

Foundations and Pre-Calculus Math 10



January 2022 Final Exam REVIEW

Name: Key *

<i>Learning Goal</i>	<i>Beginning</i>	<i>Developing</i>	<i>Proficient</i>	<i>Sophisticated</i>
1. I can explain types of income (gross and net pay)				
2. I can calculate income tax and deductions				
3. I can solve problems using the exponent laws				
4. I can multiply polynomial expressions				
5. I can factor polynomials				
6. I can use trigonometry to find missing sides and angles of right triangles				
7. I can communicate relationships among data (tables and graphs)				
8. I can use multiple equation formats for linear equations				
9. I can solve for systems of linear equations				
10. I can solve for arithmetic series and sequences				

Tips for Studying for Math:

1. Answer each question in this review booklet
2. Make a poster of all important concepts (we will start this in class)
3. Attend each lunch time tutorial your teacher holds (Math 10 is Tuesday and Thursday)
4. Make cue cards of vocab words and formulas to know
5. Look at the learning goals that are worth the most marks and MASTER those sections
6. Find a study group that BRINGS OUT THE BEST IN YOUR LEARNING
7. Teach your parents, relatives, siblings, or pets this information

GOOD LUCK ☺

Continually SELF ASSESS using this learning goal chart

Learning Goal #1: I can explain types of income (gross and net pay)

1. Complete the below identifying the type of pay for each scenario

Scenario	Type of Pay
Susan works as a seamstress and earns \$2.50 for each hem she sews	piecework
Jacob is a ski instructor and earns \$15.25 per hour	hourly
Sam is roofer and is paid \$8000.00 for each roof he installs	contract
John is a nurse and is paid \$62,000 per year	salary
Frank works in an orchard and is paid \$3.60 for each bucket of cherries he picks	piecework

2. Susie cleans office buildings after they are closed for the day, which means that she typically works week day nights. She also ends up often working a split shift. Calculate her hours worked for the week.

Day of the Week	1st Shift Time	2nd Shift Time	Hours Worked
Monday	6pm - 12am 6	5:15am - 8am 2.75	8.75
Tuesday	7pm - 10:30pm 3.5	3:30am - 6:15am 2.75	6.25
Wednesday	7:30pm - 9:00pm 1.5	11pm - 2am 3	4.5
Thursday	6:30pm - 12:15am 5.75		5.75
Friday	1:30am - 9:15am 7.75		7.75
TOTAL			33 hrs.

3. Andy works at Zia's. He earns a base salary of \$14.50/hr. On Saturday night he worked 8 hours while the restaurant was really busy. He sold \$4650.00 worth of food and beverages that evening. He earned an average of 15% tips. What was Andy's daily income for Saturday?

$$\begin{array}{r}
 14.50 \\
 \times 8 \\
 \hline
 116.00 \\
 \end{array}
 \qquad
 \begin{array}{r}
 4650 \\
 \times 0.15 \\
 \hline
 697.50 \\
 \end{array}
 \qquad
 \begin{array}{r}
 116.00 \\
 + 697.50 \\
 \hline
 813.50 \\
 \end{array}$$

4. Stella is offered two jobs for her first year out of high school, both here in BC, and both include lots of job satisfaction. Her main deciding factor is which one pays more. Outline a mathematical reasoning for which one she should choose for the next two years and why.

Job #1	Job #2
\$50,000 annually	\$4932.5 monthly
9% raise after one year	4.5% raise after one year

$$\begin{array}{r}
 y1 - \$50,000.00 \\
 y2 - \$54,500.00 \\
 \hline
 \$104,500.00 \\
 \end{array}
 \qquad
 \begin{array}{r}
 y1 = 4932.50 \times 12 = 59190.00 \\
 y2 = 5154.46 \times 12 = 61853.52 \\
 \hline
 \$121,043.52 \\
 \end{array}$$

Job 2 earns most \$

Learning Goal #2: I can calculate income tax and deductions

1. What are the four main taxable deductions on a BC resident's pay cheque? List the deduction title and what the deduction is goes towards?

Tax Deduction	What the money goes towards
Employment Insurance	- \$ if unemployed
Can. Pension Plan	- retirement
Prov. Tax	- education + health.
Fed Tax	- social assistance programs

2. What are three examples of non-taxable deductions?

- a. union dues
 b. private pension
 c. life insurance

3. Brendan has a weekly income of \$373.55 and is assigned claim code 0. Calculate his total weekly deductions and taxes.

Deduction	Amount
Federal Tax	49.70
Provincial Tax	11.70
CPP	15.16
EI	6.46
Total Deductions	<u>\$ 83.02</u>

*use deduction chart.

4. Kaleb is working with Summerland Ready Mix. He earns \$20.90/hour and works 20 hours a week. He is assigned claim code 3. Calculate his weekly net pay. Show all your steps.

