1. *[5 pts - 1 each]* Place a decimal point in each problem to make the most reasonable measurement. Circle your point, $\odot$, to make it clearly visible.

    (a) Distance from VSC to the Library: 5 0⊙0 0   meters

    (b) Temperature in a working refrigerator: 4⊙5 0 0   degrees Celsius

    (c) Thickness of a quarter: ⊙2 0 0 0   cm

    (d) Weight of our textbook: 1⊙8 0 0   kg

    (e) Volume of a medium-sized apple: 3 3 0⊙0   mℓ

2. *[8 pts - 2 each]* In each HORIZONTAL row, circle the largest measurement, and underline the smallest.

    (a)   <u>freezing</u>   (body temperature)   30° C

    (b)   2 ft   <u>2 in</u>   (2 m)

    (c)   (3 gal)   3 ℓ <u>3 mℓ</u>

    (d)   5 lb   <u>5 oz</u>   (5 kg)

(3) 306.1

3. *[24 pts - 4 or 8 each]* Convert and round as indicated. Show clear work.

    (a) 3.061 hm^2 to m^2 - do not round

$\boxed{30610 \ m^2}$

3 ̶ᵡ
hm² | 0 6
      dam² | 1 0.
             m² |

(b) 582 ounces to pounds - do not round

$$582 \text{ oz} \div 16 = \boxed{36.375 \text{ lb}}$$

proportion
or
dimension analysis
also correct.

(c) 0.57 km per \$1 to ℜ per meter - round to the nearest hundredth
(1 ℜ = 2.6 cents)

-2) no flip
③ 1000 km = 1 m
⑤ frac not worth 1

$$\frac{0.57 \text{ km}}{\$1} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{\$1}{100 \cancel{c}} \times \frac{2.6 \cancel{c}}{1 \text{ ℜ}} \quad \text{5) FLIP}$$

$$100 \div 0.57 \div 1000 \div 2.6$$

$$= \boxed{.07 \text{ ℜ per meter}}$$

(d) 157.8 team-hours per $mile^2$ to man-minutes per ft^2 - round to the nearest tenth
(1 team = 40 men)

-2) no repeat
with error

$$\frac{157.8 \text{ tm-hr}}{mile^2} \times \frac{1 \text{ mile}}{5280 \text{ ft}} \times \frac{1 \text{ mile}}{5280 \text{ ft}} \times \frac{40 \text{ men}}{1 \text{ team}} \times \frac{60 \text{ min}}{1 \text{ hr}}$$

$$= \boxed{.01 \text{ man-minutes per } ft^2}$$

4. *[8 pts]* Find the area of a circle whose circumference is 19.26 cm. Round to the nearest hundredth. Show work.

-1) units
-1) no area
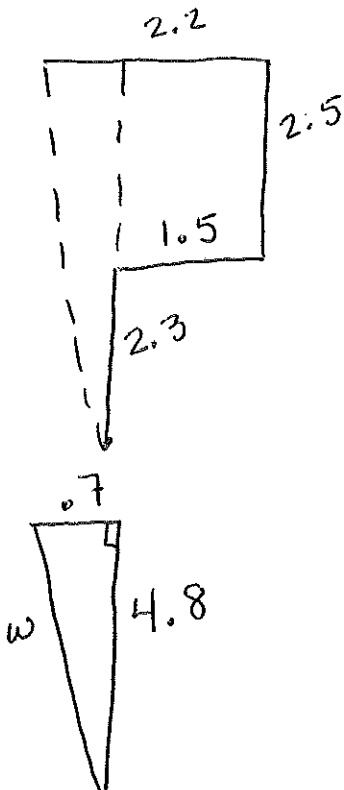
$$C = 2\pi r$$

$$\frac{19.26}{2\pi} = \frac{2\pi r}{2\pi}$$

$$3.07 = r$$

$$A = \pi r^2$$

$$A = \pi (3.07)^2$$

$$\boxed{= 29.61 \text{ cm}^2}$$

5. *[6 pts]* On the salt flats, a hiker walks 2.3 km north, then goes 1.5 km east, walks another 2.5 km north, and finally walks 2.2 km west. How far would it be for the hiker to go directly back to his starting point? Show work; round to the nearest <u>tenth</u>.

