How well do you know **Arithmetic II** (MTH 020)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this, would you be able to solve most of these problems?

*If you answered **YES** to at least two of the above questions, you should consider taking the next level math course.*

***MTH-60** (STEM)*
***MTH-050** (TECH)*
***MTH-098** (STATS)*

1. Simplify positive and negative expressions with exponents and parenthesis:

a. $-5-(-11)$ **b.** $(-2)^3+(-3)(2)$

2. Simplify fraction, proportion and percent problems:

a. $\frac{2}{3}\div\frac{6}{7}$

b. $2\frac{1}{4}+1\frac{2}{3}$

c. $\left(\frac{2}{3}\right)^2-\left(\frac{4}{3}\right)\left(\frac{1}{3}\right)$

d. How many pieces of rope that are $\frac{3}{4}$ feet long can be cut from a piece of rope that is $6\frac{3}{4}$ feet long?

e. Solve for "*x*": $\frac{3}{4}=\frac{9}{x}$

f. What is 40% of 380?

g. What percent of 80 is 72?

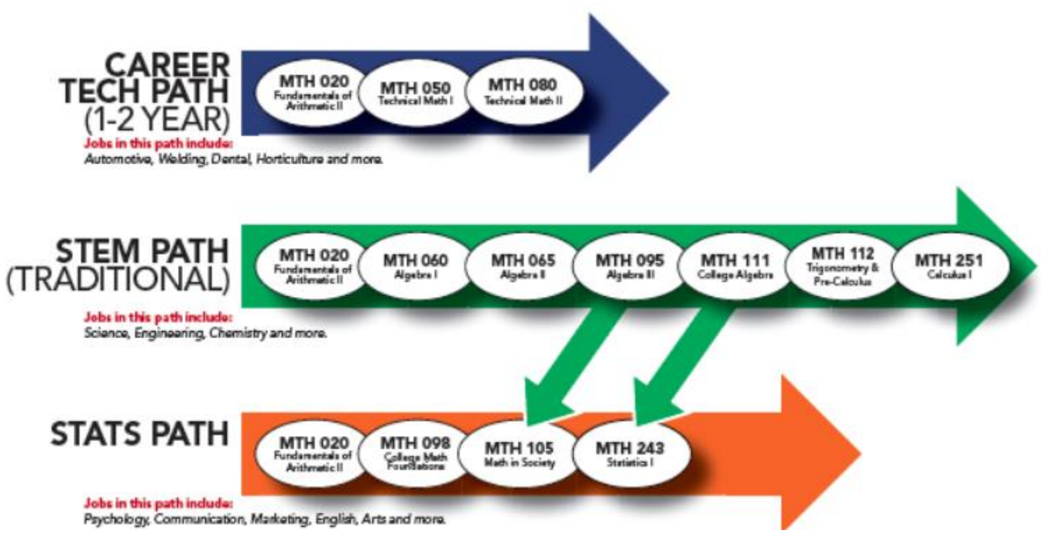
3. Solve basic geometry problems:

a. Find the circumference and area of a circle with radius 8 cm.

b. Find the area of a triangle with height=6 in and base = 12 in.

Want to find out which math path is right for your academic and career goals? Contact a CCC academic advisor at 503-594-3475 for help with choosing or switching your math path.

Transferring to a university? Choose the green or orange path.



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Answer Key

1a. 6

1b. –14

2a. $\frac{7}{9}$

2b. $3\frac{11}{12}$

2c. 0

2d. 9

2e. 12

2f. 152

2h. 90%

3a. C=50.3 cm

3a. A=201 cm^2

3b.36 in^2

How well do you know **Technical Math I** (MTH 050)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

*If you answered **YES** to at least two of the above questions, you should consider taking the next level math course.*

MTH-65 ***(STEM)***
MTH-080 ***(TECH)***
MTH-098 ***(STATS)***

1. Complete each exercise:

a. 0.825 is 12% of what number? **b**. 16 is what percent of 56?

2. The voltage E (in volts V) in an electric circuit is given by the product of the resistance R and the current I. $E = I \cdot R$

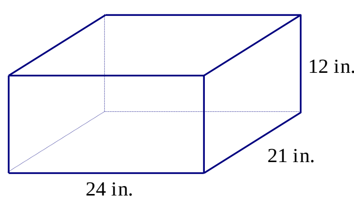
Find the voltage in a circuit if the resistance is $R = 850\,\Omega$, and the current is $I = 3.6\ \mu\text{A}$.

3. Convert, as indicated
a. 3 kg to mg
b. 15.7 cm to mm
c. 12ºC to ºF

4. On a stretch of I-5, in Washington, a driver may legally travel at 70 mph. How fast is this, in fps?

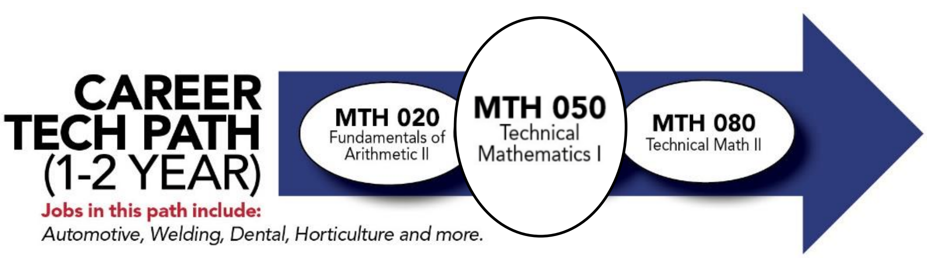
5. The torque of an engine is computed by multiplying the length of the arm on the crankshaft and the force applied by the piston's push rod. If the length of the crankshaft is 2.250 in. ± 0.025 in. and the force applied by the piston push rod is 3.75 lb ± 1.5 lb, calculate the minimum and maximum torque generated.

