

Enh/Adv Algebra and AP Pre-Calculus Summer Packet

Complete the following problems to prepare for next year. The answer key is provided at the end of the document.

A

Fundamental Algebra Skills

★ ★ Complete this entire page ★ ★

NO CALCULATOR

A1. True or false. If false, change what is underlined to make the statement true.

a. $(x^3)^4 = x^{\underline{12}}$ T F

b. $x^{\frac{1}{2}}x^3 = x^{\underline{\frac{3}{2}}}$ T F

c. $(x+3)^2 = \underline{x^2} + 9$ T F

d. $\frac{x^2-1}{x-1} = \underline{x}$ T F

e. $(4x+12)^2 = \underline{16}(x+3)^2$ T F

f. $\underline{3} + 2\sqrt{x-3} = 5\sqrt{x-3}$ T F

A2. Solve the following expressions without a calculator:

a. $-\frac{3}{2} + \frac{8}{5}$ b. $\frac{7}{4} - \left(-\frac{1}{2}\right)$

c. $-\frac{1}{5} + \frac{7}{4}$ d. $\frac{2}{5} - \frac{4}{5}$

A3. Simplify the following expressions without a calculator:

a. $\sqrt{8}$ b. $\sqrt{28x^3}$

c. $\sqrt{45x^2y^4}$ d. $\sqrt{200x^4y}$

E

Solving Equations

★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED

E1. Solve the following equations below:

a. $-(1 + 7x) - 6(-7 - x) = 36$

b. $-3(4x + 3) + 4(6x + 1) = 43$

c. $24a - 22 = -4(1 - 6a)$

d. $-5(1 - 5x) + 5(-8x - 2) = -4x - 8x$

e. $2(4x - 3) - 8 = 4 + 2x$

f. $5n + 34 = -2(1 - 7n)$

E2. Solve the following equations below:

a. $\frac{7}{9} = \frac{b}{b - 10}$

b. $\frac{9}{k - 7} = \frac{6}{k}$

c. $\frac{4}{n + 2} = \frac{7}{n}$

d. $\frac{p + 10}{p - 7} = \frac{8}{9}$

e. $\frac{n - 5}{n + 8} = \frac{2}{7}$

f. $\frac{5}{r - 9} = \frac{8}{r + 5}$

**Linear Equations and Functions**

★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED

L1. Write the slope-intercept form of the equation of each line:

a. $3x - 2y = -16$

b. $13x - 11y = -12$

c. $x - 3y = 6$

d. $4x - y = 1$

e. $11x - 4y = 32$

f. $11x - 8y = -48$

L2. Write the standard form of the equation of the line through the given point and slope:

a. through: (1,2) and slope = 7

b. through: (3, -1) and slope = -1

c. through: (-2,5) and slope = -4

d. through: (3,5) and slope = 5/3

L3. Evaluate the following expressions given the functions below:

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

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

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

a. $g(10) =$

b. $f(-3) =$

c. $h(2) =$

d. $f(3) =$

F

Factoring Basic Polynomials

★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED

F1. Factor the following polynomials completely below:

a.

$$x^2 + 8x + 7$$

b.

$$m^2 + 2m - 24$$

c.

$$5v^2 - 30v + 40$$

d.

$$2p^2 + 2p - 4$$

e.

$$2x^2 + 11x + 5$$

f.

$$7a^2 + 53a + 28$$

F2. Solve the following polynomials by factoring:

a.

$$6x^2 + 37x + 6 = 0$$

b.

$$-16x^2 = 60x - 100$$

c.