Gross pay: $\$20.90 \times 20 = \$418/\text{wk.}$

pay after deductions

EI - 17.31
 CPP - 7.23
 Prov - 2.80
 Fed - 18.20

 \$ 45.54

Net pay: $418.00 - 45.54 = \$372.46$

Learning Goal #3: I can solve problems using the exponent laws

1. What is the prime factorization of 634?

$$\frac{2 \overline{)634}}{317} = 2 \cdot 317$$

2. The greatest common factor of 116 and 160 is

$$\begin{array}{r} 2 \overline{)116} \\ 2 \overline{)58} \\ \underline{29} \end{array}$$

$$\begin{array}{r} 2 \overline{)160} \\ 2 \overline{)80} \\ 2 \overline{)40} \\ 2 \overline{)20} \\ \underline{10} \end{array}$$

$$\begin{array}{r} 116 \overline{)2 \cdot 2 \cdot 2 \cdot 2 \cdot 29} \\ 160 \overline{)2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5} \end{array}$$

GCF = 4

3. The least common multiple of 54 and 145 is

$$\begin{array}{r} 2 \overline{)54} \\ 3 \overline{)27} \\ 3 \overline{)9} \\ \underline{3} \end{array} \quad \begin{array}{r} 5 \overline{)145} \\ \underline{29} \end{array}$$

$$\begin{array}{r} 54 \overline{)2 \cdot 3 \cdot 3 \cdot 3} \\ 145 \overline{)5 \cdot 29} \end{array}$$

LCM = 7830

4. Determine which of the following numbers are irrational numbers. Circle the correct answer(s).

- I. $\sqrt{36}$ ~~6~~ X
- II. $-\sqrt{32}$
- III. $\sqrt{\frac{1}{4}}$ $\frac{1}{2}$
- IV. $\sqrt{0.49}$ 0.7

irrational → II
rational → I, III, IV

↑
decimal that goes on and on with no repeat.

5. Simplify the radical: $5\sqrt{72}$

as much out of radical

$$\begin{array}{r} 2 \overline{)72} \\ 2 \overline{)36} \\ 2 \overline{)18} \\ 3 \overline{)9} \\ \underline{3} \end{array}$$

$$5 \cdot 2 \cdot 3 \sqrt{2} = 30\sqrt{2}$$

6. Evaluate: $27^{\frac{4}{3}}$

power → 4
root → 3
 $(\sqrt[3]{27})^4 = 3^4 = 81$

7. Simplify: $\sqrt[3]{-48}$

$$\begin{array}{r} 2 \overline{)48} \\ 2 \overline{)24} \\ 2 \overline{)12} \\ \underline{2 \cdot 2 \cdot 2} \end{array}$$

$-2\sqrt{6}$

8. Approximate the below square root using the benchmark method: $\sqrt{200}$

$$\begin{array}{r} 2 \overline{)200} \\ 2 \overline{)100} \\ 2 \overline{)50} \\ \underline{5 \cdot 25} \\ 5 \end{array}$$

$2\sqrt{25}$

9. Simplify the expression $\sqrt{\frac{48x^2y^5}{25z^4y}}$
**reduce*

$$\sqrt{\frac{48x^2y^4}{25z^4}} = \frac{4xy\sqrt{3}}{5z^2}$$

$$\frac{2\sqrt{48}}{2\sqrt{25}} = \frac{2\sqrt{12}}{2\sqrt{5}} = \frac{2\sqrt{6}}{2\sqrt{5}} = \frac{\sqrt{6}}{\sqrt{5}}$$

10. Evaluate: -4^2

**no brackets*

$$-16$$

14. Simplify: $(5x^6y^7)^2$

$$25x^{12}y^{14}$$

11. Simplify: $2^5 \times 2^6 \times 2^2$

addition of expo.
 2^{13}

15. Simplify: $\frac{x^{-8}}{x^{-2}}$

$$\frac{x^2}{x^6} = \frac{1}{x^4}$$

12. Rewrite $\frac{5^{-3}}{4^3}$ with positive exponents.

$$\frac{1}{5^3 \cdot 4^3}$$

16. Simplify: $(\frac{18x^5y}{2xy^4})^3$

$$\left(\frac{18x^4}{2y^3}\right)^3 = \left(\frac{9x^4}{y^3}\right)^3 = \frac{729x^{12}}{y^9}$$

11. Evaluate: $(-2)^{-3}$

$$\frac{1}{(-2)^3} = -\frac{1}{8}$$

17. Write $8^{\frac{3}{5}}$ in radical form.

$$\left(\sqrt[5]{8}\right)^3$$

12. Evaluate: $\left(-\frac{2}{3}\right)^{-3}$

$$\left(-\frac{3}{2}\right)^3 = -\frac{27}{8}$$

18. Evaluate: $27^{\frac{4}{3}}$

$$\left(\sqrt[3]{27}\right)^4 = 3^4 = 81$$

13. Evaluate: $\frac{(4^5 \times 4^{-2})^2}{4^4}$

$$\frac{(4^3)^2}{4^4} = \frac{4^6}{4^4} = 4^2$$

19. Determine the exact value of $\left(\frac{25}{36}\right)^{-\frac{3}{2}}$

$$\left(\frac{36}{25}\right)^{\frac{3}{2}} = \left(\sqrt{\frac{36}{25}}\right)^3 = \left(\frac{6}{5}\right)^3 = \frac{216}{125}$$

20. Write $(\sqrt{x^5})(\sqrt[3]{x^4})$ as a power.

$$\left(x^{\frac{5}{2}}\right)\left(x^{\frac{4}{3}}\right) = \left(x^{\frac{15}{6}}\right)\left(x^{\frac{8}{6}}\right) = x^{\frac{23}{6}}$$

