Welding

Math Module

Welding: Finding the Area of Various Shapes: Rectangles, Squares, Triangles and Circles

Carlos has just landed his first job as a welder. Working as a welder requires that he connects pieces of metal together. The projects he works on involve working with many basic shapes of metal including squares, rectangles, triangles, and circles. He needs to know how to find the areas of all these basic shapes as well as work with measurements, fractions, and decimals. Carlos learned a lot of math while he was in his welding program.

Focus

The focus of this math strand is for you to be able to find the area of many two dimensional shapes including squares, rectangles, triangles, and circles.

In this math strand you'll be learning and/or reviewing the following math skills:

1) Determining Units of Measure
2) Working with formulas
3) Multiplying Fractions
4) Finding Area
5) Multiplying Decimals
6) Finding Circumference
7) Problem Solving
8) Working with Exponents
9) Rounding
10) Converting Units of Measure

Task One: Finding Area

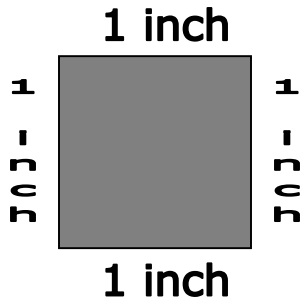
Area is the amount surface a flat space takes up. It is measured in square units. When Carlos starts his projects, he always has to think about how big the pieces need to be. He measures the pieces on the metal before he cuts them.

What is a square unit?

A square unit is a measure of area. It is square that measures the same unit of measure on each side.

For Example…

For example, a square inch would be a square that measures one inch on each side. It would look like this:



A square foot is a square that measures one foot on each side. A square foot would be too big to draw on this page. What kinds of things would be measured in square feet?

Some examples are: tiles, area of a classroom, area of a garden, carpet, area of a small lake, area of a patio, area of a deck.

For Example (cont.)…

Now think about a square mile, which is a square that measures one mile on each side. That's one big square!! Can you think of something that would be measured in square miles?

Some examples are: area of a state, area of a country, area of a large lake, area of large forest fire.

Finding the Area of Rectangles

Carlos needs to cut pieces of metal to build a rectangle. He needs to find the area of each of the pieces of the rectangle so he knows how much metal he will need. He will use a formula to find the area. A formula is an equation that tells you how to find a value.

The formula for the area of a rectangle is the length times the width.

Area of a rectangle = length x width

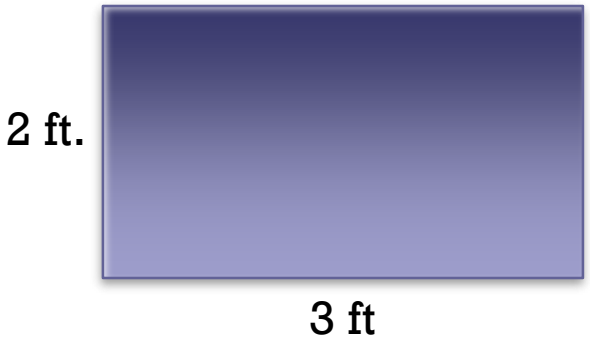
To make things easier this formula is abbreviated using the first letter of each word:

A = l x w

Using the Formula

Sometimes, the l for length and the w for width are written together like this: lw. When two variables (letters that represent unknown quantities) are written next to each with no symbol between them, it means to multiply the two values. If you see lw it means l times w. The easiest way to write the formula for area of a rectangle is A = lw.

The first rectangle that Carlos needs to cut is 2 feet by 3 feet:



To find the area of this rectangle use the formula:

Area = length x width

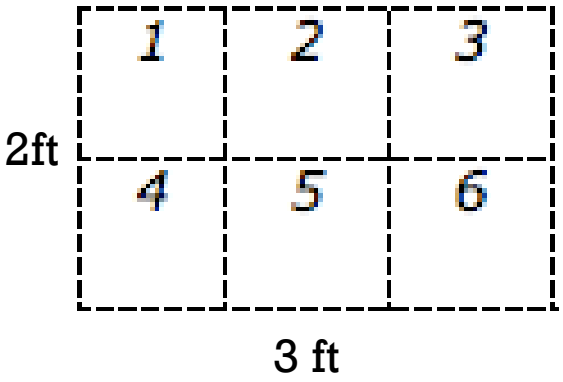
Using the Formula (cont.)

A = lw

A = 3 feet x 2 feet

A = 6 square feet

Notice, in this picture, that by cutting the 3-foot side into 3 equal 1-foot long pieces and cutting the 2-foot side into 2 equal 1-foot long pieces you can see the 6 square feet that make up the area of this rectangle.



Find the Area

Find the area of each of the following rectangles.

1) A rectangle with length 5 feet and width 3 feet.

15 square feet

2) A rectangle with length 6 feet and width 8 feet.

48 square feet

3) A rectangle with length 28 inches and width 14 inches.

392 square inches

4) A rectangle with length 21 cm and width 9 cm.

189 square cm

Finding Area with Mixed Numbers

Many times Carlos measures a rectangle where the length and width are in feet and inches. Carlos has just been given the task of cutting a rectangle that is 2 feet 4 inches long by 5 feet 6 inches wide. **Think About It!**

How do we find the area of a rectangle that is 2 feet 4 inches long by 5 feet 6 inches wide?

We need to multiply the length by the width. But first we need to change the feet and inches into just feet.

