

1. Solve the following quadratic equations:

(a)  $x^2 = 16$ ,

(c)  $4x = x^2$ ,

(b)  $(x - 2)(x + 3) = 0$ ,

(d)  $2x^2 - 6 = 0$ .

2. Solve the quadratic equations by factorisation:

(a)  $x^2 - 3x - 28 = 0$ ,

(b)  $2x^2 = x + 1$ ,

(c)  $6x^2 + 13x - 5 = 0$ .

3. What number must be placed in the box in order to complete the square?

(a)  $x^2 + 8x + \square$ ,

(b)  $x^2 - 7x + \square$ .

4. Solve the following equations by using the method of completion of squares:

(a)  $x^2 - 6x - 2 = 0$ ,

(b)  $x^2 + 8x + 1 = 0$ .

5. Use the quadratic formula to solve the following equations:

(a)  $3x^2 - 2x - 7 = 0$ ,

(b)  $10x^2 + 7x - 3 = 0$ .

6. Solve the equation  $x = \frac{x + 2}{3x}$ .

7. A number plus twice its reciprocal is equal to  $\frac{11}{3}$ . Use an equation to find what the number could be.

$$6 \quad x = \frac{x+2}{3x}$$

$$3x^2 = x+2$$

$$3x^2 - x - 2 = 0$$

$$ab = -6$$

$$a+b = -1$$

$$a = -3, b = 2$$

$$3x^2 - 3x + 2x - 2 = 0$$

$$3x(x-1) + 2(x-1) = 0$$

$$(x-1)(3x+2) = 0$$

$$x = 1 \text{ or } x = -\frac{2}{3}$$

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7 let the required number be  $x$

$$x + 2 \times \frac{1}{x} = \frac{11}{3}$$

$$\times 3x: \quad 3x^2 + 6 = 11x$$

$$3x^2 - 11x + 6 = 0 \quad \checkmark \quad ab = 18$$

$$a+b = -11$$

$$3x^2 - 9x - 2x + 6 = 0$$

$$3x(x-3) - 2(x-3) = 0$$

$$(x-3)(3x-2) = 0 \quad \checkmark$$

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

The number could be 3 or  $\frac{2}{3}$ .

$$1/ (a) \quad x^2 = 16$$

$$x = \pm 4 \quad \checkmark$$

$$(b) \quad (x-2)(x+3) = 0$$

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

$$(c) \quad 4x = x^2$$

$$x^2 - 4x = 0$$

$$x(x-4) = 0 \quad \checkmark \checkmark$$

$$x = 0 \text{ or } x = 4$$

$$(d) \quad 2x^2 - 6 = 0$$

$$x^2 - 3 = 0$$

$$x^2 = 3$$

$$x = \pm \sqrt{3} \quad \checkmark \checkmark$$

$$2 (a) \quad x^2 - 3x - 28 = 0$$

$$(x-7)(x+4) = 0 \quad \checkmark$$

$$x = 7 \text{ or } x = -4$$

$$ab = -28$$

$$a+b = -3$$

$$a = 7, b = -4$$

$$(b) \quad 2x^2 = x+1$$

$$2x^2 - x - 1 = 0 \quad \checkmark$$

$$2x^2 + 2x + x - 1 = 0$$

$$2x(x+1) - 1(x+1) = 0 \quad \checkmark$$

$$(x+1)(2x-1) = 0 \quad \checkmark$$

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

$$ab = -2$$

$$a+b = -1$$

$$a = 2, b = -1$$

$$(c) \quad 6x^2 + 13x - 5 = 0 \quad ab = -30$$

$$6x^2 + 15x - 2x - 5 = 0 \quad a+b = 13$$

$$3x(2x+3) - 1(2x+5) = 0 \quad a=+15, b=-2$$

$$(2x+5)(3x-1) = 0 \quad \checkmark \checkmark$$

$$x = -\frac{5}{2} \text{ or } x = \frac{1}{3}$$

$$3 \quad (a) \quad 4^2 = 16 \quad \checkmark$$

$$(b) \quad \left(-\frac{7}{2}\right)^2 = \frac{49}{4} \quad \checkmark$$

$$4 \quad (a) \quad x^2 - 6x - 2 = 0$$

$$x^2 - 6x + 9 = 2 + 9$$

$$(x-3)^2 = 11 \quad \checkmark$$

$$x-3 = \pm\sqrt{11} \quad \checkmark \checkmark$$

$$x = 3 \pm \sqrt{11}$$

$$(b) \quad x^2 + 8x + 1 = 0$$

$$x^2 + 8x + 16 = -1 + 16$$

$$(x+4)^2 = \sqrt{15} \quad \checkmark \checkmark \checkmark$$

$$x+4 = \pm\sqrt{15}$$

$$x = -4 \pm \sqrt{15}$$

$$5 \quad (a) \quad 3x^2 - 2x - 7 = 0$$

$$\Delta = b^2 - 4ac$$

$$= 4 - 4 \times 3 \times -7 \quad \checkmark$$

$$= 4 + 84$$

$$= 88$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} \quad \checkmark$$

$$x = \frac{2 \pm \sqrt{88}}{6} \quad \checkmark \checkmark$$

$$= \frac{2 \pm 2\sqrt{11}}{6}$$

$$= \frac{1 \pm \sqrt{11}}{3}$$

$$(b) \quad 10x^2 + 7x - 3 = 0$$

$$\Delta = b^2 - 4ac$$

$$= 49 - 4 \times 10 \times -3$$

$$= 49 + 120$$

$$= 169$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a}$$

$$= \frac{-7 \pm \sqrt{169}}{20} \quad \checkmark \checkmark \checkmark$$

$$= \frac{-7+13}{20} \text{ or } \frac{-7-13}{20}$$

$$= \frac{6}{20} \text{ or } \frac{-20}{20}$$

$$= \frac{3}{10} \text{ or } -1$$