

$$SA_{\text{sphere}} = 4\pi r^2$$

$$LSA_{\text{cone}} = \pi r \ell$$

1. [10 pts - 2 each] Circle the larger/higher measurement in each pair:

- 1 m ok too
- (a) 4 ft 1 m
- (b) 1 ft 15 cm
- (c) 50° F 50° C
- (d) 1 gal 4 l
- (e) 200 kg 1 ton

2. [10 pts - 2 each] Circle the most meaningful measurement in each list:

- (a) The temperature outside now, on a cool autumn afternoon:

1.5° C

15° C

150° C

1500° C

- (b) The weight of a newborn kitten:

0.2 g

2 g

0.2 kg

2 kg

- (c) The height of Bailey Library (the building across the quad):

1.2 cm

12 cm

1.2 m

12 m

- (d) The distance from here to Washington, DC:

5 km

50 km

500 km

5,000 km

- (e) The volume of the instructor's computer desk in this classroom:

8 l

80 l

8 kl

80 kl

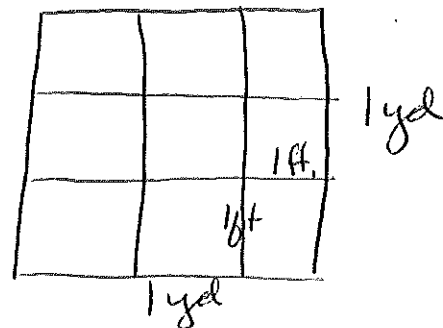
3. [6 pts] Carefully and thoroughly explain (in words, although you may refer to diagrams) how many square feet are in one square yard.

2 9
4 expl.

A square yard is a square that's one yard long on all sides.

Cut the sides into foot-long segments + extend the cuts through the square to show squares that are one foot long on all sides.

Those are square feet, + there are 9 of them.



- 26
26
4. [22 pts - 3 or 8 each] Convert and round as indicated, using any meaningful method. Show work as needed.

(a) 543.2 cm² to dam² - do not round

② 5432

$$\begin{array}{c} \text{dam}^2 \quad 00 \\ \text{m}^2 \quad 05 \\ \text{dm}^2 \quad 43 \\ \text{cm}^2 \quad 2 \end{array}$$

$$.0005432 \text{ dam}^2$$

(b) 14 pounds, 5 ounces to ounces - do not round

$$14 \times 16 = 224$$

$$+ 5$$

$$229 \text{ oz.}$$

(c) 23.6 cents per man-minute to dollars per team-hour - one team equals ten men (people); round meaningfully

② bad free
③ missing free

$$\frac{23.6 \text{¢}}{\text{man} \cdot \text{min}} \times \frac{\$1}{100 \text{¢}} \times \frac{10 \text{ men}}{1 \text{ team}} \times \frac{60 \text{ min}}{1 \text{ hr}} =$$

$$\$141.60 \text{ per team-hour}$$

(d) 3.5 square feet per liter to milliliters per square inch - round to the nearest hundredth

$$\frac{3.5 \text{ ft}^2}{\cancel{\text{L}}} \times \frac{1 \cancel{\text{L}}}{1000 \text{ mL}} \times \frac{12 \text{ in}}{1 \cancel{\text{ft}}} \times \frac{12 \text{ in}}{1 \cancel{\text{ft}}}$$

FLIP!

$$1.98 \text{ mL per in}^2$$

5. [4 pts] If the length of a rectangle is doubled and its width is tripled, by what factor has its area increased? Justify your response computationally or verbally.

6: A 1x1 rectangle has an area of 1.
The new, 2x3 rectangle has an area of 6.