Here are the steps to find the area of this rectangle:

1) Change the dimensions (length and width) into just feet.
2) Convert any mixed numbers into improper fractions.
3) Multiply the improper fractions.

The Three Steps – Step 1

Let's look at these three steps one at a time.

Change the dimensions (length and width) into just feet.

To convert the length, 2 feet 4 inches into just feet, divide 4 inches by 12 inches since there are 12 inches in one foot. The fraction bar is also a division sign, 4 divided by 12 is the same as 4/12. So, 2 feet 4 inches = 2 4/12 feet. Since 4 divides both 4 and 12 evenly, 4/12 can be simplified to 1/3.

Therefore, 2 feet 4 inches = 2 1/3 feet.

The other dimension of our rectangle, the width is 5 feet 6 inches, which is the same as 5 6/12 feet. The fraction 6/12 simplifies to 1/2.

Therefore, 5 feet 6 inches = 5 ½ feet.

Practice

Convert the following measurements into feet.

1) 7 feet 2 inches — 7 1/6 ft

2) 4 feet 9 inches — 4 3/4 ft

3) 12 feet 8 inches — 12 2/3 ft

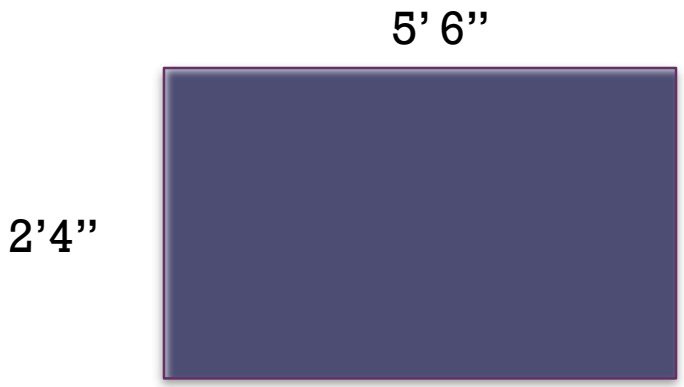
4) 17 feet 11 inches — 17 11/12 ft

5) 1 foot 1 inch — 1 1/12 ft

Remember

Remember the problem Carlos was working on? He needs to find the area of a rectangle that is 2 feet 4 inches long by 5 feet 6 inches wide. Here again are the steps he will follow:

1) Change the dimensions (length and width) into just feet.
2) Convert the mixed number to an improper fraction.
3) Multiply the improper fractions



Step 2

We know how do to do step 1. We converted the length and width to 5 1/2 feet and 2 1/3 feet.

Next, we need to do step 2.

Convert the mixed numbers to improper fractions.

A mixed number is a number that has a whole number part and a fraction part, like 2 1/3. An improper fraction is a fraction in which the number in the numerator (the top number in the fraction) is the same or larger than the number in the denominator (the bottom number in the fraction).

To find the area, we multiply 2 1/3 x 5 1/2. When you multiply mixed numbers, first you convert them to improper fractions.

The steps for converting a mixed number to an improper fraction are:

1) Multiply the whole number by the denominator and then add the numerator.

2) The number found in step one is the numerator of the improper fraction.

3) Write the denominator of the improper fraction, which is the same as the denominator of the fraction in the mixed number.

For 2 1/3, multiply 2 x 3 and then add 1. This gives you 7, which will be the numerator of your improper fraction. The denominator is still 3.

2 1/3 = 7/3

Think About It!

What would 5 1/2 be in an improper fraction?

11/2

Multiply 5 x 2 and add 1. That gives you 11 for the numerator. The denominator stays 2.

Convert the following mixed numbers to improper fractions:

1)	2 1/2	5/2
2)	5 3/4	23/4
3)	1 2/3	5/3
4)	12 4/5	64/5
5)	10 1/3	31/3

Click here for more practice converting a mixed number to an improper fraction.

Step 3

Carlos is getting closer to finding the area of the rectangle that is 2 feet 4 inches by 5 feet 6 inches.

First, he converted the measurements to feet: 2 1/3 feet and 5 1/2 feet.

Second, he converted these mixed numbers into improper fractions: 7/3 feet and 11/2 feet.

The third step is to **Multiply the improper fractions** by using the formula, Area = length x width, and multiply 7/3 x 11/2.

When multiplying fractions you multiply the numerators together and the denominators together like this:

$$\frac{7}{3} \times \frac{11}{2} = \frac{7 \times 11}{3 \times 2} = \frac{77}{6}$$

Notice the answer is an improper fraction (the numerator is bigger than the denominator). Whenever you have an answer that is an improper fraction you convert it to a mixed number.

Notice the answer is an improper fraction (the numerator is bigger than the denominator). Whenever you have an answer that is an improper fraction you convert it to a mixed number.

Here are the steps to convert to a mixed number:

1) Determine how many times 6 divides 77, which is 12 with 5 left over. Therefore, 12 is the whole number part of our mixed number answer.

2) Since 6 x 12 = 72, and 77 – 72 = 5, we have 5 left over. The 5 is called the remainder.

3) Write the fraction part of the answer. The 5 we have left over (the remainder) will be the numerator in the fraction part of our mixed number answer. The denominator is the same as the denominator in the improper fraction.

77/6 = 12 5/6

Carlos now has the area of a rectangle that is 2 feet 4 inches long by 5 feet 6 inches wide. The area is 12 5/6 square feet. Let's review how he got that answer.

