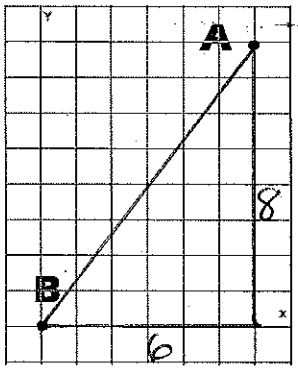
Name: Key Date: _____ Period: ____

Benchmark 2 Study Guide

I CAN USE THE PYTHAGOREAN THEOREM TO FINDING MISSING LENGTHS

The Pythagorean Theorem for right triangles says $a^2+b^2=c^2$, where *a* and *b* are legs and c is the hypotenuse. It can be used to find missing length and it can be used to find the distance between two points on the coordinate plane.

Example:

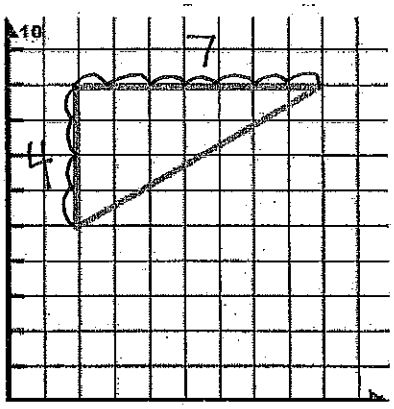


What is the exact distance between points A and B?

$a^2+b^2=c^2$
$6^2+8^2=c^2$
$36+64=c^2$
$100=c^2$
$\sqrt{100}=c$
$10=c$

Example:

What is the approximate length of the hypotenuse for the right triangle shown on the graph to the right?



$a^2+b^2=c^2$
$4^2+7^2=c^2$
$16+49=c^2$
$65=c^2$
$\sqrt{65}=c$

8 $\sqrt{65}$ 9

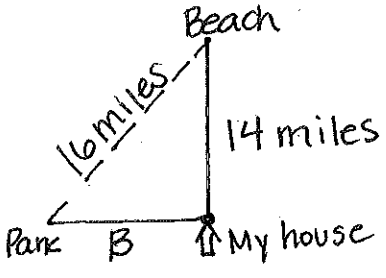
$8^2=64$ $9^2=81$
$\sqrt{64}=8$ $\sqrt{81}=9$

Try $8.1\times8.1=65.61$

So $\sqrt{65}\approx8.1$

Example:

THE BEACH IS 14 MILES NORTH OF YOUR HOUSE. THE PARK IS *B* MILES WEST OF YOUR HOUSE. WHEN YOU ARE AT THE PARK, YOU ARE 16 MILES FROM THE BEACH. HOW FAR IS THE PARK FROM YOUR HOUSE? SHOW YOUR WORK. *HINT: Draw a Picture and label what you know.*



$a^2+b^2=c^2$
$14^2+b^2=16^2$
$196+b^2=256$
$-196 \quad -196$
$b^2=60$
$b=\sqrt{60}$ (exact) $\approx$ about 7.7 miles

7 8

$7^2=49$ $\sqrt{60}$ $8^2=64$
$\sqrt{49}=7$ $\sqrt{64}=8$

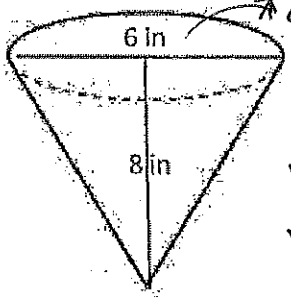
Try $7.6\times7.6=57.76$
$*7.7\times7.7=59.29$
$7.8\times7.8=60.84$

↓ estimate

I CAN USE FORMULAS TO FIND VOLUME OF CYLINDERS, CONES, AND SPHERES.

Cylinder: $V = \pi r^2 h$	**Cone:** $V = \frac{1}{3}\pi r^2 h$	**Sphere:** $V = \frac{4}{3}\pi r^3$

To find the volume of a 3-dimensional figure, identify the appropriate formula to use. For cylinders and cones, identify and plug in the radius and height. For spheres, just the radius is needed. Begin by squaring OR cubing the radius. Then multiply by the height (if applicable). For cones and spheres, multiply by the fraction 1/3 or 4/3. If the question asked for the exact volume, leave the symbol for π in the answer and don't multiply by 3.14. If the question asked for an estimated volume, use an estimate for π ($\pi \approx 3.14$) and multiply for the final answer. Don't forget to use appropriate units in your final answer!



diameter = 6, so radius = 6/2 = 3

How much ice cream can fill the cone shown below? Use 3.14 for pi.

$V = \frac{1}{3}\pi \cdot r^2 \cdot h$

$V = \frac{1}{3} \cdot 3.14 \cdot 3^2 \cdot 8$

$V = \frac{1}{3} \cdot 3.14 \cdot 9 \cdot 8$

$V = \frac{1}{3} \cdot 72 \cdot 3.14$

$V = \frac{1}{3} \cdot \frac{226.08}{1} = \frac{226.08}{3}$

$V \approx 75.36 \text{ in}^3$

*remember since we used 3.14, this is an estimate

Kiara is painting her living room. She needs three cans of paint to cover all of the walls. Each of the cans of paint has a radius of 4 inches and a height of 12 inches. What is the exact amount of paint that Kiara needs to buy for her living room?

can = cylinder

$r = 4$ $h = 12$

1 can = $\pi \cdot r^2 \cdot h$

3 cans = $3(\pi \cdot r^2 \cdot h)$

$= 3 \cdot \pi \cdot 4^2 \cdot h$

$= 3 \cdot \pi \cdot 16 \cdot 12$

$V = 576 \text{ in}^3$

Challenge: If each can of paint costs $12.50, how much will Kiara spend buying her paint?

3 cans = 3 × 12.50 = $37.50

What is the approximate volume of the figure shown to the right?

Volume of hemisphere + Volume of cone

Sphere: $\frac{4}{3}\pi r^3$

$\left[\frac{4}{3} \cdot \pi \cdot 4^3\right]$

hemisphere = $\left[\frac{256}{3}\pi\right] \cdot \frac{1}{2} = \frac{256\pi}{6}$

$V = \frac{1}{3}\pi r^2 h$

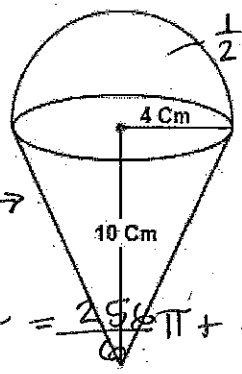
$V = \frac{1}{3}\pi 4^2 \cdot 10$

$V = \frac{160\pi}{3}$

hemisphere → ½ sphere

\+

Cone →



$\frac{256}{6}\pi + \frac{160}{3}\pi = \frac{256}{6}\pi + \frac{320}{6} = \frac{576\pi}{6} =$

96π

3.14×96

$\approx 301.44 \text{ cm}^3$

What is the exact volume of a sphere that has a diameter of 12 inches?

↳ divide by 2 to get radius = 6

$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \cdot 6^3 = \frac{4}{3} \cdot \pi \cdot 216 = \frac{864}{3}\pi = 288\pi \text{ in}^3$