Exercises

A

4. Expand and simplify.

a) $(g + 1)(g^2 + 2g + 3)$

b) $(2 + t + t^2)(1 + 3t + t^2)$

c) $(2w + 3)(w^2 + 4w + 7)$

d) $(4 + 3n + n^2)(3 + 5n + n^2)$

5. Expand and simplify.

a) $(2z + y)(3z + y)$

b) $(4f - 3g)(3f - 4g + 1)$

c) $(2a + 3b)(4a + 5b)$

d) $(3a - 4b + 1)(4a - 5b)$

e) $(2r + s)^2$

f) $(3t - 2u)^2$

B

6. **a)** Expand and simplify.

i) $(2x + y)(2x + y)$

ii) $(5r + 2s)(5r + 2s)$

iii) $(6c + 5d)(6c + 5d)$

iv) $(5v + 7w)(5v + 7w)$

v) $(2x - y)(2x - y)$

vi) $(5r - 2s)(5r - 2s)$

vii) $(6c - 5d)(6c - 5d)$

viii) $(5v - 7w)(5v - 7w)$

b) What patterns do you see in the factors and products in part a? Use these patterns to expand and simplify each product without using the distributive property.

i) $(p + 3q)(p + 3q)$

ii) $(2s - 7t)(2s - 7t)$

iii) $(5g + 4h)(5g + 4h)$

iv) $(10h - 7k)(10h - 7k)$

7. **a)** Expand and simplify.

i) $(x + 2y)(x - 2y)$

ii) $(3r - 4s)(3r + 4s)$

iii) $(5c + 3d)(5c - 3d)$

iv) $(2v - 7w)(2v + 7w)$

b) What patterns do you see in the factors and products in part a? Use these patterns to expand and simplify each product without using the distributive property.

i) $(11g + 5h)(11g - 5h)$

ii) $(25m - 7n)(25m + 7n)$

8. Expand and simplify.

a) $(3y - 2)(y^2 + y - 8)$

b) $(4r + 1)(r^2 - 2r - 3)$

c) $(b^2 + 9b - 2)(2b - 1)$

d) $(x^2 + 6x + 1)(3x - 7)$

9. Expand and simplify.

a) $(x + y)(x + y + 3)$

b) $(x + 2)(x + y + 1)$

c) $(a + b)(a + b + c)$

d) $(3 + t)(2 + t + s)$

10. Expand and simplify.

a) $(x + 2y)(x - 2y - 1)$

b) $(2c - 3d)(c + d + 1)$

c) $(a - 5b)(a + 2b - 4)$

d) $(p - 2q)(p + 4q - r)$

11. Find and correct the errors in this solution.

$$\begin{aligned}&(2r - 3s)(r - 5s + 6)\\ &= 2r(r - 5s + 6) - 3s(r - 5s + 6)\\ &= 2r^2 - 5rs + 12r - 3rs - 15s^2 - 18s\\ &= 2r^2 - 8rs + 12r - 33s^2\end{aligned}$$

12. The area of the base of a right rectangular prism is $x^2 + 3x + 2$. The height of the prism is $x + 7$. Write, then simplify an expression for the volume of the prism.

13. Expand and simplify. Substitute a number for the variable to check each product.

a) $(r^2 + 3r + 2)(4r^2 + r + 1)$

b) $(2d^2 + 2d + 1)(d^2 + 6d + 3)$

c) $(4c^2 - 2c - 3)(-c^2 + 6c + 2)$

d) $(-4n^2 - n + 3)(-2n^2 + 5n - 1)$

14. Find and correct the errors in this solution.

$$\begin{aligned}&(3g^2 + 4g - 2)(-g^2 - g + 4)\\ &= -3g^4 - 3g^3 + 12g^2 - 4g^3 + 4g^2 + 8g\\ &\quad + 2g^2 + 2g + 8\\ &= -3g^4 + 5g^3 + 6g^2 + 10g + 8\end{aligned}$$

15. Expand and simplify.

a) $(3s + 5)(2s + 2) + (3s + 7)(s + 6)$

b) $(2x + 3)(5x + 4) + (x - 4)(3x - 7)$

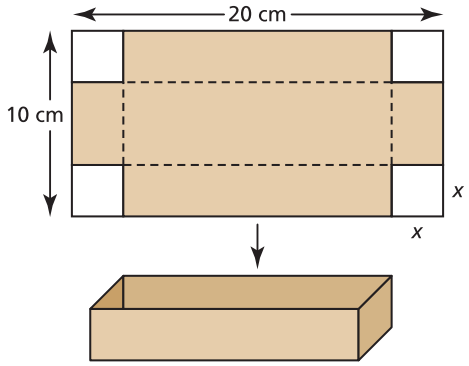
c) $(3m + 4)(m - 4n) + (5m - 2)(3m - 6n)$

d) $(4y - 5)(3y + 2) - (3y + 2)(4y - 5)$

e) $(3x - 2)^2 - (2x + 6)(3x - 1)$

f) $(2a + 1)(4a - 3) - (a - 2)^2$

16. A box with no top is made from a piece of cardboard 20 cm by 10 cm. Equal squares are cut from each corner and the sides are folded up.

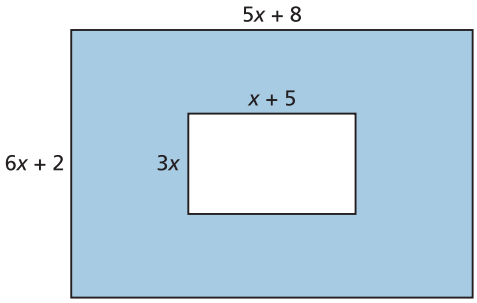


Let x centimetres represent the side length of each square cut out. Write a polynomial to represent each measurement. Simplify each polynomial.

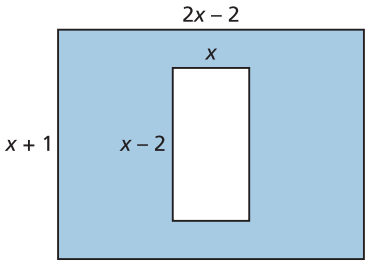
a) the length of the box
b) the width of the box
c) the area of the base of the box
d) the volume of the box

17. Each shape is a rectangle. Write a polynomial to represent the area of each shaded region. Simplify each polynomial.

a)



b)



C

18. Expand and simplify.

a) $(x - 2)^3$ **b)** $(2y + 5)^3$
c) $(4a - 3b)^3$ **d)** $(c + d)^3$

19. Expand and simplify.

a) $2a(2a - 1)(3a + 2)$
b) $-3r(r - 1)(2r + 1)$
c) $5x^2(2x - 1)(4x - 3)$
d) $-xy(2x + 5)(4x - 5)$
e) $2b(2b - c)(b + c)$
f) $y^2(y^2 + 1)(y^2 - 1)$

20. A cube has edge length $2x + 3$.

a) Write then simplify an expression for the volume of the cube.
b) Write then simplify an expression for the surface area of the cube.

21. Expand and simplify.

a) $(3x + 4)(x - 5)(2x + 8)$
b) $(b - 7)(b + 8)(3b - 4)$
c) $(2x - 5)(3x + 4)^2$
d) $(5a - 3)^2(2a - 7)$
e) $(2k - 3)(2k + 3)^2$

22. Expand and simplify.

a) $(x + y + 1)^3$
b) $(x - y - 1)^3$
c) $(x + y + z)^3$
d) $(x - y - z)^3$

Reflect

What strategies do you know for multiplying two binomials? How can you use or adapt those strategies to multiply two trinomials? Include examples in your explanation.