Year 6 · Geometry: Flips, Slides and Turns

Name: _____ Date: _____

Hi there! This sheet is all about moving shapes around, flipping, sliding and turning them, and spotting patterns called tessellations. Grab a pencil and ruler, and let's get moving!

Warm-up

1. Name the transformation for each word: (a) flip, (b) slide, (c) turn.

2. When you slide (translate) a triangle 5 cm to the right, does its size or shape change?

3. A shape is turned a full circle (360°) around a point. Where does it end up?

4. True or false: a tessellation can have small gaps between the shapes.

Practice

5. A letter 'b' is reflected in a vertical mirror line. Which letter does it look like?

6. A square tile is at position A. It is translated 3 squares right, then translated 2 squares up. Describe its final position compared to the start.

7. Amaia is making a tessellation using regular hexagons on the floor of the classroom. Explain why hexagons tessellate but regular pentagons do not.

8. An arrow shape points up (↑). It is rotated 90° clockwise, then rotated another 90° clockwise. Which way does it point now?

9. Tane draws a flag shape at the left of his page. He first reflects it in a vertical line, then translates the reflected shape 6 cm down. Describe what has happened to the flag overall.

10. A right-angled triangle has sides 3 cm, 4 cm and 5 cm. It is reflected across a line and then translated 4 cm to the right. What are the side lengths of the final triangle, and what stays the same?

Challenge

11. On grid paper, a triangle has corners at (1,1), (1,3) and (2,1). It is translated 3 right and 1 up, then reflected in the vertical line x = 6. Give the coordinates of all three corners after BOTH steps.

12. Ropata says: 'If I rotate a shape 180° and then reflect it in a horizontal mirror line, I get the same result as a single reflection in a vertical line.' Use an up-and-right arrow (↗) to test whether he is correct.

Answer key (for parents and tutors)

1. Name the transformation for each word: (a) flip, (b) slide, (c) turn.
   (a) flip = reflection, (b) slide = translation, (c) turn = rotation. These are the three ways we move a shape without changing its size.

2. When you slide (translate) a triangle 5 cm to the right, does its size or shape change?
   No. A translation only changes the position. The size, shape and the direction it points all stay exactly the same.

3. A shape is turned a full circle (360°) around a point. Where does it end up?
   Back in exactly the same place it started. A full turn of 360° brings a shape right back to where it began.

4. True or false: a tessellation can have small gaps between the shapes.
   False. A tessellation is a repeating pattern with NO gaps and NO overlaps, the shapes fit together perfectly.

5. A letter 'b' is reflected in a vertical mirror line. Which letter does it look like?
   It looks like a 'd'. A reflection makes a mirror image, so the bump swaps from the right side to the left side.

6. A square tile is at position A. It is translated 3 squares right, then translated 2 squares up. Describe its final position compared to the start.
   The tile ends up 3 squares to the right and 2 squares up from where it started. Doing the two slides in either order gives the same finishing spot.

7. Amaia is making a tessellation using regular hexagons on the floor of the classroom. Explain why hexagons tessellate but regular pentagons do not.
   At every point where hexagons meet, three hexagons fit together and their angles add to 360° (3 × 120° = 360°), leaving no gaps. Regular pentagons have 108° angles; three make only 324° (a gap) and four make 432° (an overlap), so they cannot fit together neatly.

8. An arrow shape points up (↑). It is rotated 90° clockwise, then rotated another 90° clockwise. Which way does it point now?
   It points down (↓). Each 90° clockwise turn is a quarter turn. Two quarter turns make a half turn (180°), so an up arrow becomes a down arrow: ↑ → → → ↓.

9. Tane draws a flag shape at the left of his page. He first reflects it in a vertical line, then translates the reflected shape 6 cm down. Describe what has happened to the flag overall.
   First the flag becomes a mirror image (facing the opposite direction). Then that mirror image slides 6 cm straight down. So the final flag is a flipped version of the original, sitting 6 cm lower down the page.

10. A right-angled triangle has sides 3 cm, 4 cm and 5 cm. It is reflected across a line and then translated 4 cm to the right. What are the side lengths of the final triangle, and what stays the same?
    The side lengths stay 3 cm, 4 cm and 5 cm. Reflections and translations never change lengths or angles, they keep the shape and size identical (congruent). Only the triangle's position and its facing direction have changed.

11. On grid paper, a triangle has corners at (1,1), (1,3) and (2,1). It is translated 3 right and 1 up, then reflected in the vertical line x = 6. Give the coordinates of all three corners after BOTH steps.
    Step 1 (translate 3 right, 1 up): (1,1)→(4,2), (1,3)→(4,4), (2,1)→(5,2). Step 2 (reflect in x = 6): to reflect, the new x is 6 + (6 − old x). For x=4: 6+(6−4)=8. For x=5: 6+(6−5)=7. The y-values stay the same. Final corners: (8,2), (8,4) and (7,2).

12. Ropata says: 'If I rotate a shape 180° and then reflect it in a horizontal mirror line, I get the same result as a single reflection in a vertical line.' Use an up-and-right arrow (↗) to test whether he is correct.
    Start with ↗ (pointing up-right). Rotate 180°: it now points down-left (↙). Reflect that in a horizontal line (flip top-to-bottom): down-left becomes up-left (↖). Now test a single vertical-line reflection of the original ↗: flipping left-to-right gives up-left (↖) too. Both routes give ↖, so Ropata is correct for this arrow, a 180° rotation followed by a horizontal reflection matches a single vertical reflection.