Math 118 - Dr. Miller - Exam #1 - Spring 2006 Key

22/22

Make sure that all cell phones are turned off, not set on ring or vibrate. Calculators ARE permitted on this exam.

1. *[12 pts - 2 each]* Circle the most reasonable measurement:

   (a) It's just warm enough in our room now. The indoor temperature is about:

   $20^o\ C$ $\quad 0^o\ C$ $\quad 68^o\ C$ $\quad 32^o\ C$

   (b) The area of our classroom chalkboard is about:

   $6\ m^2$ $\quad 60\ m^2$ $\quad 6\ cm^2$ $\quad 60\ cm^2$

   (c) The length of your forearm is about:

   $2\ m$ $\quad 2\ dm$ $\quad 2\ cm$ $\quad 2\ dkm$

   (d) The distance from here to the library is about:

   $50\ km$ $\quad 5.0\ km$ $\quad 50\ m$ $\quad 5.0\ m$

   (e) The weight of my cat is about:

   $50\ kg$ $\quad 5.0\ kg$ $\quad 50\ g$ $\quad 5.0\ g$

   (f) The volume of the fountain near the library is about

   $1\ \ell$ $\quad 1\ m\ell$ $\quad 1\ k\ell$ $\quad 1\ dk\ell$

2. *[10 pts - 2-4 each]* Convert exactly; do not round:

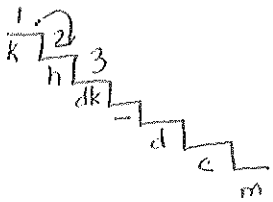
   2 (a) $1.23\ km =$ 12.3 hm

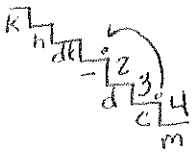
   2 (b) $23.4\ c\ell =$ 0.234 ℓ

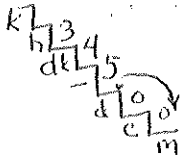
   2 (c) $345\ dg =$ 34,500 mg

   4 (d) $34.5\ m^2 =$ 345000 cm^2

   -2 one dec.
   -3 two







$34.5\ \cancel{m} \cdot \cancel{m} \times \frac{100\ cm}{1\ \cancel{m}} \times \frac{100\ cm}{1\ \cancel{m}} =$

28/28

(-3) PT
(-1) right Δ language

3. *[3 pts]* Could pipes of lengths 15 feet, 18 feet, and 34 feet be arranged to form a triangle? Explain. No. They fail the Triangle Inequality because $15 + 18 \not> 34$.

4. *[25 pts - 3 or 8 each]* Convert, rounding to the nearest tenth. Show work as needed.

3 (a) 7 hours, 38 minutes to minutes

$7 \cdot 60 + 38 = \boxed{458 \text{ minutes}}$

(-3) any error

3 (b) 76,543 feet to miles

$\frac{76543}{5280} = \boxed{14.5 \text{ miles}}$

(-3) any error

3 (c) 123.4 quarts to gallons

$\frac{123.4}{4} = \boxed{30.9 \text{ gallons}}$

8 (d) $900 dollars per (30-day) month to cents per minute

$\frac{\$900}{1 \text{ month}} \times \frac{1 \text{ month}}{30 \text{ days}} \times \frac{1 \text{ day}}{24 \text{ hrs}} \times \frac{1 \text{ hr}}{60 \text{ min}} \times \frac{100¢}{\$1} = \boxed{2.1¢/\text{min}}$

(1) 900·100
(2) # secs.

8 (e) 82.3 kilograms per square foot to pounds per square inch (1 kg = 2.2 pounds)

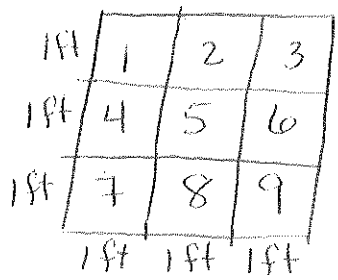
$\frac{82.3 \text{ kg}}{1 \text{ ft} \cdot \text{ft}} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{2.2 \text{ lbs}}{1 \text{ kg}} = \boxed{1.3 \text{ lbs/in}^2}$

20/20

5. *[5 pts]* Tell how many square feet are in a square yard, then clearly explain why.