6. Find the **(a)** lateral surface area (**LSA**), **(b)** total surface area (**TSA**), and **(c)** volume of each figure



7. A set of doors are manufactured. Their mean width is 36.0 in. with a standard deviation of 0.11 in.
(a) Find the interval of door widths that contain 95% of the doors.

(b) If 500 doors are manufactured, how many are wider than the interval given in **(a)**?



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Answer Key

1a. 6.875

1b. 28.6%

2. 3,060 V

3a. 3,000,000 mg

3b. 157 mm

3c. 53.6^{o} F

4. 102.67 fps

5. Min: 5 in.-lb; Max: 11.9 in.-lb

6. a. 1,080sq in; **b.** 2,088 sq in; **c.** 6,048 cubic in

7. a. 35.78 in. to 36.22 in. **b.** 12.5 (12 or 13) doors are too wide

How well do you know **Algebra I** (MTH 060)?

Instructions: Read all instructions carefully; show all work; simplify all expressions. Include units, where appropriate.

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

*If you answered **YES** to at least two above questions, you should consider taking the next level math course.*

MTH-065 *(STEM)*
MTH-080 *(TECH)*
MTH-098 *(STATS)*

1. Evaluate each expression.

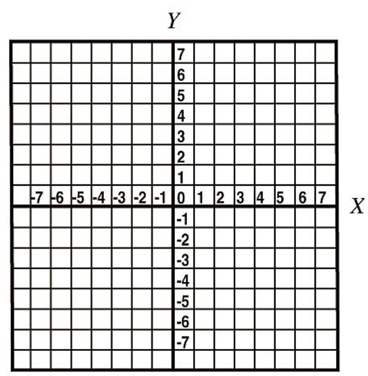
a. $4-2(3+7)$ **b.** $-(3+2\cdot 5)^2$

2. Solve each equation.

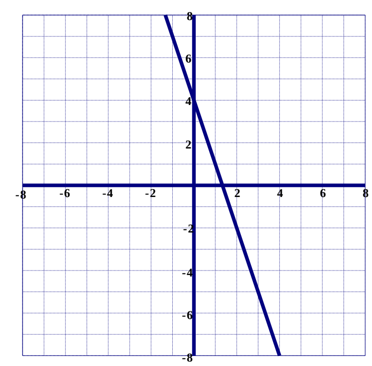
a. $2x+6=5$ **b.** $3(x-5)+1=x+4$

3. Graph the equation.

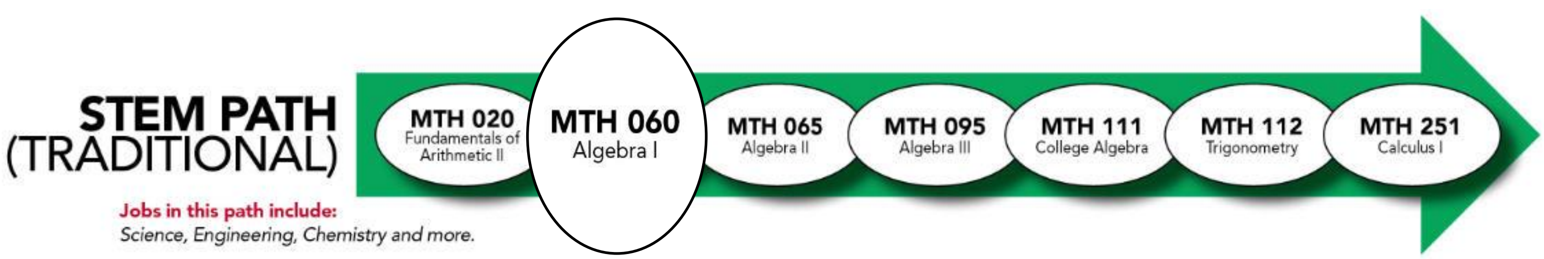
$y=2x-5$



4. Give the equation of the line shown (in **slope-intercept** form).



5. Find the equation of the line (in **slope-intercept** form) passing through each pair of points. **a.** $(-2,5)$ and $(0,2)$



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Answer Key

1. Evaluate each expression.

a. $4-2(3+7)=-16$

c. $-(3+2\cdot 5)^2=-169$

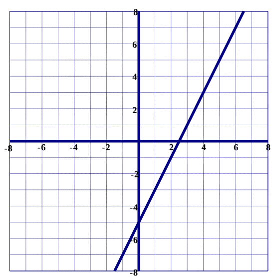
2. Solve each equation.

a. $2x+6=5$ **b.** $3(x-5)+1=x+4$

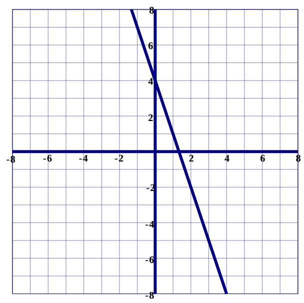
$x=-\frac{1}{2}$ $x=9$

3. Graph each equation.

$y=2x-5$



4. Give the equation of the line shown (in **slope-intercept** form).



$y=-3x+4$

5. Find the equation of the line (in **slope-intercept** form) passing through each pair of points.

a. $(-2,5)$ and $(0,2)$

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

How well do you know **Algebra II** (MTH 065)?

Instructions: Be sure to simplify all expressions. Include units, where appropriate.

