# GCSE Foundation Mathematics
# Practice Test 4: Algebra

**Instructions:**
Answer all questions. Show your working clearly.
Calculators may be used unless stated otherwise.
Time allowed: 90 minutes

## Section A: Expressions and Simplification

1. Simplify these expressions:

   (a) $6x + 2x$

   (b) $10y - 4y$

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

   (d) $9p - 6p + 2q - q$

2. Expand these expressions:

   (a) $5(x + 3)$

   (b) $2(4y - 7)$

   (c) $-4(3a + 2)$

   (d) $3(4m - 5n)$

3. Expand and simplify:

   (a) $5(x + 2) + 3(x - 5)$

   (b) $2(3y + 1) - 4(y - 3)$

   (c) $3(a - 4) + 5(2a + 1)$

   (d) $4(3p + 2) - 2(p - 4)$

4. Factorise these expressions:

   (a) $12x + 18$

   (b) $21y - 14$

   (c) $10a + 15b$

   (d) $18p - 27q$

5. Simplify these expressions involving powers:

   (a) $x^5 \times x^3$

   (b) $y^{12} \div y^5$

   (c) $(a^4)^2$

   (d) $4x^2 \times 3x^5$

## Section B: Linear Equations

6. Solve these equations:
   (a) $x + 4 = 13$
   (b) $y - 6 = 9$
   (c) $5a = 35$
   (d) $\frac{b}{7} = 4$
7. Work out:
   (a) $6x + 2 = 20$
   (b) $4y - 9 = 15$
   (c) $2a + 11 = 5$
   (d) $3b - 8 = 10$
8. Solve these equations:
   (a) $5(x + 2) = 25$
   (b) $6(y - 1) = 18$
   (c) $4(a + 3) = 24$
   (d) $3(2b - 4) = 18$
9. Solve these equations with unknowns on both sides:
   (a) $2x + 5 = x + 11$
   (b) $7y - 4 = 3y + 8$
   (c) $6a + 2 = 3a + 14$
   (d) $5b - 7 = b + 9$
10. Solve these equations involving fractions:
    (a) $\frac{x}{5} + 4 = 8$
    (b) $\frac{y}{6} - 2 = 3$
    (c) $\frac{4a}{3} = 8$
    (d) $\frac{5b+2}{4} = 3$

## Section C: Formulae and Substitution

11. Given that $d = st$, find $d$ when:
    (a) $s = 15$ and $t = 4$
    (b) $s = 25$ and $t = 6$
    (c) $s = 12.5$ and $t = 8$
12. Given that $I = PRT$, find $I$ when:
    (a) $P = 200$, $R = 0.05$, and $T = 3$
    (b) $P = 500$, $R = 0.04$, and $T = 2$
    (c) $P = 300$, $R = 0.06$, and $T = 5$
13. Given that $E = mc^2$, find $E$ when:

(a) $m = 4$ and $c = 3$
(b) $m = 2$ and $c = 5$
(c) $m = 6$ and $c = 2$

14. The formula for the area of a trapezium is $A = \frac{1}{2}(a + b)h$. Find $A$ when:

(a) $a = 8$, $b = 12$, and $h = 5$
(b) $a = 6$, $b = 14$, and $h = 4$
(c) $a = 10$, $b = 16$, and $h = 7$

15. Make the subject of the formula:

(a) $y = 5x - 3$. Make $x$ the subject.
(b) $d = st$. Make $t$ the subject.
(c) $I = PRT$. Make $R$ the subject.
(d) $E = mc^2$. Make $m$ the subject.

## Section D: Inequalities

16. Solve these inequalities:

(a) $x + 2 > 7$
(b) $y - 5 < 4$
(c) $6a \geq 18$
(d) $\frac{b}{4} \leq 7$

17. Solve these inequalities:

(a) $4x + 5 > 13$
(b) $3y - 6 < 12$
(c) $5a + 1 \geq 16$
(d) $2b - 11 \leq 7$

18. Solve these inequalities:

(a) $-2x > 10$
(b) $-6y < 18$
(c) $-a + 8 \geq 5$
(d) $-3b - 4 \leq 8$

19. Write down the integer values of $x$ that satisfy:

(a) $4 < x \leq 8$
(b) $-5 \leq x < 2$
(c) $-3 < x < 1$
(d) $1 \leq x \leq 6$

20. Show these inequalities on a number line:

(a) $x > 5$
(b) $x \leq 0$
(c) $-4 < x \leq 1$
(d) $3 \leq x < 7$

## Section E: Sequences

21. Find the next three terms in these sequences:

    (a) $6, 12, 18, 24, \ldots$

    (b) $1, 7, 13, 19, \ldots$

    (c) $35, 30, 25, 20, \ldots$

    (d) $4, 9, 14, 19, \ldots$

22. Find the first differences and state whether each sequence is arithmetic:

    (a) $5, 8, 11, 14, 17, \ldots$

    (b) $4, 16, 36, 64, 100, \ldots$

    (c) $25, 20, 15, 10, 5, \ldots$

    (d) $1, 3, 9, 27, 81, \ldots$

23. For these arithmetic sequences, find the $n$th term:

    (a) $8, 12, 16, 20, \ldots$

    (b) $2, 6, 10, 14, \ldots$

    (c) $20, 16, 12, 8, \ldots$

    (d) $4, 11, 18, 25, \ldots$

24. Use the $n$th term formula to find:

    (a) The 9th term of the sequence $7n + 2$

    (b) The 14th term of the sequence $3n - 4$

    (c) The 16th term of the sequence $4n + 1$

    (d) Which term of the sequence $6n - 5$ equals 43?

25. These are geometric sequences. Find the next two terms:

    (a) $1, 6, 36, 216, \ldots$

    (b) $4, 16, 64, 256, \ldots$

    (c) $72, 36, 18, 9, \ldots$

    (d) $3, 15, 75, 375, \ldots$

26. A sequence has first term $a = 9$ and term-to-term rule "add 5".

    (a) Write down the first 5 terms.

    (b) Find the $n$th term formula.

    (c) Which term equals 54?

## Section F: Problem Solving with Algebra

27. I think of a number, add 6, then multiply by 2. The result is 20. What was my original number?

28. The perimeter of a rectangle is 26 cm. If the length is $m$ cm and the width is $(m - 1)$ cm, find the value of $m$.

29. In a right-angled triangle, one angle is $x^\circ$ and another angle is $(x + 30)^\circ$. Find the value of $x$.

30. Jake is $n$ years old. His mother is twice his age plus 8 years. The sum of their ages is 50. How old is Jake?

31. A number pattern starts: $9, 15, 21, 27, \ldots$

    (a) Find the $n$th term.

    (b) Which term has value 63?

    (c) Is 90 a term in this sequence? Explain your answer.

32. A parking meter charges £1.50 for the first hour plus £1.20 for each additional hour. If the total cost is £6.30, how many hours was the car parked?

33. A magazine subscription costs £12 for registration plus £3.50 per issue. If the total cost is £40, how many issues were received?

34. The sum of four consecutive integers is 42. Find the four integers.

**Answer Space**

Use this space for your working and answers.

**END OF TEST**

Total marks: 100

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