First, he converted 2 feet 4 inches and 5 feet 6 inches into just feet and got 2 1/3 feet and 5 1/2 feet.

Next, he changed the mixed numbers into improper fractions and got 7/3 and 1 1/2.

Then he used the formula Area = length x width and multiplied 7/3 x 11/2 = 77/6.

Last, he converted 77/6 to a mixed number and got 12 5/6 square feet.

Working Out the Problem

Here's how the problem would look if it were figured out on paper:

Area = length x width

A = 2 feet 4 inches x 5 feet 6 inches

A = $2\frac{1}{3}$ feet x $5\frac{1}{2}$ feet

A = $\frac{7}{3}$ feet x $\frac{11}{2}$ feet

A = $\frac{77}{6}$ square feet

A = $12\frac{5}{6}$ square feet

Another Example

Let's look at another example.

Carlos has the task of finding the area of a rectangle that has dimensions of 1 foot 9 inches long by 4 feet 3 inches wide.

Listen while Carlos explains:

To find the area of a rectangle, I multiply the length times the width. So, I need to multiply 1 foot 9 inches by 4 feet 3 inches. In order to do this, I first need to convert these measurements into just feet. Since there are 12 inches in a foot, I will convert 9 inches to 9/12 of a foot and 3 inches to 3/12 of a foot. Both of these fractions will simplify. So, 1 foot 9 inches is 1 ¾ feet and 4 feet 3 inches is 4 ¼ feet.

Before I can multiply these together, I change them to improper fractions. To change 1 ¾ to an improper fraction, multiply 1 x 4 and then add 3 to get 7 for the numerator. The denominator is still 4. Now I have 7/4. 4 ¼ converts to 17/4. Then, I multiply 7/4 and 17/4 by multiplying the numerators and the denominators to get 119/16. The last step is to convert 119/16 to a mixed number. 16 goes into 119, 7 times with 7 left over. So 119/16 = 7 and 7/16. Now, I have my answer! The area of a rectangle with dimensions 1 foot 9 inches long and 4 feet 3 inches wide is 7 square feet."

Area = length x width

Area = 1 foot 9 inches x 4 feet 3 inches

A = 1 9/12 feet x 4 3/12 feet

A = 1 ¾ feet x 4 ¼ feet

A = 7/4 feet x 17/4 feet

A = 119/16 square feet

A = 7 and 7/16 square feet

Practice

Find the area of the following rectangles.

1) Find the area of a rectangle with width of 3 feet 6 inches and length of 6 feet 6 inches.

22 3/4 square feet

2) Find the area of a rectangle with dimensions of 10 feet 3 inches and 2 feet 8 inches.

27 1/3 square feet

3) Find the area of a square that is 11 feet 6 inches by 12 feet. (Hint: When multiplying you can write 12 as 12/1).

138 square feet

4) Find the area of a rectangle that is 8 feet 10 inches by 6 feet 2 inches.

54 17/36 square feet

5) Find the area of a rectangle that is 4 feet 4 inches by 4 feet 4 inches.

18 7/9 square feet

Finding the Area of a Square

A square is a rectangle that where all sides have equal length. In other words, the length is the same as the width in a square. Since a square is a type of rectangle, you can use the same formula to find the area of a square that you use to find the area of a rectangle.

Recall that in problem 5 from the last practice set, you found the area of a rectangle that was 4 feet 4 inches by 4 feet 4 inches. So you have already found the area of a square!

Think About It!

Carlos needs to cut a square that is 5 feet by 5 feet. How many square feet of metal does he need?

25 square feet, 5 feet times 5 feet is 25 square feet

Because a square's length is equal to it's width the formula for area of a square can be simplified from:

Area = length x width

To:

Area = side x side or Area = side^2 or A = s^2

Exponent

The little 2 above and to the right of the s is called an exponent. You read the formula "A equals s to the 2^{nd} power" or "A equals s squared". When a number is to the 2^{nd} power it tells you to multiply the number by itself twice.

For example: 3^2 means 3 x 3 or 9.

If the exponent is a 3 like in 5^3, it means to take 5 times itself 3 times or 5 x 5 x 5, which is 125 ($5^3 = 125$).

Practice

E. Simplify with exponents.

1) 7^2 7 x 7 = 49

2) 2^3 2 x 2 x 2 = 8

3) 10^2 10 x 10 = 100

4) 1^4 1 x 1 x 1 x 1 = 1

5) $\left(\frac{3}{4}\right)$ $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$

Practice

F. Find the area of a square with the given side length.

1) side = 8 inches — 64 square inches, which can also be written as 64 in^2

2) side = 3 feet — 9 ft^2

3) side = 1/2 cm — 1/4 cm^2

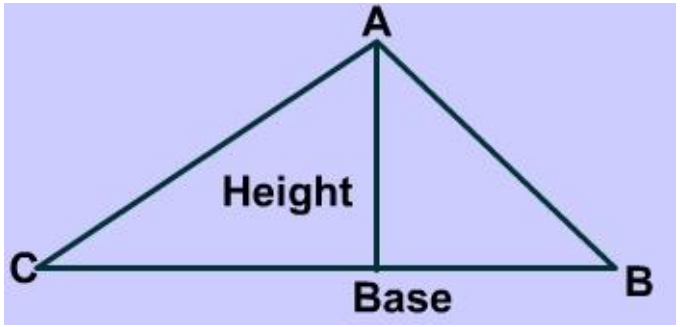
4) side = 7 feet 4 inches — 53 7/9 ft^2

Finding the Area of a Triangle

A triangle is another common shape that Carlos welds. In his last project he was making triangular braces.

