Key 18/18

Math 118 - Dr. Miller - Final Exam - 12/15/09

1. *[5 pts - 1 each]* Circle the most reasonable measurement for each attribute.

   (a) The weight of a butterfly:

   5 g | 500 g | 5kg | 500 kg

   (b) The temperature in a properly working refrigerator:

   $-50°C$ | $-5°C$ | $5°C$ | $50°C$

   (c) The height of Old Main:

   30 mm | 30 cm | 30 m | 30 km

   (d) The volume of your backpack/book bag:

   7 $m\ell$ | 70 $m\ell$ | 7 ℓ | 70 ℓ

   (e) The width of this page from left to right:

   2.1 mm | 21 mm | 2.1 cm | 21 cm

-2) dim and w/pad factor
-2) bad position on staircase
-1) no understd. of km^3

2. *[5 pts]* Convert 57.9 dam^3 to km^3; do not round.

$km^3 \mid 000$

$hm^3 \mid 057x$

$dam^3 \mid 9$

$.0000579\ km^3$

Changed to km^3 and mi^2

3. *[8 pts]* Convert 52.83 kilometers^2 per hour to minutes per mile^2, given that 1.6 km equals 1 mile. Round to the nearest hundredth.

-2) no FLIP (.34)
-1) lost #s from work to answer
-3) no cancelling arrangements.

$$\frac{52.83\ km^2}{hr} \times \frac{1\ hr}{60\ min} \times \left(\frac{1\ mile}{1.6\ km}\right)^2 \quad \text{FLIP}$$

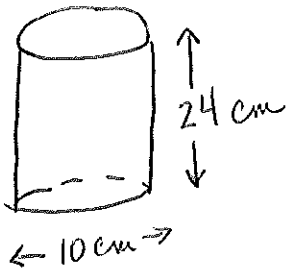
~~0.82~~ minutes

2.91 per mile

16/16

4. (a) *[10 pts]* A circular cylinder has a height of 24 cm. The diameter of top and bottom is 10 cm. Find its surface area to the nearest tenth, showing clear work.

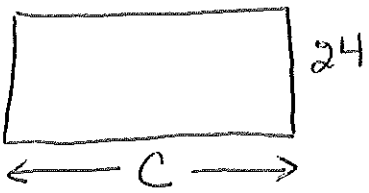
(-2) r=10
(-1) bad/no units
(-4) 24.10



Top: $\pi r^2 = \pi(5)^2 = 78.54$

Bottom: (same) 78.54

Unrolled side: $24(31.42) = 754.08$

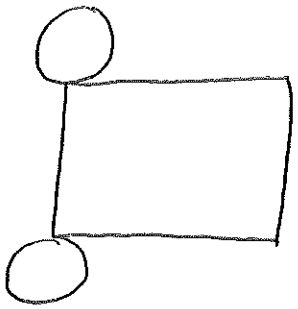


$C = 2\pi r$
$= 2\pi \cdot 5$
$= 31.42$

$911.16\ cm^2$

(-1) net = cross-sxn
(-3) not full circles
(-3)

(b) *[2 pts]* Draw a net for the cylinder.



(c) *[2 pts]* How many lateral planes of symmetry does it have?

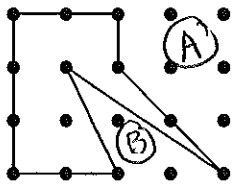
1

(d) *[2 pts]* How many lateral axes of symmetry does it have?

infinitely many

5. *[10 pts]* The horizontal and vertical distance between adjacent dots in this grid is 1 cm. Find the area of the given shape, to the nearest tenth. Show clear work.

-1) bad units
-3) ht = hypot.
-1) [] = 4×1



Area = Total − A − B

= 12 − 4 − 2

$= 6\ cm^2$

A = trapezoid

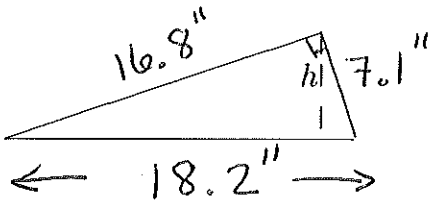
$\frac{1}{2}(b_1 + b_2)h = \frac{1}{2}(1+3)\cdot 2 = 4$

B = triangle

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

6. *[8 pts]* A right triangle is oriented so that it sits on its hypotenuse; i.e., the hypotenuse is horizontal, as shown. If the legs are 16.8 inches and 7.1 inches long, respectively, what is the height h of the triangle to the nearest tenth? Show clear work.

