

Practice Test 3
April XX, 2006

Name:
Calculators allowed.

DO NOT BEGIN TEST UNTIL INSTRUCTED TO
DO SO.

Write out and sign the honor code below.

I will be academically honest in all of my academic work and will
not tolerate academic dishonesty of others.

(1) (a) State the Pythagorean Theorem. Draw a figure if needed for reference.

(b) Prove the Pythagorean Theorem.

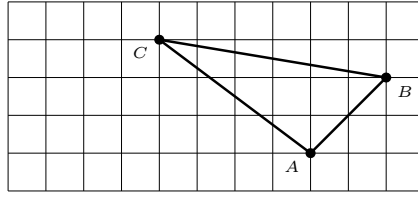


FIGURE 1. A triangle with vertices on a 1 unit grid.

- (2) (a) Determine the area of the triangle shown in Figure 1 without using shearing. Explain your reasoning.
- (b) Without a ruler, determine the three side lengths of the triangle shown in Figure 1. (*Hint: Use the Pythagorean Theorem.*)

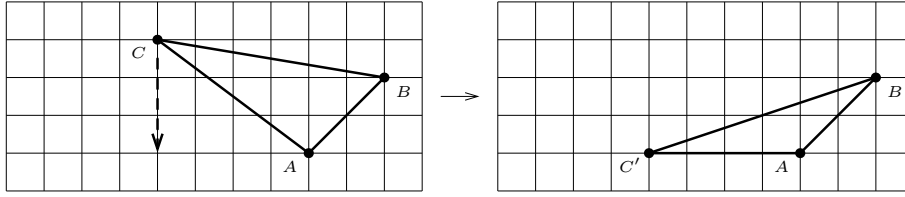


FIGURE 2. Moving a vertex to calculate area.

- (3) Suppose that you have a map with a scale of 1 inch = 25 miles. You trace a region of parkland on the map onto the $\frac{1}{4}$ -inch graph paper. You count that the traced parkland takes up about 37 squares of graph paper. Approximately what is the area of the parkland? Explain.

- (4) James wants to calculate the area of the triangle shown in Figure 1. He does this by first moving vertex C straight downwards to C' so that it is on the same horizontal line as vertex A as shown in Figure 2. Now he calculates " $\frac{1}{2}$ base \times height" to get $\frac{1}{2} \times 4 \text{ units} \times 2 \text{ units} = 4 \text{ units}^2$ as the area of the triangle. Either explain why James correctly calculated the area of the triangle or explain his mistake and how to do his method correctly.

- (5) Can two parallelograms with the same side lengths have different areas? Explain.
- (6) How is the number π defined in relation to length measurements of a circle?
- (7) Explain how to subdivide and rearrange a circle of radius r units in order to show why the area of this circle is πr^2 .

- (8) The Browns plan to build a 4-foot-wide garden path around a circular garden of diameter 16 feet. What is the area of the garden enclosed by the path? What is the area of the garden path? Explain your answer.
- (9) A plot of land has a perimeter of 320 yards.
- (a) Could it have an area of 7500 square yards? Explain why or why not.
- (b) If the plot of land was in the shape of a rectangle, what's the largest area it could have? Explain.