CHAPTER 10  DAY 0

"Destiny is not a matter of chance, it is a matter of choice."
- William Jennings Bryan

DAY 0 Opportunities To Learn

1. Copy and simplify:
   a) $4^{-1}$  
   b) $8^0$  
   c) $(x + y)^{-1}$  
   d) $5^{-2}$  
   e) $\left(\frac{12}{13}\right)^{-2}$

2. Copy and expand (multiply):
   a) $(3m^4n)^2$  
   b) $(3m^4 + n)^2$

3. $f(x) = 5 - 2x$  
   g(x) = $3x^2 - 6$  
   Compute:
   a) $f(2)$  
   b) $g(2)$  
   c) $f(-1)$  
   d) $g(-1)$
   
e) For what value(s) of x is $f(x) = 0$?

4. Solve and show that your solution(s) do in fact check:  
   $|3n - 1| = 13$

5. Solve and show that your solution(s) do in fact check:  
   $x^2 + 3x = 28$

6. First make certain that your calculator is in ‘DEGREE’ MODE – not radian mode. To be sure, press <MODE> and make sure that ‘DEGREE’ is highlighted, not radian. Evaluate each of the following and round your answer to four decimal places:
   a) $\sin 40^\circ$  
   b) $\cos 40^\circ$  
   c) $\tan 40^\circ$

7. This time you will be given a trig value and you will be asked to find the value of the angle to the nearest tenth of a degree. To help you recall how to do this, we will show you an example here.

Example. Given: $\sin D = \frac{5}{8}$, find the measure of angle $D$ to the nearest tenth of a degree.

Please follow this example and learn from it.

Key <2nd> <Sin$^{-1}$> 5/8<ENTER>

So the measure of $\angle D \approx 38.7^\circ$ to the nearest tenth of a degree.
8. Using the example on the previous page, find the measure of each angle rounded to the nearest tenth of a degree.

\[ a) \sin A = \frac{1}{3} \quad b) \cos B = \frac{4}{5} \quad c) \tan C = 2 \]

9 – 10. Copy and complete:

9. Perimeter means _____ and it is measured in _____ units.

10. Area means _____ and it is measured in _____ units.

11 – 14. Go back and look at the G.O.T.D.’s from chapter 9. By observing the equations and the graphs in chapter 9, match the following equations with the correct graph. Please note that there are more graphs than equations.

11. \( y = |x| + 2 \)  
12. \( y = |x - 2| \)  
13. \( y = |x+2| \)  
14. \( y = -|x| \)

A.  
B.  
C.  
D.  
E.  
F.
DAY 1  FUNCTIONS IN MORE THAN ONE VARIABLE

We need you to recall the function notation from the previous chapter.

\[ h(x) = 3x - 4 \]  is read “h of x is equal to 3 times x minus 4”, that is, for every input value, multiply it by three and then subtract four. \( h \) evaluated at 5 would be:

\[
\begin{align*}
 h(5) &= 3 \cdot 5 - 4 \\
 &= 15 - 4 \\
 &= 11 \\
\therefore h(5) &= 11
\end{align*}
\]

When 5 is input into the ‘h’ function, the output is 11. 5 is a number in the domain of the function, \( h \), while 11 is in the range of the function, \( h \).

We have all dealt with functions in more than one variable throughout our lives, we just didn’t realize it at the time nor did we name it that way. Let’s look at some examples.

Example 1. At a particular restaurant, a hamburger costs $1.25, an order of french fries costs $1.00, and a milkshake costs $1.50.

a) If a person orders 7 hamburgers, 3 orders of french fries, and 2 milkshakes, what is the total cost of the order?

b) If a person orders 12 hamburgers, 8 orders of french fries, and 7 milkshakes, what is the total cost of the order?

c) If a person orders \( h \) hamburgers, \( f \) orders of french fries, and \( m \) milkshakes, what is the total cost of the order?

d) Create a function of three variables that will calculate the total cost of the order. The values that are input into the function are the number of hamburgers, the number of orders of french fries, and the number of milkshakes.

e) Use the function you created in part d to verify your answers to parts a, b, and c.

f) FORMAL STATEMENT: The total cost of your bill is a function of the number of hamburgers, orders of fries, and the number of milkshakes purchased.

Example 2. Create a function of four variables that will input the coordinates of two points on a line and outputs the slope of the line as a fraction. Then make a FORMAL STATEMENT about the function that was created.
Example 3. A computer spreadsheet that could be found in either Excel or Works actually uses formulas of one or more variables. Below is part of a spreadsheet that includes payroll information and it is to calculate each person’s pay.

a) Compute the actual pay for each person.
b) Then create a function (formula) for column E that will compute the actual pays in terms of the data located in columns A, B, C, and D.