21. Simply:

$$\left(\frac{(3m^2n^5)(9n^2)}{(2m^6)(4n^4)} \right)^{-\frac{2}{3}}$$

$$\left(\frac{27mn^7}{8m^6n^4} \right)^{-\frac{2}{3}} = \left(\frac{27n^3}{8m^5} \right)^{-\frac{2}{3}} = \left(\frac{8m^5}{27n^3} \right)^{\frac{2}{3}} = \left(\frac{2m^3\sqrt[3]{m^2}}{3n\sqrt[3]{27n^3}} \right)^2$$

$$= \frac{4m^3\sqrt[3]{m^2}}{9n^2}$$

22. $(2x - 4)^2 + 4(4x - 13)$

$$(2x-4)(2x-4) + 16x - 52$$

$$4x^2 - 8x - 8x + 16 + 16x - 52 = 4x^2 - 36$$

Learning Goal #4: I can multiply polynomial expressions

1. Simplify: $(5x + 12) - (2x + 4)$

switch signs in bracket

$$5x + 12 - 2x - 4 = 3x + 8$$

2. Simplify: $(6x^2 - 2yx) + (5yx^2 - 10xy^2) - (3x^2y^2 + 5y^2x^2 - 19xy)$

switch

$$6x^2 - 2xy + 5x^2y - 10xy^2 - 3x^2y^2 - 5x^2y^2 + 19xy$$

$$6x^2 + 17xy + 5x^2y - 10xy^2 - 8x^2y^2$$

3. Expand: $3p(3p - q)$

$$9p^2 - 3pq$$

4. Expand then simplify: $-10x - 4(10x - 3y)$

$$-10x - 40x + 12y = -50x + 12y$$

5. Expand: $(2x - 5)^2$

$$(2x-5)(2x-5) = 4x^2 - 10x - 10x + 25 = 4x^2 - 20x + 25$$

6. Simplify: $(4x - 1)(x + 5) + (3x - 12)(3x - 4)$

$$4x^2 + 20x - x - 5 + 9x^2 - 12x - 36x + 48 = 13x^2 - 29x + 43$$

7. Simplify: $(x^3 + 3x - 2)(x^2 + 1) - 5x$

$$x^5 + x^3 + 3x^3 + 3x - 2x^2 - 2 - 5x$$

8.

$$x^5 + 4x^3 - 2x^2 - 2x - 2$$

Use the following information to answer the next question.

A student attempts to expand $(a + 2)^3$.
His work is shown below.

$(a + 2)^3$	$= (a + 2)(a + 2)(a + 2)$	Line 1
	$= (a + 2)(a^2 + 4)$	Line 2
	$= a^3 + 2a^2 + 4a + 8$	Line 3

Where was the mistake made? What should they have done? Show the proper steps line by line.

$$(a+2)(a+2) \neq a^2 + 4$$

Should have used distributive property (FOIL)
 $(a+2)(a+2) = a^2 + 2a + 2a + 4 = a^2 + 4a + 4$

Learning Goal #5: I can factor polynomials

1. To completely factor $4x^5y^2 - 16x^4y^2 - 48x^3y^2$, what is the greatest common factor that will be taken out first?

$$4x^3y^2$$

2. When $12m^6n - 3m^4n^2 + 15m^2n^2$ is completely factored, one of the factors will be (circle one)

- a) $4m^4 - mn + 5n$ b) $3mn$ c) $4m^4 - m^2n + 5n$
 d) $3m^2n^2$ e) mn^2

$$3m^2n(4m^4 - m^2n + 5n)$$

3. Factor: $x^2 + 4x - 12$ Trinomial $a=1$

x	$+$
$-b = -2$	-4
$(b = 6)$	4

$$(x+6)(x-2)$$

4. Factor $9x^2 - 16$

$$(3x-4)(3x+4)$$

5. Which factor do the following trinomials have in common? (circle one)

$$2x^2 - x - 6$$

a) $x + 2$

b) $x + 3$

c) $x - 2$

d) $2x + 3$

e) $x - 3$

$$3x^2 - 11x + 10$$

$$3x^2 - 5x - 6x + 10$$

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

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

$$2x^2 - x - 6$$

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

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

6. When $2n^5 - 32n$ is factored completely, one of the factors will be (circle one)

a) $n^2 - 4$

b) $n^2 + 4$

c) $n - 4$

d) $n + 4$

e) $n - 16$

$$2n(n^4 - 16)$$

$$2n(n^2+4)(n^2-4)$$

$$2n(n^2+4)(n-2)(n+2)$$

Learning Goal #6: I can use trigonometry to find missing sides and angles of right triangles

