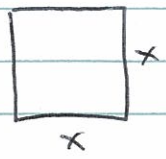
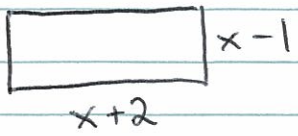
M10C - Applying Assignment (Polynomials)

a) Since Susan's original rug was square we can label the dimensions of this rug using a variable, x.



Original Square Rug



New Rectangular Rug

The new rug has one side two feet longer and another side 1 ft shorter. We can represent these new dimensions by adding two and subtracting one from the ~~on~~ sides of the original square rug.

The dimensions of the rectangular rug are $\boxed{\begin{aligned} l &= x+2 \\ w &= x-1 \end{aligned}}$

b) To find the area of the new rug simply use $A = lw$ and the distributive property.

$$\begin{aligned} A &= lw \\ &= (x+2)(x-1) \\ &= x^2 - x + 2x - 2 \\ &= x^2 + x - 2 \end{aligned}$$

An expression for the area of the new rug is

$$\boxed{A = x^2 + x - 2}$$

c) If the original square rug was 3ft x 3ft, then to find which rug had the greater area I will substitute $x = 3$ into the area formulas for the square rug ($A = x^2$) and for the rectangular rug ($A = x^2 + x - 2$) and compare them.

$$\begin{aligned} A_{square} &= x^2 \\ &= (3ft)^2 \\ &= \boxed{9\,ft^2} \end{aligned}$$

$$\begin{aligned} A_{rect} &= x^2 + x - 2 \\ &= (3)^2 + (3) - 2 \\ &= 9 + 1 \\ &= \boxed{10\,ft^2} \end{aligned}$$

The rectangular rug has a greater area.