The formula to find the area of a triangle

Area = ½ x base x height



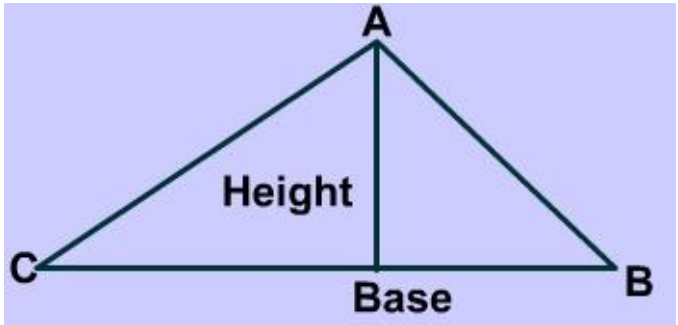
This formula is more commonly written

A = ½ b x h or A = ½ b h

Finding the Area of a Triangle

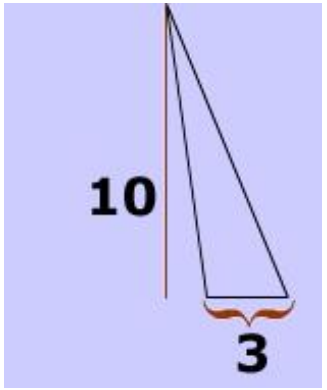
Remember, if two variables are written next to each other with no symbol between them, it means you have to multiply the two numbers, so bh mean to multiply b (the base) times h (the height).

Any side can be a base, but every base has only one height. The height is the line from the opposite vertex (point of a triangle) that is perpendicular (forms a 90 degree angle) to the base. In the picture above, the base CB has only one height, which is labeled in the picture. The height is also called the **altitude**.



Think About It!

In the triangle on the right, the base is 3 and the height is 10.

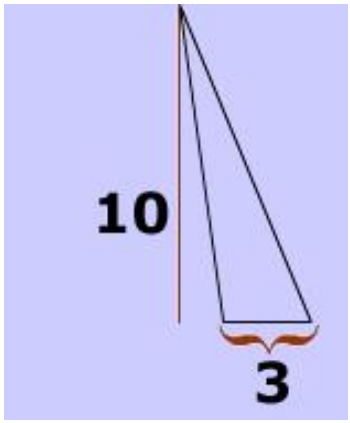


How would you find the area of this triangle?

The formula says A = ½ bh. So to find the area you would multiply the base and the height, 3 x 10, and get 30. Then multiply 30 by ½ , which is the same as dividing 30 by 2, so the area is ½ x 30 or 15!

Stop!

Notice in this triangle that the height is actually measured outside the triangle. The height of a triangle does not have to be equal to one of it's sides. Imagine standing at the top point (vertex) of this triangle and the base (the side with a length of 3) is on the ground. Now imagine drop a penny from the vertex to the base. The distance the penny would fall is the height of the triangle.



Finding the Area of a Triangle

Carlos is cutting a triangle to use for bracing. The triangle has a base length of 2 feet 6 inches and a height of 8 inches. What is the area of the triangle?

To figure out the area of a triangle, always start with the formula. Remember the formula for area of a triangle?

$$\mathbf{A = \tfrac{1}{2}bh}$$

Next, substitute into the formula the base and the height.

A = ½ x 2 feet 6 inches x 8 inches

Finding the Area of a Triangle

Just like when we were working with rectangles, we convert the measurements into just feet, then to an improper fraction before we multiply.

What is 2 feet 6 inches in just feet?

2 ½ feet

What is 8 inches in feet?

2/3 feet

Finding the Area of a Triangle

Now we have: $A = \frac{1}{2} \times 2\frac{1}{2} \times \frac{2}{3}$

Before we multiply, change 2 ½ to an improper fraction. What is 2 ½ as improper fraction? 5/2

Now we have: $A = \frac{1}{2} \times \frac{5}{2} \times \frac{2}{3}$

Multiply the numerators together and the denominators together and you get:

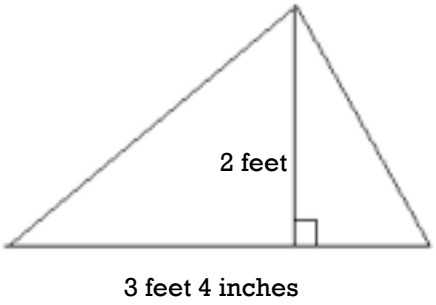
$$A = \frac{1 \times 5 \times 2}{2 \times 2 \times 3} = \frac{10}{12} = \frac{5}{6}$$

The area of a triangle with a base of 2 feet 6 inches and a height of 8 inches is 5/6 square feet.

Practice

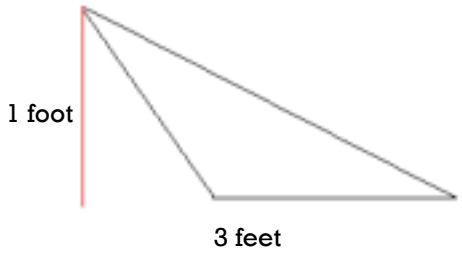
G. Find the area of these triangles.