1. Find the length of AC to the nearest tenth.

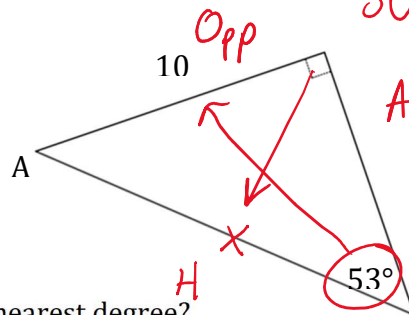
a) 6.0

b) 7.0

c) 8.0

d) 12.5

e) 16.6



SOH CAH TOA

$$\theta = 53^\circ$$

$$O = 10$$

$$H = x$$

$$\sin 53^\circ = \frac{10}{x}$$

$$0.7986 = \frac{10}{x}$$

$$x = \frac{10}{0.7986}$$

$$x = 12.52$$

2. If $a = 7$ and $b = 12$, what is the measure of $\angle C$ to the nearest degree?

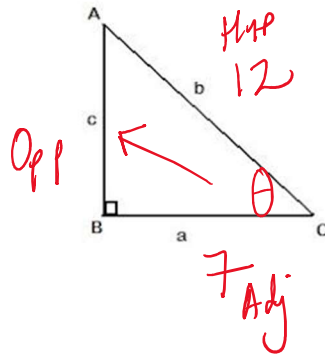
a) 15°

b) 34°

c) 36°

d) 54°

e) 56°



$$\cos \theta = \frac{7}{12}$$

$$\cos \theta = 0.58\bar{3}$$

$$\theta = \cos^{-1}(0.58\bar{3})$$

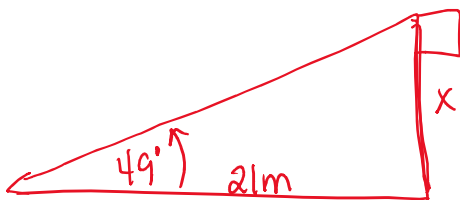
$$\theta = 54.314^\circ$$

$$\theta = x$$

$$H = 12$$

$$A = 7$$

3. The angle of elevation to the top of a flagpole is 49° . If the angle of elevation was measured from 21 m from the centre of the flagpole's base, what is its height to one decimal place?



$$\theta = 49^\circ$$

$$A = 21$$

$$O = x$$

$$\tan 49^\circ = \frac{x}{21}$$

$$1.15 = \frac{x}{21}$$

$$x = 24.16 \text{ m}$$

4. Coconut palm trees can reach heights up to 100 feet. Suppose you are lying on the beach at a distance of 60 feet from a 48-foot tall palm tree. What is the angle of elevation from your position to the top of the tree? Round your answer to the nearest tenth.



$$\theta = x$$

$$A = 60$$

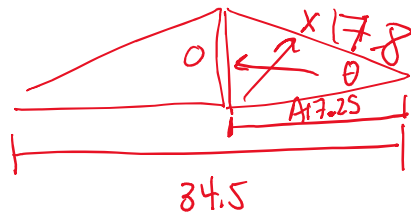
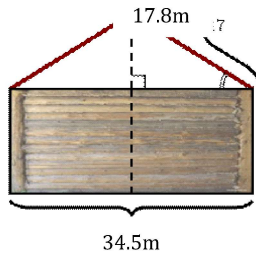
$$O = 48$$

$$\tan \theta = \frac{48}{60}$$

$$\theta = \tan^{-1}(0.8)$$

$$\theta = 38.66^\circ$$

5. Bob is building a wooden cabin. The entire cabin is 34.5 meters wide. He obtained a bunch of 17.8 meters long wooden beams for the roof of the cabin. Naturally, he wants to place the roof beams in such an angle that each pair of opposite beams would meet exactly in the middle. What is the angle of elevation of the roof beams?

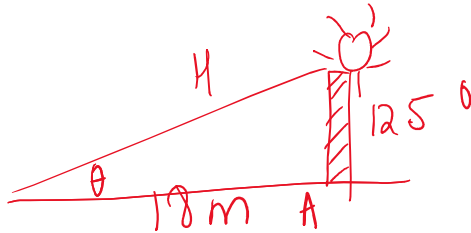


$$\cos \theta = \frac{17.25}{17.8}$$

$$\theta = \cos^{-1}(0.969)$$

$$\theta = 14.28^\circ$$

6. Find the angle of elevation of the sun when a 12.5 meter tall telephone pole casts an 18 meter long shadow.

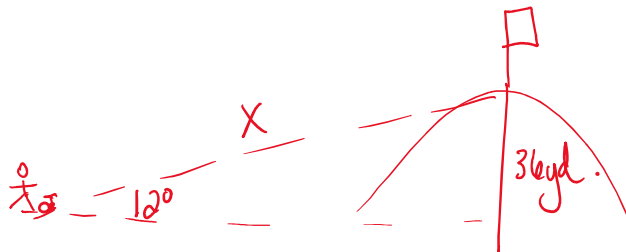


$$\tan \theta = \frac{12.5}{18}$$

$$\theta = \tan^{-1}(0.6944)$$

$$\theta = 34.78^\circ$$

7. A golfer is standing at the tee, looking up to the green on a hill. If the tee is 36 yards lower than the green and the angle of elevation from the tee to the hole is 12° , find the distance from the tee to the hole.



