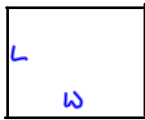**2.** The area of a rectangle, $A(x)$, is $6x^2 + 4x - 2$.
If the length is given by $(3x - 1)$, find

  (i) an expression for the width of the rectangle

  (ii) an expression for the perimeter, $P(x)$, of the rectangle.
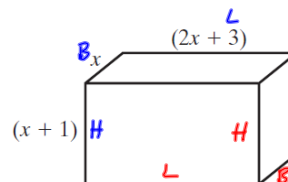
$A = LW$

$W = \dfrac{A}{L}$

$P = 2L + 2W$

$$\begin{array}{r} 2x+2 \\ 3x-1 \overline{) 6x^2+4x-2} \end{array}$$

$W = 2x + 2$

$$\begin{aligned} P(x) &= 2(3x-1) + 2(2x+2) \\ &= 6x - 2 + 4x + 4 \\ &= 10x + 2 \end{aligned}$$

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3. The dimensions (in cm) of an open rectangular box are given in the diagram. Find

(a) an expression for the volume, $V(x)$, of the box

(b) an expression for the external surface area, $S(x)$, of the box

(c) the value of
   (i) $V(x)$ and   (ii) $S(x)$ when $x = 5$.

Diagram labels: $B\ x$, $(2x+3)$ L, $(x+1)$ H, H, L, B

$V = LBH$

(a)
$$\begin{aligned} V(x) &= (x+1)(x)(2x+3) \\ &= (x^2+x)(2x+3) \\ &= 2x^3 + 3x^2 + 2x^2 + 3x \\ &= 2x^3 + 5x^2 + 3x \end{aligned}$$

$S = 2[LB + LH + BH]$

(b)
$$\begin{aligned} S(x) &= 2\big[(2x+3)(x) + (2x+3)(x+1) + (x)(x+1)\big] \\ &= 2\big[2x^2 + 3x + 2x^2 + 2x + 3x + 3 + x^2 + x\big] \\ &= 2\big[5x^2 + 9x + 3\big] \\ &= 10x^2 + 18x + 6 \end{aligned}$$

(c)
$$\begin{aligned} V(5) &= 2(5)^3 + 5(5)^2 + 3(5) \\ &= 390 \text{ units}^3 \end{aligned}$$

$$S(5) = 10(5)^2 + 18(5) + 6 = 346 \text{ units}^2$$