{20}$

3. Simplify the expression $\frac{42t-14u}{7}$.

$= \frac{42t}{7} - \frac{14u}{7}$

$= 6t - 2u$

4. Use a table to find two consecutive integers between which the solution lies for the given equation.

$14x - 66 = 40$

x	$= 14x - 66$
7	$= 14(7) - 66$ $= 98 - 66$ $= 32$
8	$= 14(8) - 66$ $= 112 - 66$ $= 46$
9	$= 14(9) - 66$ $= 126 - 66$ $= 60$

$7 < x < 8$

Algebra 1 Final Review Guide TE

5. Find the sum $-\frac{16}{40}+\left(-\frac{13}{20}\right)$.

$= -\frac{16}{40}-\frac{26}{40}$

$= -\frac{42}{40}$

$= -\frac{21}{20}$

6. Simplify the expression $5x - 3[7 - 2(6x - 7) - 3x]$.

$= 5x - 3[7 - 12x + 14 - 3x]$

$= 5x - 3[21 - 15x]$

$= 5x - 63 + 45x$

$= 50x - 63$

7. Find the solution of $-3g = 42$.

Divide both sides by -3

$\frac{-3g}{-3} = \frac{42}{-3} \rightarrow g = -14$

8. Find the solution of $7(f - 9) = 63$.

Divide both sides by 7

$\frac{7(f-9)}{7} = \frac{63}{7} \rightarrow f - 9 = 9$

$f - 9 + 9 = 9 + 9 \rightarrow f = 18$

9. Find the solution of $\frac{234z}{500} - 3z - 1 = -1 - 3z$.

$\frac{234z}{500} - 3z - 1 + 1 = -1 + 1 \rightarrow \frac{234z}{500} - 3z = -3z$

$\frac{234z}{500} - 3z + 3z = -3z + 3z \rightarrow \frac{234z}{500} = 0$

$500 \times \frac{234z}{500} = 500 \times 0 \rightarrow 234z = 0 \rightarrow z = 0$

Algebra 1 Final Review Guide TE

10. Find the solution of $-3z - 1 = +2z - 1$.

$-3z - 1 + 1 = +2z - 1 + 1 \rightarrow -3z = 2z$

$-3z - 2z = 2z - 2z \rightarrow -5z = 0$

$\frac{-5z}{-5} = \frac{0}{-5} \rightarrow \boxed{z = 0}$

11. Solve the proportion $\frac{y}{3} = \frac{5}{4}$.

product of means = product of extremes

$y \times 4 = 5 \times 3$

$4y = 15$

$\boxed{y = \frac{15}{4}}$

12. A dining table with a set of chairs that costs 250$ are on sale for 30% of the regular price. What is the sales price of the dining table and the set of chairs?

$30\%\ of\ 250 = 0.30 \times 250 = 75$

Sales price = $250 - 75 = \boxed{175\$}$

13. Graph the inequality $m > 10$.

14. Solve the inequality $7y \leq 6y - 2$.

$7y - 6y \leq 6y - 6y - 2$

$\boxed{y \leq -2}$

Algebra 1 Final Review Guide TE

15. Write and solve the inequality.

Negative six times a number is at least 14.

$-6x \geq 14$ $\qquad \frac{-6x}{-6} \leq \frac{14}{-6} \qquad x \leq -\frac{7}{3}$

16. Suppose $U = \{x \mid x$ is a real number, $x < -3\}$ is the universal set and A=$\{x \mid x$ is a real number, $x < -10\}$. What is A'?

