Completing the Square
Video 10 on www.corbettmaths.com

Question 1:  Write the following expressions in the form \((x + a)^2 + b\)

(a) \(x^2 + 8x + 1\)  
(b) \(x^2 + 10x + 3\)  
(c) \(x^2 + 2x - 1\)

(d) \(x^2 - 6x - 10\)  
(e) \(x^2 - 4x - 13\)  
(f) \(x^2 - 12x + 3\)

(g) \(x^2 + 14x + 3\)  
(h) \(x^2 - 2x - 15\)  
(i) \(x^2 + 4x - 11\)

(j) \(x^2 + x - 8\)  
(k) \(x^2 + 3x + 1\)  
(l) \(x^2 - 7x - 2\)

(m) \(x^2 - 9x - 1\)  
(n) \(x^2 + 11x + 3\)  
(o) \(x^2 - 100x - 25\)

Question 2:  Solve the following equations (use completing the square).

(a) \(x^2 + 4x + 1 = 0\)  
(b) \(x^2 + 8x - 10 = 0\)  
(c) \(x^2 + 14x - 4 = 0\)

(d) \(x^2 - 8x - 2 = 0\)  
(e) \(x^2 - 10x + 10 = 0\)  
(f) \(x^2 + 18x + 7 = 0\)

(g) \(x^2 + 12x + 3 = 19\)  
(h) \(x^2 = 2x + 10\)  
(i) \(x^2 - 7x - 3 = 0\)

(j) \(x^2 + x - 7 = 0\)  
(k) \(x^2 + 3x + 8 = 0\)  
(l) \(2x^2 - 10x - 30 = x^2 - 4x\)

Question 3:  Write the following expressions in the form \(a(x + b)^2 + c\)

(a) \(2x^2 + 8x + 2\)  
(b) \(2x^2 + 12x - 3\)  
(c) \(3x^2 - 12x + 2\)

(d) \(4x^2 + 12x - 5\)  
(e) \(2x^2 - 3x - 5\)  
(f) \(5x^2 - 20x + 30\)

Question 4:  Solve the following equations (use completing the square).

(a) \(3x^2 + 12x + 3 = 0\)  
(b) \(2x^2 + 16x - 20 = 0\)  
(c) \(3x^2 - 6x + 1 = 0\)

(d) \(5x^2 + 10x - 9 = 0\)  
(e) \(2x^2 - 5x - 3 = 0\)  
(f) \(2x^2 - 7x + 1 = 0\)

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Question 1: Write \((x + 3)^2 - 4\) in the form \(x^2 + bx + c\)

Question 2: Write \((x - 2)^2 - 9\) in the form \(x^2 + bx + c\)

Question 3: Write \((x - 7)^2 + 11\) in the form \(x^2 + bx + c\)

Question 4: Use completing the square to find the minimum point for each graph below
(a) \(y = x^2 + 10x + 12\)
(b) \(y = x^2 + 4x + 1\)
(c) \(y = x^2 + 6x + 8\)
(d) \(y = x^2 - 2x + 3\)
(e) \(y = x^2 - 6x - 3\)
(f) \(y = x^2 - x - 4\)
(g) \(y = x^2 + 9x + 1\)
(h) \(y = x^2 - 6x - 2\)
(i) \(y = x^2 + 22x + 100\)

Question 5: By using completing the square to solve \(ax^2 + bx + c = 0\), prove the quadratic formula.

Question 6: Can you spot any mistakes?

Solve \(x^2 + 10x + 2 = 0\)

\[(x + 5)^2 - 10 + 2 = 0\]
\[(x + 5)^2 = 12\]
\(x + 5 = \pm \sqrt{12}\)
\(x = -5 \pm \sqrt{12}\)

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