1)



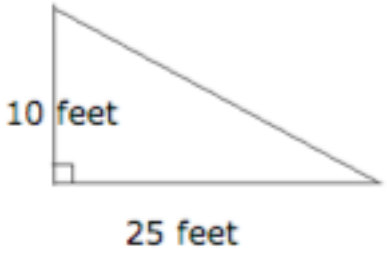
3 ⅓ square feet

2)

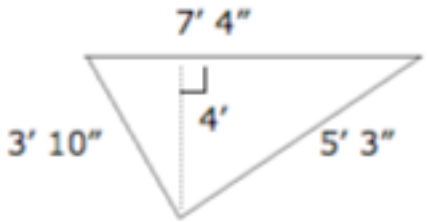


1 ½ square feet

Practice

3) 

125 square feet

4) 

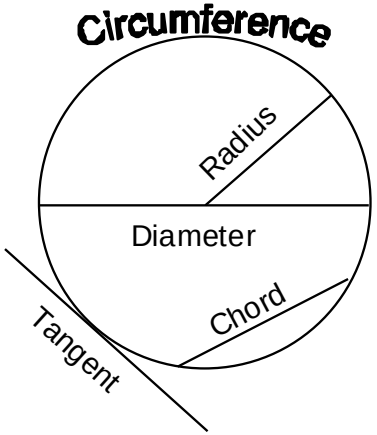
14 2/3 square feet

5) Find the area of a triangle with a base of length 35 cm and a height of 15 cm.

262 ½ square cm

Task Two: Working With Circles

Carlos is cutting circles for a new building project. There are many vocabulary words associated with circles. This picture shows some of the important terms.



Circumference: The distance around a circle.

Radius: The distance from the center of the circle to a point on the circle.

Diameter: The distance from one point on a circle to another point on a circle through the center of the circle.

Chord: A segment from one point on a circle to another point on a circle, not necessarily through the center.

Tangent: A line or line segment that touches the circle in exactly one point.

Working With Circles

The two most important formulas about circles are

Circumference = π x diameter
Area = π x radius x radius = π x radius^2

They are more commonly written

$C = \pi d$
$A = \pi r^2$

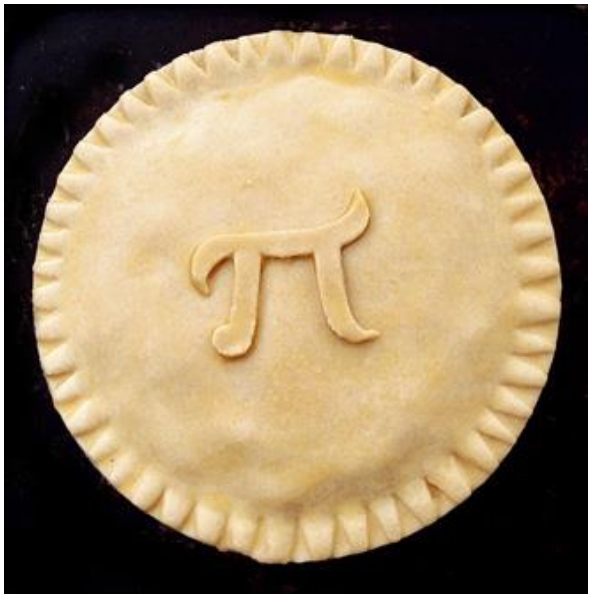
(Recall that no symbol between the π and d means to multiply.)

Both of these formulas use π.

Think About It!

What is π ?

This symbol is pronounced, "pie" and spelled pi. It is used to represent a number that is approximately 3.14.



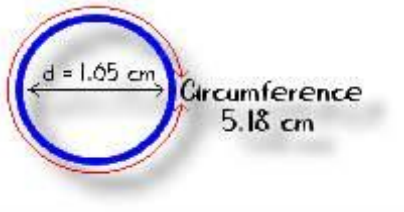
π

You may know that the approximate value of π is 3.14. But if you're like most people, you don't know why.

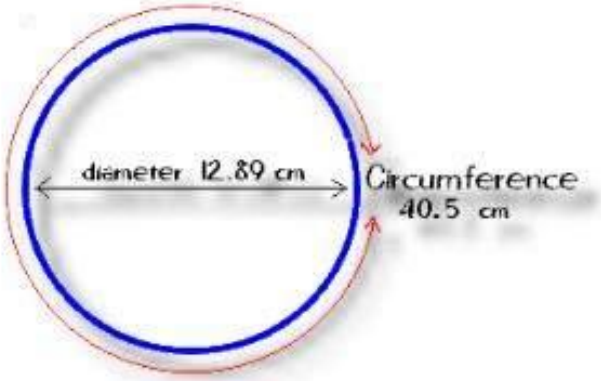
The value of π is approximately 3.14 because, if you divide the circumference of circle by its diameter, you will always get approximately 3.14. Pi has been calculated to millions of decimal places. Your calculator probably shows about nine decimal places, 3.14159265358979…

π

For example, in this circle the circumference was measured to be 5.18 cm and the diameter was measured to be 1.65 cm. If you type into your calculator 5.18 ÷1.65 you get approximately 3.139. As you know pi can be taken out to many decimal places, but in practical matters we are limited by the accuracy of our measurements.



Let's look at one more circle. This circle is larger. The circumference is larger, and the diameter is larger. When you divide the circumference by the diameter you get 40.5 ÷ 12.89 which is approximately 3.142.



Now that we have a better understanding about pi, let's use it to help us find the circumference and area of a circle.

