

CAL3 Notes

Solving Equations Part 2

Solve by completing the square. ALWAYS GET ALL TERMS ON ONE SIDE.

1. $m^2 - 8m + 20 = 5$

$$m^2 - 8m + 15 = 0$$

$$m^2 - 8m \quad + 15 = 0$$

$$\underbrace{m^2 - 8m + 16}_{\text{FACTOR}} + \underbrace{15 - 16}_{\text{COMBINE}} = 0$$

SEPARATE "C"

TAKE HALF OF "b" AND SQUARE IT.

$$(m-4)^2 - 1 = 0$$

$$(m-4)^2 = 1$$

$$m-4 = \pm 1$$

$$m = 4 \pm 1$$

$$m = 4+1, 4-1$$

$$m = 5, 3$$

3. $x^2 + 6x - 33 = -5$

$$x^2 + 6x - 28 = 0$$

$$x^2 + 6x \quad - 28 = 0$$

$$x^2 + 6x + 9 \quad - 28 - 9 = 0$$

$$(x+3)^2 - 37 = 0$$

$$(x+3)^2 = 37$$

$$x+3 = \pm \sqrt{37}$$

$$x = -3 \pm \sqrt{37}$$

2. $x^2 - 18x + 64 = -9$

$$x^2 - 18x + 73 = 0$$

$$x^2 - 18x \quad + 73 = 0$$

$$x^2 - 18x + 81 + 73 - 81 = 0$$

$$(x-9)^2 - 8 = 0$$

$$(x-9)^2 = 8$$

$$x-9 = \pm \sqrt{8}$$

$$x-9 = \pm 2\sqrt{2}$$

$$x = 9 \pm 2\sqrt{2}$$

ALWAYS SIMPLIFY RADICALS

4. $x^2 - 20x - 72 = 3$

$$x^2 - 20x - 75 = 0$$

$$x^2 - 20x \quad - 75 = 0$$

$$x^2 - 20x + 100 - 75 - 100 = 0$$

$$(x-10)^2 - 175 = 0$$

$$(x-10)^2 = 175$$

$$x-10 = \pm \sqrt{175}$$

$$x-10 = \pm 5\sqrt{7}$$

$$x = 10 \pm 5\sqrt{7}$$

YOU MUST GET ALL TERMS ON ONE SIDE FIRST.

Solve by using the quadratic formula.

5. $4a^2 - 22 = 3a$

$$4a^2 - 3a - 22 = 0$$

$$a=4 \quad b=-3 \quad c=-22$$

$$X = \frac{3 \pm \sqrt{(-3)^2 - 4(4)(-22)}}{2(4)}$$

$$X = \frac{3 \pm \sqrt{361}}{8}$$

$$X = \frac{3 \pm 19}{8}$$

$$X = \frac{3+19}{8}, \frac{3-19}{8}$$

$$X = \frac{22}{8}, \frac{-16}{8}$$

$$X = \frac{11}{4}, -2$$

7. $4a^2 - 2a = -1$

$$4a^2 - 2a + 1 = 0$$

$$a=4 \quad b=-2 \quad c=1$$

$$X = \frac{2 \pm \sqrt{(-2)^2 - 4(4)(1)}}{2(4)}$$

$$X = \frac{2 \pm \sqrt{-12}}{8}$$

$$X = \frac{2 \pm 2i\sqrt{3}}{8}$$

$$X = \frac{1 \pm i\sqrt{3}}{4}$$

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

6. $5n^2 = 4 + 10n$

$$5n^2 - 10n - 4 = 0$$

$$a=5 \quad b=-10 \quad c=-4$$

$$X = \frac{10 \pm \sqrt{(-10)^2 - 4(5)(-4)}}{2(5)}$$

$$X = \frac{10 \pm \sqrt{180}}{10}$$

$$X = \frac{10 \pm 6\sqrt{5}}{10}$$

$$X = \frac{5 \pm 3\sqrt{5}}{5}$$

8. $\frac{2v^2}{2} - \frac{6v}{2} = \frac{-12}{2}$

$$v^2 - 3v = -6$$

$$v^2 - 3v + 6 = 0$$

$$a=1 \quad b=-3 \quad c=6$$

$$X = \frac{3 \pm \sqrt{(-3)^2 - 4(1)(6)}}{2(1)}$$

$$X = \frac{3 \pm \sqrt{-15}}{2}$$

$$X = \frac{3 \pm i\sqrt{15}}{2}$$