1. [5 pts - 1 each] Circle the most reasonable measurement for each attribute.
(a) The weight of a butterfly:
$5 g$
500 g
5 kg
500 kg
(b) The temperature in a properly working refrigerator:

$$
-50^{\circ} \mathrm{C} \quad-5^{\circ} \mathrm{C} \quad 5^{\circ} \mathrm{C} \quad 50^{\circ} \mathrm{C}
$$

(c) The height of Old Main:
30 mm
30 cm
30 m
30 km
(d) The volume of your backpack/book bag:
7 ml
70 ml
$7 \ell$
$70 \ell$
(e) The width of this page from left to right:
2.1 mm
21 mm
2.1 cm
21 cm
2. [ 5 pts ] Convert $57.9 \mathrm{dam}^{3}$ to $\mathrm{km}^{3}$; do not round.
3. [ 8 pts ] Convert 52.83 square kilometers per hour to minutes per square mile, given that 1.6 km equals 1 mile. Round to the nearest hundredth.
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.
(b) [2 pts] Draw a net for the cylinder.
(c) [2 pts] How many lateral planes of symmetry does it have?
(d) [2 pts] How many lateral axes of symmetry does it have?
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.

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.

7. [6 pts - 2 each] Consider the diagram on the board. Use correct notation to name each of the following.
(a) $\angle D I E \cap \angle H I D$
(b) $\overline{I J} \cup \overrightarrow{I G}$
(c) $\overrightarrow{G J} \cap \angle B I G$
8. [8 pts] In the diagram on the board, $m(\angle D I E)=20^{\circ}, m(\angle D E I)=105^{\circ}$, and $m(\angle H P I)=$ $80^{\circ}$. Find the measure of $\angle P H I$, explaining your reasoning verbally.
9. [20 pts - 2 per characteristic] Draw examples of the following; mark all significant features.
(a) a quadrilateral that is equilateral but not regular
(b) a concave hexagon and one of its diagonals
(c) an obtuse angle and its vertex
(d) a line segment and its perpendicular bisector
(e) a pair of alternate exterior angles
10. [6 pts] How many degrees is the non-reflex angle formed by the hands of a working clock at 11:15? Show work.
11. [6 pts] Is it possible for a convex polygon to have an interior angle total of $53100^{\circ}$ ? Justify your response.
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
sometimes 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.

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14. [6 pts] $\triangle C A T \sim \triangle B U G$ with $A C=4, A T=8, B G=15$, and $B U=10$. Find the length of $C T$, to the nearest tenth.
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 $872.4 \mathrm{~m}^{3}$, find the volume of the smaller one, to the nearest tenth. Show clear work.
16. [8 pts] In the figure below, assume only that $\overline{A B}$ and $\overline{F E}$ 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.

17. (a) [ 2 pts ] What is the smallest number of degrees a regular nonagon must be rotated to demonstrate symmetry?
(b) [2 pts] Beginning with a printed capital letter "A," create a figure that has exactly two lines of symmetry.
(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?
(e) [2 pts] Name a three-dimensional object that has one longitudinal axis of symmetry and 5 longitudinal planes of symmetry.
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


