



ALGEBRA

BASIC · MEDIUM · ADVANCED

Premium Practice Worksheet

Algebra is the backbone of IGCSE and GCSE Mathematics — and getting it right from the start makes every other topic easier. This premium worksheet has been carefully prepared by **Sir Faraz Hassan**, founder of igcsegcsemaths.com, to help you build and sharpen your algebra skills through structured, exam-aligned practice.

Work through each section at your own pace. A full set of worked solutions is provided at the end to help you learn from your mistakes and build exam confidence.

igcsegcsemaths.com

Name: _____

Date: _____

Class / Year: _____

Score: _____ / 109

Worksheet Instructions

- This worksheet contains **45 questions** across three sections, worth **109 marks** in total.
- **Show all working** in the space provided. Marks are awarded for method, not just the answer.
- A **calculator is not required** except where a question is marked with **[Calculator]**.
- Worked solutions are provided at the end — use them to check your **method**, not just the final answer.

Section	Questions	Marks	Est. Time	Target Grade	Your Score
A — Basic	1 – 15	21	15 min	3 – 5	
B — Medium	16 – 30	38	25 min	5 – 7	
C — Advanced	31 – 45	50	35 min	7 – 9	
Total	45	109	~75 min		

■ Before You Start

- **Have a pen, pencil and ruler ready.** Show all working neatly.
- Attempt every question — even a partial method can earn marks in an exam.
- If you get stuck, move on and come back to it. Don't spend too long on one question.
- After marking, use the **self-assessment checklist** at the end to identify weak areas.
- The **Exam Tips** scattered throughout highlight the most common errors — read them carefully.

■ Key Algebra Reminders

- **Like terms:** only terms with the same variable and power can be combined.
- **Expanding:** multiply everything inside the bracket by the term outside.
- **Factorising:** the reverse of expanding — find the highest common factor.
- **Solving:** do the same operation to both sides to isolate the variable.
- **Quadratic formula:** $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$



BASIC

Algebra Basics

/ 21 marks

Skills: Collecting like terms · Expanding single brackets · Solving one/two-step equations · Substitution · Writing expressions · Index notation

1. Simplify: $3a + 5a - 2a$ [1]

2. Simplify: $4x + 7 - 2x + 3$ [1]

3. Simplify: $6y - 3y + 2y - y$ [1]

4. Expand: $3(x + 4)$ [2]

5. Expand: $5(2a - 3)$ [2]

6. Expand: $-2(y + 6)$ [2]

7. Solve: $x + 7 = 12$ [1]

8. Solve: $3x = 18$ [1]

9. Solve: $x - 5 = 9$ [1]

10. Solve: $2x + 3 = 11$ [2]

11. Write an expression for: "five more than a number n " [1]

12. Write an expression for: "three times a number p , decreased by 7" [1]

13. If $a = 4$, find the value of $3a + 2$ [2]

14. If $x = -2$, find the value of $5x - 1$ [2]

15. Simplify: $a \times a \times a$ [1]

■ **Exam Tip — Collecting Like Terms**

A common error is confusing signs: $4x - 2x + 3$ is **not** the same as $4x - (2x + 3)$. Watch the minus sign in front of brackets!

MEDIUM

Medium Algebra

/ 38 marks

Skills: Expanding and simplifying · Factorising · Multi-step equations · Rearranging formulae · Index laws · Double brackets · Inequalities · Sequences

16. Expand and simplify: $3(x + 2) + 2(x - 5)$ [3]

17. Expand and simplify: $4(2a - 1) - 3(a + 2)$ [3]

18. Factorise: $6x + 12$ [2]

19. Factorise: $10a^2 - 15a$ [2]

20. Solve: $5x - 3 = 2x + 9$ [3]

21. Solve: $3(2y + 1) = 21$ [3]

22. Solve: $4(x - 2) = 2(x + 3)$ [3]

■ Exam Tip — Equations with Brackets

Expand brackets first, then collect terms. A frequent mistake: forgetting to multiply **every** term inside. E.g. $4(x - 2) = 4x - 8$, not $4x - 2$.

23. Make x the subject: $y = 3x - 7$ [2]

24. Simplify: $3a^2b \times 4ab^3$ [2]

25. Simplify: $(2x^3)^2$ [2]

26. Expand and simplify: $(x + 3)(x + 5)$ [3]

27. Expand and simplify: $(x - 4)(x + 2)$ [3]

28. Solve the inequality $3x + 2 > 14$ and represent your solution on the number line below. [2]



29. Find the n th term of the arithmetic sequence: 5, 8, 11, 14, ... [2]

30. A rectangle has length $(2x + 3)$ cm and width $(x - 1)$ cm.
Write a simplified expression for its perimeter. [3]

■ Common Mistake — Double Bracket Expansion

When expanding $(x - 4)(x + 2)$, students often forget that $(-4)(+2) = -8$, not $+8$. Always check the sign of the constant by carefully multiplying the last terms.

