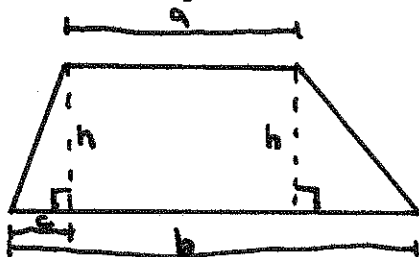


Homework #1 Part A

1. What is the largest possible radius of a circle which is completely contained in a rectangle with side lengths 8 and 13? Explain.
2. A convex pentagon has three angles measuring 100° , 90° , and 110° . What is the average measure of the other two angles?
3. A rectangle with one side length 4 has perimeter 14. What is the length of its diagonal? What is its area?
4. An equilateral triangle has side length 2. Explain why it must have height $\sqrt{3}$ (using the Pythagorean Theorem).
5. An *isosceles* triangle is a triangle with exactly two angles equal in measure, and consequently has exactly two sides equal in length. In an isosceles right triangle, what are the angle measures? If the non-hypotenuse sides each have length s , what is the length of the hypotenuse?
6. A circle is *inscribed* in a square, that is, the circle is inside of the square and touches each side at exactly one point. What is the ratio of the area of the square to the area of the circle?
7. A square is inscribed in a circle, so the square is contained in the circle and each vertex of the square touches the circumference of the circle. What is the ratio of the area of the circle to the area of the square? What is the ratio of the circumference of the circle to the perimeter of the square?
8. In this problem, you will show that the area of the *trapezoid* pictured, with height h and top and bottom base lengths a and b , is $\frac{1}{2}h(a + b)$, as follows.



- (i): If the base of right triangle on the left side is labeled c , explain why the right triangle on the right side has base $b - c - a$.

(ii): Show that the area of the triangle on the left side is $\frac{1}{2}ch$ and the area of the triangle on the right side is $\frac{1}{2}(b - c - a)h$.

(iii): Explain why the total area of the trapezoid must be

$$\frac{1}{2}ch + \frac{1}{2}(b - c - a)h + ah,$$

and simplify this expression to obtain the formula for the area.