1. /6 pts/ State any two meanings of the term "congruent."

2. [6 pts] Will this pin-and-straw construction be rigid? Explain, naming the congruence acronym that is most prevalent in considerations of rigidity.



3. [4 pts] We know that the acronym "SAS" stands for the phrase "side-angle-side." Explain precisely what this statement says mathematically (either version is acceptable).

4. [6 pts] Give an acronym that cannot guarantee triangle congruence, then explain why not, referring to a supporting diagram if you wish.

- 5. [18 pts 6 each] Apply the given information to each diagram to find a pair of congruent triangles. For each:
  - Use correct notation to tell which two triangles they are.
  - Specify the acronym that guarantees their congruence.
  - Thoroughly explain how you arrived at your conclusion.
  - (a) Assume nothing except that  $\overline{FB} \cong \overline{EC}$  and that  $\angle FBE \cong \angle BEC$ .



(b) Assume *nothing* except that  $\overline{AE} \cong \overline{CE} \cong \overline{FB} \cong \overline{DB}$  and that ACDF is a rhombus.



(c) Assume nothing except that  $\angle AXF \cong \angle DYC$  and that  $\overline{BE}$  bisects  $\angle AEC$ .



6. [6 pts] I hope to view the Gateway Arch in St. Louis while at my conference (if it's a good conference, I won't get time!). If my shadow is 3.2 feet long while the Arch's is 376.8 feet long, how tall is the arch? I am 5.25 feet tall. Show clear work, but you need not explain. Round to the nearest tenth if needed.

7. [4 pts] An adult giraffe and its young are geometrically similar. The adult is 18 feet tall and the youngster is 6 feet tall. How many times stronger is the adult than the youngster? Briefly explain.

8. [12 pts] In the figure,  $\triangle CAT \sim \triangle MAD \sim \triangle MDT$ . Show work in finding the missing lengths x and y, rounded to the nearest tenth.



9. [8 pts] Two rectangular boxes are mathematically similar. The surface area of one is 15.2 square meters while that of the other is 237.5 square meters. If the volume of the smaller one is 100 cubic meters, what is the volume of the larger? Show work, but you need not explain. Round to the nearest tenth.

10. (a) [8 pts] Translate the "F" via the arrow, then rotate the result  $90^{\circ}$  clockwise around point O. Circle your final answer.

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(b) [10 pts] Reflect the "F" through line  $\ell$ , then rotate the result 180° around point Q. Circle your final answer.

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11. [4 pts] Complete the diagram so that line  $\ell$  is a line of reflection.



12. [8 pts] One of these figures is the image of the other after a rotation about point C. Precisely locate the center of rotation, explaining your technique. (Leave any scratch marks in place for grading purposes.)