$$2x^2 + 5x + 2 = 0$$

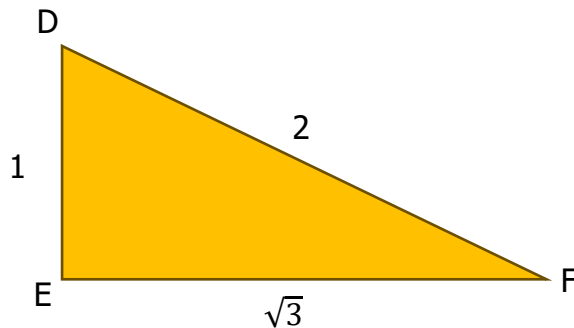
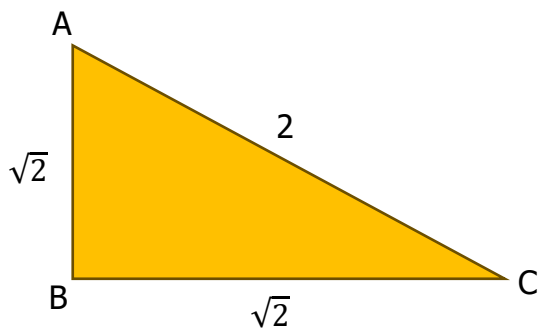
d.

$$4x^2 + 4 = 17x$$

T

Trigonometry

★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED



T1. Use the diagram(s) above to solve the following trig functions:

a. $\sin(A) =$

b. $\cos(A) =$

c. $\tan(A) =$

d. $\sin(C) =$

e. $\cos(C) =$

f. $\tan(C) =$

g. $\sin(F) =$

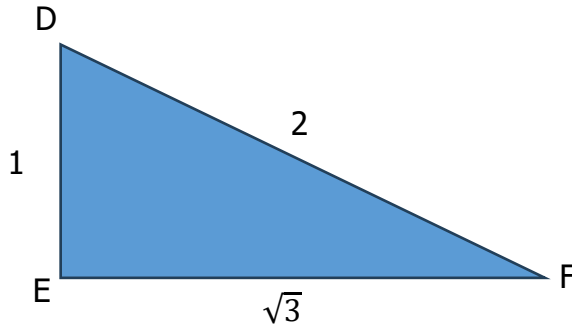
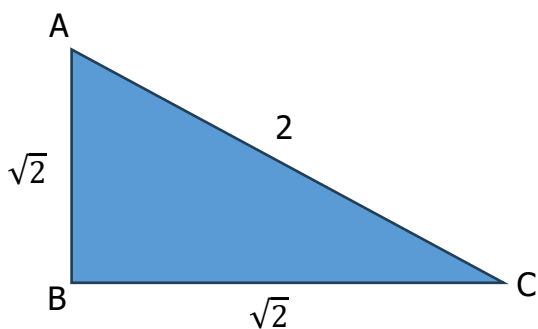
h. $\cos(F) =$

i. $\tan(F) =$

j. $\sin(D) =$

k. $\cos(D) =$

l. $\tan(D) =$



T2. Use the diagram(s) above to solve for each of the angles of the triangle (triangles may not be drawn to scale):

a. $m\angle A =$

d. $m\angle D =$

b. $m\angle B =$

e. $m\angle E =$

c. $m\angle C =$

k. $m\angle F =$

I

Interpreting Linear Equations

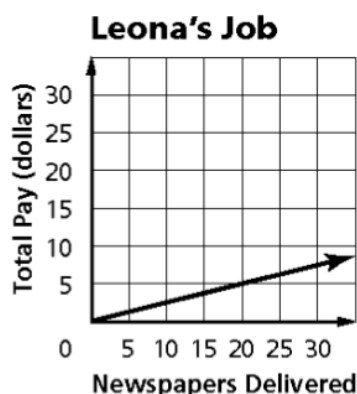
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CALCULATOR CAN BE USED

- I1.** The function below shows the cost of a hamburger with different numbers of toppings (t), $f(t) = 1.90 + 1.40t$. Use this equation to answer the questions below:

- What is the y-intercept and what does it mean?
- What is the slope and what does it mean?
- If Jodi paid \$3.30 for a hamburger, how many toppings were on Jodi's Hamburger?

- I2.** The graph below shows the number of newspapers delivered and the total pay for Leona's newspaper delivery job. Use the graph to answer the questions below:

- What is the slope and what does it represent?