2.2

2.5

1.5

2.3

.7

ω 4.8

$$(4.8)^2 + (0.7)^2 = \omega^2$$

$$23.04 + .49 = \omega^2$$

$$23.53 = \omega^2$$

$$\sqrt{23.53} = \omega$$

$$\boxed{\begin{array}{c} 4.9 \text{ km } = \omega \\ \text{distance to} \\ \text{start} \end{array}}$$
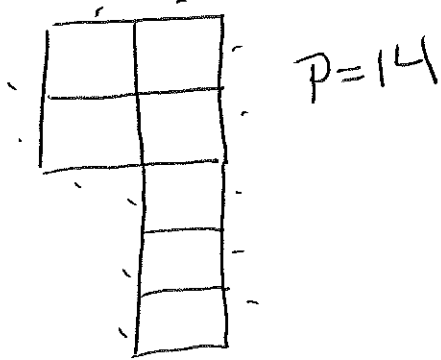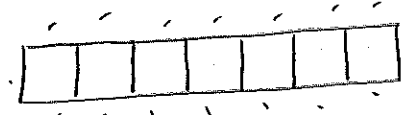
① $16 = P$ but expl is right.

6. *[5 pts]* Draw a heptomino ("hepto" means 7) whose perimeter is neither the largest nor the smallest possible. Compute your perimeter, and explain how you know it falls between the two extreme possibilities.

- The smallest possible comes from the most compact shape!

$P = 14$

$P = 12$
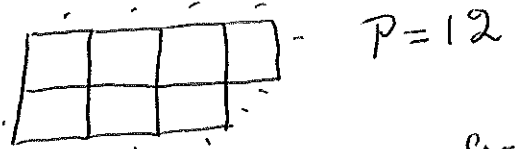
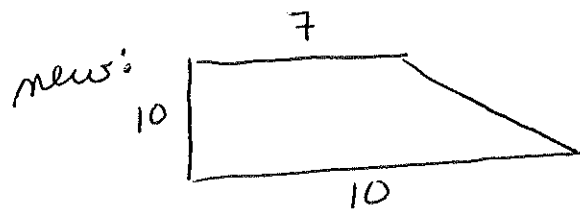The largest possible comes from the most elongated shape!

$P = 16$

① bad units

② bad analysis

7. *[10 pts]* The height of a trapezoid is 10 feet. If each base gets 2 feet longer, what amount will be added to the area? Show ONE pair of comparisons and state your conclusion verbally.

(Various)

old: 10, 5, 8

$A = \frac{1}{2} \cdot (8+5) \cdot 10 = 65 \ ft^2$

new: 7, 10, 10
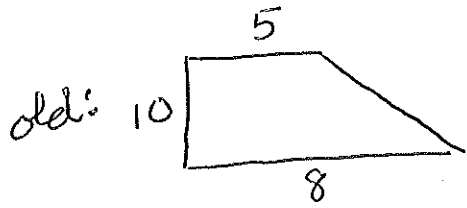
$A = \frac{1}{2} \cdot (10+7) \cdot 10 = 85 \ ft^2$

The area has had 20 ft² added to it.

8. *[3 pts]* In a triangle, the two longer sides are 15 inches and 19 inches. What is the minimum possible length of the shortest side, to the nearest tenth?
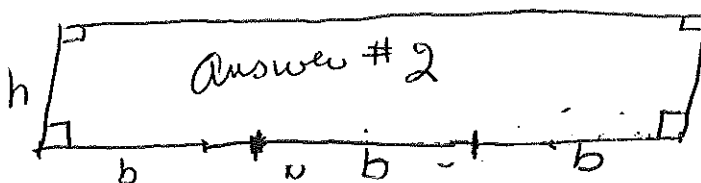
-1 4
-3 Pyth Thm.

