

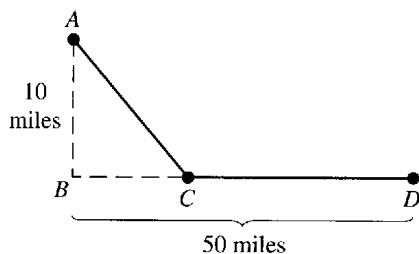
**Instructions:** Read each problem. Write a sentence or two about the approach you might take to solve each problem. Draw a picture to illustrate the scenario. Write a formula that might be needed to help set up or solve the problem.

1. Write an equation for each of the following scenarios.

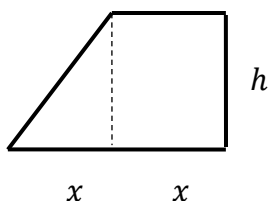
A) If the area of a rectangle is 45 square meters, write the perimeter of the rectangle in terms of the width only.

B) If the perimeter of a rectangle is 65 inches, write the area of the rectangle in terms of the width only.

C) An offshore oil rig is located at point  $A$ , which is 10 miles out to sea. An oil pipeline is to be constructed from point  $A$  to a point  $C$  on the shore and then to a point  $D$ , farther up the coast. If it costs \$7 million per mile to lay the pipeline in the sea and \$1.5 million per mile on land, express the cost of laying the pipeline in terms of  $x$ , where  $x$  is the distance from  $B$  to  $C$ .



D) Given the object below, express the perimeter in terms of  $x$  only given that the area of the triangular section is  $50 \text{ in}^2$ .



2. A cylindrical barrel is to hold 1.3 cubic meters. The material for the top costs  $\$7/\text{m}^2$ . The material of the bottom costs  $\$10/\text{m}^2$  and the material for the side costs  $\$8/\text{m}^2$ . Write the cost as a function of  $r$ , the radius of the cylinder.

3. Explain the difference between  $f(0) = y$  and  $f(x) = x$ . Be very clear and precise in your answer.

4. Factor  $\frac{\frac{1}{3}(x^2+2)^{\frac{1}{2}} - 2x(x^2+2)^{-\frac{1}{2}}}{(x^2+2)}$  and  $\frac{\frac{a}{(x+h)^2} - \frac{a}{x^2}}{h}$

5. (A) Consider a stack of three tennis balls. Is the height of the stack less or greater than the circumference of one tennis ball?

(B) Now answer the same question with ping-pong balls. Is the answer the same or different?

(C) Now make a statement about 3 stacked spheres in general. Explain/prove your statement.