-3) hypot.
-5) 18.2 − 16.8
-2) ~ Δs not clearly ordered



$A = \frac{1}{2}bh$

$= \frac{1}{2}(16.8)(7.1)$

$= 59.64$

$16.8^2 + 7.1^2 = c^2$

$332.65 = c^2$

$18.2 = c$

$A = \frac{1}{2}bh$

$59.64 = \frac{1}{2}(18.2)h$

$59.64 = 9.1h$

$h = 6.6''$

14
14

7. *[6 pts - 2 each]* Consider the diagram on the board. Use correct notation to name each of the following.

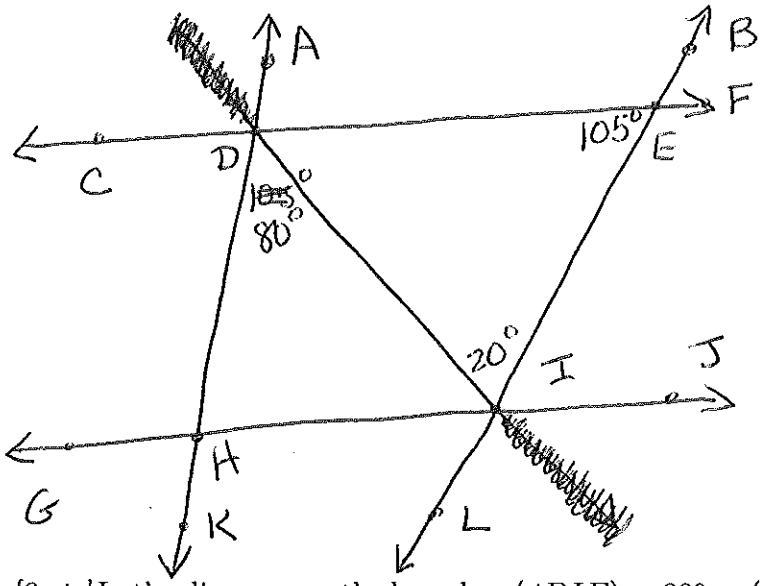
(-1) $\overline{ID}$

(a) $\angle DIE \cap \angle HID$ $\overrightarrow{ID}$

(b) $\overline{IJ} \cup \overrightarrow{IG}$ $\overrightarrow{JG}$

(-1) ray

(c) $\overrightarrow{GJ} \cap \angle BIG$ $\overline{IG}$



P=D

HDI

8. *[8 pts]* In the diagram on the board, $m(\angle DIE) = 20°$, $m(\angle DEI) = 105°$, and $m(\angle \cancel{HPI}) = 80°$. Find the measure of $\angle PHI$, explaining your reasoning verbally.

$m(\angle EDI) = 55°$ because it completes $\triangle EDI$.

$m(\angle CDH) = 45°$ because it is supplementary to the $(80 + 55)°$ $\angle HDI$.

$m(\angle DHI) = 45°$ because it is alternate interior with $\angle CDH$.

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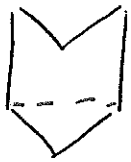
9. *[20 pts - 2 per characteristic]* Draw examples of the following; mark all significant features.

(a) a quadrilateral that is equilateral but not regular

4

(b) a concave hexagon and one of its diagonals

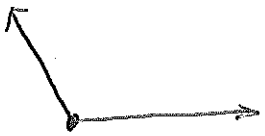
6



(c) an obtuse angle and its vertex

(-1) no arrows

4

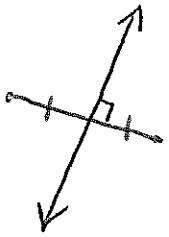


(d) a line segment and its perpendicular bisector

(-1) no "7" mark

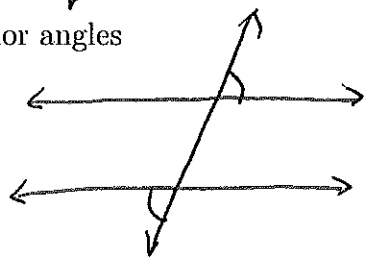
(-1) no ≅ marks

4



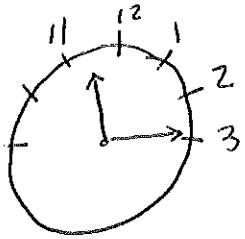
(e) a pair of alternate exterior angles

2



10. *[6 pts]* How many degrees is the non-reflex angle formed by the hands of a working clock at 11:15? Show work.

