## Math-2A

Lesson 10-3:
Area of:
-Triangles
-rectangles
-circles
-trapezoids
and Surface Area of:
-Rectangular Prisms

Describe the idea of area.
Area attempts to answer the question "how big is it?"

$\mid \leftarrow 1$ inch $\rightarrow \mid$
The area of this square is....? area $=$ length * width area $=(1$ inch $)(1 \mathrm{inch})$ area $=1$ inch $^{2}$ area $=1$ "square inch"

When we ask for an area, we really mean, "how many 1 inch x 1 inch squares will fit in the area."


The area of this circle is....?
"how many 1 inch squares will fit in the circle."
area $=$ less than 4 inch $^{2}$
Will all those extra corners make up 1 sq. inch?
No. They make up slightly less than 1 sq. inch.
are $=$ slightly more than 3 inch $^{2}$

$$
\text { area }=3.1428 \text { inch }^{2}
$$

What is the definition of "pi"?

## distance around the circle distance across the circle

$$
\pi=\frac{\text { Circumference }}{\text { diameter }}
$$

$$
\pi=\frac{\mathrm{C}}{\mathrm{D}}
$$

$$
\mathrm{C}=\pi D
$$

$$
\pi=\frac{\text { Circumference }}{2 \text { radii }} \quad \pi=\frac{\mathrm{C}}{2 \mathrm{r}}
$$

$C=2 \pi r$

The area of this circle is....? area $=\pi r^{2}$

What is the area of the circle given by the equation?

$$
16=x^{2}+(y+2)^{2}
$$

area $=16 \pi$


The area of this circle is....?

$$
\mathrm{A}=\pi \mathrm{r}^{2}
$$

Is the given dimension a radius?

$$
\text { area }=\pi\left(\frac{2.7}{2}\right)^{2}=5.73 \mathrm{in}^{2}
$$

If decimal dimensions are given in the problem, it is OK to have a decimal answer.

If the problem says to use 3.14 for "pi", DO NOT use the pi button on your calculator; use 3.14.


## The area of this triangle is....?

$$
\mathrm{A}_{\Delta}=\frac{1}{2} * \text { base } * \text { height }
$$

Base (of a triangle): any side of the triangle.
height (of a triangle): the perpendicular distance (altitude) from any vertex of the triangle to its opposite side.
height (of a triangle) is the same at its altitude.

Area $_{\triangle A B C}=? \quad$ Area $=0.5 *$ base $*$ height
C Drop an altitude to the longest side.

## $L$

The width of a rectangle is 2 feet. The length is twice the width. What is the perimeter of the rectangle?


$$
\begin{aligned}
& w=2 \\
& L=2 w
\end{aligned} \text { substitution } \rightarrow \quad L=2(2)=4
$$

$P_{\text {rectangle }}=2 L+2 w \quad$ substitution $\rightarrow$

$$
P_{\text {rect. }}=2(4)+2(2) \quad P_{\text {rect }}=12 \mathrm{ft}
$$

## $L$

The width of a rectangle is 3 feet. The length is four times the width. What is the area of the rectangle?


$$
\begin{aligned}
& \quad \begin{array}{l}
\quad=3 \\
L=4 w \\
\text { Area }_{\text {rectangle }}=l * w \quad \text { substitution } \rightarrow \quad L=4(3)=12 \\
A_{\text {rect. }}= \\
A_{\text {rect. }}=36 \mathrm{ft}^{2}
\end{array} \text { substitution }(3 \mathrm{ft})
\end{aligned}
$$

If the width of a rectangle is twice the length,
 and the perimeter is 90 feet, what is the area?

$$
w=2 L
$$

$$
\begin{aligned}
& w=2 L \\
& P_{\text {rect. }}=90 \mathrm{ft}
\end{aligned} \text { substitution } \rightarrow
$$

$$
P_{\text {rectangle }}=2 L+2 w
$$

$$
90=2 L+2(2 L) \quad \text { solve for }{ }^{\prime} L^{\prime} \rightarrow
$$

$$
90=6 L
$$

$$
L=15 \quad \text { substitution } \rightarrow w=2 L
$$

$$
w=30 \quad \text { substitution } \rightarrow A=L * w
$$

$$
A_{\text {rect. }}=(15 f t)(30 f t) \quad A_{\text {rect. }}=450 f t^{2}
$$

The area of a trapezoid is the average of the two bases times the height.

$$
A=\frac{1}{2}\left(b_{1}+b_{2}\right) h
$$

One base has a length of 6 feet. The other base is three times as long. If the area of the trapezoid is 75 square feet,
 what is the height?
$b_{1}=6 \mathrm{ft}{ }_{\text {substitution }} \rightarrow b_{2}=3(6 \mathrm{ft})=18 \mathrm{ft}$ $b_{2}=3 b_{1}$
$A=75 \mathrm{ft}^{2} \quad$ substitution $\rightarrow A=0.5\left(b_{1}+b_{2}\right) h$
$75=0.5(6+18) h \quad$ solve for ${ }^{\prime} h^{\prime} \rightarrow$
$75=12 h \quad h=6.25 f t$

## What does "surface area" mean?

Surface area: The area of the surface of the shape.

Why would this information be important?

Helps you to know how much material you need to build, paint, or cover the item.

A "Solid": a three-dimensional shape.
Prism: a "solid" that has two parallel polygonal bases and planer ("flat") sides.

Prisms are named based upon the shape of their bases.


If the sides intersect the base at a right angle, we include that in the name:
"Right Rectangular Prism"

Lateral Area: the total area of the sides.

Build a 'net' (flatten out the "box").


## Symbolically we could say:

Surface $^{\text {area }}{ }_{\text {prism }}=2 \square+2 \square+2 \square$

What is the surface area of the prism?


Surface area ${ }_{\text {prism }}=2$


6 in

$S A=2(4 * 10)+2(6 * 10)+2(4 * 6)$

