

# Algebra Practice

## Skill 2.9 Solving equations with pronumerals on both sides

Solve these equations:

- |                       |                         |
|-----------------------|-------------------------|
| 1 $2a + 6 = a - 4$    | 2 $5a + 2 = 3a + 8$     |
| 3 $11a - 4 = 6a + 1$  | 4 $a + 6 = 4a + 3$      |
| 5 $2a + 1 = 5a - 8$   | 6 $2(a + 1) = a - 11$   |
| 7 $3(a + 4) = a + 8$  | 8 $3(2a + 1) = 5a + 12$ |
| 9 $2(a + 5) = 3a - 6$ | 10 $a + 1 = 3(a - 5)$   |

## Skill 2.10 Solving equations by removing more than two numbers

Solve:

- |                               |                               |
|-------------------------------|-------------------------------|
| 1 $\frac{3x+1}{2} + 6 = 14$   | 2 $\frac{3x-5}{2} - 2 = 0$    |
| 3 $\frac{x-4}{3} - 3 = 4$     | 4 $\frac{x+4}{5} + 6 = -11$   |
| 5 $\frac{3(x+1)}{4} - 6 = -3$ | 6 $\frac{2(x+4)}{3} + 6 = 12$ |
| 7 $\frac{5(x-3)}{4} + 8 = 28$ | 8 $\frac{4(2x+7)}{5} - 4 = 8$ |

## Skill 2.11 Simultaneous equations

(a) Solve these simultaneous equations using the substitution method:

- $y = 2x, \quad x + y = 21$
- $y = 3x, \quad x + y = 20$
- $y = 3x, \quad x + y = -20$
- $y = x + 1, \quad 2x + y = 10$
- $y = x - 1, \quad 3x + y = 23$

(b) Solve these simultaneous equations using the elimination method:

- $x + y = 4, \quad x - y = 10$
- $2x + y = 5, \quad -2x + y = 7$
- $x + 2y = 11, \quad x - 2y = -3$
- $x + 2y = 3, \quad 2x - y = 1$
- $x + 3y = 5, \quad 2x - y = 3$

## Skill 2.12 Solving quadratic equations

(a) Solve these equations:

- $b^2 = 25$
- $2c^2 = 50$
- $\frac{b^2}{2} = 32$
- $(a - 2)(a + 3) = 0$
- $(a + 4)\left(\frac{a}{2} + 1\right) = 0$
- $\left(\frac{a}{4} + 1\right)(a - 2) = 0$
- $2(a + 1)(a - 4) = 0$

(b) Factorise first and then solve the equations:

- $x^2 + 11x + 18 = 0$
- $x^2 + 5x + 6 = 0$
- $a^2 - 2x - 15 = 0$
- $a^2 + 2x - 15 = 0$
- $a^2 + a - 56 = 0$
- $a^2 - a - 30 = 0$
- $a^2 - 4a + 4 = 0$
- $a^2 + 12a + 20 = 0$

## Skill 2.13 Evaluating formulas

The bank interest ( $I$ ) paid on a principle investment ( $P$ ) for a rate ( $R$ ) over a period of time ( $T$ ) is given

by the formula:  $I = \frac{PRT}{100}$

Find the interest paid in these situations:

- $P = \$20\,000, R = 12\%, T = 2$  years
- $P = \$100\,000, R = 8.3\%, T = 3$  years
- $P = \$15\,000, R = 5\%, T = 5$  years
- $P = \$30\,000, R = 10\%, T = 4$  years

## Skill 2.14 Transposing equations

Transpose these equations to make  $a$  the subject:

- |                         |                    |
|-------------------------|--------------------|
| 1 $\frac{2a}{b} = c$    | 2 $a + b = 3c$     |
| 3 $5a + 2 = c$          | 4 $6a + 2b = 3$    |
| 5 $\frac{a+1}{2} = 5b$  | 6 $a(b+1) = c$     |
| 7 $\frac{a}{2} + 3 = b$ | 8 $9a - 3 = b + c$ |
| 9 $3(a+2) = b$          | 10 $2(a-4) = b$    |

11 For the equation  $F = ma$

- make  $m$  the subject
- find the value of  $m$  when:
  - $F = 100, a = 20$
  - $F = 20, a = 2$
  - $F = 15, a = 3$

# Answers

## Skill 2.9

- |             |           |             |
|-------------|-----------|-------------|
| 1 $a = -10$ | 2 $a = 3$ | 3 $a = 1$   |
| 4 $a = 1$   | 5 $a = 3$ | 6 $a = -13$ |
| 7 $a = -2$  | 8 $a = 9$ | 9 $a = 16$  |
| 10 $a = 8$  |           |             |

## Skill 2.10

- |             |           |            |
|-------------|-----------|------------|
| 1 $x = 5$   | 2 $x = 3$ | 3 $x = 25$ |
| 4 $x = -89$ | 5 $x = 3$ | 6 $x = 5$  |
| 7 $x = 19$  | 8 $x = 4$ |            |

## Skill 2.11

- |                             |                             |
|-----------------------------|-----------------------------|
| 1 $x = 7, y = 14$           | 2 $x = 5, y = 15$           |
| 3 $x = -5, y = -15$         | 4 $x = 3, y = 4$            |
| 5 $x = 6, y = 5$            | 6 $x = 7, y = -3$           |
| 7 $x = -\frac{1}{2}, y = 6$ | 8 $x = 4, y = 3\frac{1}{2}$ |
| 9 $x = 1, y = 1$            | 10 $x = 2, y = 1$           |

## Skill 2.12

- |                      |                    |
|----------------------|--------------------|
| 1 $b = \pm 5$        | 2 $c = \pm 5$      |
| 3 $b = \pm 8$        | 4 $a = 2, a = -3$  |
| 5 $a = -4, a = -2$   | 6 $a = -4, a = 2$  |
| 7 $a = -1, a = 4$    | 8 $x = -2, x = -9$ |
| 9 $x = -2, x = -3$   | 10 $a = 5, a = -3$ |
| 11 $a = -5, a = 3$   | 12 $a = -8, a = 7$ |
| 13 $a = 6, a = -5$   | 14 $a = 2$         |
| 15 $a = -2, a = -10$ |                    |

## Skill 2.13

- (a) \$4800 (b) \$24 900 (c) \$3750 (d) \$12 000

## Skill 2.14

- |   |                               |
|---|-------------------------------|
| 1 $a = \frac{bc}{2}$                            | 2 $a = 3c - b$                |
| 3 $a = \frac{c-2}{5}$                           | 4 $a = \frac{3-2b}{6}$        |
| 5 $a = 10b - 1$                                 | 6 $\hat{a} = \frac{c}{(b+1)}$ |
| 7 $a = 2(b-3)$                                  | 8 $a = \frac{b+c+3}{9}$       |
| 9 $a = \frac{b}{3} - 2$ or $a = \frac{b-6}{3}$  |                               |
| 10 $a = \frac{b}{2} + 4$ or $a = \frac{b+8}{2}$ |                               |
| 11 (a) $m = \frac{F}{a}$                        |                               |
| (b) (i) $m = 5$ (ii) $m = 10$ (iii) $m = 5$     |                               |