(-5) 120°



3 full 30° + part of another

$\frac{3}{4}$ of another

$\frac{3}{4}$ of $30^\circ = 22.5^\circ$

112.5°

11. *[6 pts]* Is it possible for a convex polygon to have an interior angle total of 53100°? Justify your response.

$(n-2)\cdot 180^\circ = 53100^\circ$

$n-2 = 295$

$n = 297$ sides IS possible.

(n is a whole #.)

12. *[4 pts - 1 each]* Classify each statement below as always, sometimes, or never true.

(a) A kite is a quadrilateral.

always true *sometimes true* *never true*

(b) A square is equiangular.

always true *sometimes true* *never true*

(c) A rhombus is a trapezoid.

always true *sometimes true* *never true*

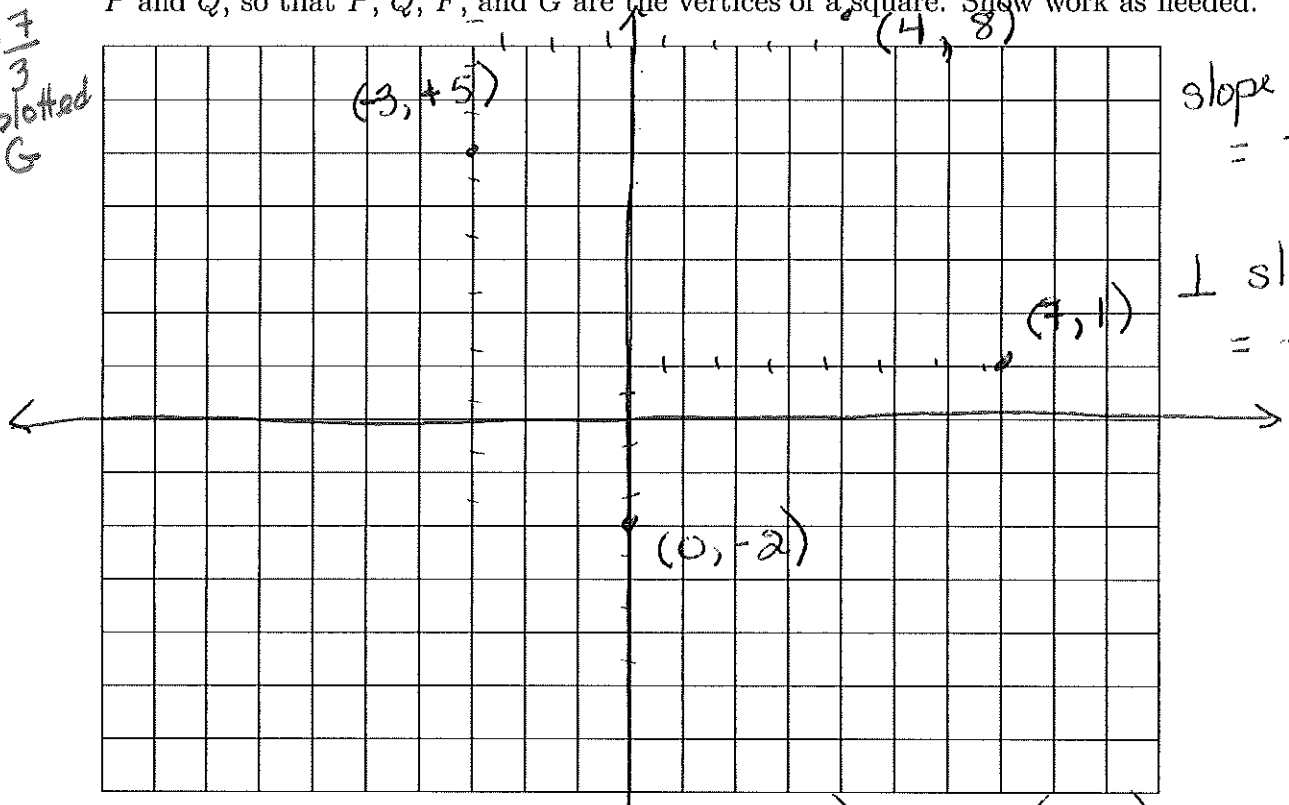
(d) An isosceles triangle is obtuse.

always true *sometimes true* *never true*

13. *[10 pts]* If point $F = (0, -2)$ and $G = (-3, 5)$, find the coordinates of a pair of points, P and Q, so that P, Q, F, and G are the vertices of a square. Show work as needed.