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

*If you answered **YES** to at least two of the above questions, you should consider taking the next level math course.*

***MTH-095** (STEM)*
***MTH-080** (TECH)*
***MTH-098** (STATS)*

1. Exponents: Simplify…Assume that all variables represent positive real numbers. Write answers in simplest form (all exponents should be positive and no variable should appear more than once).

$$\frac{\left(5r^{-4}\right)\left(3r^{2}\right)^{2}\left(b^{2}\right)^{0}}{r^{-10}}$$

2. Polynomials: Report your result as a simplified polynomial in descending order.

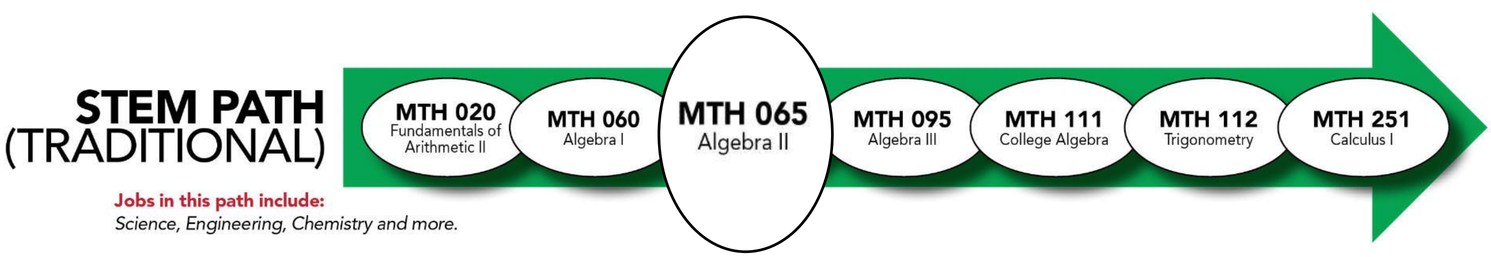
a) Subtract $-7x^4+6+5x^8$ from $2x^4+6-3x^8+10x$.

b) Multiply $4x\left(x-2y\right)^2$.

3. Completely factor:
$3b^3-15b^2-42b$

4. Solve each system of equations algebraically. If a unique solution does not exist, state whether the system is dependent or inconsistent.

$$3x+4y=21$$
$$2x-2y=7$$



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Answer Key:

1. $45r^{10}$

2. a) $-8x^8+9x^4+10x$
b) $4x^3-16x^2y+16xy^2$

3. $3b(b-7)(b+2)$

4. $\left\{\left(5,\frac{3}{2}\right)\right\}$

How well do you know **Technical Math II** (MTH 080)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

*If you answered **YES** to at least two of the above questions, you should consider taking the next level math course.*

Check the math requirements for your selected program or goal.

***MTH-065/095** (STEM)*
***MTH-098** (STATS)*

1. Simplify the expression.

$$4x^2 + 8x^2 + 2x - 1 - 5x$$

2. Solve the equation.

$$9x - 2 = 8x + 5$$

3. A boat travels 36 mi downstream in 2 hr. Returning upstream, the boat takes 3 hr. Find the rate of the boat in still water and the rate of the current.

4. Solve the proportion.

$$\frac{x}{6} = \frac{15}{2}$$

5. The scale on one map is $0.4\text{ in.} = 10\text{ mi.}$ A second map's scale is $\frac{1}{2}\text{ in.} = 5\text{ mi.}$

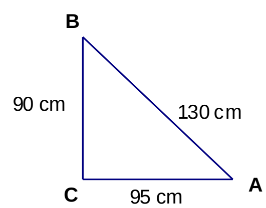
A rectangular feature on the first map measures 0.2 in. by 0.3 in.

What would its dimensions be on the second map?

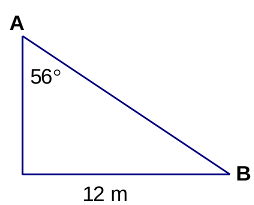
6. Consider the right triangle shown.

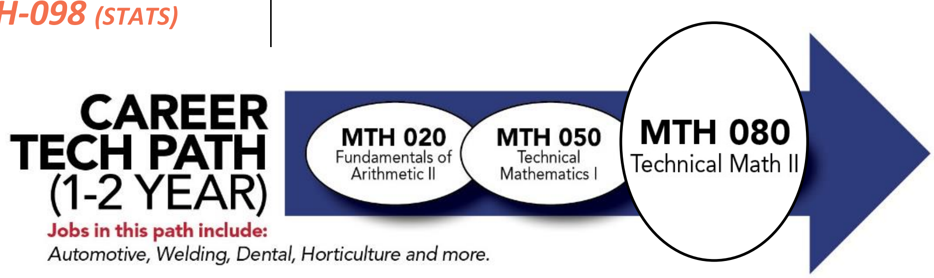
Evaluate (write your answers as fractions).
(a). $\sin \mathbf{A}$

Evaluate, to the nearest tenth degree.
(b). $m\angle \mathbf{A}$



7. Solve the right triangle (one decimal place).





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Answer Key

1. $12x^2 - 3x - 1$;

2. $x = 7$;

3. 15 mph (speed in still water);
3 mph (current)

4. X = 45

5. 0.5 in. by 0.75 in.

6. **(a)** $\frac{9}{13}$; **(b)** 43.8°

7. $b = 8.1$ m, $c = 14.5$ m, $B = 34°$

How well do you know **Algebra III** (MTH 095)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

*If you answered **YES** to at least two of the above questions, you should consider taking the next level math course.*

MTH-111 (STEM)
MTH-105 (STATS)