Nine. One square yard is a square that's 1 yard on each side. That means it's 3 feet by 3 feet, so it has an area of 9 square feet.

full credit for dimension analysis, too.

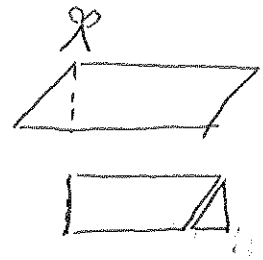


6. *[5 pts]* Clearly and thoroughly explain how we derive the formula for the area of a parallelogram from that for a rectangle.

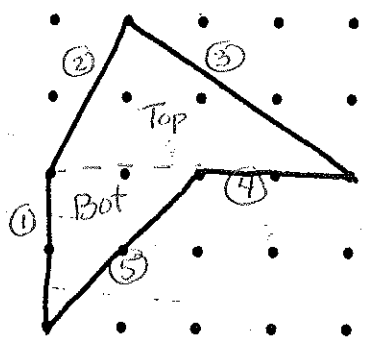
-1) same b, h

-3) no derive/create

If you cut a parallelogram along its height, you can move the detached triangle to create a rectangle. The area of the rectangle is the same as of the parallelogram, but the rectangle's is b·h, the same b and h as the parallelogram's.



7. *[10 pts]* Find the perimeter (6) and area (3 4) of this object, clearly separating your perimeter work and answer from that for area; round to the nearest tenth if necessary.



Area = entire grid − upper left Δ − upper right Δ − trapezoid

$= 4\times4 - \frac{1}{2}(1)(2) - \frac{1}{2}(2)(3) - \frac{1}{2}(4+2)\cdot 2$

$= 16 - 1 - 3 - 6 = 6$ (square units)

OR Area = top Δ + bottom Δ

$= \frac{1}{2}(4)(2) + \frac{1}{2}(2)(2) = \boxed{6 \text{ (square units)}}$

Perimeter = sides 1-5 totalled

$= 2 + \sqrt{5} + \sqrt{13} + 2 + \sqrt{8}$

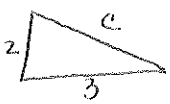
$= 2 + 2.2 + 3.6 + 2 + 2.8$

$\boxed{= 12.6}$

(2) 

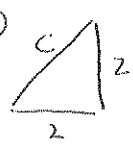
$1^2 + 2^2 = c^2$

$\sqrt{5} = c$

(3) 

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

$\sqrt{13} = c$

(5) 

$2^2 + 2^2 = c^2$

$\sqrt{8} = c$

$\frac{20}{20}$

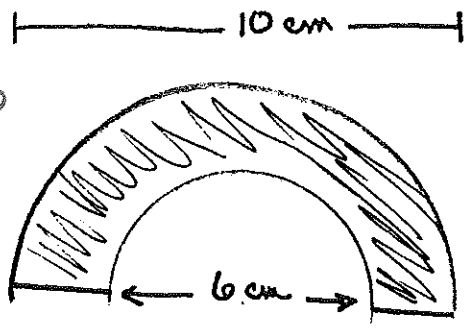
(6) (4)

8. *[10 pts]* Find the perimeter and area of this object, clearly separating your perimeter work and answer from that for area; round to the nearest tenth if necessary.

-1 no half
-2 no subt.

$\frac{5\pi}{2} \approx 39.3$

$\frac{7\pi}{2} \approx 14.1$



Area = half big circle − half little cir.

$= \frac{1}{2}\pi(5)^2 - \frac{1}{2}\pi(3)^2$

$= 8\pi = \boxed{25.1 \text{ cm}^2}$

Perimeter = big arc + little arc + 2 straight pieces

$= 5\pi + 3\pi + 2 + 2$

$\boxed{= 29.1 \text{ cm}}$

$5\pi \approx 15.7$

$3\pi \approx 9.4$

-1 no +4.