OR

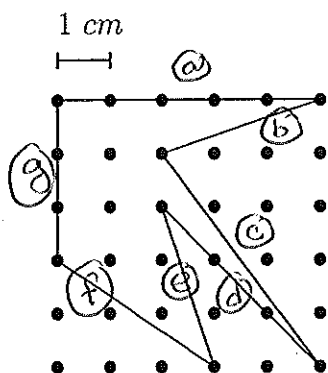
$$\begin{aligned} \text{Old area} &= bh \\ \text{New area} &= (2b)(3h) = 6bh = 6 \cdot \text{Old area} \end{aligned}$$

6. [4 pts] A rectangle and a triangle have the same base. If the area of the triangle is 4 times that of the rectangle, how do their heights compare? Justify your response computationally or verbally.

③ double, bigger
① 8 example but no answer
② 4 times

The triangle's height is 8 times the rectangle's. For their areas just to be equal, the triangle's height must be double the rectangle's. To account for the extra factor of 4, multiply that double height by 4: $(2h) \cdot 4 = 8h$.

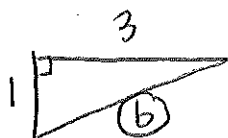
7. [16 pts - 8 each] Find the area and perimeter, both rounded to the nearest tenth, of the figure below; show clear work and tell which is which.



$$P = a + b + c + d + e + f + g$$

$$= 5 + 3.2 + 5 + 4.2 + 3.2 + 3.6 + 3$$

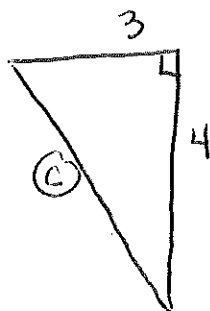
$$= 27.2 \text{ cm}$$



$$1^2 + 3^2 = b^2$$

$$10 = b^2$$

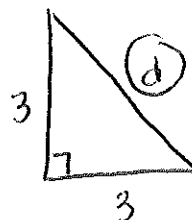
$$3.2 = b$$



$$3^2 + 4^2 = c^2$$

$$25 = c^2$$

$$5 = c$$

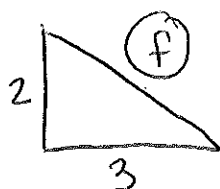


$$3^2 + 3^2 = d^2$$

$$18 = d^2$$

$$4.2 = d$$

$$e = b$$



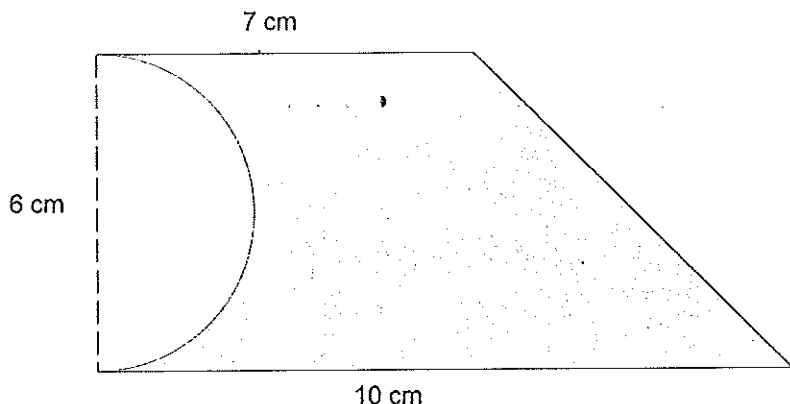
$$2^2 + 3^2 = f^2$$

$$13 = f^2$$

$$3.6 = f$$

16
16

8. [16 pts - 8 each] Find the area and perimeter, both rounded to the nearest tenth, of the shaded figure below; show clear work and tell which is which.



$$\begin{aligned} \text{Curve} &= \frac{1}{2} \text{ circumf} \\ &= \frac{1}{2} \pi d \\ &= \frac{1}{2} \pi (6) \\ &= 9.4 \end{aligned}$$