1. Solve different types of equations algebraically:

a. Quadratic: $2x^2 = x+3$

b. Rational: $\frac{3}{2} + \frac{2}{2x-4} = \frac{1}{x-2}$

c. Exponential: $9 = 3^{x+8}$

d. Logarithmic: $\log_4(2x+5) = 2$

2. Simplify different types of expressions:

a. Rational: $\frac{x^2-4}{x+2} \cdot \frac{3x-18}{x^2-7x+6}$

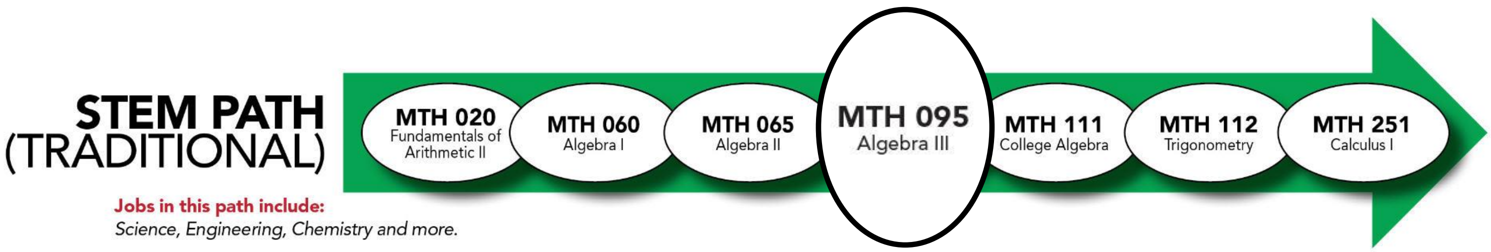
b. Logarithmic: $3\log(x) + 5\log(y) - \frac{1}{2}\log(z)$

c. Radical: $(80x^3y^6)^{1/3}$

3. Graph different types of functions:

a. Quadratic: $f(x) = -x^2+6x-11$ (find vertex, intercepts, and sketch a graph)

b. Rational: $f(x) = \frac{2x-6}{x+1}$ (Find the intercepts, asymptotes, and sketch a graph)



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1a. $\left\{\frac{3}{2},-1\right\}$

1b. $x=2$ is an extraneous solution

1c. $x=-6$

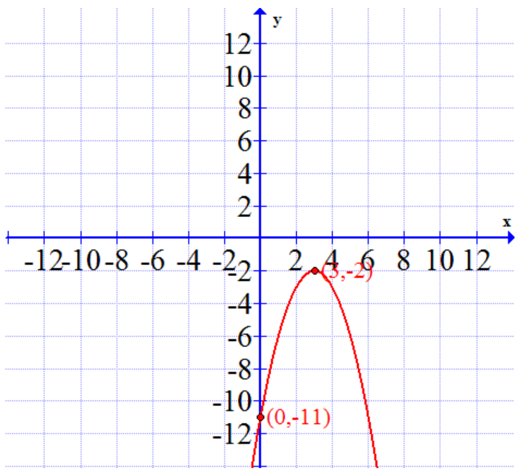
1d. $x=\frac{11}{2}$

2a. $\frac{3x-6}{x-1}$

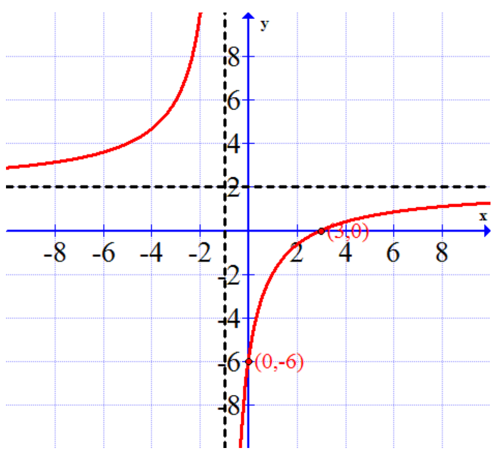
2b. $\log\left(\frac{x^3y^5}{\sqrt{z}}\right)$

2c. $2\sqrt[3]{10}xy^2$

3a.



3b.



Is College Math Foundations (MTH 98) right for me?

Do you feel confident working with percentages, proportions, and ratios?

Do you have some previous math experience working with probability and statistics?

Do you feel comfortable with these example problems?

*If you answered **YES** to the above questions, you should consider **MTH-105**.*

**Check with academic advising to verify Stats Pathway courses meet the math requirements for your program.*

Benefits of MTH-098:

- Provides a supportive atmosphere where students work together in small groups to understand math concepts
- Understand important topics and trends that involve numbers in our society
- Build confidence to solve realistic problems and improve critical-thinking abilities, number sense, and estimation skills

Understanding and interpreting numbers and measurements…

1. Describe how far it is from Portland, Oregon to New York, New York What are two different ways you can explain this distance? How would you help someone understand how far away this is?

2. When you compare the costs of grocery items, how do you decide which is the better deal? How would you help someone make this decision? (What is a "unit cost"? How does it help us compare two things?)

3. Do you think the percent of people vaccinated against measles in the United States and Canada is similar or different? Why? What information would we need in order to calculate and compare these numbers?

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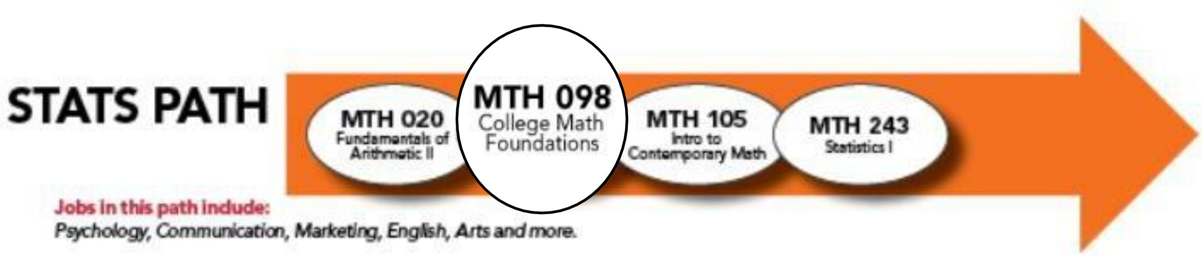


Is Math in Society (MTH 105) right for me?

