MATH 310 ♦ TEST ♠ Measure ♣ Spring, 2009 ♥ NAME

Don't forget UNITS! ***Please*** **leave answers with π; do not replace with approximation.**

(8) 1. Convert each of the following units, showing your work.

a. $0.35\ m^3 =$ ____________ cm^3

$$0.35\ m^3 = 0.35\ m^3 \cdot \frac{100\ cm}{1\ m} \cdot \frac{100cm}{1\ m} \cdot \frac{100cm}{1\ m} = 0.35 \cdot 100 \cdot 100 \cdot 100\ cm^3 = 350000\ cm^3$$

b. 1500 mL water (at 4°C) = ____________ kg.

$$1500\ mL = 1500\ mL \cdot \frac{1\ g^*}{1\ mL} \cdot \frac{1\ kg}{1000\ g} = \frac{1500}{1000} kg = 1.5\ kg$$

* (this equivalence good only for substances which have the same density as water at 4°C)

or say $1500\ mL = 1500\ cm^3 \overset{*}{=} 1500\ g = 1.5\ kg$

(8) 2. Place the following measures in increasing order: 34 in 0.5 m 1 ft 2 cm

2 cm < 1 ft < .5 m < 34 in

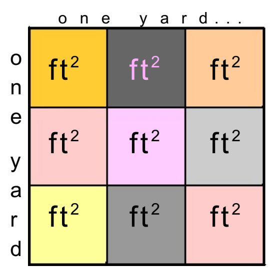
Smallest Largest

1 ft = ⅓ yd, which is close to ⅓ m < .5 m

34 in is close to a yard, which is close to 1 m

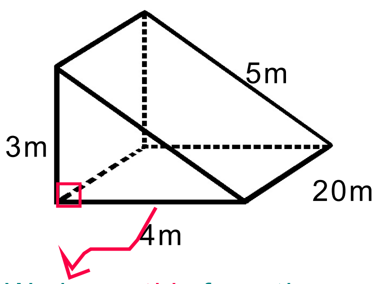
2 cm = .02 m ...is by far the smallest

(3) 3a. Draw a sketch which illustrates the relationship between square yards and square feet.

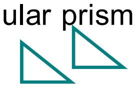


Since 1 yd = 3ft, a square yd, being a square that's 1yd by 1yd, is a square that is 3ft by 3ft, and thus contains NINE ft^2, as SHOWN.

(9) 5. Find the SURFACE AREA of this right triangular prism, showing your work.

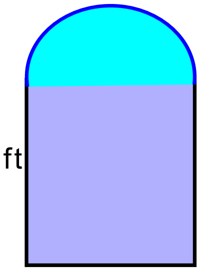


We know this from the 3-4-5 dimensions of the △



$$SA = \text{Area of triangular ends} + \text{Area of rectangular lateral walls}$$
$$= 2 \cdot \tfrac{1}{2} \cdot 4m \cdot 3m + (3m + 4m + 5m) \cdot 20m$$
$$= 12\ m^2 + 12\ m \cdot 20\ m$$
$$= 12\ m^2 + 240\ m^2$$
$$= 252\ m^2$$

(8) 6. Find the AREA of the demilune* window pictured at right, showing your work.
* (the window is rectangular with a semicircular part at the top)



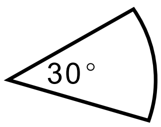
AREA = Area of the rectangular region + Area of the semicircular top

= $10\text{ ft} \cdot 6\text{ ft}$ + $(½)\ \pi\ (3\text{ ft})^2$

= 60 ft^2 + $(½)\ 9\pi\text{ ft}^2$

= $(60 + 9\pi/2)\text{ ft}^2$

(4) 7. If the area in a circle is 360 square meters, then what area does a 30° sector of that circle contain?



A 30° sector contains **1/12** of the circle (since 30°/360° = 1/12) .

1/12 of 360 m^2 = 30 m^2

OR...
a 360-degree sector ➔ 360 m^2
so a 30-degree sector ➔ 30 m^2

(5) 9. Write a formula which gives the VOLUME of a right circular cylinder with base radius r and height h.

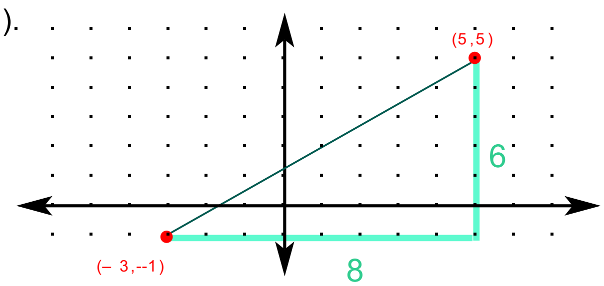
Volume of any cylinder = (area of base) · height = $\pi r^2 \cdot h$

What happens to the volume of a cylinder if the base radius is doubled and the height is cut in half?
[circle the LETTER of your selection] The new volume is().

A the same. B 1.5 times as great. C. actually smaller. D 2.5 times as great.
(E) 2 times as great. F 4 times as great. G 4 times as great. E insufficient information

If dimensions change from r & h to 2r and h/2 then volume changes
from $\pi r^2 h$ to $\pi (2r)^2 (h/2)$, which is $2\pi r^2 h$ (twice the original volume).

(4) 11. Find the distance between the points (– 3,– 1) and (5,5).



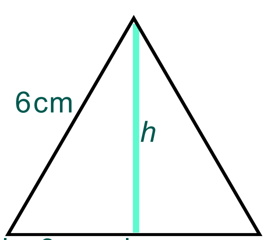
Using the theorem named for Pythagoras:

$8^2 + 6^2 = D^2$

D = 10

The distance is 10 units.

(4) 12. Find the HEIGHT of an equilateral triangle whose sides are 6 cm long.



Using that Pythagorean theorem again:

$h^2 + (3\text{ cm})^2 = (6\text{ cm})^2$

$h^2 + 9\text{ cm}^2 = 36\text{ cm}^2$

$h^2 = 27\text{ cm}^2$

$h = \sqrt{27}\text{ cm}$ or $3\sqrt{3}\text{ cm}$