Algebra – 3B

Exercise A

Simplify the following expressions where possible.

1 $3a + 5a$	2 $6x - 2x$	3 $4a + 3b$	4 $6c - 4d$
5 $3d + d$	6 $3x + 2$	7 $7y + 2y$	8 $5h - 3h$
9 $8w - 5w$	10 $6y - 5y$	11 $7x + y$	12 $8m + m$
13 $16y - 9y$	14 $6m + 5n$	15 $4x + 6$	16 $5b + 8b$
17 $20t - 8t$	18 $7p - 6p$	19 $10n + 15n$	20 $6a - 5$
21 $8x + 2$	22 $14h + 16h$	23 $9 - 7x$	24 $8b - 4$
25 $7a + 6$	26 $5c + c$	27 $12y - 12$	28 $12y - y$

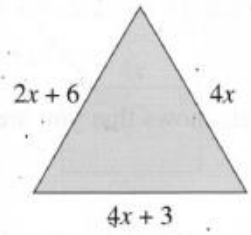
Exercise B

Simplify the following expressions as far as possible by collecting like terms.

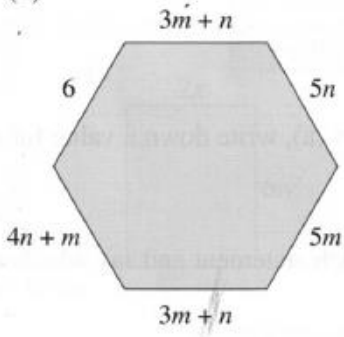
1 $3a + 5b + 3a + 2b$	2 $2x + 4y + 7x + 3y$	3 $8x + 4y - 5x - 2y$
4 $7m + 5n - 4m + 3n$	5 $6a + 5 + a + 4$	6 $8a + 3b - 6a + 4b$
7 $5x + 9 - 2x - 7$	8 $7p + 9q + 2p - 4q$	9 $7x + 8 + x - 6$
10 $a + 14b + 5a - 4b$	11 $6m + 8 + 6m - 7$	12 $3h + 20 - h + 5$
13 $5m + 2n + 4n + 7m$	14 $8p + 6q - 3q - 2p$	15 $6x + 10 - 6 + 3x$
16 $7x + 3y + x + 6$	17 $8a + 3b - 4a + 4c$	18 $5w + 8 - 3w + w$
19 $8 + 4a + 7 - 2a$	20 $4y + 8 - 5 - 3y$	21 $5c - c + 6a + 8c$
22 $5p + 6q + 4p - 4q$	23 $7m + 9n - 7n + 4$	24 $6x + 8 - x + 9x$

25 Write down an expression for the perimeter of each shape below. Collect like terms where possible.

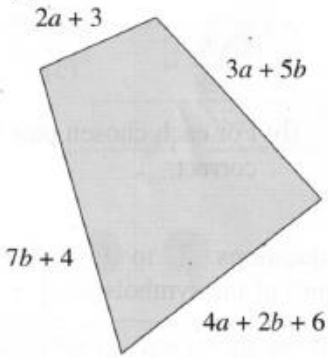
(a)



(b)



(c)

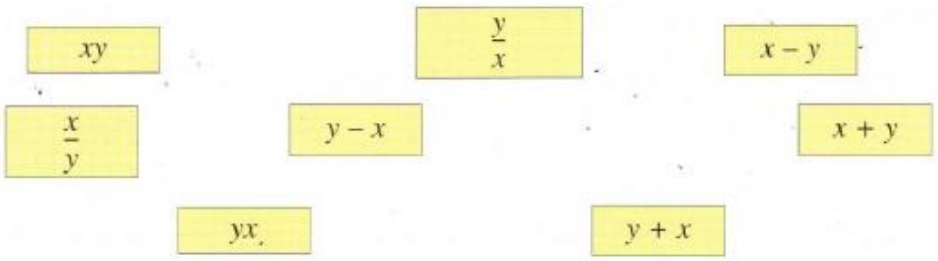


26 Which two expressions below are *equivalent* (this means they give the same answer when the like terms are collected).

(a) $5x + 3 - 2x + 6y + x$ (b) $3y + 4x + 3y + 6 - 2$ (c) $7 + 4y + 4x + 2y - 3$

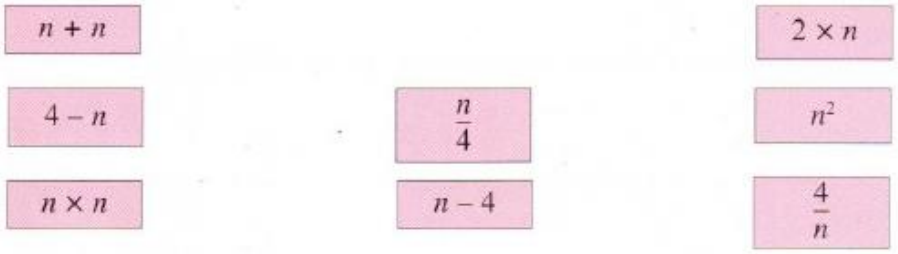
Exercise C

1 (a) Write down any pairs of expressions from below that are equal to each other.



(b) For each chosen pair from part (a), write down a pair of values for x and y which show that you are correct.

2 (a) Write down any pairs of expressions from below that are equal to each other.



(b) For each chosen pair from part (a), write down a value for n which shows that you are correct.

In questions 3 to 14 write down each statement and say whether it is 'true' or 'false' for all values of the symbols used.