Do you feel confident understanding data from news articles and popular media?

Do you have some previous math experience working with probability and statistics?

Do you feel comfortable writing about these questions?

*If you answered **YES** to the above questions, you should consider **MTH-243**.*

**Check with academic advising to verify Stats Pathway courses meet the math requirements for your program.*

1. Understanding and interpreting information in graphs…

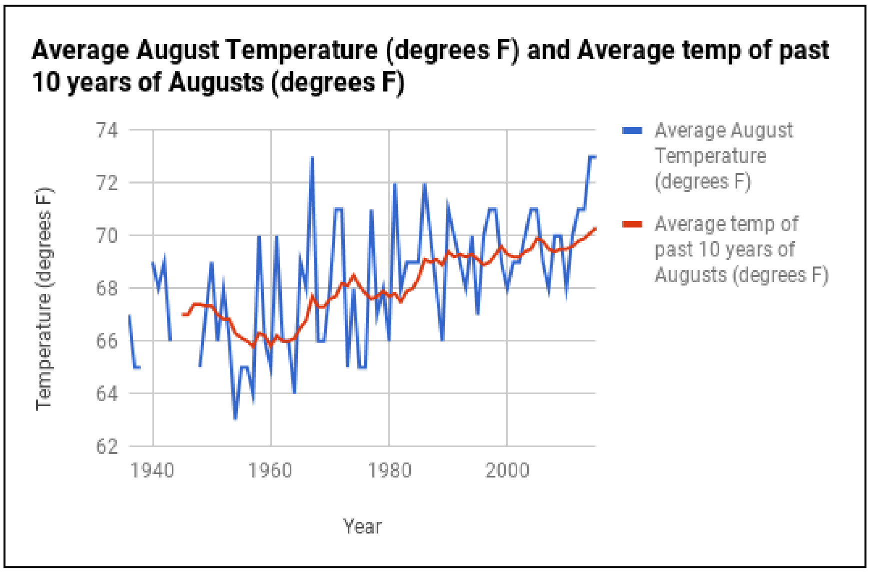
Answer the following questions to “tell the story” of this graph:

a. What is being shown in this graph?

b. What is the relationship between the red and blue lines? How much does each data set vary? Why do you think they vary differently?

c. What does average mean here? Is it being used in multiple ways?

d. What could we use this graph for?



Graph created by Kelly Mercer using Data Source: “Weather History for KPDX - August, 2016.” *Weather Underground*, ww.wunderground.com/history/airport/KPDX/. Web. 19 April 2017.

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2. Understanding and interpreting information with tables…

Consider the following questions:

a. What is being shown in these tables? How do the tables relate to each other?

b. What could we use this table for?

c. Estimate this person's car budget to show how much they should budget each month.

	Amount	Frequency
Car Payment	$297	Once per month
AAA membership	$109	Once per year
Insurance	$288	Once every six months
Registration	$132	Once every 2 years

Gas and Maintenance

Fuel Economy	22 miles per gallon
Miles driven per week	242 miles
Cost of gas	$4.40 per gallon

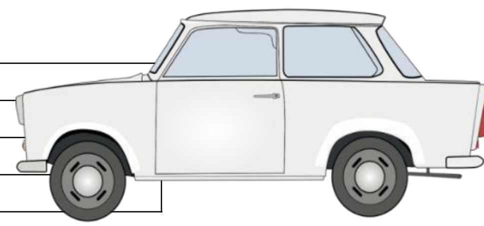


Figure 1 "Trabant" by molnar is in the Public Domain, CC0

How well do you know **College Algebra** (MTH 111)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

(See next page for additional MTH-111 review problems.)

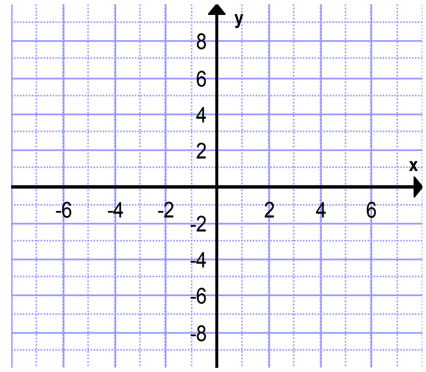
1. Consider the function below:

$$f(x)=\begin{cases} x^2-8 & \text{if } -4\le x\le 2 \\ -2x+8 & \text{if } \ 2<x<6 \end{cases}$$

Sketch a graph of f on the grid provided.

Evaluate $f(2)$

Find all values where $f(x)=-4$

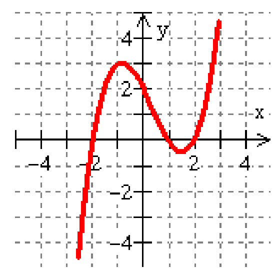


2. Algebraically solve the following equations for real or complex solutions. Be sure to simplify all answers and check for extraneous solutions when appropriate.

a. $3x^{\frac{3}{2}}-11=13$ b. $\sqrt{x-4}+x=6$ c. $\dfrac{3-2x}{x+2}=12$

3. Find the polynomial function with the given graph. Leave your answer in factored form.

Degree 3 (you'll have to find the leading coefficient)