$A' = \{x \mid x \text{ is a real number}, -10 < x < -3\}$

17. Solve the equation $|x + 6| + 3 = 16$.

$|x + 6| + 3 - 3 = 16 - 3$

$|x + 6| = 13$

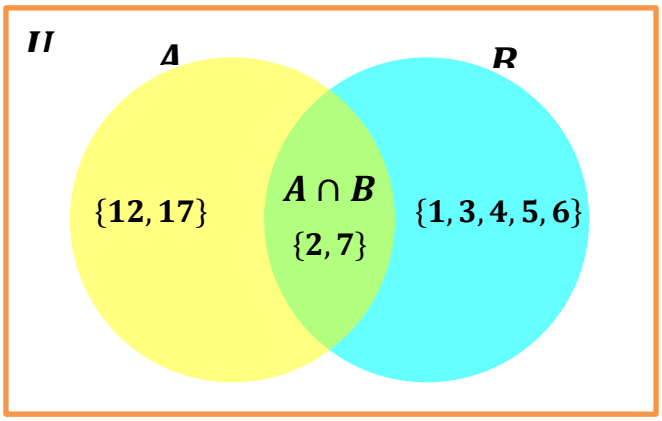
$x + 6 = 13$ $\qquad$ $x + 6 = -13$

$x + 6 - 6 = 13 - 6$ $\qquad$ $x + 6 - 6 = -13 - 6$

$x = 7$ $\qquad$ $x = -19$

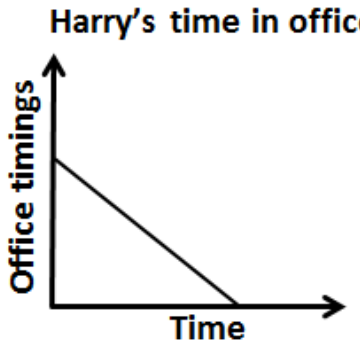
18. Draw a Venn diagram to represent the union and intersection of these sets.

$A = \{2, 7, 12, 17\}$ and $B = \{x | x$ is a positive whole number less than 8$\}$. Find $A \cap B$.



19. Sketch a graph representing the situation given below.

Harry's time in office starting from morning till the evening.



20. For the table given below, determine whether the relationship is a function. If yes, then represent the relation using words and ordered pairs.

y	0	1	2	3	4
z	6	7	8	9	10

Yes, it is a function.

Using words: z is 6 more than y

Using ordered pairs: (0,6), (1,7), (2,8), (3,9), (4,10)

21. The set of ordered pairs represents a function. Write a rule representing the function.

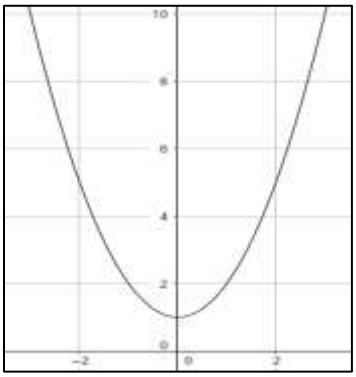
(-1,1), (0,2), (1,3), (2,10), (3,29)

Rule: $y = x^3 + 2$

22. Graph the function represented by the data in the table. Tell whether the function is linear or non-linear.

x	y
0	1
1	2
2	5
3	10

Graph:



23. Write a function rule representing the situation given below.

The cost c of the membership of a club is 30$ for sign up and 15$ per week w to be a member.

$c = 30 + 15w$

24. Describe the pattern in the sequence given below. Also find the next three terms in the sequence.

1, 3, 9, 27, 54, …

Pattern: Each term is 3 times the previous one.

Next three terms: $54 \times 3 = 162$

$15 \times 2 = 486$

$17 \times 2 = 1458$

25. Find the slope of the line passing through the points (1,0) and (-4,2).

$$Slope\ m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$Slope\ m = \frac{2-0}{-4-1}$$

$$Slope\ m = -\frac{2}{5}$$

26. Determine whether the given below equation represents a direct variation or not. If it does, find the constant of variation.

$$3y - 7 = 2x - 7$$

$$3y = 2x - 7 + 7$$

$$y = \frac{2}{3}x$$

Yes it represents a direct variation.

$$k = \frac{2}{3}$$

27. Write an equation in slope-intercept form of the line that passes through the points $(12, 10) and\ (16, 8)$.

$$Slope\ m = \frac{8-10}{16-12} = -\frac{1}{2}$$

$$y = mx + b \rightarrow\ 10 = -\frac{1}{2}(12) + b$$

$$b = 16$$

$$y = -\frac{1}{2}x + 16$$

28. Write an equation in slope-intercept form of the line passing through $(3, 1)$ *and* $(4, 3)$.

$\boldsymbol{Slope\ m = \frac{3-1}{4-3} = 2}$

Put $(3, 1)$ in $y - y_1 = m(x - x_1)$:

