1.1.9 One way to find the area of a triangle from its side lengths is to use Hero's Formula:

$$K = \sqrt{s(s-a)(s-b)(s-c)}.$$

Here, s is the semiperimeter: half of the perimeter $p = a + b + c$. Finally, a, b, and c are the side lengths themselves.

In our case, each side length is x, so calculate:

$$\begin{aligned} a &= x; \\ b &= x; \\ c &= x; \\ p = a + b + c &= x + x + x = 3x; \\ s = \frac{1}{2}p &= \frac{1}{2}(3x) = \frac{3}{2}x; \\ s - a &= \frac{3}{2}x - x = \frac{1}{2}x; \\ s - b &= \frac{3}{2}x - x = \frac{1}{2}x; \\ s - c &= \frac{3}{2}x - x = \frac{1}{2}x; \\ K = \sqrt{s(s-a)(s-b)(s-c)} &= \sqrt{\frac{3}{2}x \cdot \frac{1}{2}x \cdot \frac{1}{2}x \cdot \frac{1}{2}x} = \sqrt{\frac{3}{16}x^4} = \frac{1}{4}\sqrt{3}x^2. \end{aligned}$$

Thus, the perimeter and area are respectively $3x$ and $\sqrt{3}x^2/4$.

1.1.61 Two variable quantities are inversely proportional iff their product is constant. At one point, this product is

$$rs = (6)(4) = 24;$$

so later, when $r = 10$, we may solve for s:

$$\begin{aligned} rs &= 24; \\ 10s &= 24; \\ s &= \frac{12}{5}. \end{aligned}$$