4. Consider the rational function, $g(x)=\dfrac{5(x+4)(x-2)}{2(x+3)(x-5)}$

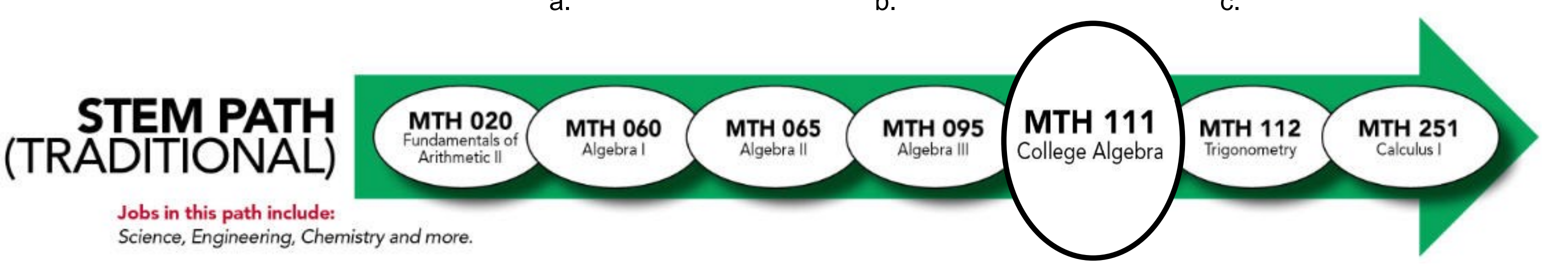
Give the equation(s) of any vertical asymptote(s).

5. Answer the following about functions f and g represented by the tables below.

x	-2	-1	0	1	2
$f(x)$	1	0	2	-2	3

x	-2	-1	0	1	2
$g(x)$	2	3	-2	-1	0

a. $g(-2)$ b. $(f+g)(-2)$ c. $(f\circ g)(-2)$



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How well do you know **College Algebra** (MTH 111)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

If you answered ***YES*** *to at least three of the above questions, you should consider taking the next level math course.*

MTH-112 ***(STEM)***

MTH-243 ***(STATS)***

6. Solve the following equations. Give exact values when possible; otherwise round to four decimal places.

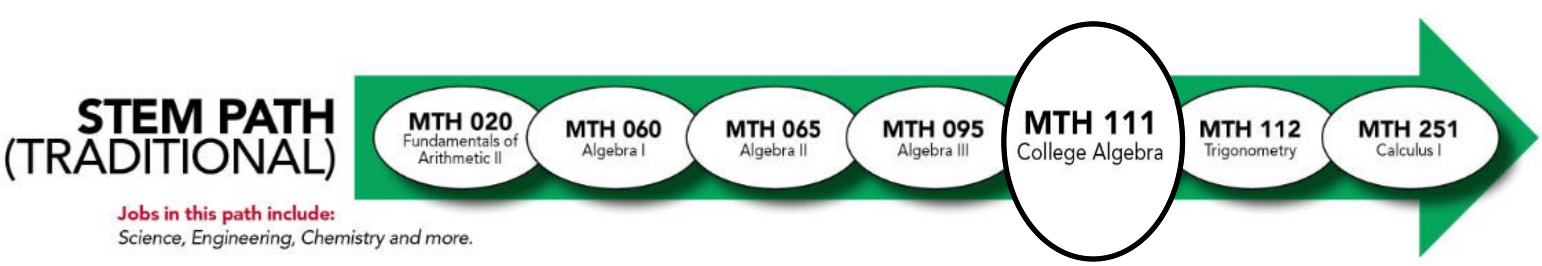
   a. $8^x = \frac{1}{4}$

   b. $\log(3x-5)=0$

7. Find the sum of the following. Show all work.

   $$\sum_{k=3}^{5}\left(k^2-5\right)$$

8. Expand $(x+4)^6$ and simplify.



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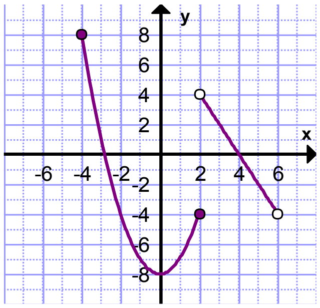
Answer Key:

1. a.



b. $f(2) = -4$

c. $x = 2$ and $x = -2$

2. a. $x = \pm 2\sqrt{2}$ b. x = 5 (note: x = 8 is an extraneous root) c. x = -3/ 2

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

4. Vertical asymptote: x = 5 or x = -3

5. a. 2 b. 3 c. 3

6. a. x = -2/3 b. x = 2

7. a. 35

8. $x^6 + 24x^5 + 240x^4 + 1280x^3 + 3840x^2 + 6144x + 4096$

How well do you know **Trigonometry** (MTH 112)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

*If you answered **YES** to at least two of the above questions, you should consider taking the next level math course.*

***MTH-251** (STEM)*

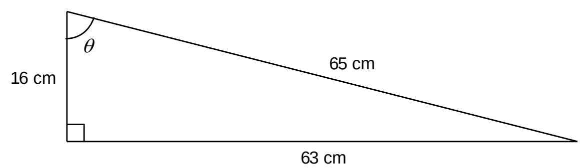
***MTH-243** (STATS)*

Instructions: Read all instructions carefully; simplify all expressions. Include units and round results as directed.
Remember to check degree/radian mode!

1. Convert 86.2° to radians (4 decimal places).

2. Convert $\frac{4\pi}{7}$ to degrees (1 decimal place).

3. Consider the triangle shown.



(a) Find the six trigonometric functions of θ (exact-value answers).

(b) Find the measure of θ (to the nearest tenth degree).

4. Give an exact-value result for $\tan 105°$.

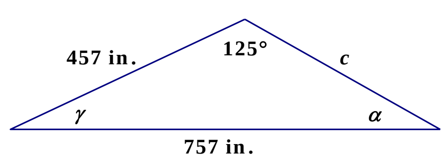
5. Consider the equation $4\sin\left(x-\frac{\pi}{6}\right)+3=5$.

(a) Find all solutions to the equation on the interval $[0,2\pi)$ (exact values).

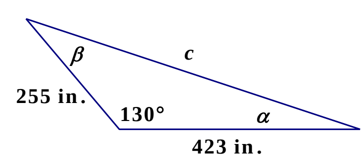
(b) Find all real-number solutions to the equation.