$\boldsymbol{y - 1 = 2(x - 3)}$

$\boldsymbol{y = 2x - 5}$

29. Write an equation in slope-intercept form of the line that passes through the given point and is parallel to the graph of the given equation.

$$(-1, 6)\ ;\ y = 9x - 5$$

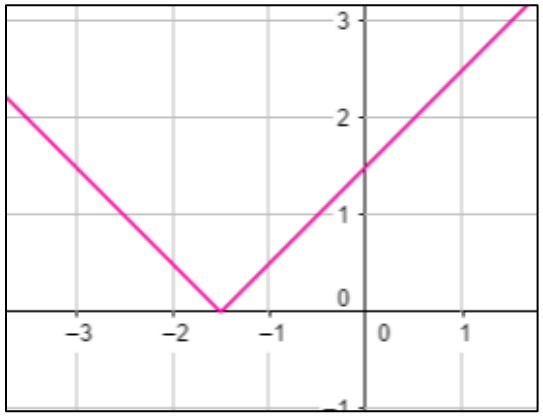
Slope of the parallel line $m = 9$

$\boldsymbol{y - y_1 = m(x - x_1)}$

$\boldsymbol{y - 6 = 9(x - (-1))}$

$\boldsymbol{y = 9x + 15}$

30. Write the equation represented by the graph shown below.



$\boldsymbol{y = |x + 1.5|}$

Algebra 1 Final Review Guide TE

31. Find the solution of the following system of equations by graphing.

$2x + y = 6$

$x + y = 5$

$2x + y = 6$:

$x = 0 \rightarrow y = 6 \rightarrow (0, 6)$

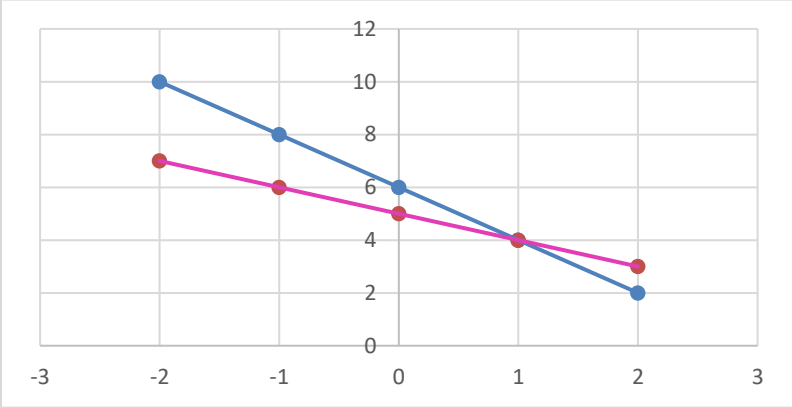
$y = 0 \rightarrow x = 3 \rightarrow (3, 0)$

$x + y = 5$:

$x = 0 \rightarrow y = 5 \rightarrow (0, 5)$

$y = 0 \rightarrow x = 5 \rightarrow (5, 0)$

Graph:



System Solution (1, 4)

32. Find the solution of the following system of equation by substitution and determine if it is an independent, inconsistent or dependent system.

$$7x + 2y = 16$$

$$-21x - 6y = 24$$

We choose the equation which contains the easiest variable to solve. In this case, both are equally difficult to solve, so we can select any of them. We select variable "y" from equation I and then substitute it in equation II to find the value of the other variable, like follows:

$$y = \frac{16 - 7x}{2}$$

Substituting in II:

$$-21x - 6\left(\frac{16-7x}{2}\right) = 24$$

Applying distributive property: $-21x - 48 + 21x = 24 \quad \rightarrow \quad 0 = 72$

No Solution. Inconsistent System

33. Find the solution of the following systems by elimination and determine if it is an independent, inconsistent or dependent system.