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<tr>
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DAY 1 Opportunities To Learn

“Success is written in ice, and eventually the sun comes out.”

- Joe Garagiola

REVIEW BLOCK

1. Solve and show that your solution(s) do in fact check: \( y^2 = y + 30 \)

2. Copy and expand (multiply): \( a) \ (-5y^3z)^2 \quad b) \ (5y^3 - z)^2 \)

3. Find the area and perimeter.

\[
\text{Area} = \frac{1}{2} \times \text{base} \times \text{height} \\
= \frac{1}{2} \times 12 \text{ cm} \times 5 \text{ cm} \\
= 30 \text{ cm}^2
\]

\[
\text{Perimeter} = 2 \times (\text{base} + \text{height}) \\
= 2 \times (12 \text{ cm} + 5 \text{ cm}) \\
= 34 \text{ cm}
\]

4. Compute the following to four decimal places:
   \( a) \ \sin 37^\circ \quad b) \ \cos 64^\circ \quad c) \ \tan 83^\circ \)

5 – 12. a) \& b) Evaluate the functions.

   c) Write a FORMAL STATEMENT indicating what is a function of what.

5. \( f(x,y,z) = 3x - 2y + z \)
   \( a) \ f(5,4,3) \quad b) \ f(-1,-3,-5) \quad c) \ \text{FORMAL STATEMENT} \)

6. \( g(n,p,q) = 6n + p - 2q \)
   \( a) \ g(5,4,3) \quad b) \ g(-1,-3,-5) \quad c) \ \text{FORMAL STATEMENT} \)
7. *Paycheck*(hours, rate) = \text{hours} \times \text{rate}
   
   a) Paycheck(30, \$5.75)  
   b) Paycheck(40, \$9.50)  
   c) FORMAL STATEMENT

8. *Perimeter*(length, width) = 2 \times \text{length} + 2 \times \text{width}
   
   a) Perimeter(7\,\text{cm}, 6\,\text{cm})  
   b) Perimeter(8\,\text{in}, 10\,\text{in})  
   c) FORMAL STATEMENT

9. $AVG_4(P, Q, R, S) = (P + Q + R + S)/4$
   
   a) $AVG_4(5, 7, 9, 11)$  
   b) $AVG_4(40, 50, 52, 60)$  
   c) FORMAL STATEMENT

10. $AVG_3(T, U, V) = (T + U + V)/3$
    
    a) $AVG_3(18, 27, 56)$  
    b) $AVG_3(412, 92, 6000)$  
    c) FORMAL STATEMENT

11. The cost of a cup of coffee is 89 cents. The cost of a muffin is $1.05 while a donut costs 50 cents.
    a) Create a function of three variables that inputs in order: how many cups of coffee, how many muffins, and how many donuts. The output is the total cost of the order.
    b) Use that function to compute the cost of 6 coffees, 3 muffins, and 5 donuts.
    c) Use that function to compute the cost of 17 coffees, 26 muffins, and 19 donuts.
    d) FORMAL STATEMENT

12. The cost of a 12-inch pizza is $4.75. The cost of a 14-inch pizza is $5.95 while a 16-inch pizza costs $7.25.
    a) Create a function of three variables that inputs an order of how many different size pizzas can be ordered. The output will be the total cost of the order.
    b) Use that function to compute the cost of 3 12-inch pizzas, 4 14-inch pizzas, and 1 16-inch pizza.
    c) Use that function to compute the cost of 18 12-inch pizzas, 7 14-inch pizzas, and 13 16-inch pizza.
    d) FORMAL STATEMENT

13. Sales people are often paid an hourly rate plus a commission on their sales, which is usually expressed as a percent of the total sales. Below is a spreadsheet that lists information about some people who are paid in this way.
    a) Compute the pay for each person. (Notice that Mike’s pay is already done for you)
    b) Write a formula for column F that will calculate the pay for each person in terms of the columns B, C, D, and E.

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<td>Total</td>
<td>Commission Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Name Of Hours</td>
<td>Rate</td>
<td>Sales</td>
<td>Rate as a % Pay</td>
<td></td>
<td></td>
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<td>$2.25</td>
<td>$4050.00</td>
<td>5</td>
<td>$292.50</td>
</tr>
<tr>
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<td>$2.00</td>
<td>$4200.00</td>
<td>6</td>
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<tr>
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<td>Melissa</td>
<td>47.0</td>
<td>$2.50</td>
<td>$5100.00</td>
<td>7</td>
<td></td>
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</tbody>
</table>
14. Below is part of a spreadsheet that includes payroll information and it is to calculate each person’s pay.
   a) Compute the actual pay for each person.
   b) Then create a function (formula) for column E that will compute the actual pays in terms of the data located in columns A, B, C, and D.