- I3.** Dionne pays a fixed fee plus an hourly rate to rent a boat. The table below shows how much Dionne paid for the boat. Use the chart to answer the questions below:

- What is Dionne's hourly rate to rent the boat?

Dionne's Boat Rental					
Hours Rented	1	2	3	4	5
Amount Paid	\$27	\$39	\$51	\$63	\$75

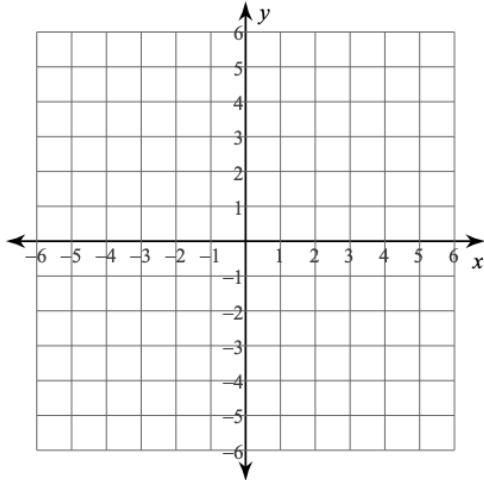
G

Graphing Linear Equations

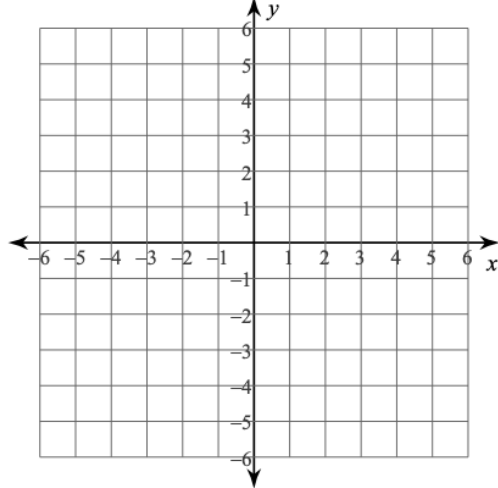
★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED

G1. Graph the following equations on the grid provided:

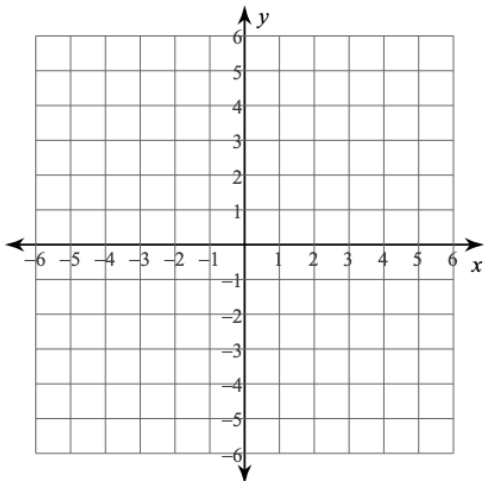
a. $7x + y = 5$



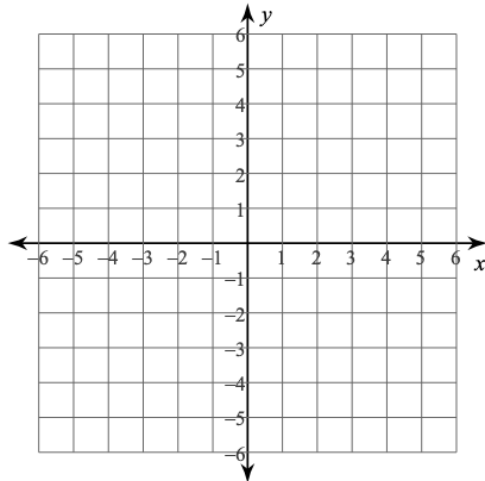
b. $3x + 5y = -5$



c. $x = -3$



d. $6x + 5y = 20$



Enh/Adv Algebra and AP Pre-Calculus Summer Packet KEY

A

Fundamental Algebra Skills

★ ★ Complete this entire page ★ ★
NO CALCULATOR

A1. True or false. If false, change what is underlined to make the statement true.

