

11 $A = -4$ and $B = 1$

12 a $r = \sqrt{\frac{Gm_1m_2}{F}}$ b $1.5 \times 10^{11} \text{ m}$

17 Unit test

1 $5x + 20$ seen [1]

$x = 5y + 20$ [1]

$y = \frac{x-20}{5}$ [1]

2 $x^2 + 8x + 16 - 2x - 7 = x^2 + 6x + 9$ [1]

$x^2 + 6x + 9 = x^2 + 6x + 9$ [1]

3 $\sqrt{2y} = x + 3$ [1]

$x = \sqrt{2y} - 3$ [1]

4 $\frac{(3-x)(3+x)}{x(x-3)}$ [1] = $\frac{3+x}{x}$ [1]

5 a $\frac{3y}{10x^2}$ [2] [-1 for 1 mistake]

b $\frac{45}{20x} - \frac{8}{20x}$ [1] = $\frac{37}{20x}$ [1]

6 $Vx = 1 + 5x$

$Vx - 5x = 1$ [1]

$x(V-5) = 1$

$x = \frac{1}{V-5}$ [1]

7 a $12 - 3\sqrt{2} + 4\sqrt{2} - 2$ [1] = $10 + \sqrt{2}$ [1]

b $9 + 6\sqrt{5} + 5$ [1] = $14 + 6\sqrt{5}$ [1]

8 a $\frac{(x-5)(x+6)}{(x+6)(x+4)} \times \frac{(x+4)(x-1)}{(x-5)(x-7)}$ [1] = $\frac{x-1}{x-7}$ [1]

b $\frac{(5x+6)(x-2)}{4(x-2)} \times \frac{5(x+1)}{(5x+6)(x+1)}$ [1] = $\frac{5}{4}$ [1]

9 $\frac{9(1+\sqrt{3})}{(1-\sqrt{3})(1+\sqrt{3})}$ [1] = $\frac{9+9\sqrt{3}}{-2}$ [1]

10 a $5x^2 - x - 6 = 0$ [1]

$(5x-6)(x+1) = 0$ [1]

$x = \frac{6}{5}, x = -1$ [1]

b $12 = x(x-1)$

$x^2 - x - 12 = 0$ [1]

$(x-4)(x+3) = 0$ [1]

$x = 4, x = -3$ [1]

11 $2 = x^2 + 6x + 8$ [1]

$x = \frac{-6 \pm \sqrt{36-24}}{2}$ [1]

$x = -1.27, x = -4.73$ (2 d.p.) [1]

12 a i 12 [1] ii 5 [1]

b $\alpha = \pm 3$ [1]

$$\begin{aligned} \text{c } fg(x) &= f(2x+1) = (2x+1)^2 - 9 \text{ [1]} \\ &= 4x^2 + 4x + 1 - 9 \\ &= 4x^2 + 4x - 8 \text{ [1]} \end{aligned}$$

Sample student answer

The student has made an error in multiplying both sides by $(b-5)$: $a \times (b-5) = ab - 5a$, not $ab - 5$.

The student could avoid this mistake by putting the terms in a bracket before multiplying them up, which would remind them to multiply BOTH terms in the brackets by a .