Finding the Circumference of a Circle

Recall that the distance around a circle is the circumference of the circle. Carlos needs to know how to find the circumference of a circle to make the circles for this fence. We know the formula for circumference of a circle is $C = \pi d$. The only piece of information we need in order to find the circumference is the diameter.

The diameter of each circle in this fence is 8. What is the circumference of each circle?

The circumference is 3.14 x 8 = 25.12 inches.

Multiplying Decimals

3.14 is a decimal. Here are the steps for multiplying decimals.

1) Multiply the numbers just as if they were whole numbers.

- Line up the numbers on the right - **do not align the decimal points.**
- Starting on the right, multiply each digit in the top number by each digit in the bottom number, just as you do with whole numbers.
- Add the products if needed.

Multiplying Decimals

2) Place the decimal point in the answer by starting at the right and moving left the number of places equal to the sum of the places behind the decimal point in both numbers being multiplied.

$3.77 \times 2.8 = ?$

$$\begin{array}{rl} & 3.77 \quad (2 \text{ decimal places}) \\ \times & \underline{2.8} \quad (1 \text{ decimal place}) \\ & 3016 \\ & +754 \\ \hline & 10.556 \quad (3 \text{ decimal places}) \end{array}$$

Click here for more practice multiplying decimals.

Think About It!

How would we find the circumference of a circle with a **radius** of length 3.1 cm?

The formula tells us to multiply 3.14 by the **diameter.** To find the diameter take the radius, 3.1 cm, and multiply it by 2. The diameter is 6.2 cm. The circumference is 3.14 x 6.2 = 19.468 cm. The diameter is always twice as long as the radius.

Finding the Circumference of a Circle

Let's look at another example of finding the circumference of a circle.

Carlos is welding a circle with a radius of 6.7 cm. What is the circumference of this circle?

$C = \pi d$

$C = 3.14 \times 13.4$ (the 13.4 came from 6.7×2)

$C = 42.076$ cm

Practice

1) 

7.065 inches

2) 

84.78 feet

Practice

3) Find the circumference of a circle with a diameter of length 18.7 cm.

58.718 cm

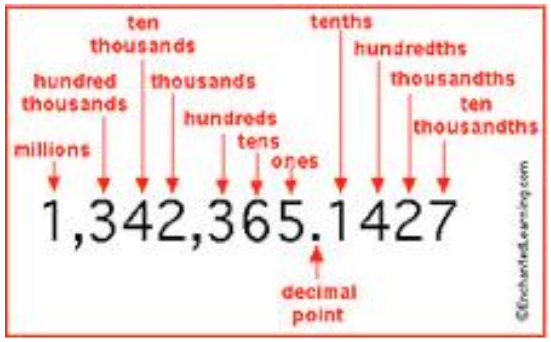
4) Find the circumference of a circle with a radius of length 2.3 meters.

14.444 meters

5) What is the circumference of a circle with a radius of length 2 feet 6 inches? (Hint: 6 inches is ½ of a foot and ½ is 0.5 as a decimal. Because we are using the decimal 3.14 for pi, the problem is easier to solve if all the numbers are in decimal form.)

15.7 feet, change the radius to 2.5 feet, then the diameter is 5 feet

Rounding Decimals



To round to the nearest hundredth look at the number in the thousandths place. If that number is 5 or greater, you round up by adding one to the digit in the hundredth place. If not, you keep the number in the hundredths place the same. Then drop all the numbers after the place value you are rounding to.

For 169.725, the number in the thousandths place is 5, so we round the 2 in the hundredths place up to a 3. The answer is 169.73. To round 169.725 to the nearest tenth, look at the number in the hundredths place. Since a 2 is in the hundredths place and is less than 5, the 7 in the tenths place would stay a 7. The answer would be 169.7.

Think About It!

Carlos is finding the circumference of a circle with diameter of length 5.125 inches. What is the circumference of the circle to the nearest tenth?

16.1 inches, C = 3.14 x 5.125 = 16.0925.
Since 9 is in the hundredths place, the 0 in the tenths place rounds up to a 1.

Practice

I. Round these values to the nearest tenth.

1) 24.561 24.6

2) 1903.535 1903.5

3) 2776.899 2776.9

4) 35.06 35.1

5) 0.072 0.1

Click here for more practice rounding.

Area of a Circle

Carlos is cutting circles for the tops and bottoms of metal barrels.

The formula to find the area of a circle is

Area = π x radius x radius ***or***
$A = \pi \times r^2$ ***or***
$A = \pi r^2$

The radius of the top of the barrel is 1 foot 3 inches. To find the area using the formula he needs to multiply 3.14 x 1 foot 3 inches x 1 foot 3 inches.

Think About It!

How can he multiply 1 foot 3 inches by 1 foot 3 inches by 3.14?

He needs to convert 1 foot 3 inches to a decimal.

Convert to Decimals

To convert 1 foot 3 inches to a decimal, divide the number of inches by 12 on your calculator. When you type in 3 ÷ 12 you get 0.25. 1 foot 3 inches = 1.25 feet.

Another way to convert 3 inches to a decimal number of feet is to first convert 3 inches to a fractional number of feet by placing the number of inches over 12. 3 inches = 3/12 feet, which simplifies to ¼ feet. This is a common fraction and you may know that ¼ = 0.25.

Chart

Here is a chart of some common conversions from inches to fractions of a foot to decimals.