a. $(x^3)^4 = x^{12}$ $(x^3)^4 = x^{3 \cdot 4} = x^{12}$ T F

b. $x^{\frac{1}{2}}x^3 = x^{\frac{3}{2}}$ $x^{\frac{1}{2}} \cdot x^3 = x^{\frac{1}{2}+3} = x^{\frac{7}{2}}$ T F

c. $(x+3)^2 = x^2 + 9$ $(x+3)^2 = (x+3)(x+3) = x^2 + 6x + 9$ T F

d. $\frac{x^2-1}{x-1} = x$ $\frac{x^2-1}{x-1} = \frac{(x-1)(x+1)}{x-1} = x+1$ T F

e. $(4x+12)^2 = 16(x+3)^2$ $(4x+12)^2 = (4x+12)(4x+12) = 4(x+3) \cdot 4(x+3) = 16(x+3)^2$ T F

f. $3 + 2\sqrt{x-3} = 5\sqrt{x-3}$ T F

A2. Solve the following expressions without a calculator:

a. $-\frac{3}{2} + \frac{8}{5} = -\frac{15}{10} + \frac{16}{10} = \frac{1}{10}$

b.

$\frac{7}{4} - \left(-\frac{1}{2}\right) = \frac{7}{4} + \frac{1}{2} = \frac{7}{4} + \frac{2}{4} = \frac{9}{4}$

c. $-\frac{1}{5} + \frac{7}{4} = -\frac{4}{20} + \frac{35}{20} = \frac{31}{20}$

d.

$\frac{2}{5} - \frac{4}{5} = \frac{-2}{5}$

A3. Simplify the following expressions without a calculator:

a. $\sqrt{8} = \sqrt{4 \cdot 2} = \sqrt{4} \cdot \sqrt{2} = 2\sqrt{2}$

b.

$\sqrt{28x^3} = \sqrt{28} \cdot \sqrt{x^3} = \sqrt{4} \cdot \sqrt{7} \cdot \sqrt{x^2} \cdot \sqrt{x} = 2\sqrt{7} \cdot x\sqrt{x} = 2x\sqrt{7x}$

c. $\sqrt{45x^2y^4} = \sqrt{45} \cdot \sqrt{x^2} \cdot \sqrt{y^4} = \sqrt{9} \cdot \sqrt{5} \cdot x \cdot y^2 = 3\sqrt{5} \cdot xy^2 = 3xy^2\sqrt{5}$

d.

$\sqrt{200x^4y} = \sqrt{200} \cdot \sqrt{x^4} \cdot \sqrt{y} = \sqrt{100} \cdot \sqrt{2} \cdot x^2 \cdot \sqrt{y} = 10\sqrt{2} \cdot x^2\sqrt{y} = 10x^2\sqrt{2y}$

E

Solving Equations

★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED

E1. Solve the following equations below:

a. $-(1 + 7x) - 6(-7 - x) = 36$

$$-1 - 7x + 42 + 6x = 36$$

$$41 - x = 36$$

$$-x = -5$$

$$x = 5$$

c. $24a - 22 = -4(1 - 6a)$

$$24a - 22 = -4 + 24a$$

$$-22 = -4$$

No Solution

e. $2(4x - 3) - 8 = 4 + 2x$

$$8x - 6 - 8 = 4 + 2x$$

$$8x - 14 = 4 + 2x$$

$$6x = 18$$

$$x = 3$$

b. $-3(4x + 3) + 4(6x + 1) = 43$

$$-12x - 9 + 24x + 4 = 43$$

$$12x - 5 = 43$$

$$12x = 48$$

$$x = 4$$

d. $-5(1 - 5x) + 5(-8x - 2) = -4x - 8x$

$$-5 + 25x - 40x - 10 = -12x$$

$$-15x - 15 = -12x$$

$$-15 = 3x$$

$$-5 = x$$

f. $5n + 34 = -2(1 - 7n)$

$$5n + 34 = -2 + 14n$$

$$36 = 9n$$

$$4 = n$$

E2. Solve the following equations below:

a. $\frac{7}{9} = \frac{b}{b-10}$ $b \neq 10$

$$9b = 7(b-10)$$

$$9b = 7b - 70$$

$$2b = -70$$

$$b = -35$$

c. $\frac{4}{n+2} = \frac{7}{n}$ $n \neq 0, -2$

$$7(n+2) = 4n$$

$$7n + 14 = 4n$$

$$14 = -3n$$

$$-\frac{14}{3} = n$$

e. $\frac{n-5}{n+8} = \frac{2}{7}$ $n \neq -8$

$$7(n-5) = 2(n+8)$$

$$7n - 35 = 2n + 16$$

$$5n = 51$$

$$n = \frac{51}{5}$$

b. $\frac{9}{k-7} = \frac{6}{k}$ $k \neq 7$

$$9k = 6(k-7)$$

$$9k = 6k - 42$$

$$3k = -42$$

$$k = -14$$

d. $\frac{p+10}{p-7} = \frac{8}{9}$ $p \neq 7$

$$9(p+10) = 8(p-7)$$

$$9p + 90 = 8p - 56$$

$$p = -146$$

f. $\frac{5}{r-9} = \frac{8}{r+5}$ $r \neq 9, -5$

$$5(r+5) = 8(r-9)$$

$$5r + 25 = 8r - 72$$

$$97 = 3r \rightarrow r = \frac{97}{3}$$



Linear Equations and Functions

★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED

L1. Write the slope-intercept form of the equation of each line:

a. $3x - 2y = -16$

$$-2y = -3x - 16$$

$$y = \frac{3}{2}x + 8$$

b. $13x - 11y = -12$

$$-11y = -13x - 12$$

$$y = \frac{13}{11}x + \frac{12}{11}$$

c. $x - 3y = 6$

$$-3y = -x + 6$$

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

d. $4x - y = 1$

$$-y = -4x + 1$$

$$y = 4x - 1$$

e. $11x - 4y = 32$

$$-4y = -11x + 32$$

$$y = \frac{11}{4}x - 8$$

f. $11x - 8y = -48$

$$-8y = -11x - 48$$

$$y = \frac{11}{8}x + 6$$

L2. Write the standard form of the equation of the line through the given point and slope:

a. through: (1,2) and slope = 7

$$y - 2 = 7(x - 1)$$

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

$$-7x + y = -5$$

$$7x - y = 5$$

c. through: (-2,5) and slope = -4

$$y - 5 = -4(x + 2)$$

$$y - 5 = -4x - 8$$

$$4x + y = -3$$

b. through: (3, -1) and slope = -1

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

$$y + 1 = -x + 3$$

$$x + y = 2$$

d. through: (3,5) and slope = 5/3

$$y - 5 = \frac{5}{3}(x - 3)$$

$$y - 5 = \frac{5}{3}x - 5$$

$$-\frac{5}{3}x + y = 0$$

$$5x - 3y = 0$$

L3. Evaluate the following expressions given the functions below:

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

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

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

a. $g(10) = -3(10) + 1$

$$= -30 + 1$$

$$= -29$$

b. $f(-3) = (-3)^2 + 7$

$$= 9 + 7$$

$$= 16$$

c. $h(2) = \frac{12}{2}$

$$= 6$$

d. $f(3) = (3)^2 + 7$

$$= 9 + 7$$

$$= 16$$

F

Factoring Basic Polynomials

★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED

F1. Factor the following polynomials completely below:

a. $x^2 + 8x + 7$ $ac = 7$
 $b = 8$

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

$$x(x + 7) + 1(x + 7)$$

$$(x + 1)(x + 7)$$

b. $m^2 + 2m - 24$ $ac = -24$
 $b = 2$

$$(m^2 + 6m)(4m - 24)$$

$$m(m + 6) - 4(m + 6)$$

$$(m - 4)(m + 6)$$

c. $5v^2 - 30v + 40$ $ac = 8$
 $b = -6$

$$5(v^2 - 6v + 8)$$

$$5[(v^2 - 2v)(4v + 8)]$$

$$5[v(v - 2) - 4(v - 2)]$$

$$5(v - 4)(v - 2)$$

d. $2p^2 + 2p - 4$ $ac = -2$
 $b = 1$

$$2(p^2 + p - 2)$$

$$2[(p^2 + 2p)(p - 2)]$$

$$2[p(p + 2) - 1(p + 2)] \rightarrow 2(p - 1)(p + 2)$$

e. $2x^2 + 11x + 5$ $ac = 10$
 $b = 11$

$$(2x^2 + 10x)(x + 5)$$

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

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

f. $7a^2 + 53a + 28$ $ac = 196$
 $b = 53$

$$(7a^2 + 49a)(4a + 28)$$

$$7a(a + 7) + 4(a + 7)$$

$$(7a + 4)(a + 7)$$

F2. Solve the following polynomials by factoring:

a. $6x^2 + 37x + 6 = 0$ $ac = 36$
 $b = 37$

$$(6x^2 + 36x)(x + 6) = 0$$

$$6x(x + 6) + 1(x + 6) = 0$$

$$(6x + 1)(x + 6) = 0$$

$$6x + 1 = 0 \rightarrow x = -\frac{1}{6}, -6$$

$$x + 6 = 0$$

c. $2x^2 + 5x + 2 = 0$ $ac = 4$
 $b = 5$

$$(2x^2 + 4x)(x + 2) = 0$$

$$2x(x + 2) + 1(x + 2) = 0$$

$$(2x + 1)(x + 2) = 0$$

$$2x + 1 = 0 \rightarrow x = -\frac{1}{2}, -2$$

$$x + 2 = 0$$

b. $-16x^2 = 60x - 100$

$$\frac{16x^2}{4} + \frac{60x}{4} - \frac{100}{4} = 0$$

$$4x^2 + 15x - 25 = 0$$

$$(4x^2 + 20x)(-5x - 25) = 0$$

$$4x(x + 5) - 5(x + 5) = 0$$

$$(4x - 5)(x + 5) = 0$$

$$4x - 5 = 0 \rightarrow x = \frac{5}{4}, -5$$

$$x + 5 = 0$$

d. $4x^2 + 4 = 17x$ $ac = 16$
 $b = -17$

$$4x^2 - 17x + 4 = 0$$

$$(4x^2 - 16x)(x + 4) = 0$$

$$4x(x - 4) - 1(x - 4) = 0$$

$$(4x - 1)(x - 4) = 0$$

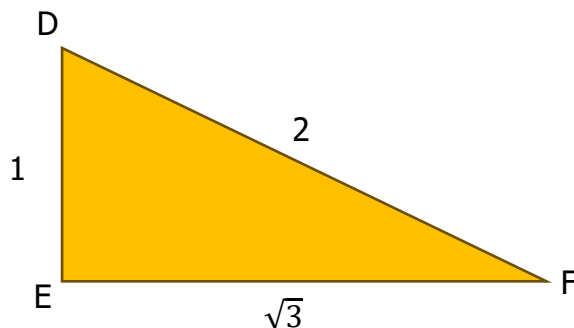
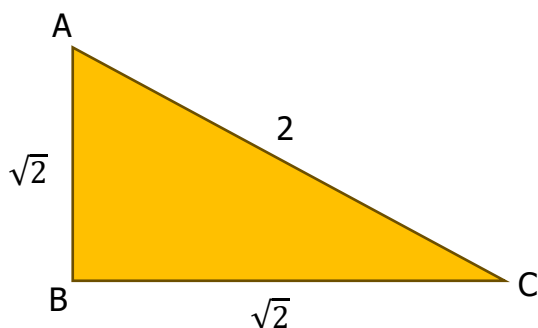
$$4x - 1 = 0 \rightarrow x = \frac{1}{4}, 4$$