ADVANCED

Advanced Algebra

/ 50 marks

Skills: Factorising quadratics · Quadratic formula · Completing the square · Algebraic fractions · Simultaneous equations · Function notation · Algebraic proof

31. Factorise: $x^2 + 7x + 12$ [2]

32. Factorise: $x^2 - 5x - 14$ [2]

33. Factorise: $2x^2 + 5x - 3$ [3]

34. Solve by factorising: $x^2 + 3x - 10 = 0$ [3]

35. Solve by factorising: $2x^2 - 7x + 3 = 0$ [4]

36. Solve using the quadratic formula: $x^2 - 4x - 1 = 0$

Give your answers correct to 2 decimal places. **[Calculator]** [4]

37. Write $x^2 + 6x + 2$ in the form $(x + p)^2 + q$. [3]

■ Exam Tip — Completing the Square

To write $x^2 + bx + c$ as $(x + p)^2 + q$: take half of $b \rightarrow$ that's p . Then $q = c - p^2$. Always expand your answer to verify.

38. Make x the subject: $y = (x + 3)^2 - 5$, where $x > -3$ [3]

39. Simplify fully: $(3x^2 - 12) \div (3x + 6)$

State any values of x for which the expression is undefined. [3]

40. Solve simultaneously:

$$2x + y = 7$$

$$x - y = 2$$
 [4]

41. Solve simultaneously:

$$3x + 2y = 12$$

$$5x - 2y = 4$$
 [4]

42. Solve simultaneously:

$$y = x + 1$$

$$x^2 + y^2 = 13 \quad [5]$$

- 43.** The product of two consecutive positive integers is 72.
By forming and solving an equation, find the two integers. [4]

- 44.** Given $f(x) = 2x^2 - 3x + 1$, find $f(-2)$. [2]

- 45.** Prove algebraically that the sum of any three consecutive integers is always a multiple of 3. [4]

CHALLENGE

Bonus Challenge

★ Show that $(n + 1)^2 - (n - 1)^2$ is always a multiple of 4, for all positive integers n . [4]

SPOT THE MISTAKE

A student was asked to solve $3(x + 2) = 2(x - 1)$.

Their working:

$$3x + 6 = 2x - 1$$

$$3x - 2x = -1 + 6$$

$$x = 5$$

Identify the error, explain the mistake, and write the correct solution.

SELF-ASSESSMENT

I can collect like terms confidently.	■ Yes ■ Almost ■ Not yet
I can expand single and double brackets.	■ Yes ■ Almost ■ Not yet
I can factorise expressions and quadratics.	■ Yes ■ Almost ■ Not yet
I can solve linear and quadratic equations.	■ Yes ■ Almost ■ Not yet
I can rearrange formulae.	■ Yes ■ Almost ■ Not yet
I can solve simultaneous equations.	■ Yes ■ Almost ■ Not yet
I can write algebraic proofs.	■ Yes ■ Almost ■ Not yet

SOLUTIONS

Worked Solutions

Section A — Basic

1. $3a + 5a - 2a = (3 + 5 - 2)a = 6a$
2. $(4x - 2x) + (7 + 3) = 2x + 10$
3. $(6 - 3 + 2 - 1)y = 4y$
4. $3 \times x + 3 \times 4 = 3x + 12$
5. $5 \times 2a + 5 \times (-3) = 10a - 15$
6. $-2 \times y + (-2) \times 6 = -2y - 12$
7. $x = 12 - 7 = 5$
8. $x = 18 \div 3 = 6$
9. $x = 9 + 5 = 14$
10. $2x = 11 - 3 = 8$, $x = 8 \div 2 \rightarrow x = 4$
11. $n + 5$
12. $3p - 7$
13. $3(4) + 2 = 12 + 2 = 14$
14. $5(-2) - 1 = -10 - 1 = -11$
15. $a \times a \times a = a^3$

