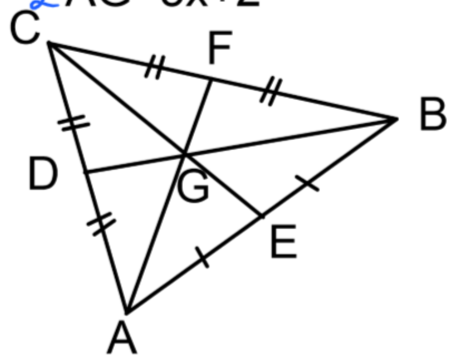
Warm Up

Find the value of x in each.

1 FG=5x-6

2 AG=3x+2



$2(5x-6)=3x+2$

$10x-12=3x+2$

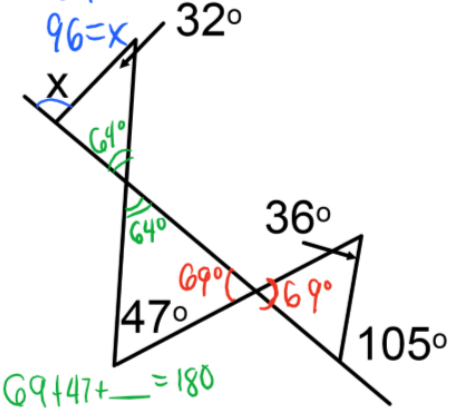
$7x-12=2$

$7x=14$

$x=2$

$32+64=x$

$96=x$



$69+47+\_\_=180$

$116+\_\_=180$

$\_\_=64°$

$36+\underline{69}=105$

Where does pi come from?

Let's find out!

Ponder the following questions

What special number is this close to?

$\pi = 3.14159$

What is the relationship between the diameter and the circumference of a circle?

$\frac{C}{d}=\pi \rightarrow C=\pi d$

What is the relationship between the radius of the circle and the circumference?

$d=2r$

$\frac{C}{2r}=\pi \qquad C=2\pi r$

Recap: Where did the value of pi come from?

The value of pi can be found by dividing the circumference by the diameter.

Now that we know the origin of pi, lets investigate the <u>AREA</u> of a circle equation. $A=\pi r^2$

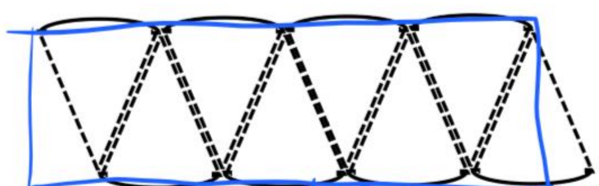
1. Cut out the circle and then cut along the lines, to get *8 congruent sectors.*

2. Arrange these sectors into a rectangle like shape.

https://www.youtube.com/watch?v=YokKp3pwVFc

3. Think about the dimensions of your "rectangle". Where do they come from?

$h=r$



$b = \frac{1}{2}C = \frac{1}{2}\cdot 2\pi r = \pi r$

4. Since the Area of a Rectangle is found by multiplying the length of its base by its height, Find the Area of your "rectangle" by doing the same calculation.

$A = b \cdot h$

$A = \pi r \cdot r = \pi r^2$

Area Discovery cont.

5. How does your formula compare with the formula you know to be the Area of a Circle? It is the same.

Recap:

How did we discover the Area of a circle equation?

The equation of the area of a circle can be derived by cutting a circle into infinitely many congruent sectors and then making them into a rectangle. This rectangle has the dimensions of height that is equal to the radius and a base that is ½ Circumference or πr. This will make the area

$A = \pi r \cdot r = \pi r^2$.

Volume of a Cylinder and Prisms

The CD example

1 CD would just have the volume of the area of 1 CD.

2 CD's would have 2 times the area of 1 CD. and so on.

$$V = B \cdot h \begin{cases} V_{cylinder} = \pi r^2 \cdot h \\ V_{prism} = l \cdot w \cdot h \end{cases}$$

$\uparrow$ area of the base

Volume of a Cone and Pyramid

The Water Test

It took 3 cones to fill the cylinder.

$$3V_{cone} = V_{cylinder}$$

$$V_{cone} = \frac{1}{3} V_{cylinder} \qquad V_{pyramid} = 1/3\, V_{prism}$$

$$V_{cone} = \frac{1}{3} \pi r^2 \cdot h \qquad V_{pyramid} = 1/3\, l \cdot w \cdot h$$

Cavalieri's Principle

If two shapes have the same height and matching cross sectional areas everywhere along the height, then the shapes have the same volume

Explained with CD's

Height and cross sectional areas are the same. The volumes are the same.

Which shapes have the same volume?

*All cross sectional areas are the same