

Test yourself 2

1. Simplify

- (a) $5y - 7y$
 (b) $\frac{3a + 12}{3}$
 (c) $-2k^3 \times 3k^2$
 (d) $\frac{x}{3} + \frac{y}{5}$
 (e) $4a - 3b - a - 5b$
 (f) $\sqrt{8} + \sqrt{32}$
 (g) $3\sqrt{5} - \sqrt{20} + \sqrt{45}$

2. Factorise

- (a) $x^2 - 36$
 (b) $a^2 + 2a - 3$
 (c) $4ab^2 - 8ab$
 (d) $5y - 15 + xy - 3x$
 (e) $4n - 2p + 6$
 (f) $8 - x^3$

3. Expand and simplify

- (a) $b + 3(b - 2)$
 (b) $(2x - 1)(x + 3)$
 (c) $5(m + 3) - (m - 2)$
 (d) $(4x - 3)^2$
 (e) $(p - 5)(p + 5)$
 (f) $7 - 2(a + 4) - 5a$
 (g) $\sqrt{3}(2\sqrt{2} - 5)$
 (h) $(3 + \sqrt{7})(\sqrt{3} - 2)$

4. Simplify

- (a) $\frac{4a - 12}{5b^3} \times \frac{10b}{a^3 - 27}$
 (b) $\frac{5m + 10}{m^2 - m - 2} \div \frac{m^2 - 4}{3m + 3}$

5. The volume of a cube is $V = s^3$. Evaluate V when $s = 5.4$.

6. (a) Expand and simplify

$$(2\sqrt{5} + \sqrt{3})(2\sqrt{5} - \sqrt{3})$$

(b) Rationalise the denominator of

$$\frac{3\sqrt{3}}{2\sqrt{5} + \sqrt{3}}$$

7. Simplify $\frac{3}{x-2} + \frac{1}{x+3} - \frac{2}{x^2 + x - 6}$.

8. If $a = 4$, $b = -3$ and $c = -2$, find the value of

- (a) ab^2
 (b) $a - bc$
 (c) \sqrt{a}
 (d) $(bc)^3$
 (e) $c(2a + 3b)$

9. Simplify

- (a) $\frac{3\sqrt{12}}{6\sqrt{15}}$
 (b) $\frac{4\sqrt{32}}{2\sqrt{2}}$

10. The formula for the distance an object falls is given by $d = 5t^2$. Find d when $t = 1.5$.

11. Rationalise the denominator of

- (a) $\frac{2}{5\sqrt{3}}$ (b) $\frac{1 + \sqrt{3}}{\sqrt{2}}$

12. Expand and simplify

- (a) $(3\sqrt{2} - 4)(\sqrt{3} - \sqrt{2})$
 (b) $(\sqrt{7} + 2)^2$

13. Factorise fully

- (a) $3x^2 - 27$
 (b) $6x^2 - 12x - 18$
 (c) $5y^3 + 40$

14. Simplify

- (a) $\frac{3x^4y}{9xy^5}$
 (b) $\frac{5}{15x - 5}$

15. Simplify

- (a) $(3\sqrt{11})^2$
 (b) $(2\sqrt{3})^3$

16. Expand and simplify

- (a) $(a + b)(a - b)$
 (b) $(a + b)^2$
 (c) $(a - b)^2$

17. Factorise

- (a) $a^2 - 2ab + b^2$
 (b) $a^3 - b^3$

18. If $x = \sqrt{3} + 1$, simplify $x + \frac{1}{x}$ and give your answer with a rational denominator.

19. Simplify

- (a) $\frac{4}{a} + \frac{3}{b}$
 (b) $\frac{x-3}{2} - \frac{x-2}{5}$

20. Simplify $\frac{3}{\sqrt{5} + 2} - \frac{\sqrt{2}}{2\sqrt{2} - 1}$, writing your answer with a rational denominator.

ANSWERS TO TEST YOURSELF 2

1. (a) $-2y$ (b) $a + 4$ (c) $-6k^5$ (d) $\frac{5x + 3y}{15}$
 (e) $3a - 8b$ (f) $6\sqrt{2}$ (g) $4\sqrt{5}$
 2. (a) $(x + 6)(x - 6)$ (b) $(a + 3)(a - 1)$
 (c) $4ab(b - 2)$ (d) $(y - 3)(5 + x)$
 (e) $2(2n - p + 3)$ (f) $(2 - x)(4 + 2x + x^2)$
 3. (a) $4b - 6$ (b) $2x^2 + 5x - 3$ (c) $4m + 17$
 (d) $16x^2 - 24x + 9$ (e) $p^2 - 25$ (f) $-1 - 7a$
 (g) $2\sqrt{6} - 5\sqrt{3}$ (h) $3\sqrt{3} - 6 + \sqrt{21} - 2\sqrt{7}$
 4. (a) $\frac{8}{b^2(a^2 + 3a + 9)}$ (b) $\frac{15}{(m - 2)^2}$
 5. $V = 157.464$ 6. (a) 17 (b) $\frac{6\sqrt{15} - 9}{17}$
 7. $\frac{4x + 5}{(x + 3)(x - 2)}$ 8. (a) 36 (b) -2 (c) 2 (d) 216
 (e) 2 9. (a) $\frac{1}{\sqrt{5}}$ (b) 8 10. $d = 11.25$
 11. (a) $\frac{2\sqrt{3}}{15}$ (b) $\frac{\sqrt{2} + \sqrt{6}}{2}$
 12. (a) $3\sqrt{6} - 6 - 4\sqrt{3} + 4\sqrt{2}$ (b) $11 + 4\sqrt{7}$
 13. (a) $3(x - 3)(x + 3)$ (b) $6(x - 3)(x + 1)$
 (c) $5(y + 2)(y^2 - 2y + 4)$ 14. (a) $\frac{x^3}{3y^4}$
 (b) $\frac{1}{3x - 1}$ 15. (a) 99 (b) $24\sqrt{3}$ 16. (a) $a^2 - b^2$
 (b) $a^2 + 2ab + b^2$ (c) $a^2 - 2ab + b^2$
 17. (a) $(a - b)^2$ (b) $(a - b)(a^2 + ab + b^2)$
 18. $\frac{3\sqrt{3} + 1}{2}$ 19. (a) $\frac{4b + 3a}{ab}$ (b) $\frac{3x - 11}{10}$
 20. $\frac{21\sqrt{5} - 46 - \sqrt{2}}{7}$