GCSE Foundation Mathematics
Practice Test 2: 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) $4x + 7x$

   (b) $9y - 3y$

   (c) $6a + 2b - 3a + 5b$

   (d) $7p - 4p + 3q - 2q$

2. Expand these expressions:

   (a) $4(x + 5)$

   (b) $3(3y - 4)$

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

   (d) $6(3m - 2n)$

3. Expand and simplify:

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

   (b) $5(2y + 3) - 2(y - 1)$

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

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

4. Factorise these expressions:

   (a) $8x + 12$

   (b) $15y - 10$

   (c) $12a + 18b$

   (d) $20p - 25q$

5. Simplify these expressions involving powers:

   (a) $x^4 \times x^6$

   (b) $y^9 \div y^3$

   (c) $(a^3)^2$

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

Section B: Linear Equations

6. Solve these equations:
   (a) $x + 9 = 15$
   (b) $y - 7 = 4$
   (c) $4a = 20$
   (d) $\frac{b}{5} = 3$
7. Work out:
   (a) $3x + 4 = 16$
   (b) $2y - 5 = 9$
   (c) $4a + 7 = 3$
   (d) $5b - 12 = 8$
8. Solve these equations:
   (a) $3(x + 2) = 18$
   (b) $4(y - 1) = 12$
   (c) $2(a + 5) = 16$
   (d) $5(2b - 3) = 25$
9. Solve these equations with unknowns on both sides:
   (a) $4x + 3 = x + 12$
   (b) $6y - 2 = 3y + 10$
   (c) $5a + 8 = 2a + 17$
   (d) $7b - 4 = 3b + 8$
10. Solve these equations involving fractions:
    (a) $\frac{x}{3} + 2 = 6$
    (b) $\frac{y}{4} - 3 = 2$
    (c) $\frac{3a}{2} = 9$
    (d) $\frac{2b+3}{5} = 3$

Section C: Formulae and Substitution

11. Given that $A = \pi r^2$, find A when ($\pi = 3.14$):
    (a) $r = 4$
    (b) $r = 6$
    (c) $r = 2.5$
12. Given that $C = 2\pi r$, find C when ($\pi = 3.14$):
    (a) $r = 5$
    (b) $r = 8$
    (c) $r = 3.5$
13. Given that $s = ut + \frac{1}{2}at^2$, find s when:

(a) $u = 12$, $t = 3$, and $a = 2$
(b) $u = 8$, $t = 4$, and $a = -5$
(c) $u = 0$, $t = 5$, and $a = 4$

14. The formula for the volume of a cylinder is $V = \pi r^2 h$. Find V when ($\pi = 3.14$):

(a) $r = 3$ and $h = 8$
(b) $r = 5$ and $h = 6$
(c) $r = 2$ and $h = 10$

15. Make the subject of the formula:

(a) $y = 4x - 7$. Make x the subject.
(b) $C = 2\pi r$. Make r the subject.
(c) $A = \frac{1}{2}bh$. Make h the subject.
(d) $s = ut + \frac{1}{2}at^2$. Make u the subject.

Section D: Inequalities

16. Solve these inequalities:

(a) $x + 5 > 9$
(b) $y - 4 < 6$
(c) $3a \geq 12$
(d) $\frac{b}{2} \leq 5$

17. Solve these inequalities:

(a) $2x + 3 > 11$
(b) $4y - 7 < 9$
(c) $3a + 5 \geq 14$
(d) $6b - 10 \leq 14$

18. Solve these inequalities:

(a) $-3x > 9$
(b) $-2y < 8$
(c) $-a + 7 \geq 4$
(d) $-3b - 2 \leq 10$

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

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

20. Show these inequalities on a number line:

(a) $x > 2$
(b) $x \leq -3$
(c) $-1 < x \leq 5$
(d) $0 \leq x < 4$

Section E: Sequences

21. Find the next three terms in these sequences:

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

    (b) $6, 11, 16, 21, \ldots$

    (c) $25, 21, 17, 13, \ldots$

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

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

    (a) $3, 7, 11, 15, 19, \ldots$

    (b) $2, 8, 18, 32, 50, \ldots$

    (c) $15, 11, 7, 3, -1, \ldots$

    (d) $4, 8, 16, 32, 64, \ldots$

23. For these arithmetic sequences, find the nth term:

    (a) $5, 9, 13, 17, \ldots$

    (b) $7, 11, 15, 19, \ldots$

    (c) $18, 14, 10, 6, \ldots$

    (d) $3, 8, 13, 18, \ldots$

24. Use the nth term formula to find:

    (a) The 12th term of the sequence $4n + 1$

    (b) The 18th term of the sequence $6n - 2$

    (c) The 25th term of the sequence $3n + 5$

    (d) Which term of the sequence $5n - 4$ equals 46?

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

    (a) $3, 9, 27, 81, \ldots$

    (b) $2, 8, 32, 128, \ldots$

    (c) $64, 32, 16, 8, \ldots$

    (d) $1, 4, 16, 64, \ldots$

26. A sequence has first term $a = 7$ and term-to-term rule "add 4".

    (a) Write down the first 5 terms.

    (b) Find the nth term formula.

    (c) Which term equals 63?

Section F: Problem Solving with Algebra

27. I think of a number, subtract 4, then multiply by 5. The result is 25. What was my original number?

28. The perimeter of a rectangle is 28 cm. If the length is y cm and the width is $(y - 3)$ cm, find the value of y.

29. In a right-angled triangle, one angle is x° and another angle is $(3x - 10)^\circ$. Find the value of x.

30. Tom is z years old. His sister is 4 years younger than him. The sum of their ages is 32. How old is Tom?

31. A number pattern starts: $7, 12, 17, 22, \ldots$

    (a) Find the nth term.

    (b) Which term has value 67?

    (c) Is 85 a term in this sequence? Explain your answer.

32. The cost of a taxi journey is £3.50 plus £1.20 per mile. If the total cost is £15.10, how many miles was the journey?

33. A gym membership costs £20 per month plus £3 per visit. In one month, the bill was £41. How many visits were made?

34. The sum of three consecutive even integers is 54. Find the three integers.

Answer Space

Use this space for your working and answers.

END OF TEST

Total marks: 100

For more resources and practice materials, visit:
stepupmaths.co.uk