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15 – 22.  
   a) Make a sketch of each geometric figure on your paper.
   b) Use a ruler to measure each appropriate dimension of the figure in the book to the nearest cm.
   c) Write the length you found on the sketch on your paper.
   d) Compute the area of the figure.
   e) Compute the perimeter of the figure.

15. Parallelogram

16. Parallelogram

17.

18.
NOTE: For exercises 21 and 22, your answers should be both EXACT and ROUNDED to four decimal places.
23. **G.O.T.D.** On a new sheet of graph paper, write CHAPTER 10 at the top of the paper. Label this graph as DAY 1. By using what you observed about graphing in chapter 9, sketch the graph of the equation on the paper without making a table of values and without the assistance of your graphing calculator. At least 7 points should be clearly seen on the graph. 

\[ y = |x| - 3 \]

**DAY 2   Formulas as Functions**

Review Activity with a different “twist”.

In your notes, do the following:
1) Copy the name of the geometric figure.
2) Make a neat sketch of that figure and label the important dimensions.
3) Create a function in one or more variables that computes either the area or perimeter (whichever is requested).

I. Area of a parallelogram   II. Perimeter of a Rectangle

III. Area of a circle in terms of the radius

**NOTE:** You will continue this activity within the O.T.L. section. Please include your answers to these in your notes with the three exercises, I., II., III., above.

**DAY 2 Opportunities To Learn**

**REVIEW BLOCK**

1. Solve and show that your solution(s) do in fact check: 
   \[ x^2 - 16 = 6x \].

2. Copy and expand (multiply): 
   \[ a) (6x - y^2)^2 \quad b) (-6xy^2)^2 \]

3. Copy and rewrite in simplest form without negative or zero exponents (no decimals in your answers please and do not use a calculator)
   \[ a) 6^{-1} \quad b) 3^{-2} \quad c) 14^0 \]

4. Find the measures of the angles to the nearest tenth of a degree. Make sure that your answers do in fact check.
   \[ a) \sin A = 0.26 \quad b) \cos B = \frac{2}{13} \quad c) \tan C = \frac{\sqrt{5}}{2} \]

5. Copy and complete:
   a) Perimeter means _____ and it is measured in ______.
   b) Area means _____ and it is measured in ______.
6–10. Place these next five exercises in your notes along with the three we did in class.
1) Copy the name of the geometric figure.
2) Make a neat sketch of that figure and label the important dimensions.
3) Create a function in one or more variables the computes either the area or perimeter (whichever is requested).

9. Perimeter of a circle in terms of the diameter 10. Area of a square

11–14. Find the: a) Area and b) Perimeter of each. Answers should be exact and rounded to four decimal places as necessary.

11.

12.

13.

14.

“Of course, it’s the same old story. Truth usually is the same old story.”
- Margaret Thatcher
15 – 20.  
   a) Make a sketch.
   b) Solve the problem showing your work.
   c) Clearly indicate your answer.

15. A circular garden is to be enclosed with a fence. If the diameter of the garden is 20 feet, and you can only buy fence as a whole number in feet (no fractional parts):
   i) Find the whole number of feet of fence to buy
   ii) Find the total cost of the fence if each foot of fence is $1.78

16. A circular garden is to be enclosed with a fence. If the diameter of the garden is 18 feet, and you can only buy fence as a whole number in feet (no fractional parts):
   i) Find the whole number of feet of fence to buy
   ii) Find the total cost of the fence if each foot of fence is $1.95

17. A garden is in the shape of a right triangle. Its sides are 80, 150, and 170 feet. The garden is to be fertilized and the fertilizer costs $4.50 per bag. Each bag covers 800 square feet.
   i) How many bags of fertilizer must be bought?
   ii) What will be the total cost of the fertilizer?

18. A garden is in the shape of a right triangle. Its sides are 27, 120, and 123 feet. The garden is to be fertilized and the fertilizer costs $4.25 per bag. Each bag covers 300 square feet.
   i) How many bags of fertilizer must be bought?
   ii) What will be the total cost of the fertilizer?

19. For which pizza will you get the most for your money:
   a 14-inch pizza for $8  OR  a 16-inch pizza for $10.50? Clearly indicate why you chose your answer.