Big arc

d=10

$\frac{1}{2}\pi d = \frac{1}{2}\pi(10) = 5\pi$

Little

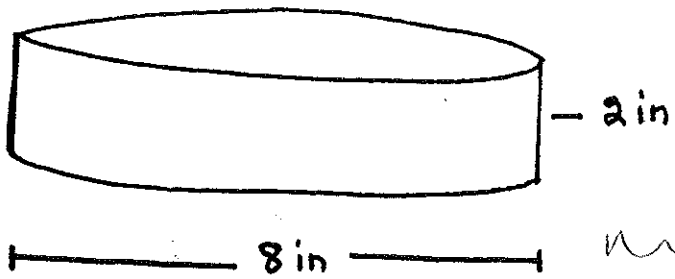
d=6

$\frac{1}{2}\pi d = \frac{1}{2}\pi \cdot 6 = 3\pi$

(6) (4)

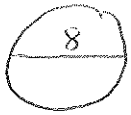
9. *[10 pts]* Find the surface area and volume of the shape below, clearly separating your surface area work and answer from that for volume; round to the nearest tenth if necessary.

-3 no circum



$V = Bh = (\pi \cdot 4^2) \cdot 2$

$\boxed{= 100.5 \text{ in}^3}$



$A = \pi r^2$

$= \pi \cdot 4^2$

SA = top + bottom + side

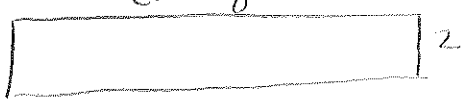
$= \pi \cdot 4^2 + \pi \cdot 4^2 + \pi \cdot 8 \cdot 2$

$= 48\pi$

$\boxed{= 150.8 \text{ in}^2}$

side:

circumference

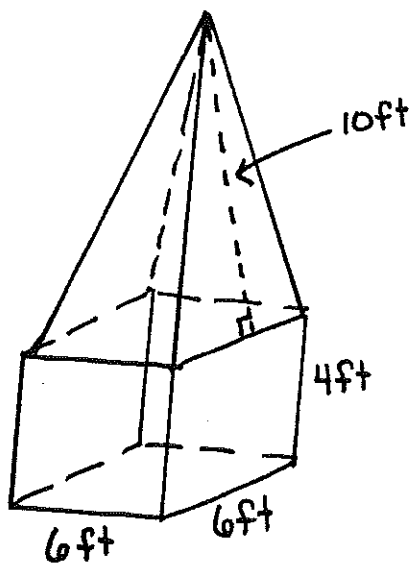


$C = \pi d = \pi \cdot 8$

area $= \pi \cdot 8 \cdot 2$

10 / 10

10. *[10 pts]* Find the surface area and volume of the shape below, clearly separating your surface area work and answer from that for volume; round to the nearest tenth if necessary.

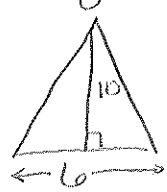


SA = 4 triangles + 4 rectangles (sides) + square (bottom)

$= 4(30) + 4(6 \cdot 4) + 6 \cdot 6$

$\boxed{= 252 \text{ ft}^2}$

Triangles:



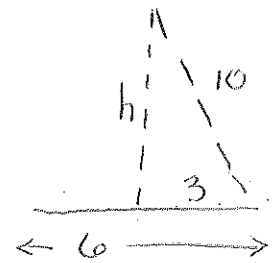
$A = \frac{1}{2}(6)(10)$
$= 30$

$V = V_{block} + V_{pyramid}$

$= 6 \cdot 6 \cdot 4 + \frac{1}{3}(36)(9.5)$

$\boxed{= 258 \text{ ft}^3}$

$V_{pyr} = \frac{1}{3} Bh$



$h^2 + 3^2 = 10^2$

$h^2 = 91$

$h = \sqrt{91} \approx 9.5$

$V_{pyr} = \frac{1}{3}(36)(9.5)$

-3 no PT

$V_{sphere} = \frac{4}{3}\pi r^3 \qquad SA_{sphere} = 4\pi r^2 \qquad SA_{cone\ side} = \pi r \ell$