$$2x + y = 3$$

$$5x - 2y = 4$$

We interchange the "x" or "y" coefficients from equation I and equation II to eliminate one of the variables. In this case, we are going to interchange the "x" coefficients of both equations, like follows:

$$\begin{cases} -5(2x + y = 3) \\ 2(5x - 2y = 4) \end{cases}$$

As both coefficients have the same sign, we have to assign a negative sign to one of the coefficients so they can eliminate each other

Applying distributive property:

$$\begin{cases} -10x - 5y = -15 \\ 10x - 4y = 8 \end{cases}$$

The result would be:

$$-9y = -7 \qquad \rightarrow y = \frac{7}{9}$$

Now, we calculate the value of variable "x" by substituting the result of "y" into one of the equations

$$x = \frac{3 - y}{2} = \frac{3 - \frac{7}{9}}{2} = \frac{10}{9}$$

Solution (10/9, 7/9). Independent System

34. The sum of two numbers is 13 and their difference is 5. Find the numbers.

- **Identify variables**

  x: First unknown number **y: Second unknown number**

- **Set up equations**

$$x + y = 13 \qquad and \qquad x - y = 5$$

- **Solve linear System**

In this case we will use the elimination method, like follows:

$$\begin{cases} x + y = 13 \\ x - y = 5 \end{cases}$$

The result would be:

$$2x = 18 \qquad \rightarrow \qquad x = \frac{18}{2} = 9$$

Now, we calculate the value of variable "y" by substituting the result of "x" into one of the equations

$$y = 13 - x = 13 - 9 \qquad \rightarrow \qquad y = 4$$

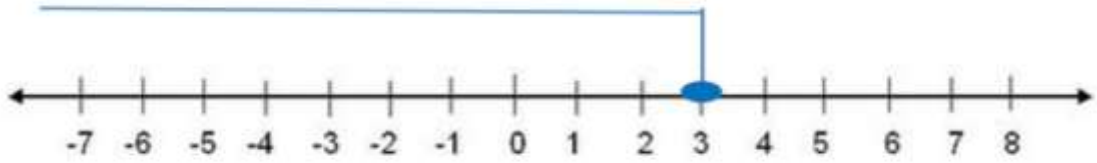
The numbers are 9 and 4

Algebra 1 Final Review Guide TE

35. Solve the following inequality and graph it:

$$2x + 1 \leq 7$$

$$2x \leq 7 - 1 \quad \rightarrow \quad 2x \leq 6 \quad \rightarrow \quad \frac{2x}{2} \leq \frac{6}{2} \quad \rightarrow \quad x \leq 3$$



Solution:

$$\{x | x \in R,\ x \leq 3\} = (-\infty, 3]$$

36. Solve the following inequalities and graph its solution:

$$\begin{cases} y \geq 2x + 1 \\ y \geq -x + 3 \end{cases}$$

We have to graph each of the linear function that compound the system. One easy way to graph each linear function is to find its intercepts with the axes.

- $y = 2x + 1$

  $x = 0 \rightarrow y = 1 \rightarrow (0, 1)$

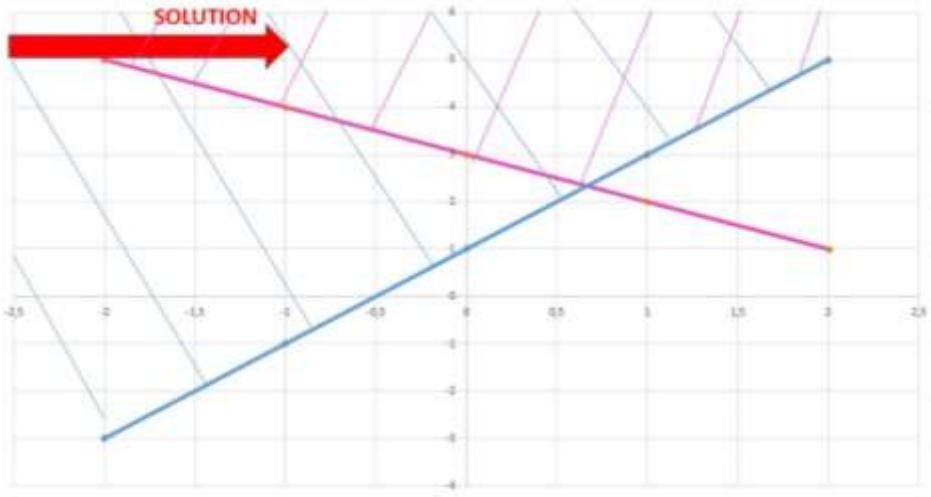
  $y = 5 \rightarrow x = 2 \rightarrow (2, 5)$