20. For which pizza will you get the most for your money:
   a 12-inch pizza for $7.25  OR  a 14-inch pizza for $9.25? Clearly indicate why you chose your answer.

21. **G.O.T.D.** On the same sheet of graph paper as you used for DAY 1, sketch the graph of the equation on the paper without making a table of values and without the assistance of your graphing calculator. At least 7 points should be clearly seen on the graph.  
   \[ y = |x - 3| \]  Label this DAY 2.

**DAY 3 Right Triangle Trigonometry**

Back in geometry class, you studied how to find missing parts of right triangles (sides and/or angles) using trigonometry. You used the three trig ratios: sine, cosine, tangent.

We will be using a Greek letter, \( \theta \), pronounced “thay-tuh”, to represent an angle.
Here are the definitions of the three trig ratios (in case you forgot them):

\[
\sin \theta = \frac{\text{length of the side opposite } \theta}{\text{length of the hypotenuse}} = \frac{\text{opp}}{\text{hyp}}
\]

\[
\cos \theta = \frac{\text{length of the side adjacent to } \theta}{\text{length of the hypotenuse}} = \frac{\text{adj}}{\text{hyp}}
\]

\[
\tan \theta = \frac{\text{length of the side opposite } \theta}{\text{length of the side adjacent to } \theta} = \frac{\text{opp}}{\text{adj}}
\]

Example 1.

Find:

a) \(\sin P\)  

b) \(\cos P\)  

c) \(\tan P\)  

d) \(\sin R\)  

e) \(\cos R\)  

f) \(\tan R\)

Example 2.

Find the length, \(x\).

Example 3.

Find the length, \(y\).

Example 4.

Find the \(m \angle G\)

NOTE: For all problems that use trigonometry to solve them, we will always round the final answers as follows: lengths round to four decimal places and angles rounded to the nearest tenth of a degree. Do not perform any rounding until after the final calculation.
"Many are the varnish. Few are the wood."

- Jose Narosky

REVIEW BLOCK

1. Solve and show that your solution(s) do in fact check: 
   \[-10n = n^2 + 25.\]

2. Copy and expand (multiply): 
   a) \((2x^3 + y^4)^2\) 
   b) \((2x^3 y^4)^2\)

3. Copy and rewrite in simplest form without negative or zero exponents (no decimals in your answers please and do not use a calculator)
   a) \(7^{-1}\) 
   b) \(5^{-2}\) 
   c) \((-14)^0\)

4. Find the measures of the angles to the nearest tenth of a degree. Make sure that your answers do in fact check.
   a) \(\sin D = \frac{3}{4}\) 
   b) \(\cos E = \frac{\sqrt{7}}{8}\) 
   c) \(\tan F = \sqrt{3}\)

5 – 18. 
   a) Make a sketch of the triangle onto your paper and label the lengths and measures of the angles.
   b) Write an equation that will help you find the missing part of the triangle.
   c) Show your work on your paper. Round all lengths to four decimal places and all angles to the nearest tenth of a degree.

5. Find a

![Diagram of Triangle A with sides labeled a, 108.9, and 51.7]

6. Find b

![Diagram of Triangle B with sides labeled b, 63.8, 90.7, and 40]

7. Find c

![Diagram of Triangle C with sides labeled c, 18.7, 21.6, and 42]

8. Find d

![Diagram of Triangle D with sides labeled d, 38.2, and 43.61]

9. Find \(m\angle E\)

![Diagram of Triangle E with sides labeled 34 and 25]

10. \(m\angle F\)

![Diagram of Triangle F with sides labeled 27.6 and 40]

11. Find \(g\)

![Diagram of Triangle G with sides labeled g, 38.2, and 43.61]
12. Find $h$

13. Find $i$

14. Find $j$

15. Find $m\angle K$

16. Find $m\angle N$

17. Find $p$

18. Find $q$

19. **G.O.T.D.** On the same sheet of graph paper as you used for DAY 1 and 2, sketch the graph of the equation on the paper by making a table of at least five points and without the assistance of your graphing calculator. $y = 3|x|$ Label this DAY 3.

**DAY 4  ARC LENGTHS AND AREAS OF SECTORS OF A CIRCLE**

Example 1. Given: $\odot O$

Discuss: 

a) What information do you need to know in order to find the length of $AB$, that is, the distance from $A$ to $B$ along the circle?

b) What information do you need to know in order to find the area of the sector, that is, the area of the shaded region?