$$\theta = 12^\circ$$

$$O = 36$$

$$H = x$$

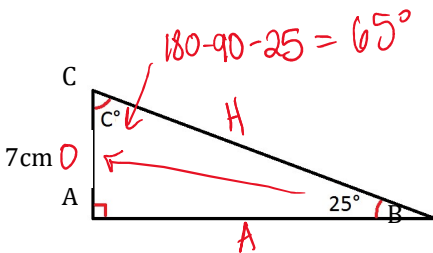
$$\sin 12^\circ = \frac{36}{x}$$

$$0.2079 = \frac{36}{x}$$

$$x = \frac{36}{0.2079}$$

$$x = 173.16 \text{ yds}$$

8. Solve $\triangle MNP$. Find each answer to one decimal place.



$$\sin 25^\circ = \frac{7}{x}$$

$$0.4226 = \frac{7}{x}$$

$$x = \frac{7}{0.4226}$$

$$x = 16.53$$

$$\angle C = 65^\circ$$

$$AB = 15.01 \text{ cm}$$

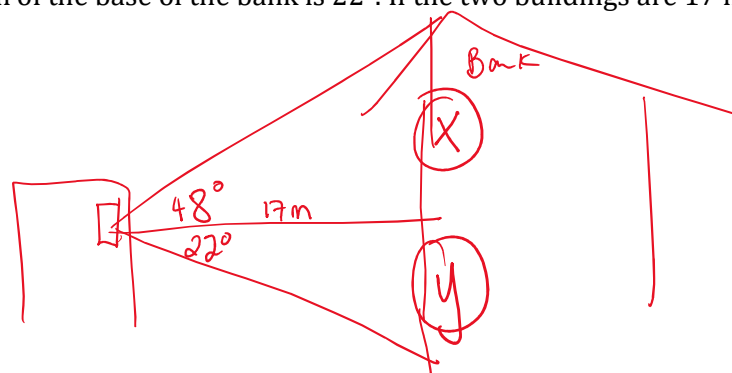
$$BC = 16.53 \text{ cm}$$

$$\tan 25^\circ = \frac{7}{x}$$

$$x = \frac{7}{0.4663}$$

$$x = 15.01$$

9. From a window in an apartment house, the angle of elevation of the top of a bank across the street is 48° while the angle of depression of the base of the bank is 22° . If the two buildings are 17 metres apart, find the height of the bank.



$$\tan 48^\circ = \frac{x}{17}$$

$$x = 18.88$$

$$\tan 22^\circ = \frac{y}{17}$$

$$y = 6.87$$

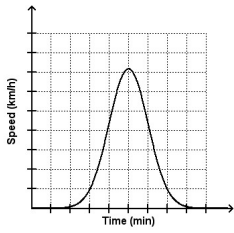
$$\text{total} = 18.88 + 6.87$$

$$= 25.75 \text{ m}$$

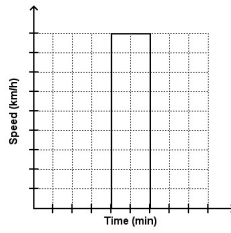
Learning Goal #7: I can communicate relationships among data (tables and graphs)

1. A person in a car drives away from a stop sign, cruises at a constant speed, and then slows down as she approaches another stop sign. Which graph best represents this situation?

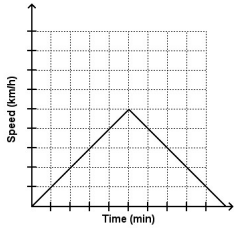
a.



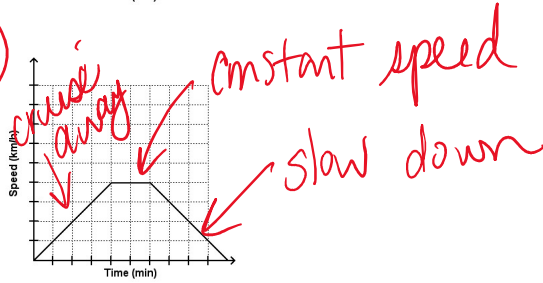
c.



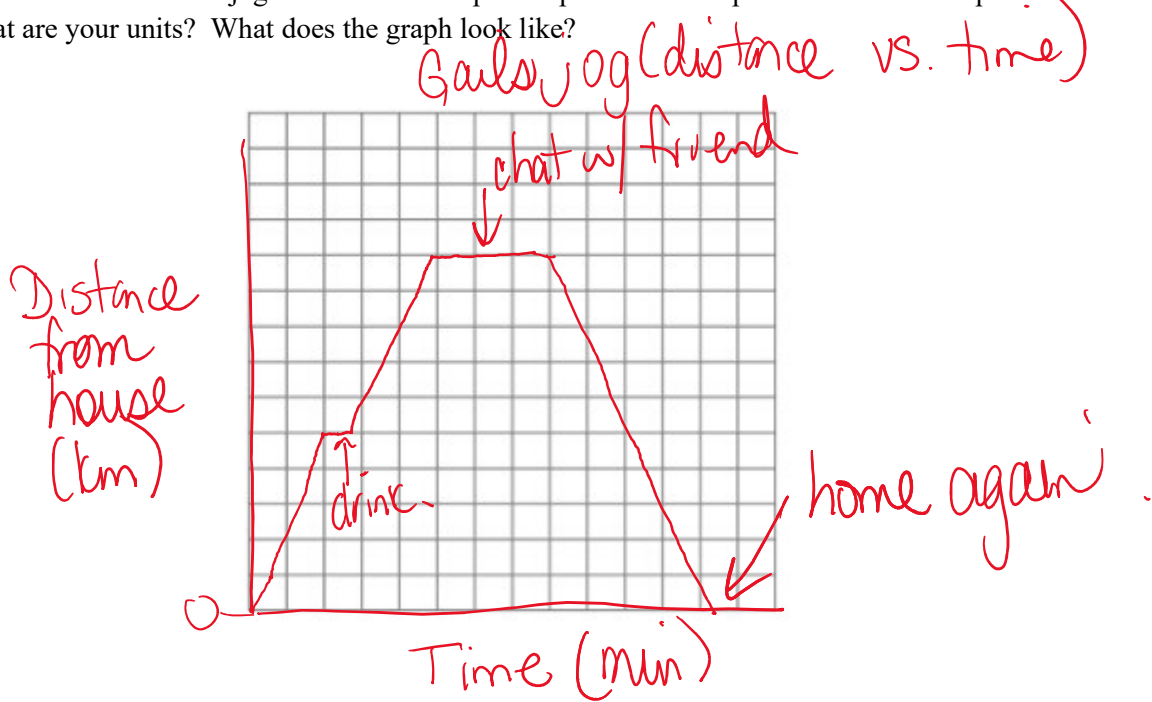
b.



d.