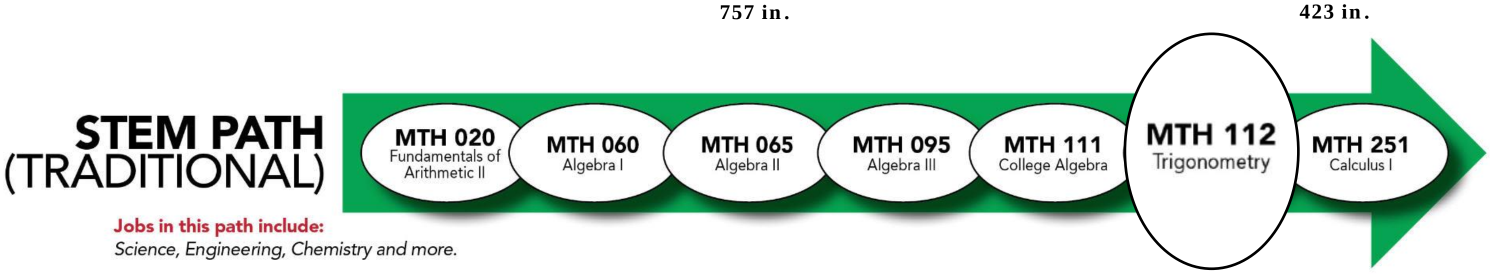
6. Solve and find the area of each triangle.

(a)



(b)





Answer Key

1. 1.5045

2. 102.9º

3. **(a)** $\sin\theta = \frac{63}{65}$; $\cos\theta = \frac{16}{65}$; $\tan\theta = \frac{63}{16}$; $\csc\theta = \frac{65}{63}$; $\sec\theta = \frac{65}{16}$; $\cot\theta = \frac{16}{63}$

(b) 75.7º

4. $-2-\sqrt{3}$

5. **(a)** $\left\{\frac{\pi}{3}, \pi\right\}$; **(b)** $\left\{x \mid x = \frac{\pi}{3} + 2n\pi \text{ or } x = \pi + 2n\pi = (2n+1)\pi\right\}$

6. **(a)** $\alpha \approx 29.64°$, $\gamma \approx 25.36°$, $c \approx 395.8$ in., Area $\approx 74{,}086$ in.^{2};

(b) $c \approx 618.6$ in., $\alpha \approx 18.41°$, $\beta \approx 31.59°$, Area $\approx 41{,}315$ in.^{2}

How well do you know **Calculus I** (MTH 251)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems using algebraic techniques?

(See next page for additional Math 251 problems and the answer to all problems.)

1. Use the definition of the limit, f'(x) = $\lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$ to determine the derivative of $f(x) = x^2 - 5x + 3$.

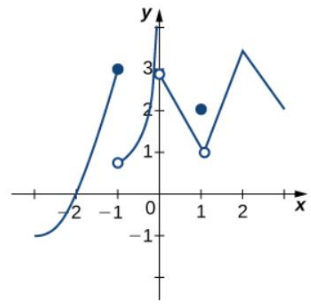
2. Let f(x)= $\begin{cases} e^{kx} & 0 \le x < 4 \\ x+3 & 4 \le x \le 8 \end{cases}$

What is the value of k such that the function will be continuous over the interval [0,8]?

3. Consider the piecewise function at the right.

a. Find all values for which f(x) is discontinuous.

b. Classify any discontinuities as jump, removable, or infinite.



4. Let the position function, $s(t) = t^2 - 3t - 4$, represent the position of the back of a car which is reversing out of the garage into the driveway and then driving into the street where s is in feet and t is in seconds. Let s(t)=0 represent the position in which the back of the car lines up with the garage door.

a What does s(0) = -5 represent?

b What is the velocity when s(t)= 0?

c What is the velocity when s(t)=14?

d What is the acceleration when s(t)=14?

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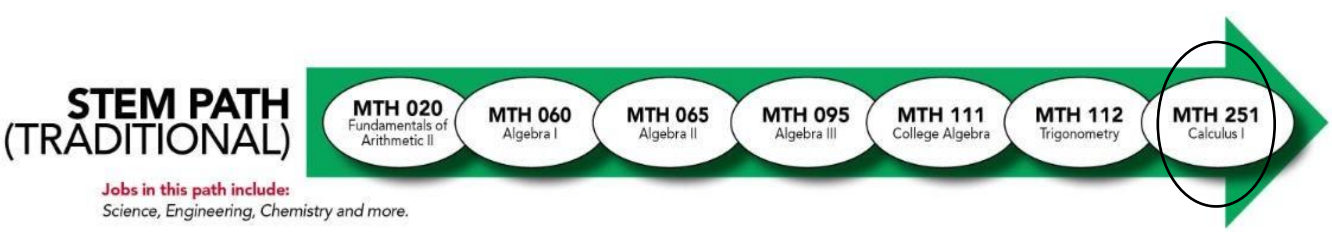

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How well do you know **Calculus I** (MTH 251)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

If you answered YES to at least five of the above questions, you should consider taking the next level math course:

MTH-252 (Calculus II)

5. a. Find the equation of the line which is tangent to f(x) $= (3x + \frac{1}{x})^2$ at the point (1,16).
b. Using linearization, estimate f(1.02).