Example 2. Given: $\odot Q$ $QR = 10cm$ $m\angle PQR = 140^\circ$

a) Find the length of $PR$

b) Find the area of the sector (the shaded region)
DAY 4 Opportunities To Learn

“If it is bright and sunny after two cold and rainy days, it is probably Monday.”
Hugh B. Brous, Jr.

REVIEW BLOCK

1. Solve and show that your solution(s) do in fact check: \( \left| \frac{1}{2}n - 3 \right| = 11 \).

2. Copy and simplify: 
   a) \( x^3 + x^3 \)  
   b) \( x^2 - 2x^2 \)  
   c) \( x^3 \cdot x^3 \)  
   d) \( \frac{x^2}{x^6} \)

3. Copy and rewrite in simplest form without negative or zero exponents (no decimals in your answers please and do not use a calculator)
   a) \( x^{-1} \)  
   b) \( y^{-2} \)  
   c) \( w^0 \)

4. Find the missing lengths:

5 – 10. Copy the figure onto your paper. Find the answers both exact and rounded to four decimal places. Include appropriate units.

5. \( \odot K \ HK = 12 \text{cm} \)  
   \( m\angle GKH = 40^\circ \)
   a) Find the length of \( GH \)  
   b) Find the area of the sector, the shaded region

6. \( \odot K \ HK = 18 \text{cm} \)  
   \( m\angle GKH = 30^\circ \)
   a) Find the length of \( GH \)  
   b) Find the area of the sector, the shaded region

7. \( \odot N \ NP = 10 \text{in.} \)
   a) Find the length of \( MQP \)  
   b) Find the area of the sector
8. $\odot N \ NP = 10 \text{ in.}$  
   a) Find the length of $MQP$  
   b) Find the area of the sector

9. a) Find the length of $XZ$  
   b) Find the area of the sector

$\odot Y \ XY = 13 \text{ m}$  
$m\angle XYZ = 110^\circ$

10. a) Find the length of $XZ$  
    b) Find the area of the sector

11. **G.O.T.D.** On the same sheet of graph paper as you used for DAY 1, 2, and 3, sketch the graph of the equation on the paper without making a table of values and without the assistance of your graphing calculator. At least 7 points should be clearly seen on the graph. $y = -3|x|$ Label this DAY 4.

**DAY 5  AREAS OF SEGMENTS OF A CIRCLE**

Example 1. In order to find the area of the shaded region, called a segment of the circle, what else do you need to know?

Example 2. Find the area of the shaded region, the segment of the circle.

Given: $\odot Q; \ PQ = 7 \text{ cm};$  
$m\angle PQR = 100^\circ$
DAY 5 Opportunities To Learn

REVIEW BLOCK

1. Solve and show that your solution(s) do in fact check: \(2x^3 = 18x\).

2. Copy and simplify: 
   - \(y^5 + y^5\)
   - \((y^5)^3\)
   - \(y^5 \cdot y^5\)
   - \(\frac{y^5}{y^{10}}\)

3. Copy and rewrite in simplest form without negative or zero exponents (no decimals in your answers please and do not use a calculator)
   - \(a) \left(\frac{14}{9}\right)^{-1}\)
   - \(b) \left(\frac{17}{12}\right)^{-2}\)
   - \(c) \left(-\frac{6}{7}\right)^0\)

4. Find the exact perimeter of the square:

5 – 8. Find the area of each segment of the circle – answers both exact and rounded to 4 decimal places.

5. \(\odot B \ AB = 9\text{in.}\)

6. \(\odot B \ AB = 7\text{in.}\)
9. **G.O.T.D.** On the same sheet of graph paper as you used for DAY 1, 2, 3, and 4, sketch the graph of the equation on the paper without making a table of values and without the assistance of your graphing calculator. At least 7 points should be clearly seen on the graph. \( y = 2|x| \) Label this DAY 5.

**DAY 6** The Classic “Goat on a Leash” Activity

Problem: A goat is attached to the outside of a corner of a barn with a leash that is 50 feet long. The dimensions of the barn are 40 feet by 20 feet. Find the total area in which the goat can graze? Answer both exact and approximated to four decimal places.