- $y = -x + 3$

  $x = 0 \rightarrow y = 3 \rightarrow (0, 3)$

  $y = 1 \rightarrow x = 2 \rightarrow (2, 1)$

Algebra 1 Final Review Guide TE



Proving with the point (1, 4) that belongs to the solution region to verify if it satisfies the inequalities:

$$4 \geq 2(1) + 1 \rightarrow 4 > 3$$

$$4 \geq -1 + 3 \rightarrow 4 > 2$$

37. Simplify:

$2x + (5y)^0 =$ ____$2x + 1$____

38. Simplify:

$2x^2y \cdot 3x =$ _____$6x^3y$_____

39. Simplify:

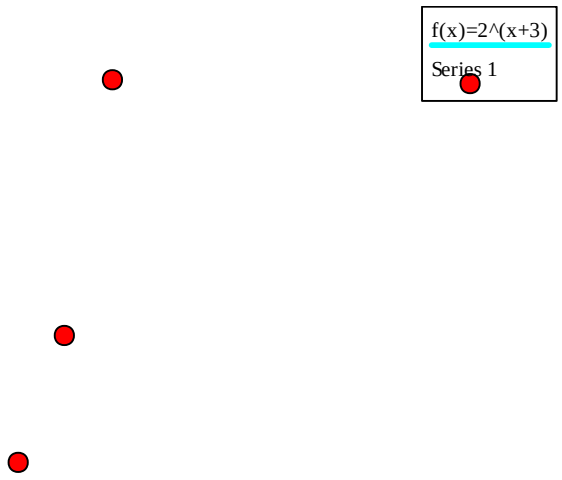
$\frac{4x^5y}{2y^3} =$ ____ $\frac{2x^5}{y^2}$ _____

40. Simplify:

$\sqrt{\frac{2x^3}{4x^6}} =$ ____ $\frac{x\sqrt{2x}}{2x^3}$ _____

Algebra 1 Final Review Guide TE

41. Draw the graph of $y = 2^{x+3}$.



42. Suppose you have the following: 2$ in the first day, 4$ in the second day, 8$ in the third day, etc. each day saving double of what you save the preceding day. How many dollar you would have for 15 days?

Solution:

$a = 2, r = 2, n = 15$

$$S = \frac{a(1 - r^n)}{1 - r}$$

$$S = \frac{2(1-2^{15})}{1-2} = \$65534$$

43. Add $3xy - x^2y + xy^2$; $-xy^2 - 5xy - 6x + 4x^2y$

Answer:

$$3xy - x^2y + xy^2$$

$$+ \quad -5xy + 4x^2y - xy^2 - 6x$$

$$-2xy + 3x^2y \qquad - 6x$$

$$3x^2y - 2xy - 6x$$

44. Find the product of the following polynomials.

$6bc(2a + b - 2c)$

$= 12abc + 6b^2c - 12bc^2$

$6b^2c - 12bc^2 + 12abc$

45. Simplify $(x + y)(3x + 4y)$.

$3x^2 + 3xy + 4xy + 4y^2$

$3x^2 + 7xy + 4y^2$

$3x^2 + 4y^2 + 7xy$

46. Factorize $4y^2 + 12y - 40$.

$4y^2 = (2y)(2y)$

$-40 = (-4)(10)$

$12y = -8y + 20y$

$(2y - 4)(2y + 10)$

47. Factorize $x^2 + 12x + 36$.

$x^2 = (x)(x)$

$36 = (6)(6)$

$12x = 6x + 6x$

$(x + 6)^2$

48. Factorize $y^2 - 3ny + 2ay - 6an$ by grouping.

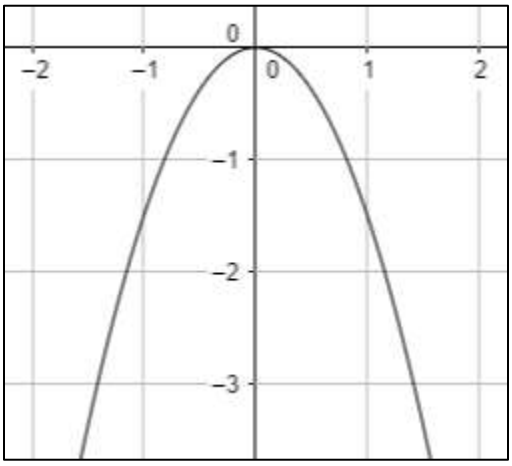
$(y^2 - 3ny) + (2ay - 6an)$

$y(y - 3n) + 2a(y - 3n)$

$(y + 2a)(y - 3n)$

Algebra 1 Final Review Guide TE

49. Graph the quadratic function $y = -1.5x^2$.



50. Identify the axis of symmetry and vertex of the graph of the quadratic function $f(x) = x^2 - 8x$.

Axis of symmetry:

$x = -\frac{b}{2a} \rightarrow -\frac{-8}{2(1)} = 4$

Vertex:

$f(4) = 4^2 - 8(4) = 16 - 32 = -16 = (4, -16)$

51. Find the solution of the equation $4b^2 - 36 = 0$ by finding the square roots or mention if the equation has no solution.

$b^2 = \frac{36}{4} = 9$

$\sqrt{b^2} = \sqrt{9}$

$b = \pm 3$

52. Solve the equation $x^2 + 11x + 28 = 0$ by factoring.

Factorize:

$x^2 + 7x + 4x + 28 = 0$

$x(x + 7) + 4(x + 7) = 0$

$(x+4)(x+7)=0$

$x=-4 \quad ; \quad x=-7$

53. Solve the quadratic equation using the quadratic formula.

$x^2+9x-13=0$

Here $a=1, b=9, c=-13$

$x=\frac{-(9)\pm\sqrt{(9)^2-4(1)(-13)}}{2(1)}$

$x=\frac{-9\pm\sqrt{81+52}}{2(1)}$

$x=\frac{-9\pm\sqrt{133}}{2}$

$x=\frac{-9+\sqrt{133}}{2} \; ; \; x=\frac{-9-\sqrt{133}}{2}$

54. Solve the system of equation algebraically.

$y=x^2-3x-27 \quad ; \quad y=x-6$

First put the value of y from linear equation into the quadratic equation.

