

Practice Final
May XX, 2006

Name:
Calculators allowed.

I've gotten problems from most of you, but it looks like there are still a few who haven't sent theirs in. Send in your problems and I'll attach them to the end of this.

About half of the problems on the actual final will be taken from this practice test.

- (6) If a new airplane is 3 times as long, 3 times as wide, and 3 times as tall as the current one, how much material will be needed to make the new airplane? How much fuel will be needed to fill the new airplane, with the same pressure, compared to the current one?

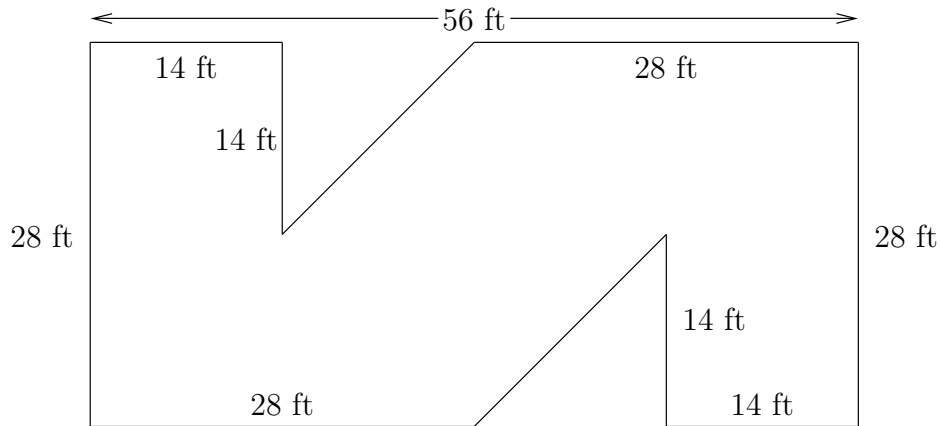


FIGURE 1. The floor plan for a modern, one-story house.

- (7) Figure 1 shows the floor plan for a modern, one-story house. Ken calculates the area of the house in the following way:

$$28 \times 56 \div 14 = 1372 \text{ft}^2$$

What do you think Ken has in mind? Explain why Ken's method is a legitimate way to calculate the floor area of the house, and explain clearly how one or both of the moving and combining principles on area apply in this case.

- (8) (11.3) Suppose that you have a map with a scale of 1 inch = 100 miles. You trace a state on the map onto $\frac{1}{2}$ -inch graph paper (where the grid lines are spaced $\frac{1}{2}$ inch apart). You count that the state takes up about 80 squares of graph paper. Approximately what is the area of the state? Explain.

- (9) One liter is the capacity of a cube that is 10cm wide, 10cm deep, and 10cm tall. One gallon is 0.134 cubic feet. One quart is a one-quarter of a gallon. Which is more; one quart or one liter? Use basic the basic fact 1 inch= 2.54cm to figure this out. (PP 10.6 pg 466)

- (10) A Explain how to see that the area of the large rectangle in Figure 2 as consisting of $4\frac{1}{2}$ groups with $5\frac{1}{2}$ square cm in each group, thereby explaining why it makes sense to multiply: $4\frac{1}{2} \times 5\frac{1}{2}$ to determine the area of the rectangle in square centimeters.

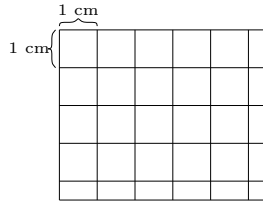


FIGURE 2. Why is the area $4\frac{1}{2} \times 5\frac{1}{2}$ square centimeters?

- B Calculate $4\frac{1}{2} \times 5\frac{1}{2}$ without a calculator, showing your calculations. Then verify that this calculation has the same answer as when you determine the area of the rectangle in the figure above in square centimeters by counting full 1-cm-by-1-cm squares and combining partial squares. (PP 10.5 pg 458)

- (11) What does it mean to say two shapes in a plane are congruent?

