Solving Quadratic Equations

1. Solve by finding a common factor.

(a) $3x^2 + 5x = 0$ (b) $x^2 + 8x = 0$ (c) $x^2 - 3x = 0$

(d) $6x^2 + 18x = 0$ (e) $4x^2 - 2x = 0$ (f) $5x^2 + 20x = 0$

(g) $6x - x^2 = 0$ (h) $10x - 4x^2 = 0$ (i) $4a - 18a^2 = 0$

2. Solve, using difference of two square (and some common factor!).

(a) $x^2 - 9 = 0$ (b) $x^2 - 64 = 0$ (c) $x^2 - 36 = 0$

(d) $4x^2 - 9 = 0$ (e) $16x^2 - 25 = 0$ (f) $4a^2 - 36 = 0$

(g) $3x^2 - 12 = 0$ (h) $2x^2 - 50 = 0$

Did you notice anything special about your answers for question 2?

3. Solve the quadratic equations by factorising the trinomial.

(a) $x^2 + 3x + 2 = 0$ (b) $x^2 + 8x + 15 = 0$ (c) $x^2 + 7x + 8 = 0$

(d) $x^2 + 9x - 2 = 0$ (e) $x^2 + 4x - 21 = 0$ (f) $x^2 - 7x + 12 = 0$

(g) $2x^2 + 5x + 3 = 0$ (h) $3x^2 + 14x + 15 = 0$ (i) $2x^2 - 7x + 3 = 0$

(j) $5x^2 + 4x - 1 = 0$ (k) $2 + 5x - 3x^2 = 0$ (l) $1 - 4x - 5x^2 = 0$

4. Solve each of the quadratic equations. You must first identify what type of factorising to use.

(a) $x^2 - 49 = 0$ (b) $3a^2 - 15a = 0$ (c) $u^2 - 2u + 1 = 0$

(d) $4x - 10x^2 = 0$ (e) $9x^2 + 6x + 1 = 0$ (f) $81 - a^2 = 0$

(g) $2x^2 - 32 = 0$ (h) $2f^2 + 3p - 5 = 0$ (i) $2x^2 - 8x = 0$

(j) $25 - 4b^2 = 0$ (k) $15 - 7x - 2x^2 = 0$ (l) $4x^2 + 10x + 6 = 0$

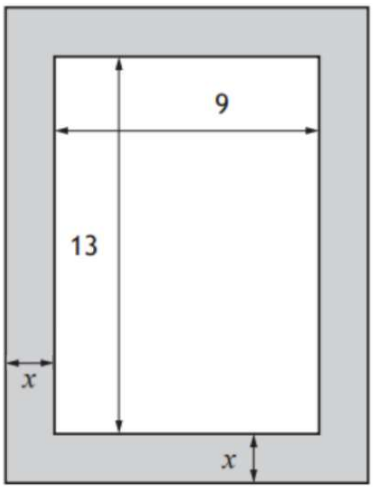
5. For the following questions, you must re-arrange the equations before factorising. Remember: a quadratic equation must be of the form $ax^2 + bx + c = 0$ to solve.

(a) $x^2 + 2x = -1$ (b) $3x^2 = 6x$ (c) $x^2 = 49$

(d) $2x^2 + 5x = -2$ (e) $3x^2 + x = 4$ (f) $4x^2 = 16x$

(g) $6x^2 = 13x + 5$ (h) $4x^2 = 36$ (i) $35 = 8x^2 + 6x$

6. A photo is mounted on a grey card background as shown below. The photo measures 9 inches by 13 inches. The grey background extends a width of x inches around the edge of the photo.

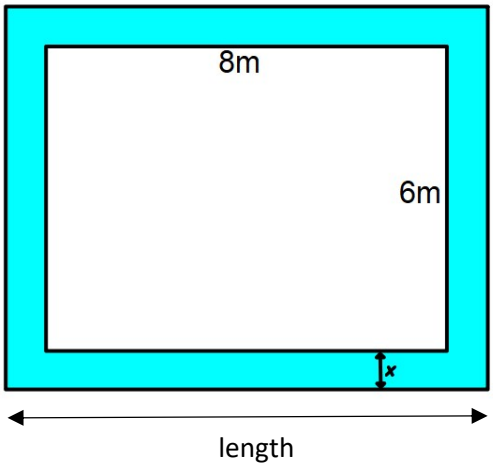


(a) Show that the grey area of the photo frame can be expressed as:

$$\text{Area} = 4x^2 + 44x + 117$$

(b) If the area of the frame is 270, calculate the value of x, giving your answer to 1 decimal place.

7. A pool is being designed as shown below

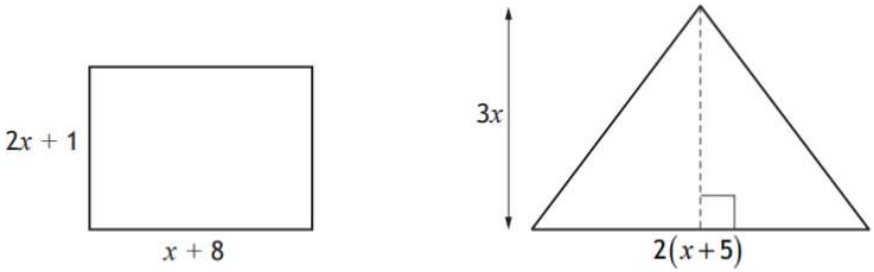


(a) Write down an expression for the length of the pool (the longer side).
(b) Show that the area of the pool (including the edges) can be expressed as

$$\text{Area} = 4x^2 + 28x + 48$$

(c) A cover is bought for the pool. The area of the cover is 288m^2. Calculate the value of x, the width of the edge of the pool.

8. The area of the rectangle and triangle below are identical.



(a) Write down an expression for the area of the rectangle.
(b) Show that $x^2 - 2x - 8 = 0$
(c) Hence calculate the value of x.
(d) Using your value for x, calculate the area of the rectangle and triangle.