**DAY 6 Opportunities To Learn**

*“We are tomorrow’s past.”*  
- Ruth Boorstin

**REVIEW BLOCK**

1. Solve and show that your solution(s) do in fact check: \(|2 - 3z| = 16\).

2. Copy and simplify:  
   a) \( x^4 + x^4 \)  
   b) \( x^4 - x^4 \)  
   c) \( x^4 \cdot x^4 \)  
   d) \( \frac{x^4}{x^8} \)

3. Copy and rewrite in simplest form without negative or zero exponents (no decimals in your answers please and do not use a calculator)  
   a) \( \left( \frac{2}{3} \right)^{-1} \)  
   b) \( \left( \frac{3}{4} \right)^2 \)  
   c) \( \left( \frac{7}{3} \right)^0 \)
4. Find the missing lengths:

\[ r = 6 \]

\[ s = \text{missing} \]

5. Given: \[ f(a, b, c, d) = 2a + 3b + c + 4d \] Find: \( f(4, 6, 1, 3) \)

6. The cost of a gallon of paint is $18. The price for a paint brush is $6.50 and the cost of a roll of masking tape is $3.
   a) Create a function of three variables that inputs the number of gallons of paint, the number of the paint brushes, and the number of rolls of masking tape, and outputs the cost of an order.
   b) Use that function to compute the cost of 7 gallons of paint, 3 paint brushes, and 8 rolls of masking tape.
   c) Use that function to compute the cost of 12 gallons of paint, 5 paint brushes, and 20 rolls of masking tape.
   d) Make a FORMAL STATEMENT about the function.

7. a) Sketch a trapezoid and label the appropriate dimensions.
    b) Create a function in several variables that computes the area of the trapezoid

8. a) Compute the total cost to put a fence around each rectangle in the table
    b) Write a formula in terms of the data located in columns A, B, and C to put into column D that will compute the total cost to put a fence around the rectangle.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Length</td>
<td>Width</td>
<td>Fence cost</td>
</tr>
<tr>
<td>5</td>
<td>of rectangle</td>
<td>of rectangle</td>
<td>per foot</td>
</tr>
<tr>
<td>6</td>
<td>18 ft</td>
<td>10 ft</td>
<td>$2.25</td>
</tr>
<tr>
<td>7</td>
<td>50 ft</td>
<td>20 ft</td>
<td>$2.75</td>
</tr>
</tbody>
</table>

9. A circular garden is to be fertilized. The cost of a bag of fertilizer is $1.75 and it will cover 135 square feet. The diameter of the garden is 24 feet.
   a) Find the number of bags of fertilizer needed to be purchased.
   b) Find the total cost.

10 – 12. Find the length of the missing side to four decimal places or the measure of the missing angle to the nearest tenth of a degree:

10. \[ 150.9 \]

11. \[ 204 \]

12. \[ 48.91 \]
13. Exact and rounded to 4 decimal places
   a) Find the length of $CDA$
   b) Find the area of the shaded sector

$\odot B\ AB \perp CB\ AB = 7\ cm$

14. Find the area of the shaded region (the segment) rounded to 4 decimal places

$\odot F\ EF = 20\ ft\ \angle F = 130^\circ$

---

**DAY 7**  Assessment of Days 0 through 6

Assignment: Individual “Goat on a Leash” problem. This will be graded as a quiz.

**DAY 8**  CYLINDERS: CANS, CANS, AND MORE CANS!

Before we begin with *The Cylinder Activity*, let’s first review some more geometry concepts.

The **VOLUME** of an object is the amount of space inside the object. Volume is measured in cubic units. **KNOW THIS!**

***One of the most fundamental formulas for finding the volume of an object is:

$$V = B \cdot h$$

where $B$ stands for the area of the base of the object and $h$ stands for the height of the object. You will discuss this more in class. Know this!!!

$L.A.$ stands for the Lateral Area of an object. It is found by finding the area of the lateral sides of an object (but not the bases). Since this is an area, what type of units is it measured in?

$T.A.$ stands for the Total Area of an object. It is found by finding the Lateral Area and then adding the area(s) of the base(s). Since this is an area, what type of units is it measured in?

Now it is time to participate in *The Cylinder Activity!* Enjoy.
DAY 8 Opportunities To Learn

“Freedom is nothing else but a chance to be better.”
- Albert Camus

REVIEW BLOCK

1. Solve and show that your solution(s) do in fact check: \( \frac{2}{3} x + 1 \) = 11.

2. Copy and simplify: 
   a) \( x^4 + x^3 \) 
   b) \( (x^4)^3 \) 
   c) \( x^4 \cdot x^3 \) 
   d) \( \frac{x^4}{x^3} \)

3. Copy and rewrite in simplest form without negative or zero exponents (no decimals in your answers please and do not use a calculator)
   a) \( \left( \frac{x}{y} \right)^{-1} \)
   b) \( \left( \frac{a}{b} \right)^{-3} \)
   c) \( \left( \frac{3z^2}{4y^3} \right)^{-2} \)

4. Find the missing lengths:

5 – 10. Copy the figure onto your paper. Find the a) Lateral Area, b) Total Area, c) Volume of each figure. Express each answer in exact form and approximate to four decimal places. Include proper units in your answers also.

