1. [14 pts - 2 each] Refer to the diagram below (extra copies are on the back page):

(a) Name a set of three noncollinear points.
(b) Name three different objects that $\overline{F H}$ is part of.
(c) Name a pair of adjacent angles that are not a linear pair.
(d) Name a pair of acute vertical angles having $F$ as a vertex.
(e) Find $\overrightarrow{F E} \cup \overline{E G}$.
(f) Find $\overrightarrow{F C} \cap \angle D C A$.
(g) Find $\angle G C F \cap \angle I F C$.
2. [8 pts] Find the exact size of the non-reflex angle formed by the hands of a working clock at 11:20. Show clear work.
3. [10 pts] In this diagram, $\overleftrightarrow{C} \vec{F} \| \overleftarrow{A} \vec{E}, m(\angle I K G)=75^{\circ}$, and $m(\angle J D E)=35^{\circ}$.

(a) Find $m(\angle J K F)$, clearly explaining your reasoning.
(b) Find $m(\angle H B E)$, clearly explaining your reasoning.
4. (a) [3 pts] Circle all possible points $C$ in the grid that would make $\angle B C A$ an obtuse angle.

(b) [3 pts] Circle all possible points $D$ in the grid that would make $\angle D E F$ a straight angle.

5. [8 pts] Determine the total number of diagonals of a 140-gon, explaining your process thoroughly and clearly. (If you use a memorized formula, you must still explain why that formula works.)
6. [6 pts] Is it possible for a polygon to have an interior angle total of $50,280^{\circ}$ ? Justify your response with a suitable computation or verbal reasoning.
7. [6 pts] Find the missing angle measures, rounded to the nearest tenth. Show work.

8. [8 pts - 2 each] Classify each statement below as always, sometimes, or never true.
(a) A square is a quadrilateral.
(b) An equilateral triangle is acute.
(c) The diagonals of a rhombus are congruent.
(d) A trapezoid has no congruent sides.
9. [24 pts - 4 each] Draw and mark examples as indicated of the following; if not possible, say so.
(a) a bisector of an angle (circle the actual bisector to mark it)
(b) a right equilateral triangle (mark the right angle; mark the sides to show same or different lengths)
(c) a trapezoid having no congruent sides (mark the sides to show same or different lengths)
(d) a parallelogram that is not a square (mark the parallel sides with matching arrows; mark the sides to show same or different lengths)
(e) a curve that is closed but not simple (no marking required)
(f) a quadrilateral that is equiangular but not equilateral (mark all sides and angles to show same or different sizes)
10. [10 pts - 2 each] Complete each sentence with the correctly spelled term being defined.
(a) The point where the two rays creating an angle are joined together is called the ...
(b) A polygon having twelve sides is called a ...
(c) Two angles whose measurements total $90^{\circ}$ are called ...
(d) Three or more lines that intersect at the same point are called ...
(e) A polygon that is both equiangular and equilateral is called ...