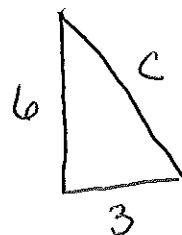
$$\begin{aligned} \text{Area} &= A_{\text{trap}}^{(4)} - A_{\text{semicircle}}^{(4)} \\ &= 51 - 14.1 \\ &= 36.9 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} A_{\text{trap}} &= \frac{1}{2} (b_1 + b_2) h \\ &= \frac{1}{2} (7 + 10) \cdot 6 \\ &= 51 \end{aligned}$$

$$\begin{aligned} A_{\text{semicircle}} &= \pi r^2 \div 2 \\ &= \pi \cdot 3^2 \div 2 \\ &= 14.1 \end{aligned}$$

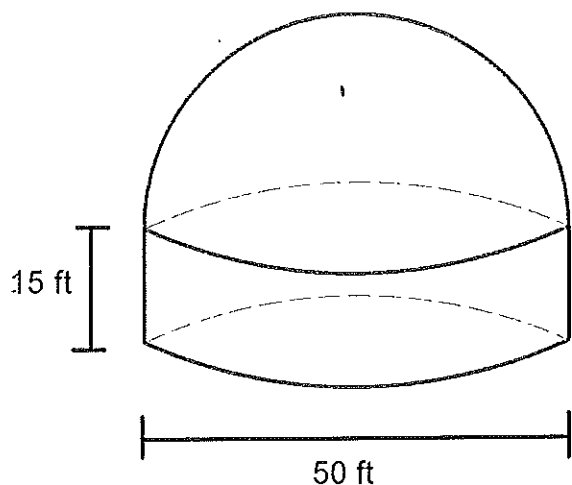
$$\begin{aligned} P &= \text{top} + \text{slant} + \text{bottom} + \text{curve} \\ &= \underline{7} + \underline{6.7} + \underline{10} + \underline{9.4} \\ &= 33.1 \text{ cm} \end{aligned}$$

slant:



$$\begin{aligned} 6^2 + 3^2 &= c^2 \\ 45 &= c^2 \\ 6.7 &= c \end{aligned}$$

9. (12 pts) Find the surface area, rounded to the nearest tenth, of this solid cylinder with hemispherical cap; show clear work.



SA = top + unrolled side + bottom

Top hemisphere: $4\pi r^2 \div 2 = 4\pi (25)^2 \div 2 = 3927.0$

Unrolled side:

$C = \pi d = \pi \cdot 50 = 157.1$

$A = (15)(157.1) = 2356.5$

Bottom



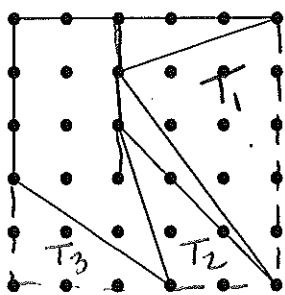
$A = \pi r^2 = \pi (25)^2 = 1963.5$

$\boxed{8247 \text{ ft}^2}$

6. [4 pts] A rectangle and a triangle have the same base. If the area of the triangle is 4 times that of the rectangle, how do their heights compare? Justify your response computationally or verbally.

7. [16 pts - 8 each] Find the area and perimeter, both rounded to the nearest tenth, of the figure below; show clear work and tell which is which.

1 cm



(2) bad split on T_2
(4) bad Δ in add.
(2) bad in add.

Area (subtractive):

$$\begin{aligned}
 A &= \text{whole grid} - T_1 - T_2 - T_3 \\
 &= 25 - 7.5 - 3 - 3 \\
 &= 11.5 \text{ cm}^2
 \end{aligned}$$

$$T_1 = \frac{1}{2}bh = \frac{1}{2}(5)(3) = 7.5$$

$$T_2 = \frac{1}{2}bh = \frac{1}{2}(2)(3) = 3$$

$$T_3 = \frac{1}{2}bh = \frac{1}{2}(2)(3) = 3$$

8. [16 pts - 8 each] Find the area and perimeter, both rounded to the nearest tenth, of the shaded figure below; show clear work and tell which is which.