$\boxed{4.1 \text{ in}}$

$\left(\begin{array}{l}\text{we need} \\ \underline{\hspace{1cm}} + 15 > 19 \\ \text{so } \underline{\hspace{1cm}} \text{ contains more than 4.}\end{array}\right)$

9. *[3 pts]* Draw, to scale, a rectangle whose area is triple that of the parallelogram shown. You may overlap the parallelogram if you wish.

answer #1
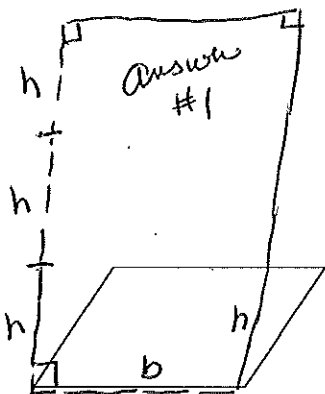
$\left(\text{They are accidentally leaning, but should NOT.}\right)$

answer #2

1 in = 1

10. *[10 pts]* An isosceles triangle has an area of 60 square meters and a base of 10 meters. The other two sides are each x meters long. Find x, to the nearest tenth. Show clear work.
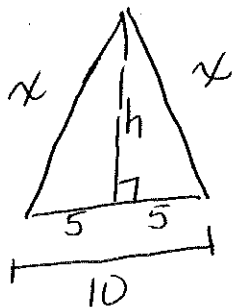
$A = \frac{1}{2}bh$

$60 = \frac{1}{2} \cdot 10 \cdot h$

$\frac{60}{5} = \frac{5h}{5}$

$h = 12$

$5^2 + 12^2 = x^2$
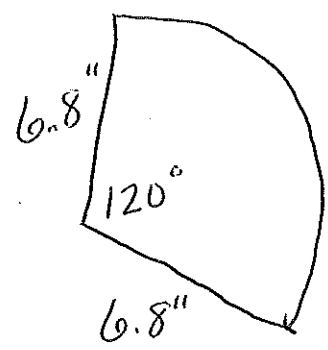
$25 + 144 = x^2$

$169 = x^2$

$\sqrt{169} = x$

$\boxed{13m = x}$

or 13.0 m

② foot sides

11. *[10 pts]* Find the complete perimeter of a circular sector that opens 120° and whose radius is 6.8 inches long. Round to the nearest tenth, and show work.

6.8"

120°

6.8"

$\frac{1}{3}$ circle:

total $C = 2\pi r$
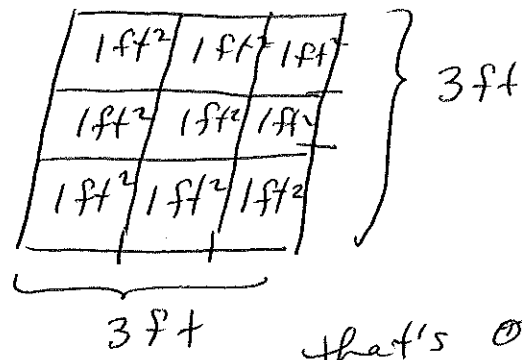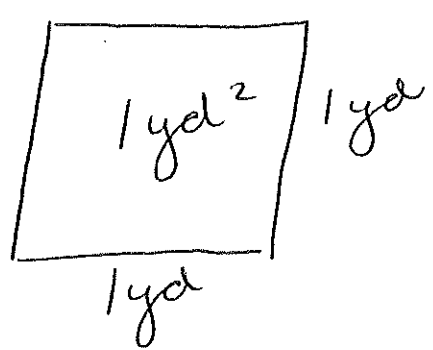$= 2\pi(6.8)$
$= 42.7$

$\frac{1}{3}C = 14.2$

Total perim $= 6.8 + 6.8$
$+ 14.2$

$\boxed{= 27.8 \text{ in}}$

① no words
1 yd by 1 yd
is accepted.

12. *[6 pts]* Draw and refer to a diagram to explain how many square feet there are in a square yard. Your diagram should show and clearly label an object representing 1 square yard and also an object representing 1 square foot.

1 yd^2 1 yd

1 yd

1 ft²	1 ft²	1 ft²
1 ft²	1 ft²	1 ft²
1 ft²	1 ft²	1 ft²

} 3 ft

3 ft

A square yard's a square. that's one yard along each side. Cut those sides into 3 feet each + extend through the diagram. This makes 9 smaller squares that are all 1ft along each side. that makes each equal to 1 square foot. So there are $\boxed{9 \text{ sq ft in } 1 \text{ sq yd}}$