5. 
6. 
7. 
8. 
11 – 18. Copy the figure onto your paper. Find the a) Area and b) Perimeter of each; exact and approximate to 4 decimal places. Include appropriate units.

11.

![Diagram of a triangle with sides 9 m, 12 m, and 13 cm.]

12.

![Diagram of a triangle with sides 12 m, 16 m, and 17 cm.]

13.

![Diagram of a trapezoid with bases 12 cm and 31 cm, and height 11 cm.]

14.

![Diagram of a trapezoid with bases 8 cm and 21 cm, and height 7 cm.]

15.

![Diagram of a triangle with sides 12 in and 17 cm.]

16.

![Diagram of a triangle with sides 18 in and 13 cm.]


DAY 9  THE “FILLING A SWIMMING POOL” PROBLEM

About this time of year, many pool owners are thinking about cleaning their pools and getting them ready for the upcoming hot weather. They must also consider filling the pool with clean water. Today we will figure out just how much it costs to fill a home swimming pool with water. Please note that the water rates will vary with location.

Example 1. A circular pool has a diameter of 18 feet and is filled to a depth of 7 feet. Find the:
   a) number of gallons that the pool will hold (to the nearest 4 decimal places)
   b) the total cost of filling the pool to the nearest penny

Water rates:
First 500 gallons cost $0.083 per gallon
Next 500 gallons cost $0.072 per gallon
Over 1000 gallons cost $0.061 per gallon

NOTE: Do not round any intermediate results until the final calculation!
Example 2. An in-ground pool’s side view is shown below. The pool is 40 feet wide. Find the:

a) number of gallons that the pool will hold (to the nearest 4 decimal places)

b) the total cost of filling the pool to the nearest penny

Water rates:

First 2500 cubic feet of water cost $2.87 per hundred cubic feet
Second 2500 cubic feet of water cost $2.31 per hundred cubic feet
Over 5000 cubic feet of water cost $2.19 per hundred cubic feet

Side view of pool:

---

DAY 9 Opportunities To Learn

REVIEW BLOCK

1. Solve and graph your solution set: \( |4x + 1| < 11 \).

2. Copy and simplify. No negative exponents allowed in your final answers.

   a) \( x^4 + x^4 \)

   b) \( (x^4)^3 \)

   c) \( x^4 \cdot x^{-3} \)

   d) \( \frac{x^4}{x^{-3}} \)

3. Copy and rewrite in simplest form without negative or zero exponents (no decimals in your answers please and do not use a calculator)

   a) \( \left( \frac{3x}{y} \right)^{-2} \)

   b) \( \left( \frac{2a}{3b} \right)^3 \)

   c) \( \left( \frac{13z^5}{14y^4} \right)^{-2} \)

4. Find the EXACT perimeter and area of a square whose diagonal is 12 inches long.

“Practice doesn’t make perfect.
Perfect practice makes perfect.”

-Marty Schottenheimer
5. Find the a) Lateral Area, b) Total Area, c) Volume of this cylinder. Answers exact and rounded to the nearest 4 decimal places.

6. Find the a) length of $AC$ b) area of the shaded sector

$\odot B; \ m\angle ABC = 150^\circ; \ BC = 21cm$

**DAY 10 IN CLASS INDIVIDUAL PROBLEMS**

Your teacher will give each of you your own individual problems to solve. Please follow the directions on your problems. These will be graded as a quiz.

**DAY 10 Opportunities To Learn**

**REVIEW BLOCK**

1. Solve and graph the solution set: $|3x + 1| \geq 11$.

2. Copy and simplify. No negative exponents allowed in your final answers.

   a) $2x^3 + x^5$  
   b) $(x^{-5})^3$  
   c) $x^{-5} \cdot x^3$  
   d) $\frac{x^3}{x^{-5}}$

3. Find the EXACT perimeter and area of a square whose diagonal is 20 inches long.

4. Find the value of $x$ to 4 decimal places.

5. Find the measure of $\angle Y$ to the nearest tenth of a degree.
DAY 11 through DAY 13  THE GREAT APPLIED PROBLEM

During the next three days you will work together on what is referred to as The Great Applied Problem. Each day you will do a review assignment to prepare for the chapter test. On Day 14 you will have a test over Chapter 10.