If you are not sure, try different values for the letters

3 $x + x + x = 3x$

4 $xw = wx$

5 $m \times m = 2m$

6 $m + n = n + m$

7 $5y - y = 5$

8 $a \times 5 = 5a$

9 $\frac{x}{2} = \frac{2}{x}$

10 $a \times a \times a = 3a$

11 $a^2 = 2a$

12 $a \div 3 = 3 \div a$

13 $\frac{1}{2}$ of $b = \frac{b}{2}$

14 $3n^2 = (3n)^2$

15 Simplify the following expressions.

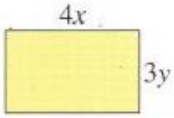
(a) $\frac{m}{m}$ (b) $\frac{4a}{4}$ (c) $\frac{n^2}{n}$ (d) $\frac{6x}{x}$

Exercise D

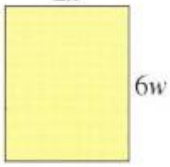
Simplify

1. $4a \times 2b$
2. $5c \times 3d$
3. $6m \times 7n$
4. $3p \times 8q$
5. $9b \times 2a$
6. $2m \times n \times 5p$
7. $7a \times 3b \times 2c$
8. $4q \times 6r \times p$
9. $5a \times 3 \times 2b$
10. Use algebra to write down an expression for the area of each rectangle below.

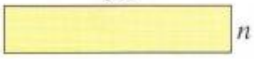
(a)



(b)



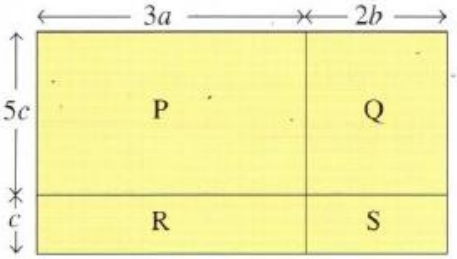
(c)



11. Simplify by collecting like terms

(a) $pq + qp$
(b) $3xy + 4mn - 2mn + 4yx$
(c) $5m + nm + 3mn - 2m$
(d) $4ab + 3a - 2ba - a + 3ab$
(e) $x + y + xy + 3yx - x + 3xy$
(f) $6cd + 4dc + ab - 2c + 3cd + ba$
(g) $2a + 3ba - a + 5ab - 2ba$
(h) $3q + 4pq - 2q + 3qp + 4$

12.



Use algebra to write down an expression for the area of each of the following:

(a) P (b) Q (c) P + R
(d) S (e) Q + S (f) P + Q + R + S

13. What must be added to $6ba$ to give $8ab$?
14. What must be added to $3x + 7yx$ to give $5x + 8xy$?
15. Neil multiplies two algebraic terms together and gets the answer $12ab$. Write down all the different pairs of terms that Neil may have used (numbers used must be whole numbers).

Exercise E

In Questions **1** to **20** collect like terms together.

1. $2x + 3 + 3x + 5$
2. $4x + 8 + 5x - 3$
3. $5x - 3 + 2x + 7$
4. $6x + 1 + x + 3$
5. $4x - 3 + 2x + 10 + x$
6. $5x + 8 + x + 4 + 2x$
7. $7x - 9 + 2x + 3 + 3x$
8. $5x + 7 - 3x - 2$
9. $4x - 6 - 2x + 1$
10. $10x + 5 - 9x - 10 + x$
11. $4a + 6b + 3 + 9a - 3b - 4$
12. $8m - 3n + 1 + 6n + 2m + 7$
13. $6p - 4 + 5q - 3p - 4 - 7q$
14. $12s - 3t + 2 - 10s - 4t + 12$
15. $a - 2b - 7 + a + 2b + 8$
16. $3x + 2y + 5z - 2x - y + 2z$
17. $6x - 5y + 3z - x + y + z$
18. $2k - 3m + n + 3k - m - n$
19. $12a - 3 + 2b - 6 - 8a + 3b$
20. $3a + x + e - 2a - 5x - 6e$

21. Simplify where possible.

(a) $x^2 - 3x + 1 + 2x^2 + 3x$ (b) $5a + ab - 3a + 4ab$

(c) $x^3 - 7x + 4x^2$ (d) $ab + 3a^2 - 7a - ab + a^2$

22. Which of these expressions is equivalent to $x - 2$?

A $x^2 - 7x - 1 - x^2 + 8x + 3$	B $x^2 + 7x + 2x - 8x - x^2 - 2$
C $5 + 7x - x - 4 - 6x + x^2$	D $5x - 7 + 4 - x + 1 - 3x$

Collect like terms together.

23. $x^2 + 5x + 2 - 2x + 1$

24. $x^2 + 2x + 2x^2 + 4x + 5$

25. $x^2 + 5x + x^2 + x - 7$

26. $2x^2 - 3x + 8 + x^2 + 4x + 4$

27. $3x^2 + 4x + 6 - x^2 - 3x - 3$

28. $5x^2 - 3x + 2 - 3x^2 + 2x - 2$

29. $2x^2 - 2x + 3 - x^2 - 2x - 5$

30. $6x^2 - 7x + 8 - 3x^2 + 5x - 10$

31. $3y^2 - 6x + y^2 + x^2 + 7x + 4x^2$

32. $8 - 5x - 2x^2 + 4 + 6x + 2x^2$

33. $5 + 2y + 3y^2 - 8y - 6 + 2y^2 + 3$

34. $ab + a^2 - 3b + 2ab - a^2$

35. $3c^2 - d^2 + 2cd - 3c^2 - d^2$

36. $ab + 2a^2 + 3ab - 4a^2 + 2a$

37. $x^3 + 2x^2 - x + 3x^2 + x^3 + x$

38. $5 - x^2 - 2x^3 + 6 + 2x^2 + 3x^3$

39. $xy + ab - cd + 2xy - ab + dc$

40. $pq - 3qp + p^2 + 2qp - q^2$