2. Gail leaves the house for her morning jog. She stops for a quick drink, then continues jogging before stopping again to chat with a friend. She then jogs back home. Graph this pattern in the space below. Make up the data to match the story. What are your units? What does the graph look like?



3. A helicopter is travelling toward its destination.

a) Identify the dependent and independent variables.

Dependent distance from destination

Independent time

Time (min)	Distance from Destination (mi.)
0	285
20	244
40	203
60	162
80	121

$m = -\frac{41}{20}$
consistently

b) Is this a linear relationship? How can you tell?

Slope is constant

$m = -\frac{41}{20}$

c) If the relation is linear, determine its rate of change.

$$m = -\frac{41}{20}$$

d) Assume the helicopter continues to travel at the same speed. How many more minutes will it take the helicopter to reach its destination? Give your answer to the **nearest minute**.

$$y = -\frac{41}{20}x + 285$$

$$y = 0$$

$$0 = -\frac{41}{20}x + 285$$

$$-285 = -\frac{41}{20}x$$

$$x = 139 \text{ min}$$

4. For the function $f(x) = -3x + 8$, determine:

a) $f(5)$

$$f(x) = -3(5) + 8$$

$$= -15 + 8$$

$$= -7$$

b) the value of x when $f(x) = 19$

$$19 = -3x + 8$$

$$-8 \quad -8$$

$$11 = -3x$$

$$\frac{11}{-3} = \frac{-3x}{-3}$$

$$x = -\frac{11}{3}$$

5. It cost \$15.00 to enter an amusement park and \$2.50 per ride.

a) Write an equation that relates the total cost, C , of going to the amusement park to the number of rides, n .

$$C(n) = 2.50n + 15$$

b) How much would someone spend at the park who goes on 9 rides?

$$C(n) = 2.50(9) + 15 = \$37.50$$

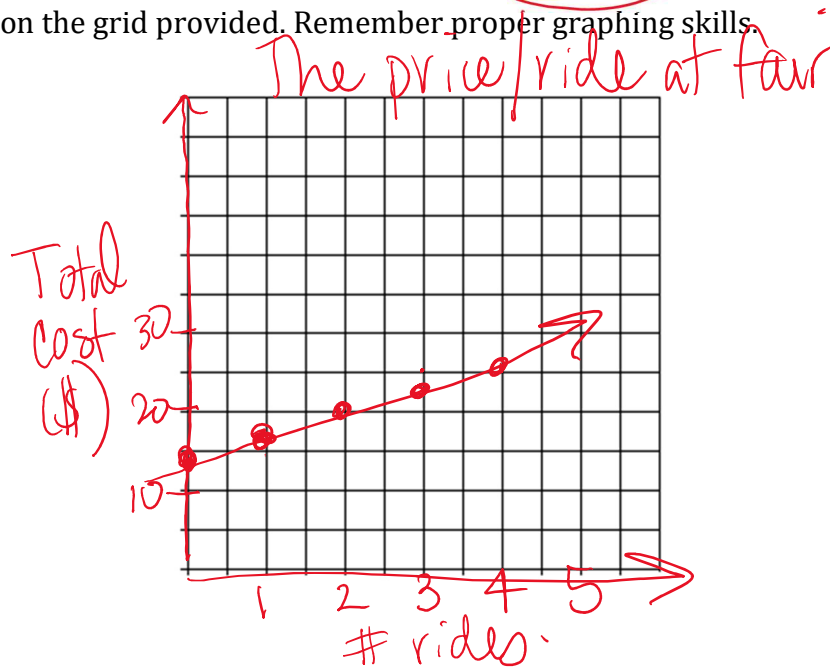
c) How many rides could someone go on without spending more than \$50?

$$50 = 2.50(n) + 15$$

$$n = 14$$

d) Graph the equation on the grid provided. Remember proper graphing skills.

n	$C(n)$
x	y
0	15
1	17.50
2	20
3	22.50
4	25



Learning Goal #8: I can solve for the slope of a linear equation

1. What is the slope of the line joining (8, 8) and (12, 6)?

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 8}{12 - 8} = \frac{-2}{4} = -\frac{1}{2}$$

2. The points (3, k) and (k, 7) lie on a line having a slope of 4. What is the value of k?

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad (k-3)4 = \frac{7-k}{k-3} \quad (k-3)$$

$$4k - 12 = 7 - k$$

$$5k = 19 \quad k = \frac{19}{5} = 3\frac{4}{5}$$

3. What is the slope of any line perpendicular to the line $5x - 6y = 30$?

$$y = \frac{-5x + 30}{6}$$

$$y = \frac{-5x + 5}{6} \quad m_1 = \frac{-5}{6}$$

$$m_{\perp} = \frac{6}{5}$$

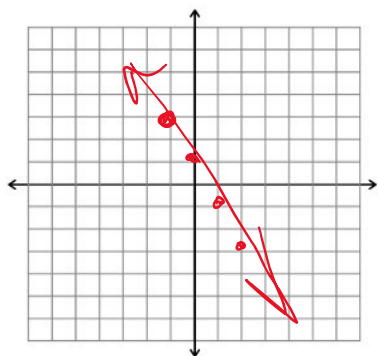
4. The lines $2x - 3y = -15$ and $3x + ky = 12$ have the same y-intercept. What is the value of k?

