Year 6 · Algebra: Patterns, Points and Number Sentences

Name: _____ Date: _____

Hi! This sheet helps you spot rules in growing patterns, check if number sentences are true, and plot points on a coordinate plane. Take your time and show your working.

Warm-up

1. Fill in the missing number: 6 × ___ = 42

2. True or false? 15 − 3 ≥ 12

3. What are the coordinates of a point that is 4 to the right and 0 up from (0, 0)?

4. Continue the pattern: 5, 8, 11, 14, ___, ___

Practice

5. Aroha builds towers with blocks. Tower 1 has 4 blocks, Tower 2 has 7 blocks, Tower 3 has 10 blocks. Write the rule in words and find how many blocks Tower 6 has.

6. True or false? 8 × 7 ≤ 8 × 5 + 20. (Remember the order of operations.)

7. Complete the open number sentence: 36 ÷ ___ + 5 = 14

8. Plot these points on a coordinate plane and say which one is on the y-axis: A(3, 2), B(0, 5), C(4, 0).

9. A food stall at the Avondale market charges $2 for entry plus $3 for each smoothie. Write a rule for the total cost, then find the cost of 5 smoothies.

10. A pattern follows the rule y = 2 × x + 1. Complete the table of values for x = 0, 1, 2, 3.

Challenge

11. Use the rule y = 3 × x − 2 to make a table for x = 1, 2, 3, 4, then plot the points on a coordinate plane. What do you notice about the shape they make?

12. A tiling pattern uses this rule: number of tiles = 4 × step + 2. Kauri says step 10 needs more than 40 tiles. Write a true/false inequality to check, and find which step first has more than 50 tiles.

Answer key (for parents and tutors)

1. Fill in the missing number: 6 × ___ = 42
   42 ÷ 6 = 7, so the missing number is 7. Check: 6 × 7 = 42. ✓

2. True or false? 15 − 3 ≥ 12
   15 − 3 = 12. The symbol ≥ means 'greater than or equal to'. Since 12 = 12, the statement is TRUE.

3. What are the coordinates of a point that is 4 to the right and 0 up from (0, 0)?
   Moving 4 right gives x = 4, and 0 up gives y = 0. The point is (4, 0), which sits on the x-axis.

4. Continue the pattern: 5, 8, 11, 14, ___, ___
   The pattern goes up by 3 each time. 14 + 3 = 17, then 17 + 3 = 20. The next two terms are 17 and 20.

5. Aroha builds towers with blocks. Tower 1 has 4 blocks, Tower 2 has 7 blocks, Tower 3 has 10 blocks. Write the rule in words and find how many blocks Tower 6 has.
   Each tower adds 3 blocks. In words: 'Start with 4 and add 3 for each extra tower', or 'multiply the tower number by 3 and add 1'. Check: Tower 1 = 3 × 1 + 1 = 4 ✓. Tower 6 = 3 × 6 + 1 = 18 + 1 = 19 blocks.

6. True or false? 8 × 7 ≤ 8 × 5 + 20. (Remember the order of operations.)
   Left side: 8 × 7 = 56. Right side: do multiplication first, 8 × 5 = 40, then 40 + 20 = 60. Is 56 ≤ 60? Yes, so the statement is TRUE.

7. Complete the open number sentence: 36 ÷ ___ + 5 = 14
   First subtract 5 from both sides: 36 ÷ ___ = 14 − 5 = 9. Then 36 ÷ 9 = 4, so the missing number is 4. Check: 36 ÷ 4 + 5 = 9 + 5 = 14. ✓

8. Plot these points on a coordinate plane and say which one is on the y-axis: A(3, 2), B(0, 5), C(4, 0).
   A is 3 right and 2 up. B is 0 right and 5 up, so it lies on the y-axis. C is 4 right and 0 up, so it lies on the x-axis. The point on the y-axis is B(0, 5) (its x-value is 0).

9. A food stall at the Avondale market charges $2 for entry plus $3 for each smoothie. Write a rule for the total cost, then find the cost of 5 smoothies.
   Rule: total cost = 2 + 3 × (number of smoothies). For 5 smoothies: 2 + 3 × 5 = 2 + 15 = $17.

10. A pattern follows the rule y = 2 × x + 1. Complete the table of values for x = 0, 1, 2, 3.
    When x = 0: y = 2 × 0 + 1 = 1. When x = 1: y = 2 × 1 + 1 = 3. When x = 2: y = 2 × 2 + 1 = 5. When x = 3: y = 2 × 3 + 1 = 7. Table: (0,1), (1,3), (2,5), (3,7). These points rise by 2 each step, forming a straight line.

11. Use the rule y = 3 × x − 2 to make a table for x = 1, 2, 3, 4, then plot the points on a coordinate plane. What do you notice about the shape they make?
    x = 1: y = 3 × 1 − 2 = 1. x = 2: y = 3 × 2 − 2 = 4. x = 3: y = 3 × 3 − 2 = 7. x = 4: y = 3 × 4 − 2 = 10. Points: (1,1), (2,4), (3,7), (4,10). When plotted, the points line up in a straight line, going up 3 each time you move 1 right. This shows the pattern is a constant (linear) rule.

12. A tiling pattern uses this rule: number of tiles = 4 × step + 2. Kauri says step 10 needs more than 40 tiles. Write a true/false inequality to check, and find which step first has more than 50 tiles.
    Step 10: 4 × 10 + 2 = 42 tiles. Inequality: 42 > 40, which is TRUE, so Kauri is right. To pass 50 tiles we need 4 × step + 2 > 50, so 4 × step > 48, meaning step > 12. Step 12 gives 4 × 12 + 2 = 50 (not more than 50), and step 13 gives 4 × 13 + 2 = 54. So step 13 is the first step with more than 50 tiles.