(3) slope = $\frac{-7}{3}$

(-3) misplotted for G



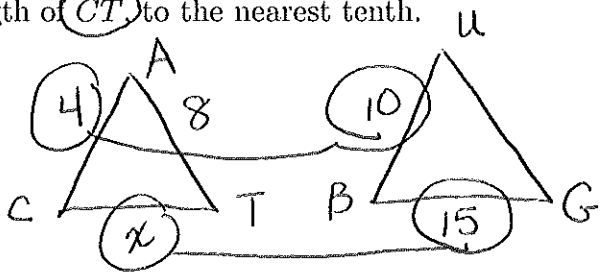
slope of $\overline{FG}$ = $\frac{-7}{3}$

$\perp$ slope = $\frac{3}{7}$

(4, 8) and (7, 1)

or (-7, -5) and (-10, 2)

14. *[6 pts]* $\triangle CAT \sim \triangle BUG$ with $AC = 4$, $AT = 8$, $BG = 15$, and $BU = 10$. Find the length of CT, to the nearest tenth.



$\frac{4}{x} = \frac{10}{15}$

$60 = 10x$

$\boxed{6 = x} = CT$

15. *[10 pts]* Two objects are similar. Every length in the larger object is 5.2 times that of the smaller one. If the volume of the larger object is 872.4 m^3, find the volume of the smaller one, to the nearest tenth. Show clear work.

$5.2 = \text{S.f.} = \frac{IS}{OF} = \frac{\text{larger}}{\text{smaller}} = \frac{\text{new length}}{\text{old length}}$

(-6) straight proportions (167.76)

$\frac{\text{new volume}}{\text{old volume}} = (\text{S.f.})^3$

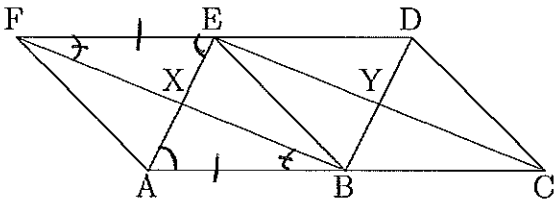
$\frac{872.4}{V} = (5.2)^3$

$\frac{872.4}{V} = 140.608$

$\boxed{V = 6.2\ m^3}$

16. *[8 pts]* In the figure below, assume only that $\overline{AB}$ and $\overline{FE}$ are congruent and parallel. Find a pair of congruent triangles, using correct notation $\triangle$_____ $\cong$ $\triangle$_____, then explain your reasoning for the congruence acronym you used.

(-2) bad order



(2) $\triangle FEX \cong \triangle BAX$

(1) by ASA

(2) $\angle EFX \cong \angle ABX$ because they're alternate interior $\angle$s.

(1) $\overline{EF} \cong \overline{AB}$ is given.

(2) $\angle FEX \cong \angle BAX$ " " " " "

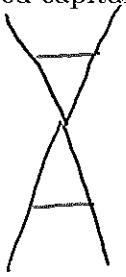
Also $\triangle FEA \cong \triangle BAE$ by (2) (1) (2) SAS
top two above
$\overline{EA}$ is shared.

} Also $\triangle FEB \cong \triangle BAF$

17. (a) *[2 pts]* What is the smallest number of degrees a regular nonagon must be rotated to demonstrate symmetry?

$\frac{360^\circ}{9} = 40^\circ$

(b) *[2 pts]* Beginning with a printed capital letter "A," create a figure that has exactly two lines of symmetry.



(various)

(c) *[2 pts]* Draw a figure that has reflectional symmetry, but no other kind of symmetry.

(d) *[2 pts]* If a prism has an isosceles trapezoid for a base, how many axes of symmetry does the prism have altogether?

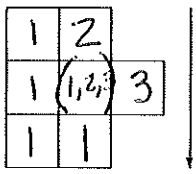
1

(e) *[2 pts]* Name a three-dimensional object that has one longitudinal axis of symmetry and 5 longitudinal planes of symmetry.

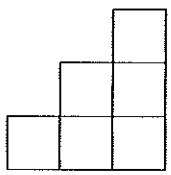
regular pentagonal pyramid (or prism)

18. *[4 pts]* Given these views of a three-dimensional block structure, tell how tall each portion of the structure is by writing the heights in the top view positions.

Top View



Front View



Side View