Section B — Medium

16. $3x + 6 + 2x - 10 = 5x - 4$
17. $8a - 4 - 3a - 6 = 5a - 10$
18. $HCF = 6 \rightarrow 6(x + 2)$
19. $HCF = 5a \rightarrow 5a(2a - 3)$
20. $5x - 2x = 9 + 3 \rightarrow 3x = 12 \rightarrow x = 4$
21. $6y + 3 = 21 \rightarrow 6y = 18 \rightarrow y = 3$
22. $4x - 8 = 2x + 6 \rightarrow 2x = 14 \rightarrow x = 7$
23. $y + 7 = 3x \rightarrow x = (y + 7) / 3$
24. $(3 \times 4)(a^{2+1})(b^{1+3}) = 12a^3b^4$
25. $2^2 \times (x^3)^2 = 4x^6$
26. $x^2 + 5x + 3x + 15 = x^2 + 8x + 15$
27. $x^2 + 2x - 4x - 8 = x^2 - 2x - 8$
28. $3x > 12 \rightarrow x > 4$ (open circle at 4, arrow pointing right)
29. Common difference = 3, zero term = $5 - 3 = 2 \rightarrow nth \text{ term} = 3n + 2$
30. $P = 2(2x + 3) + 2(x - 1) = 4x + 6 + 2x - 2 = (6x + 4) \text{ cm}$

Section C — Advanced

31. Two numbers: +3 and +4 (multiply to 12, add to 7)
 $(x + 3)(x + 4)$
32. Two numbers: -7 and +2 (multiply to -14, add to -5)
 $(x - 7)(x + 2)$
33. $ac = -6$; pair: +6, -1
 $= 2x(x + 3) - 1(x + 3) = (2x - 1)(x + 3)$
34. $(x + 5)(x - 2) = 0 \rightarrow x = -5 \text{ or } x = 2$
35. $(2x - 1)(x - 3) = 0 \rightarrow x = \frac{1}{2} \text{ or } x = 3$
36. $a=1, b=-4, c=-1$; $x = (4 \pm \sqrt{20})/2$
 $\sqrt{20} = 4.472... \rightarrow x = 4.24 \text{ or } x = -0.24$ (2 d.p.)
37. Half of 6 = 3; $(x+3)^2 = x^2 + 6x + 9$
Adjust: $+2 - 9 = -7 \rightarrow (x + 3)^2 - 7$
38. $y+5 = (x+3)^2 \rightarrow x+3 = \sqrt{y+5}$ [positive root, since $x > -3$]
 $x = -3 + \sqrt{y + 5}$
39. Num: $3(x-2)(x+2)$; Den: $3(x+2)$
Cancel $(x+2) \rightarrow x - 2$, $x \neq -2$
40. Add: $3x = 9 \rightarrow x = 3$; sub: $y = 1$
 $x = 3, y = 1$

41. Add: $8x = 16 \rightarrow x = 2$; sub: $y = 3$

$x = 2, y = 3$

42. Sub $y=x+1$: $x^2+(x+1)^2=13 \rightarrow 2x^2+2x-12=0 \rightarrow (x+3)(x-2)=0$

$x=-3, y=-2$ or $x=2, y=3$

43. $n(n+1)=72 \rightarrow n^2+n-72=0 \rightarrow (n+9)(n-8)=0$

$n=8$ (positive) $\rightarrow$ **The integers are 8 and 9.**

44. $2(4)-3(-2)+1 = 8+6+1 = 15$

45. Let integers: $n, n+1, n+2$. Sum = $3n+3 = 3(n+1)$.

Since $(n+1)$ is an integer, $3(n+1)$ is always a multiple of 3. ■

Bonus & Extras

★. **Challenge:** $(n+1)^2-(n-1)^2 = (n^2+2n+1)-(n^2-2n+1) = 4n = 4(n) \rightarrow$ always a multiple of 4. ■

✎. **Spot the Mistake:** Error in line 1 — expanding $2(x-1)$ gives $2x-2$, not $2x-1$.

Correct: $3x+6 = 2x-2 \rightarrow x = -2-6 \rightarrow x = -8$

REVIEW

Score Analysis & Reflection

Section	Your Score	Out of	%	Rating
A — Basic		21		
B — Medium		38		
C — Advanced		50		
Total		109		

■ Reflection

- Which section did you find most challenging? _____
- Which type of question do you need to practise more? _____
- Did you lose marks for method or for silly mistakes? _____
- What is one thing you will do differently next time? _____

■ Next Steps — Topics to Revisit

If you scored below 70% in any section, revisit the following topics:

- **Section A (below 15/21):** Simplifying, expanding, basic equations
- **Section B (below 27/38):** Factorising, double brackets, inequalities, sequences
- **Section C (below 35/50):** Quadratics, completing the square, simultaneous equations, proof

Visit igcsegcsemaths.com for topic-specific worksheets and revision guides.

■■■ Teacher / Tutor Review

- **Strengths:** _____
- **Areas to improve:** _____
- **Recommended follow-up:** _____
- **Signature:** _____ **Date:** _____