$x-6=x^2-3x-27 \quad \rightarrow x^2-3x-27-x+6=0$

$\rightarrow x^2-4x-21=0$

$\rightarrow x^2-7x+3x-21=0$

$\rightarrow (x-7)(x+3)=0$

$\rightarrow x=7, \; x=-3$

$y=7-6=1 \quad ; \quad y=-3-6=-9$

Solutions: $(7,1), \; (-3,-9)$

55. A rectangle has a width of 10 and a length of 22. How long is the diagonal of the rectangle?

$$x^2 = 22^2 + 10^2$$

$$x^2 = 484 + 100$$

$$x^2 = 584$$

$$x = \sqrt{584}$$

$$x = 24.16$$

56. Simplify the following expression. Assume that all variables represent positive real numbers.

$$\sqrt[4]{\frac{112x^5}{y^4}}$$

$$= \frac{\sqrt[4]{2^4 \times 7 \times x \times x^4}}{\sqrt[4]{y^4}}$$

$$= \frac{2x\sqrt[4]{7x}}{y}$$

57. Simplify $(x + \sqrt{x})(\sqrt{x} - 1)$.

$$= x \times \sqrt{x} - x \times 1 + \sqrt{x} \times \sqrt{x} - \sqrt{x}$$

$$= x\sqrt{x} - x + x - \sqrt{x}$$

$$= x\sqrt{x} - \sqrt{x}$$

$$= (x - 1)\sqrt{x}$$

58. Solve $\sqrt{10 - x} = \sqrt{x - 1}$

$$\left(\sqrt{10 - x}\right)^2 = \left(\sqrt{x - 1}\right)^2$$

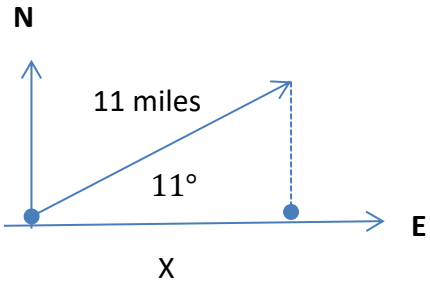
$$10 - x = x - 1$$

$$2x = 11$$

$$x = 5.5$$

Algebra 1 Final Review Guide TE

59. Andy walked 10 miles at an angle of $11°$ north of due east. To the nearest tenth of a mile, how far east, x, is Andy from his starting point?



$$\cos 11° = \frac{x}{11\ miles}$$
$$x = 11\ miles * \cos 11°$$
$$x = 11\ miles * 0.98$$
$$x = 10.79\ miles$$

60. Find the value of α that makes the statement true.

$$\sin\alpha = \cos(3\alpha + 54°)$$

$$\cos(90° - \alpha) = \cos(3\alpha + 54°)$$

$$90° - \alpha = 3\alpha + 54°$$

$$4\alpha = 36° \rightarrow \alpha = 9°$$

61. Simplify the following.

$$\frac{5x^2y + 5x^2z}{15xy + 15xz}$$

$$\frac{(5x^2)(y+z)}{(15x)(y+z)} = \frac{5x(x)}{5x(3)} = \frac{x}{3}$$

62. Simplify:

$$\frac{5x - 5y}{xy^2} \times \frac{x^2y}{2x - 2y}$$

$$= \frac{5(x-y)}{xy^2} \times \frac{x^2y}{2(x-y)} = \frac{5x}{2y}$$

63. Simplify:

$$\frac{4a+4}{a^2-25} \div \frac{20}{a^2-5a}$$

$$= \frac{4(a+1)}{(a+5)(a-5)} \times \frac{a(a-5)}{5(4)} = \frac{4(a+1)}{5(a+5)}$$

64. Simplify:

$$\frac{4}{5z} + \frac{1}{2z}$$

LCD: $10z$

$$= \frac{4(2)+1(5)}{10z} = \frac{8+5}{10z} = \frac{13}{10z}$$

65. Solve for the variable *x*.

$$\frac{1}{x} + \frac{1}{16} = \frac{1}{10}$$

Solution:

$$\frac{1}{x} = \frac{1}{10} - \frac{1}{16}$$

$$\frac{1}{x} = \frac{3}{80}$$

$$3x = 80$$

$$x = \frac{80}{3}$$

66. How long will it take a car to travel a certain distance at 80 km/ h if the same distance can be traveled in 6 hours at 40km/h.

Solution:

speed	Time
80	6
40	?

$6 = \frac{k}{80} \quad k = 480$

$t = \frac{480}{40} = 12 \text{ hours}$

67. Find the vertical and horizontal asymptote of $f(x) = \frac{4x-2}{x+2}$.

Vertical asymptote

$x + 2 = 0 \qquad x = -2$

Horizontal asymptote

$y = \frac{4}{1} = 4$

68. The following are scores of 13 students in Algebra quiz: 3, 20, 18, 17, 6, 14, 11, 11, 15, 27, 23, 25, and 28. Find the Mean.

$\bar{x} = (3 + 20 + 18 + 17 + 6 + 14 + 11 + 11 + 15 + 27 + 23 + 25 + 28)/13 = 16.8$

69. A Super market wants to conduct a survey about costumer service; the number of visitor of the super market per week is about 1000 visitor. Find the sample of the population at 1% margin of error.

$n = \frac{1000}{1+1000(0.01)^2} = 909.01 \text{ or } 909$

70. There are 10 males and 8 females. How many 5-member committees can be formed if a committee is composed of 2 males and 3 females?

$_{10}C_2 = \frac{10!}{(10-2)!\,2!} = 45$

n = 8, r =3

$_8C_3 = \frac{8!}{(8-3)!\,3!} = 56$

(45)(56) =2520 committees