$$x - 4 = 0$$

T

Trigonometry

★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED



T1. Use the diagram(s) above to solve the following trig functions:

a. $\sin(A) = \frac{\sqrt{2}}{2}$

b. $\cos(A) = \frac{\sqrt{2}}{2}$

c. $\tan(A) = \frac{\sqrt{2}}{\sqrt{2}} = 1$

d. $\sin(C) = \frac{\sqrt{2}}{2}$

e. $\cos(C) = \frac{\sqrt{2}}{2}$

f. $\tan(C) = \frac{\sqrt{2}}{\sqrt{2}} = 1$

g. $\sin(F) = \frac{1}{2}$

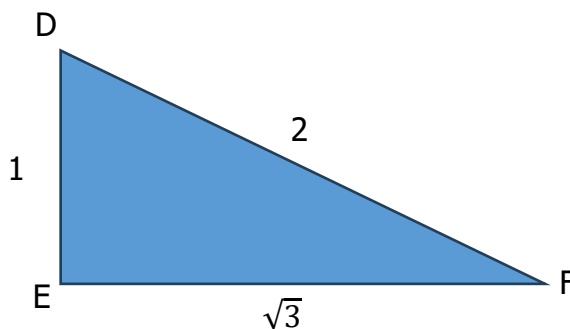
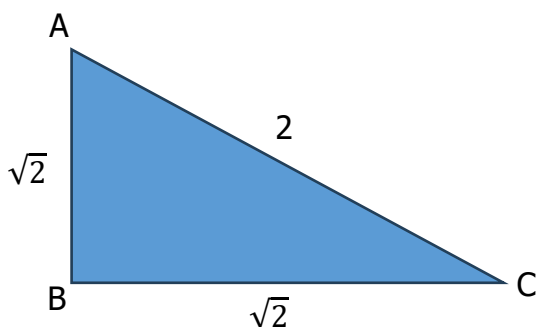
h. $\cos(F) = \frac{\sqrt{3}}{2}$

i. $\tan(F) = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

j. $\sin(D) = \frac{\sqrt{3}}{2}$

k. $\cos(D) = \frac{1}{2}$

l. $\tan(D) = \frac{\sqrt{3}}{1} = \sqrt{3}$



T2. Use the diagram(s) above to solve for each of the angles of the triangle (triangles may not be drawn to scale):

a. $m\angle A = \sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = 45^\circ$

b. $m\angle B = 90^\circ$

c. $m\angle C = 45^\circ$

d. $m\angle D = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = 60^\circ$

e. $m\angle E = 90^\circ$

k. $m\angle F = 30^\circ$

I

Interpreting Linear Equations

★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED

- I1.** The function below shows the cost of a hamburger with different numbers of toppings (t), $f(t) = 1.90 + 1.40t$. Use this equation to answer the questions below:

- a.** What is the y-intercept and what does it mean?

The y-intercept is 1.90, as it represents the total cost with 0 toppings.

- b.** What is the slope and what does it mean?

The slope is 1.40, as it represents the amount added to the cost per single topping.

- c.** If Jodi paid \$3.30 for a hamburger, how many toppings were on Jodi's Hamburger?

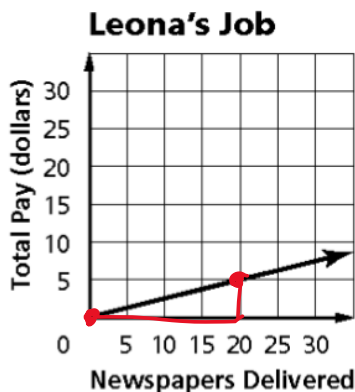
$$3.30 = 1.90 + 1.40t$$

$$1.40 = 1.40t$$

$$1 = t$$

- I2.** The graph below shows the number of newspapers delivered and the total pay for Leona's newspaper delivery job. Use the graph to answer the questions below:

- a.** What is the slope and what does it represent?



$$m = \frac{5}{20} = \frac{1}{4}$$

For every 4 newspapers delivered, it costs \$1.00.