6. For $f(x) = x + \sin(2x)$ over $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$, find:

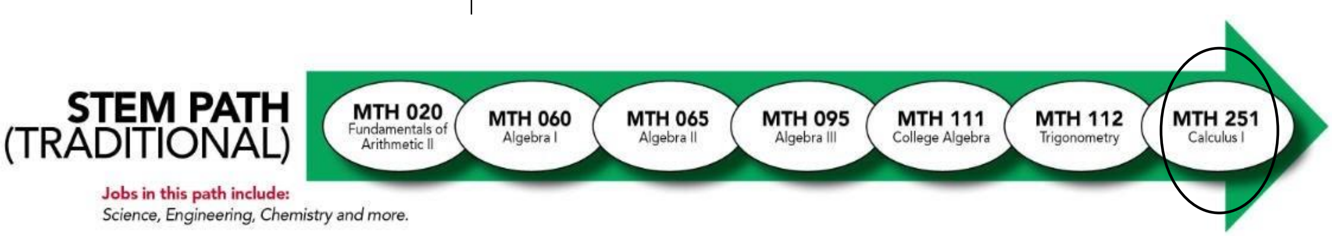
a. Where f(x) is increasing and decreasing.
b. The local minimums and maximums.
c. The intervals where f(x) is concave up and down.

7. a. Determine the x-intercepts for $x^2 + xy + y^2 = 7$.
b. Using implicit differentiation, find the slope of the tangent lines at those x-intercepts.

8. The volume of a cube decreases at a rate of $10\ {}^{m^3}/_{sec}$. Find the rate at which the side of the cube changes when the side length is 2 meters.

Answers:

1. $f'(x) = 2x - 5$
2. $k = \frac{\ln(7)}{4}$
3. Discontinuities: Jump: x=-1; infinite: x=0; removable: x=1
4. a. The car is 5 feet inside the garage.
   b. 5 ${}^{ft}/_{sec}$
   c. 9 ${}^{ft}/_{sec}$
   d. 2 ${}^{ft}/_{sec^2}$
5. a. $y = 16x$; b. 16.32
6. a. Increasing: $(-\frac{\pi}{3}, \frac{\pi}{3})$; Decreasing: $(-\frac{\pi}{2}, -\frac{\pi}{3}) \cup (\frac{\pi}{3}, \frac{\pi}{2})$
   b. $x = -\frac{\pi}{3}\ (min.), x = \frac{\pi}{3}\ (max.)$
   c. Concave up: $(-\frac{\pi}{2}, 0)$; Concave down: $(0, \frac{\pi}{2})$
7. 7. a. $(0, -\sqrt{7}), (0, \sqrt{7})$; b. $\frac{dy}{dx} = -2$
8. $\frac{dx}{dt} = -\frac{5\ m}{6\ sec}$



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How well do you know **Calculus II** (MTH 252)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems using algebraic techniques?

If you answered YES to at least six of these questions, you should consider taking the next level math course:

MTH-253 (Calculus III)

(See next page for answer to these MTH-252 problems.)

1. Find the area of the region under the curve, $f(x) = (x-1)^3 + 4$, on the interval [0,2] using:
   a. a left-end approximation with n=4.
   b. a right-end approximation with n=4.

2. Find the following anti-derivatives:
   a. $\int \frac{x}{\sqrt{x-1}} dx$
   b. $\int x e^{4x^2+3} dx$
   c. $\int \ln(\cos x) \tan(x)\, dx$
   d. $\int \frac{1}{\sqrt{9-x^2}} dx$
   e. $\int x cos(x) dx$

3. Find the exact average value f_{ave} of $f(x) = \cos(x)$ between 0 and 2π. Then determine the exact number c in [0,2π) where $f(c) = f_{ave}$.

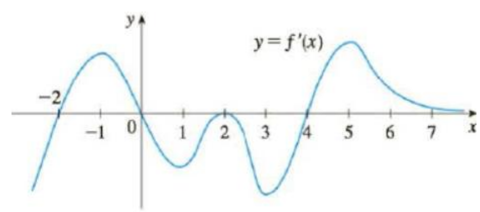
4. Find the area bounded by $f(x) = x^2$, $g(x) = 2 - x$, and the x-axis.

5. Determine the volume of the solid formed by revolving the region bounded between the function $f(x) = \frac{1}{x}$ and the x-axis over the interval [1,2].

6. Determine the arc length for the function $f(x) = x^2$ over the interval [1,3]. (Note: After setting up the integral, a calculator or online program can be used to evaluate this definite integral.)

7. Evaluate $\int_{0.1}^{0.5} \frac{\cos(x)}{x} dx$ using Simpson's rule with n=4.

8. Given the graph of $y = f'(x)$, determine the following about the antiderivative, f(x):



   a. On what intervals is f(x) increasing?
   b. On the interval (-2,7), at what x values does f(x) have a local max? local min?
   c. On the interval (-2,7), where is f(x) concave up? Concave down?

9. Assume a tank is in the shape of an inverted cone. The height of the tank is 12 feet and the base radius is

4 feet. The tank is full at the beginning and water is pumped out until the height of the water is 4 feet. Determine the work done in pumping the water out of the tank using a weight density of 62.4 $^{lb}/_{ft^3}$.

1. a. 7.5
   b. 8.5

2. a. $\frac{2}{3}(x-1)^{\frac{3}{2}} + 2(x-1)^{\frac{1}{2}} + C$
   b. $\frac{1}{2}e^{4x^2+3} + C$
   c. $-\frac{1}{2}[\ln(\cos(x))]^2 + C$
   d. $\sin^{-1}\frac{x}{3} + C$
   e. $xsin(x) + \cos(x) + C$

3. $c = \frac{\pi}{2}, \frac{3\pi}{2}$
4. $A = \frac{5}{6}$
5. $V = \frac{\pi}{2}$
6. $Arc\ length \approx 8.26815$
7. 1.5629
8. a. Increasing: $(-2,0) \cup (4, \infty)$
   b. Max: x=0; Min: x=4
   c. Up: $(-2,-1) \cup (1,2) \cup (3,5)$; Down: $(-1,1) \cup (2,3) \cup (5,7)$
9. $Work \approx 33{,}456.7\ ft - lb$

Updated as of 10.2022

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