Name: _____ Date: _____

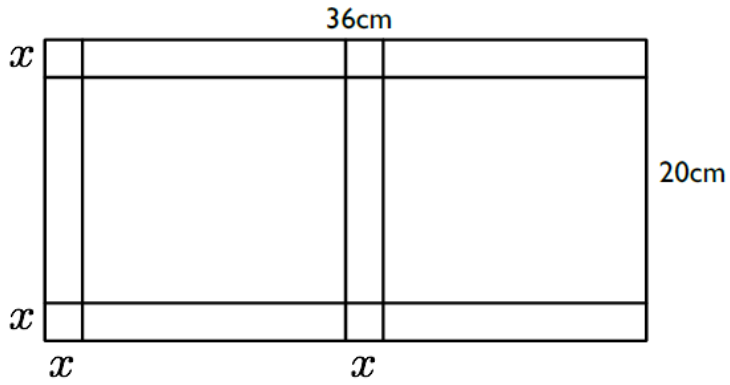
Learning Goal 3.3	Solving equations algebraically and graphically.

1. The specifications for a cardboard box state that the width must be 5 cm less that the length, and the height must be double the length of the box.
   a. Write an equation for the volume of the box.
   $$V = 2x^2(x - 5)$$
   b. What is the degree of the polynomial?
   $$3$$
   c. What are the leading coefficient and the constant of this function?

Leading Coefficient	Constant
2	0

   d. Describe the end behaviour of the graph of this function.
   $$\lim_{x \to \pm\infty} V(x) = +\infty$$
   $$\lim_{x \to -\infty} V(x) = -\infty$$
   e. What are the restrictions on the domain of this function? Explain how you determined those restrictions.
   $$x > 0$$
   f. What do the $x-$ intercept(s) of the graph represent in this context?
   The value of the length
   g. What are the dimensions of a box with a volume of $384\ \text{cm}^3$?
   $w = 3\ \text{cm}$ $l = 8\ \text{cm}$ $h = 16\ \text{cm}$

2. Boxes for candies are to be constructed from cardboard measures 36 cm by 20 cm. Each box is formed by folding a sheet along the dotted lines as shown.



   a. Write an equation for the volume of the box.
   $$V = 2x(10 - x)(18 - x)$$
   b. What is the degree of the polynomial?
   $$3$$
   c. What are the leading coefficient and the constant of this function?

Leading Coefficient	Constant
2	0

   d. Describe the end behaviour of the graph of this function/ What are the restrictions on the domain of this funciton? Explain how you determined the restrictions.
   $$\lim_{x \to \pm\infty} V(x) = +\infty$$
   $$\lim_{x \to -\infty} V(x) = -\infty$$
   e. What the possible whole number dimensions of the box if the volume is 512 cubic centimetres?
   $$w = 16 \text{ cm} \qquad l = 16 \text{ cm} \qquad h = 2 \text{ cm}$$

3. The length of a pool is 4 feet more than twice the width. The depth of the pool is two thirds the width.
   a. Write an equation for the volume.
   $$V = \frac{2}{3}w^2(4 + 2w)$$
   b. The volume of the pool is 1188 ft^3. What are the dimensions?
   $$w = 9 \text{ ft} \qquad l = 22 \text{ ft} \qquad h = 6 \text{ ft}$$
   c. If we wanted to increase all dimensions by the same amount, but the maximum volume at 2700 ft^3, what is the maximum size of the pool?
   $$w = 12 \text{ ft} \qquad l = 25 \text{ ft} \qquad h = 9 \text{ ft}$$