- (12) What is the difference between reporting something weighs 4.00 lbs and 4 lbs?
- (13) Explain why a 7in by 5in rectangle has an area of 35in squared.
- (14) A black bear escaped from the zoo and it needs to be located as soon as possible. The tracker on the Bear says that it is no more than 5 miles from the zoo. Another animal control office which is 10 miles away directly east is not picking anything up on their radar. The radars can pick up the signal 10 miles in all directions. Where could the bear be located? Scale: 1mile = .5in
- (15) You have a can of peaches that is 4 inches tall and has a diameter of $2\frac{1}{2}$ inches.
- (a) How many cubic inches does the can hold? How many fluid ounces is this?
- (b) Now you have a tin crate to pour the peaches into. This crate is 12 inches tall, 10 inches long, and 9 inches wide. How many cans of peaches will fit into the crate?

- (16) You are building a model airplane that has a scale factor of 1:150 to the real version. If you can fit 35 marbles into your model, how many marbles should fit into the real version?
- (17) Suppose that Ada, Bada, and Cada are three cities and that Bada is 20 miles from Ada, Cada is 30 miles from Bada, and Ada is 40 miles from Cada. There are straight-line roads between Ada and Bada, Ada and Cada, and Bada and Cada. Draw a careful and precise map showing Ada, Bada, and Cada and the roads between them, using a scale of 10 miles = 1 inch. Describe how to use a compass to make a precise drawing.
- (18) A popular brand of soup comes in cans that are $2\frac{5}{8}$ inches in diameter and $3\frac{3}{4}$ inches tall. Each such can has a paper label that covers the entire side of the can (but not the top or the bottom).
- (a) If you remove a label from a soup can, you'll see that it's made from a rectangular piece of paper. How wide and how long is this rectangle (ignoring the small overlap where two ends are glued together)?
- (b) Ignoring the small folds and overlaps where the can is joined, determine how much metal sheeting is needed to make the entire can, including the top and bottom. Use the moving and combining principles about area to explain why your answer is correct. Be sure to use an appropriate unit to describe the amount of metal sheeting.

- (19) The area of the aquarium floor is 6,000 square yards. How many square meters is this using $1 \text{ mi} = 5280 \text{ ft}$ and $1 \text{ in} = 2.54 \text{ cm}$?
- (20) Jill is finding area of a rectangle that has the length and width of 4 in x 4 in. She gives the answer 16 square inches because you multiply the first measurement of length by itself. Next a rectangle with dimensions 5 in x 6 in is 30 square inches because if inches are squared then you square the 5 in to get 25. Explain why Jill is wrong in her procedure of squaring a unit to calculate area.
- (21) An attic apartment in a house is the shape of a rectangular prism. The bases of the prism are equilateral triangles with a base of 20 feet and a height of 10 feet. The room is 20 feet long, from base to base. A little girl has a dollhouse that is an exact scaled replica of this house, by a scale factor of $1/20$. Determine the volume of the attic apartments in both the real house and the dollhouse.
- (22) The little girls brother gets ahold of her dollhouse and colors the entire outside surface area of the attic with paint. How much area did the brother cover?

- (23) (practice problem: 4 page 539) A typical ice cream cone is $4\frac{1}{2}$ inches tall and has a diameter of 2 inches. How many cubic inches does it hold (just up to the top)? How many fluid ounces is this? (one fluid ounce is 1.8 cubic inches.)
- (24) (practice problem: 3 page 544) If a giant was 12 feet tall but proportioned like a typical 6 foot tall man, about how much would you expect the giant to weigh?
- (25) (Triangles 8.4) Can a triangle have one side of length 6 inches, one side of length 2 inches, and one side of length 3 inches? Explain.
- (26) (Accuracy in Measurement 10.2) What is the difference between reporting that an object is 5 inches long and reporting that it is 5.0 inches long?
- (27) A space satellite locates a new planet. It is less than one light-year away from satellite A, and more than one light-year away from satellite B. Where is the new planet located? $1 \text{ inch} = 1 \text{ light-year}$