REVIEW PROBLEMS FOR CHAPTER 10

1. Perimeter means _____ and is measured in _____ units.

2. Area means _____ and is measured in _____ units.

3. Volume means _____ and is measured in _____ units.

4. Solve and check: \(\left|\frac{2}{3}x - 2\right| = 8\)

5. Solve and graph the solution set: \(|2a - 7| \leq 13\)

6. Copy and simplify. No negative exponents allowed in your final answers:
   
   \(a)\ 3x^{-4} + 2x^{-4} \quad b)\ 3x^{-4} \cdot 2x^{-4} \quad c)\ \left(x^{-4}\right)^{-4} \quad d)\ \frac{x^{-4}}{x^{-5}}\)

7. Find the EXACT Area and Perimeter of a square whose diagonal is \(14\sqrt{2}\) in.

“Little progress can be made by merely attempting to repress what is evil. Our great hope lies in developing what is good.” - Former President Calvin Coolidge
8. Copy and rewrite in simplest form without negative or zero exponents (no decimals in your answers please and do not use a calculator)

\[ a) \left( \frac{4}{3} \right)^{-1} \quad b) \left( \frac{15}{17} \right)^{0} \quad c) \left( \frac{11x}{15y^2} \right)^{-2} \]

9. Find the missing lengths:

- \( \triangle wv \), \( w = 20 \)
- \( \triangle bc \), \( b = \) unknown, \( c = 60 \), \( 30 \)
- \( \triangle q \), \( q = \) unknown, \( 4 \), \( 3 \)

10. Given: \( g(a,b,c,d) = 4a - 3c + d + 5b \)  
    Find \( g(2, 6, 0, 1) \)

11. The cost for a pair of pants is $36. The cost for a shirt is $28 while the cost for a pair of shoes is $55.
    a) Create a function of three variables that inputs the number of pairs of pants, the number of shirts, and the number of pairs of shoes, and outputs the cost of an order.
    b) Use that function to compute the cost of buying 5 pairs of pants, 10 shirts, and 3 pairs of shoes.
    c) Use that function to compute the cost of buying \( x \) pairs of pants, \( y \) shirts, and \( z \) pairs of shoes.
    d) Make a FORMAL STATEMENT about the function.

12. a) Compute the length of the hypotenuse of each right triangle in the table. Answers should be exact and rounded to the nearest hundredth.
    b) Write a formula in terms of the data located in columns A and B to put into column C that will compute the hypotenuse of the right triangle.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Length of one leg</td>
<td>Length of 2nd leg</td>
<td>Length of hypotenuse</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>
13. A circular garden is to be enclosed with fence. The cost of the fence is $1.79 per foot. The radius of the garden is 40 feet. If the sales tax is 6%, find the total cost to enclose the garden with fence to the nearest penny.

14 – 16. Find the length of the missing side to four decimal places or the measure of the missing angle to the nearest tenth of a degree:

14.

![Image of triangle with sides 71, 458, and unknown angle]

15.

![Image of triangle with sides 161, 125, and unknown angle]

16.

![Image of triangle with sides 7.92, 58, and unknown angle]

17. Exact and rounded to 4 decimal places
   a) Find the length of $AB$
   b) Find the area of the shaded sector

   $\odot O; \ m\angle AOB = 80^\circ; \ OA = 16 \text{ ft}$

18. Find the area of the shaded region
   (the segment) rounded to 4 decimal places

   $\odot Q; \ m\angle PQR = 140^\circ; \ QR = 20 \text{ in}$

19. A goat is attached to the outside of a corner of a barn with a leash that is 40 feet long. The dimensions of the barn are 30 feet by 25 feet. Find the total area in which the goat can graze. Answers both exact and approximated to four decimal places.

“Destiny isn’t a matter of chance, it’s a matter of choice; it is not something to be waited for, but something to be achieved.” - Unknown
20. Find the a) Lateral Area, b) Total Area, c) Volume of each. Answers exact and rounded to the nearest 4 decimal places.

\[
\text{8 ft} \quad \text{13 ft}
\]

21. Find the number of gallons in an “above-the-ground” pool that has a 20 foot diameter and is filled to a level of six and a half feet. Recall that 1 gallon is equivalent to 231 cubic inches.

22. Find the number of cubic feet of water that this pool could hold. Below is a side view of the pool that is 15 feet wide.

\[
\text{30 ft} \quad \text{3 ft}
\]

23. Find the cost of filling a swimming pool given the volume of the water is:

a) 2350 cubic feet  
b) 8500 cubic feet  
c) 13,000 cubic feet

First 5000 cubic feet is $2.75 per hundred cubic feet
Second 5000 cubic feet is $2.56 per hundred cubic feet
Over 10,000 cubic feet is $2.29 per hundred cubic feet