Quadratic Formula

The quadratic formula is used to solve quadratic equations which do not factorise. You can spot such a question when it states give your answers to 3 significant figures.

To solve $ax^2 + bx + c = 0$

use $$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Ex1 Solve $x^2 - 5x + 6 = 0$

$a = 1$
$b = -5$
$c = 6$

$$x = \frac{+5 \pm \sqrt{(-5)^2 - 4 \times 1 \times 6}}{2}$$

$$x = \frac{+5 \pm \sqrt{25 - 24}}{2}$$

$$x = \frac{+5 \pm 1}{2}$$

$$x = \frac{+5+1}{2} \quad \text{or} \quad x = \frac{+5-1}{2}$$

$$x = 3 \quad \text{or} \quad x = 2$$

Ex2 $3x^2 - 5x - 7 = 0$

$a = 3 \quad b = -5 \quad c = -7$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{+5 \pm \sqrt{(-5)^2-4(3)(-7)}}{2(3)}$$

$$x = \frac{+5 \pm \sqrt{25+84}}{6}$$

$$x = \frac{+5 \pm \sqrt{109}}{6}$$

$$x = \frac{+5+\sqrt{109}}{6} \qquad x = \frac{+5-\sqrt{109}}{6}$$

$$x = 2.57 \qquad x = -0.907$$

to 3 sig figs to 3 sig figs

Ex 3 $\quad 5x^2 + 11x + 3 = 0$

$a = 5, \quad b = 11, \quad c = 3$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{-11 \pm \sqrt{11^2-4(5)(3)}}{2(5)}$$

$$x = \frac{-11 \pm \sqrt{121-60}}{10}$$

$$x = \frac{-11+\sqrt{61}}{10} \quad \text{or} \quad x = \frac{-11-\sqrt{61}}{10}$$

$$x = -0.319 \quad \text{or} \quad x = -1.88$$

to 3 s.f. to 3 s.f.
