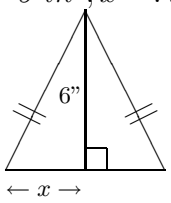
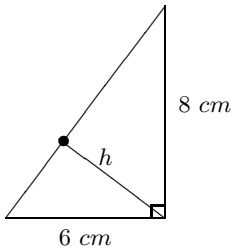
Math 118 - Dr. Miller - Homework #6: "Backwards" Area Problems

Find the requested quantity in each problem; use appropriate units.

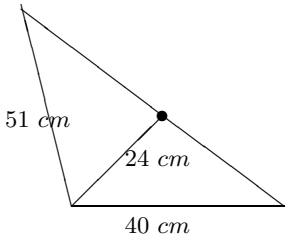
1. $A = 9\ in^2, x = ??$



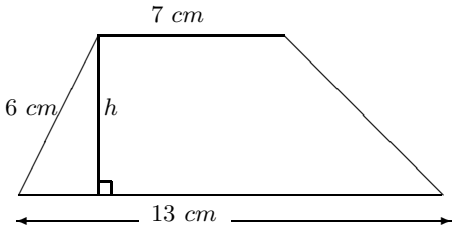
2. $h = ??$ (There is a second right angle at the point marked in bold.)



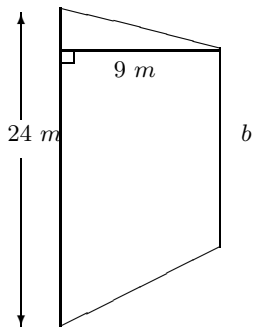
3. If the area is 924 cm^2, what is the perimeter? (There is a right angle at the point marked in bold.)



4. $A = 50\ cm^2, h = ??$



5. $A = 180\ m^2, b = ??$



1. The markings on the sides show that the triangle is isosceles, so we can safely conclude that its height splits its base perfectly in half. That means the base is $2x$ all the way across.
$$A = \frac{1}{2}(6)(2x), \ so\ 9 = 6x, \ and\ x = 1.5\ inches$$

2. Because it's a right triangle, we can find its area by using its legs as base and height. Thus, the area is $\frac{1}{2}(6)(8) = 24$. Also, because it's a right triangle, we can find the length of the hypotenuse by applying the Pythagorean Theorem: $6^2 + 8^2 = c^2$, or $100 = c^2$ so c is 10. Now this 10 cm hypotenuse can be viewed as the base of the triangle, with h the height. We already found the area, so we'll substitute into $A = \frac{1}{2}bh$:
$$24 = \frac{1}{2}(10)(h), \quad so\ h = \frac{24}{5} = 4.8\ cm$$

3. This is somewhat like the problem above. We already know the area and can use 24 as the height with the missing third side as the base, so
$$924 = \frac{1}{2}(b)(24), \quad making\ b = 77$$
and then the perimeter must be $51 + 40 + 77 = 168$ cm.

4. We'll just substitute into $A = \frac{1}{2}(b_1 + b_2)h$:
$$50 = \frac{1}{2}(7 + 13)(h), \quad so\ that\ h = 5\ cm.$$

5. Again, just substitute into $A = \frac{1}{2}(b_1 + b_2)h$:
$$\begin{aligned} 180 &= \frac{1}{2}(b + 24)(9) \\ 180 &= 4.5(b + 24) \\ 40 &= b + 24 \\ b &= 16\ m \end{aligned}$$