- (28) Compare rotation and rotation symmetry.
- (29) (8.4 Exercise 6) In your own words, explain clearly why the sum of the angles in a triangle must always add to 180° .
- (30) (11.3 Exercise 2) Suppose that you have a map with a scale of 1 inch = 50 miles. You trace a state on the map onto $\frac{1}{2}$ -inch graph paper. (The grid lines are $\frac{1}{2}$ -inch apart.) You count that the state takes up about 91 squares of graph paper. Approximately what is the area of the state? Explain.
- (31) A vertical pole that is 1 yard long casts a shadow that is 2 feet 4 inches long. At the same time Pollys shadow is 3 feet 4 inches long.
- Draw a picture of the similar triangles that are relevant to determining Pollys height and explain why the triangles are similar.
 - Determine Pollys height in an elementary way without setting up a proportion in which you set two fractions equal to each other. Explain your reasoning in detail as if you were teaching someone the method you use.

- (37) There are two boats anchored out to sea. They are both looking for octopi. These boats are exactly 20 miles apart. There is a group of octopi at least 15 miles away from the first boat. That same group is no more than 10 miles away from the second boat. Show the area of ocean where the octopi are. Explain how you come across this answer.
- (38) Draw a detailed Venn Diagram that shows how the set of rectangles, trapezoids, and quadrilaterals are related. Explain why these sets are related the way they are.
- (39) You are covering the floor of your house with new carpet. The floor area that needs to be covered is 1800 square feet. Carpet comes in rolls of 75 square meters. How many rolls of carpet will you need? (1 inch = 2.54 cm)
- (40) Explain to a child why we can measure a cylindrical tank in cubic feet.
- (41) John says that his house is more than 5 miles from Walmart and more than 3 miles from Kmart. Indicate all the possible locations for John's house on the map below and explain your answer.

- (42) Answer the following about a prism with a pentagon base without using a model. Visualize or draw a picture if you want.
- A) How many faces does it have?
 - B) What shapes are the faces?
 - C) How many edges does it have?
 - D) How many vertices does it have?
- (43) Explain why the volume of a box is expressed as cubic units.
- (44) How many 2cm by 2cm by 2cm cubes can be stacked neatly in an 8cm by 9cm by 12cm box? Explain.

- (45) Crystal got into her car and drove from Point A to Point F . The route is shown in Figure 3.
- Show Crystal's angles of turning of her route.
 - Find the total amount of turning along the route by adding the angles measured in part a.
 - How could you find the total amount of turning *without* measuring the angles with a protractor?

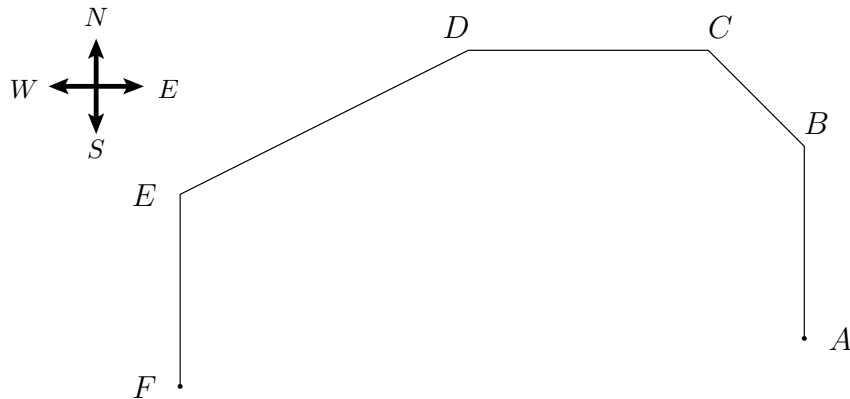


FIGURE 3. Crystal's car route.

- (46) Bea has lost her dog, but the dog has a GPS tracking system on its collar. The dog is less than one kilometer from house A and more than one kilometer from house B . Where could Bea's dog be? Show all possible places Bea's dog could be.

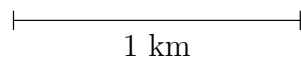


FIGURE 4. Houses A and B .