PROJECT MATHS

Text & Tests

Leaving 3 Certificate

Algebra 1

chapter 1

Section 1.2 Simplifying algebraic expressions

Notes

In algebra $2x^2 - 3x + 4$ is called an **expression**.

It consists of three **terms** which are separated by plus or minus signs.

The letter x is called a **variable** because it can have different values in other expressions.

The number 4 is called a **constant** because its value does not change.

The number -3 before the x is called the **coefficient** of x.

The coefficient of x^2 is 2.

Like terms

Here are some **like terms**:

(i) $2x$ and $3x$ (ii) $2x^2$ and $3x^2$ (iii) $3ab$ and $-6ab$.

These are like terms because they contain the same letter or combinations of the same letters or powers of the same letters.

The terms $3ab$ and $3ac$ are not like terms.
Neither are $3x^2$ and $3x$, because the powers are not the same.

Like terms only may be added or subtracted.

Example 1

Simplify each of the following

(i) $2x - 3y + 4 - 3x + 5y - 2$

(ii) $3x^2 - 2xy + y^2 - 5xy + x^2 - 3y^2$

Example 2

(i) Remove the brackets and simplify $(2x - 3)(x + 5)$.

(ii) Hence simplify $2(3x^2 - 2x + 4) - (2x - 3)(x + 5)$.

Exercise 1.2

Answers: **1.** $13x$ **2.** $3x$ **3.** $7a$ **4.** $6a$ **5.** a **6.** $2y$

Simplify each of the following expressions:

1. $4x + 3x + 6x$

2. $7x - 4x$

3. $3a + 8a - 4a$

4. $5a - 3a + 4a$

5. $a - 2a + 3a - a$

6. $6y - 7y + 5y - 2y$

Exercise 1.2

Answers: **7.** $5x^2$ **8.** $3x^2 - 2x$ **9.** $7a^2 - 2b$ **10.** $-2x + 2$ **11.** $4a + 4$ **12.** $6x^2 - 2$

Simplify each of the following expressions:

7. $6x^2 + 4x^2 - 5x^2$

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

9. $3a^2 + b + 4a^2 - 3b$

10. $3x - 7 - 5x + 9$

11. $5a - 4 - a + 8$

12. $9x^2 + 6 - 3x^2 - 8$

Exercise 1.2

Answers:
(i) $x^2 + 7x + 12$ (ii) $2x^2 + 5x + 3$
(iii) $2x^2 + 5x - 12$ (iv) $2x^2 + 8x - 10$
(v) $6x^2 + 13x - 5$ (vi) $2x^2 - 15x + 18$

13. Remove the brackets and simplify each of these:

(i) $(x + 4)(x + 3)$ (ii) $(2x + 3)(x + 1)$ (iii) $(x + 4)(2x - 3)$

(iv) $(2x - 2)(x + 5)$ (v) $(3x - 1)(2x + 5)$ (vi) $(2x - 3)(x - 6)$

Exercise 1.2

Answers: (i) $19x - 17$ (ii) $2x^2 - 17x$ (iii) $x - 10$ (iv) $2x^2 + 6x + 3$

14. Remove the brackets and simplify each of these:

(i) $3x - 5 + 4(4x - 3)$

(ii) $3x(x - 4) - x(x + 5)$

(iii) $3(2x - 4) - (5x - 2)$

(iv) $2(x^2 + 4x - 1) - 2x + 5$

Exercise 1.2

Answers: (i) $x^2 + 4x + 4$ (ii) $x^2 - 6x + 9$ (iii) $4x^2 + 12x + 9$ (iv) $9x^2 - 12x + 4$

15. Expand and simplify each of these:

(i) $(x + 2)^2$

(ii) $(x - 3)^2$

(iii) $(2x + 3)^2$

(iv) $(3x - 2)^2$

Answers: (i) $2x$ (ii) 2 (iii) $4x$, 15 (iv) $4x$, 8

16. Copy and complete each of these:

(i) $3(\square + 5) = 6x + 15$

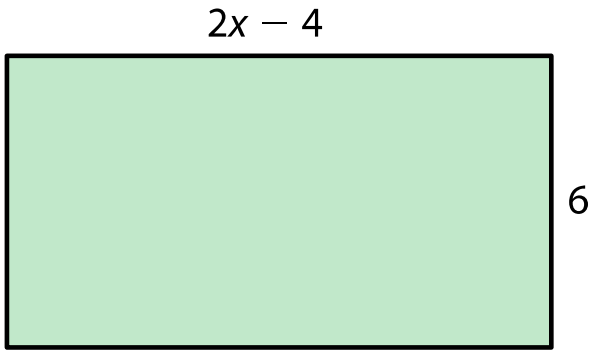
(ii) $4(\square - a) = 8 - 4a$

(iii) $5(\square - 3) = 20x - \square$

(iv) $2(\square + \square) = 8x + 16$

Answer: $12x - 24$

17. Which of these expressions gives the area of the rectangle?

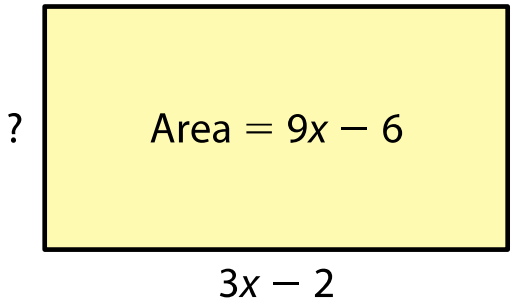


$12x - 4$ $2x - 24$ $12x - 24$

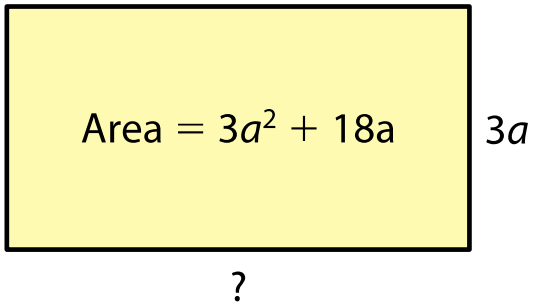
Answers: (i) 3 (ii) $a + 6$

18. For each shape, write an expression for the missing length:

(i)



(ii)



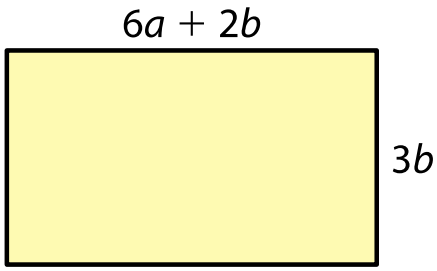
Answers: (i) $18ab + 6b^2$ (ii) $12a + 10b$

19. Write and simplify an expression for

(i) the area

(ii) the perimeter

of the given rectangle.



Answer: $x^2 + 19x - 24$

20. Simplify: $(3x - 2)(x + 5) - 2(x^2 - 3x + 7)$.