Inches	Fraction	Decimal
3 inches	3/12 = 1/4	0.25
4 inches	4/12 = 1/3	0.33333…
6 inches	6/12 = 1/2	0.5
8 inches	8/12 = 2/3	0.666…
9 inches	9/12 = 3/4	0.75

Area of a Circle

Let's get back to our problem. Carlos needs to find the area of a circle with a radius of length 1 foot 3 inches. Using the formula he has:

Area = 3.14 x 1 foot 3 inches x 1 foot 3 inches

As we saw above, 3 inches = 0.25 feet, so 1 foot 3 inches = 1.25 feet. Now we have:

Area = 3.14 x 1.25 feet x 1.25 feet

The last step is to multiply these three numbers together. You may want to use a calculator. You will get:

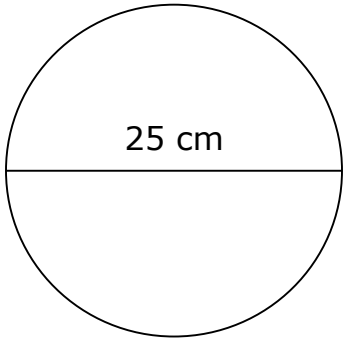
Area = 4.90625 square feet

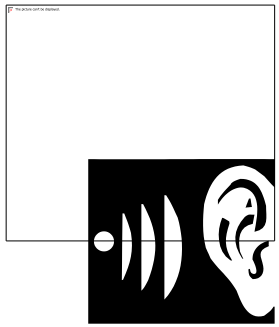
What is the area rounded to the nearest tenth?

4.9 square feet

Area of a Circle

Let's look at another situation that involves the area of a circle. Carlos received a job in which he is to make a circle with a diameter of 25 cm.





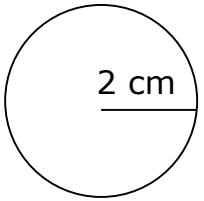
Listen to Carlos describe how to find the area of a circle with a diameter of 25 cm.

"The formula tells me to multiply 3.14 x radius x radius. I know the diameter is 25 cm. To find the radius I need to divide the diameter by 2. Since 25 divided by 2 is 12.5, the radius is 12.5 cm. To find the area, I will multiply 3.14 x 12.5 x 12.5, which is 490.625 square cm. The area rounded to the nearest tenth is 490.6 square cm."

Practice

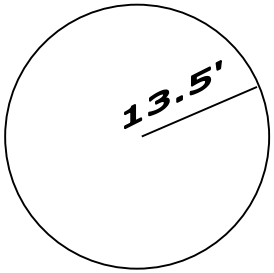
J. Find the area of these circles. Round your answers to the nearest hundredth.

1) A circle with a radius of length 2 cm.



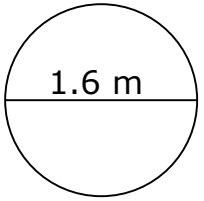
12.56 square cm

2) A circle with a radius of length 13.5 feet.



572.27 square feet

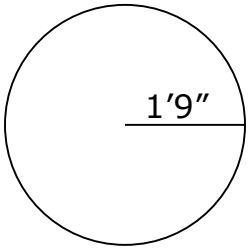
3) A circle with a diameter of length 1.6 m.



2.01 square meters

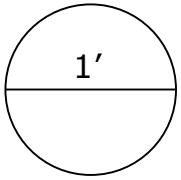
Practice

4) A circle with a radius of length 1 foot 9 inches.



9.62 square feet

5) A circle with a diameter of length 1 foot.



0.79 square feet or 113.04 square inches

Now you know how to find the areas of squares, rectangles, triangles, and circles as well as the circumference of a circle. You also know how to work with feet, inches, fractions, and decimals.

Looks like you are ready for a quiz!

Quiz

Part One: Fill in the blank with the correct formula.

1) Area of a square: A = _____ $A = s \times s$ or $A = s^2$

2) Area of a rectangle: A = _____ $A = lw$

3) Area of a triangle: A = _____ $A = \frac{1}{2} bh$ or $A = bh/2$

4) Area of a circle: A = _____ $A = \pi r^2$

5) Circumference of a circle: C = _____ $C = \pi d$

Quiz

Part Two: Answer the following multiple-choice questions.

6) Which of the following units would you most likely use to find the area of a country?

a. square inches
b. square miles
c. miles
d. square feet
e. yards

b. Square miles

7) Which of the following units would you most likely use to find the area of a deck?

a. square inches
b. square miles
c. miles
d. square feet
e. yards

d. yards

Quiz

8) Why is π approximately 3.14?

a. Circumference is approximately 3.14 times bigger than the area.
b. There is no reason, someone just picked 3.14.
c. Circumference divided by the diameter is approximately 3.14.
d. The radius is approximately 3.14 times bigger than the diameter.
e. Circumference divided by the radius is approximately 3.14.

c. Circumference divided by the diameter is approximately 3.14.

Quiz

Part Three: Find the area of each of the following.

9) Find the area in square feet, of a rectangle with a length of 3 feet 9 inches and a width of 2 feet.

7 ½ square feet or 7.5 square feet

10) Find the area of a square with a side of length 18.25 meters. Round your answer to the nearest tenth.

333.1 square meters

11) Find the area of a triangle, in square feet, with a base length of 4 feet 3 inches and a height of 9 inches.

51/32 – 1 19/32 square feet

Quiz

Part Three: Find the area of each of the following.

