

University of South Carolina
Math 222: Math for Elementary Educators II
Instructor: Austin Mohr
Section 002
Fall 2010

Midterm Exam

Please write your solutions (including work) on the blank paper, not the test sheet. For problems involving trigonometry, make sure your calculator is in degree mode, not radian mode.

Definitions (25%)

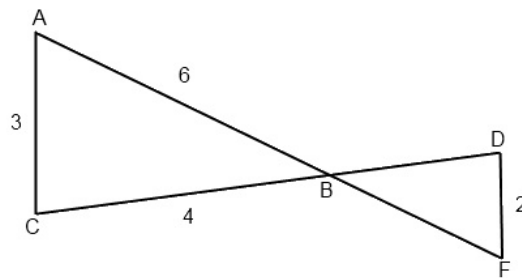
Define each of the following terms.

1. similar triangles
2. simple (three-dimensional version)
3. convex
4. polygon
5. polyhedron
6. prism

Computation (50%)

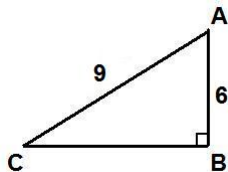
Provide the requested information for each question. Show all your work.

7. Refer to the figure below for the following questions. You may assume that side \overline{AC} is parallel to side \overline{DF} .



- a. Show that the big triangle on the left is similar to the small triangle on the right.
- b. Sketch the two triangles side-by-side (with the vertices labelled) so that they are oriented the same way.
- c. Find the length of side \overline{BF} .

8. Find all missing sides and angles in the triangle below. You may *not* use the Pythagorean Theorem.



9. The following two questions are unrelated. You will not use part a to solve part b.
- A factory is trying to decide whether to produce cogs or sprockets. The profit for producing cogs is modelled by the equation $y = x - 500$, where x is the number of cogs produced and y is the profit in dollars. Similarly, the profit for producing sprockets is modelled by the equation $y = 3x - 1000$. What is the level of production (i.e. how many units are being produced) if the profit is the same for both cogs and sprockets? How much profit is being made at this level of production?
 - Water is being added to a tank at a constant rate. Four seconds after the filling began, the tank contained 20 gallons of water. Ten seconds after filling began, the tank contained 41 gallons. Write a linear equation to describe the change in the volume of water over time. Be sure to specify the meaning of the variables x and y .

Short Answer (25%)

Give a short response to each of the following questions. Do *not* give a full proof.

- How many planes are determined by four points that are not all coplanar? Explain.
- Is every trapezoid a rhombus? Is every rhombus a trapezoid? Explain.
- Can there be a regular polyhedron with three hexagons meeting at every vertex? Why or why not?
- Explain why certain triangle congruence rules are “good” (i.e. they can be used to tell two triangles are congruent), while other congruence rules are “bad” (i.e. they give no information about the congruence of two triangles).