$$\frac{-3y = -2x - 15}{-3} \quad y = \frac{2x + 5}{3}$$

$$ky = \frac{-3x + 12}{k} \quad y = \frac{-3x}{k} + \frac{12}{k}$$

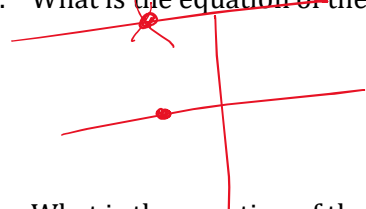
$$\frac{5}{3} = \frac{12}{k} \quad k = \frac{12}{5}$$

5. Graph a line with a slope of -2 passing through the point (-1, 3).



$$y - 3 = -2(x + 1)$$

6. What is the equation of the horizontal line that contains the point (-3, 8)?



$$y = 8$$

7. What is the equation of the line parallel to the line $2x - 5y = 10$ and passing through the point (5, -2)? Show in both slope intercept and general form.

$$2x - 5y = 10$$

$$\frac{-5y = -2x + 10}{-5} \quad m_1 = \frac{2}{5} \quad m_{\parallel} = \frac{2}{5}$$

$$\text{SP} \rightarrow y + 2 = \frac{2}{5}(x - 5)$$

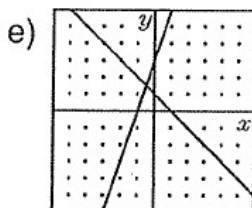
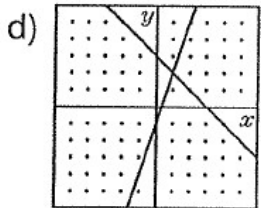
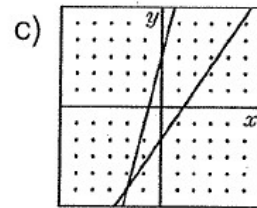
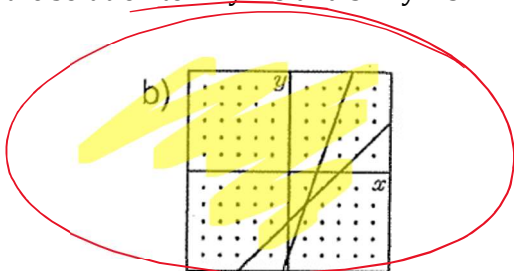
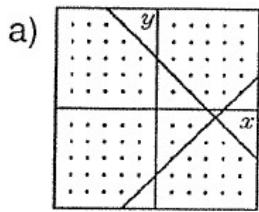
$$\text{Gen} \rightarrow 2x - 5y - 20 = 0$$

8. Which graph illustrates the solution to $x - y = 3$ and $3x - y = 5$?

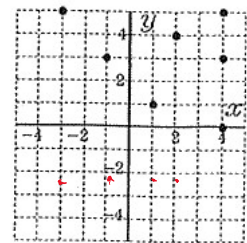
$y = x - 3$

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

B



9. State the domain of the function.



a) $\{-3, -1, 1, 2, 4\}$

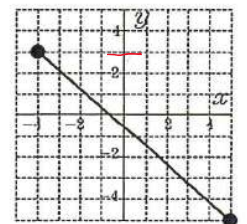
b) $\{-3, -1, 1, 2, 3\}$

c) $\{0, 1, 3, 4, 5\}$

d) $\{1, 4\}$

e) $\{0, 1, 4\}$

10. State the range of the function.



a) $y \geq -4$

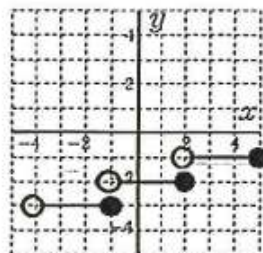
b) $-4 \leq y \leq 5$

c) $-5 \leq y \leq 3$

d) $y \leq 3$

e) $\{-5, -4, -3, -2, -1, 0, 1, 2, 3\}$

11. What is the range of the function shown?



a) $\{-1, -2, -3\}$

b) $-4 \leq x \leq 5$

c) $\{-4, -1, 2, 5\}$

d) $-3 \leq y \leq -1$

e) $-4 \leq x < 5$

Learning Goal #9: I can solve for systems of linear equations

1. For which of the given systems is $(-1, 0)$ a solution?

a) $2x + 3y = -2$
 $-3x + y = -3$

b) $5x - 3y = 5$
 $x - y = -1$

c) $-x - y = 1$
 $5x + 5y = 0$

d) $-5x + 5y = 5$
 $x - y = -1$

e) $11x - 4y = -11$
 $22x + y = 22$

substitute to verify.