12) Find the area of a circle with a radius of length 6.8 cm. Round your answer to the nearest tenth.

145.2 square cm

13) Find the circumference of a circle with a radius of length 6.8 cm. Round your answer to the nearest tenth.

42.7 cm

Quiz

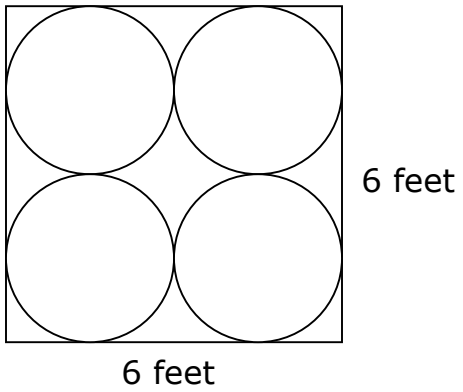
Part Four: Answer the following application problems.

14) Tom needs to cut 26 triangular supports for a bridge. The triangles are right triangles and are all the same size. They have a base of length 1 foot 8 inches and a height of 1 foot 8 inches. How much metal will all 26 triangles require?

36 1/9 square feet

Quiz

15) Carlos is cutting circles for barrel tops and bottoms. He has a 6-foot by 6-foot piece of metal and is cutting out 4 circles each with a diameter of 3 feet. (See the diagram.) Answer the following questions to determine how much metal will be wasted.



a) What is the area of the square piece of metal?

36 square feet

b) What is the area of one of the circles?

7.065 square feet

c) What is the total area of all four circles?

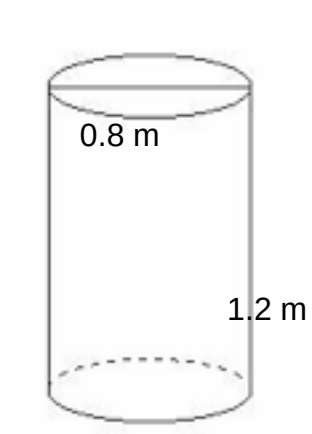
28.26 square feet

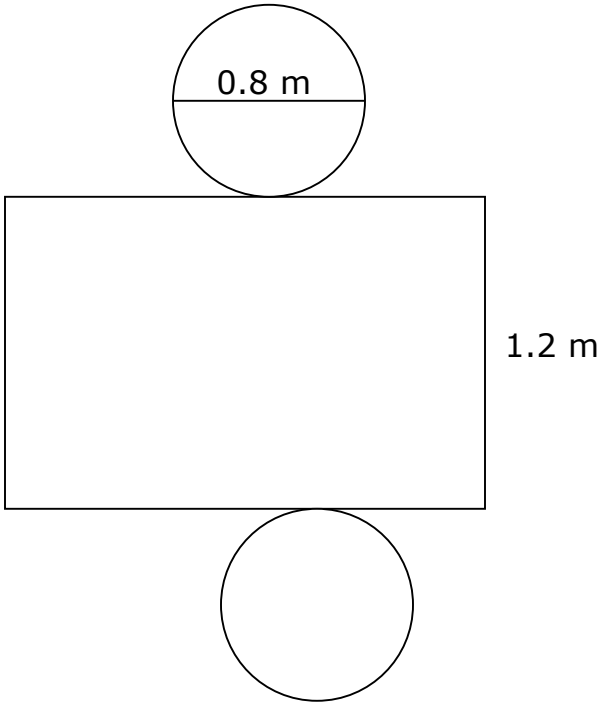
d) How much metal will be wasted?

7.74 square feet

Quiz

16) Carlos is cutting the pieces required to make a barrel. He needs two circles for the top and bottom and one rectangle for the body of the barrel. (See the diagram). The barrel is to have a diameter of length 0.8 meters and a height of 1.2 meters. Answer the questions on the next screen to determine how much metal is needed to make this barrel.





Quiz

a) What is the area of the top of the barrel? (Hint: In order to find the area of the rectangle used to make the body of the barrel, we need to find the length of the rectangle and multiply it by the width. Since the length of the rectangle wraps around the top of the barrel, the length of the rectangle is equal to the circumference of the circle.)

0.5024 square meters

b) What is the circumference of the top of the barrel?

2.512 meters

c) What is the area of the rectangle used to make the body of the barrel? (Hint: The length of the rectangle is equal to the circumference of the circle on the top of the barrel and the width is equal to the height of the barrel.)

3.0144 square meters

d) How much total metal is needed to make this barrel? Round your answer to the nearest tenth. (Hint: Make sure to add the top, bottom, and body of the barrel.)

4.0 square meters

Key Math Concepts

- Determining Units of Measure
- Working with formulas
- Multiplying Fractions
- Finding Area
- Multiplying Decimals
- Finding Circumference
- Problem Solving
- Working with Exponents
- Rounding
- Converting Units of Measure

Math Vocabulary

- Fraction
- Decimal
- Improper Fraction
- Mixed Number
- Multiply
- Numerator
- Denominator
- Product
- Area
- Square Unit
- Square Inch
- Square Foot
- Square Mile
- Rectangle
- Length
- Width
- Formula
- Variable
- Square
- Exponent
- Triangle
- Right Triangle
- Base
- Height
- Vertex
- Perpendicular
- Altitude
- Circle
- Circumference
- Radius
- Diameter
- Pi

Congratulations!

You have completed the Math Module.

The end