- I3.** Dionne pays a fixed fee plus an hourly rate to rent a boat. The table below shows how much Dionne paid for the boat. Use the chart to answer the questions below:

- a.** What is Dionne's hourly rate to rent the boat?

Dionne's Boat Rental					
Hours Rented	1	2	3	4	5
Amount Paid	\$27	\$39	\$51	\$63	\$75

$$\frac{\text{Amount paid per every hour}}{\text{per every hour}} = \frac{39-27}{2-1} = \frac{12}{1} = 12 \text{ dollars per hour.}$$

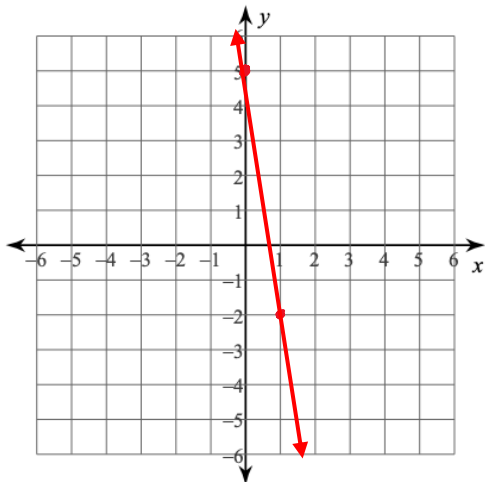
G

Graphing Linear Equations

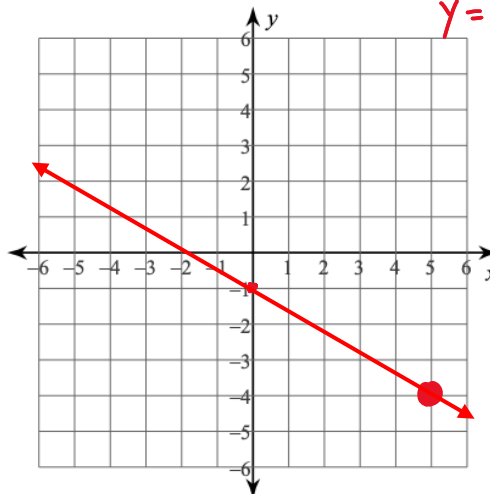
★ ★ Complete the entire page. ★ ★
CALCULATOR CAN BE USED

G1. Graph the following equations on the grid provided:

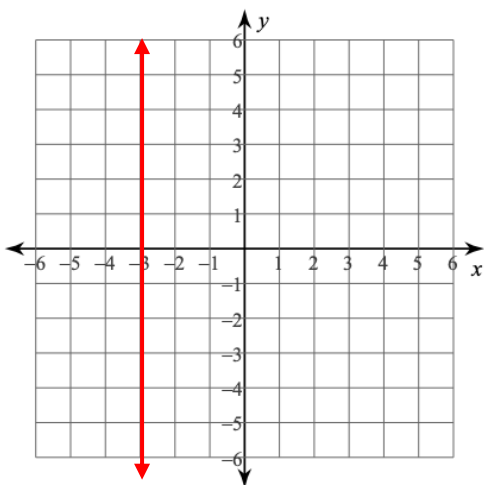
a. $7x + y = 5 \rightarrow y = -7x + 5$



b. $3x + 5y = -5 \rightarrow 5y = -3x - 5$
 $y = -\frac{3}{5}x - 1$



c. $x = -3$



d. $6x + 5y = 20 \rightarrow 5y = -6x + 20$
 $y = -\frac{6}{5}x + 4$