D

2. Solve:

$$\begin{cases} 3x - y = 7 \\ x + 3y = 9 \end{cases}$$

$$x = 9 - 3y$$

$$\begin{aligned} 3(9 - 3y) - y &= 7 \\ 27 - 9y - y &= 7 \\ 27 - 10y &= 7 \\ -10y &= -20 \\ y &= 2 \end{aligned}$$

$$\begin{aligned} x + 6 &= 9 \\ x &= 3 \end{aligned}$$

$(3, 2)$

3. At Septemberfest, in Berlin, the City Council charged \$3 for an adult and \$2 for a child. If 365 tickets were sold and the total receipts were \$925, which pair of equations could determine the number of each ticket sold

let $c = \#$ child tickets (170)
 $a = \#$ adult tickets (195)

$$\begin{cases} 3a + 2c = 925 \\ a + c = 365 \end{cases}$$

$$\begin{aligned} 3(365 - a) + 2c &= 925 \\ 1095 - 3a + 2c &= 925 \\ -3a + 2c &= -170 \\ 3a - 2c &= 170 \end{aligned}$$

$c = 170$
 $a = 195$

4. Solve the following linear system using either substitution or elimination.

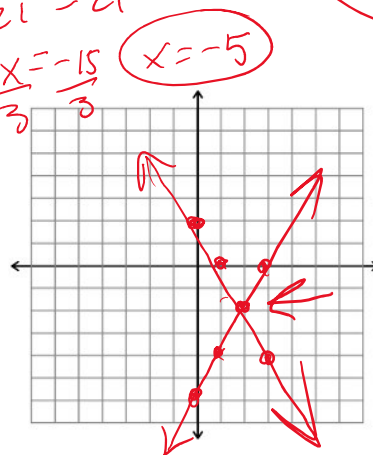
$$\begin{aligned} 3(x + 4y) &= 7 \\ 3x + 12y &= 21 \\ - (3x + 7y) &= 6 \\ \hline 5y &= 15 \\ y &= 3 \end{aligned}$$

$$\begin{aligned} 3x + 7(3) &= 6 \\ 3x + 21 &= 6 \\ -21 &= -21 \\ \hline 3x &= -15 \\ x &= -5 \end{aligned}$$

$(5, 3)$

5. Graph the below systems of equations.

$$\begin{cases} y = -2x + 2 \\ y + 6 = 2x \\ y = 2x - 6 \end{cases}$$



$(2, -2)$

6. A sack of wheat costs \$10.75 and a sack of oats costs \$12.75. If the total cost was \$778.75 and 65 sacks were ordered, how many sacks of each grain were purchased?

let: $w = \#$ sacks of wheat
 $o = \#$ sacks of oats

$$\begin{cases} 10.75w + 12.75o = 778.75 \\ w + o = 65 \end{cases}$$

wheat - 48
oats - 20

Learning Goal #10: I can solve arithmetic sequences and series

1. Fill in the following values for the arithmetic sequence: -8, -5, -2, 1, 4, 7, 10

$$d = 3 \quad n = 7 \quad t_1 = -8 \quad t_n = -8 + 3(n-1)$$

2. Determine the next three terms of each arithmetic sequence:

- (a) 25, 21, 17, 13, 9, 5
(b) 1.9, 2.6, 3.3, 4, 4.7, 5.4

3. Determine the 40th term in an arithmetic sequence with a first term of 12 and a difference of -4 .

$$a_{40} = 12 - 4(40 - 1)$$

$$= 12 - 4(39)$$

~~$$= 12 - 156$$~~

$$a_{40} = -144$$

4. Garrett's rich uncle decides to deposit \$1000 into the bank when he is born and continues depositing \$100 each birthday until the last deposit on Garrett's 21st birthday. How much will be in the account after the last deposit? (not counting any interest...)

$$\$1000, 1100, 1200, \dots, \textcircled{21}$$

$$n_1, n_2, n_3, \dots, n_{22}$$

$$a_{22} = 1000 + 100(22 - 1)$$

$$a_{22} = \$3100$$

5. In a supermarket, soft drink boxes are stacked in a display arranged in eight layers. The number of boxes in each layer form an arithmetic sequence. There are 48 boxes in the bottom layer and 20 boxes in the top layer. How many boxes are in the display?

$$n = 8 \quad 20 = a_{20}$$

$$48 = a_1$$

$$S_n = \frac{8}{2}(48 + 20)$$

$$= 4(68)$$

$$= 272$$

6. Find the sum of the multiples of 5 between 99 and 999.

$$100, 105, 110, 115, \dots, 995$$

$$a_1, a_n$$

$$995 = 100 + 5(n - 1)$$

$$995 = 100 + 5n - 5$$

$$900 = 5n$$

$$n = 180$$

$$S_{180} = \frac{180}{2}(100 + 995)$$

$$= \$98550$$

$$3, 8, 13$$

7. Determine the first three terms of the arithmetic series if $t_1 = 3$, $S_n = 648$ and $t_n = 78$.

$$648 = \frac{n}{2}(3 + 78) \quad (2) \quad 648 = \frac{81n}{2} \quad (2)$$

$$648 = \frac{n}{2}(81)$$

$$\frac{1296}{81} = \frac{81n}{81}$$

$$n = 16$$

$$a_n = a_1 + d(n - 1)$$

$$78 = 3 + d(15)$$

$$-3 \quad -3$$

$$\frac{75}{15} = \frac{15d}{15} \quad d = 5$$

8. Madison's family has been renting a house for the past 7 years (started in January). During the first year of renting, they paid \$800 a month, and each year thereafter their rent was increased by \$100 (for January of each year). Find the total amount they have paid over the last 7 years.

$$\$9600, 10800, 12000$$

$$a_n = 9600 + 1200(n)$$

$$a_n = 16800$$

$$S_n = \frac{7}{2}(9600 + 16800)$$

$$S_n = 92400$$

$$n = 7$$

$$d = 1200$$

$$a_1 = 9600$$