Transformation (Translation, reflection, enlargement)

Mana Maths

Te reo Māori terms

whakaahua
transformation
Open in Te Aka

hangarite whakaata
reflection symmetry
Open in Te Aka

whakarahinga
enlargement
Open in Te Aka

hangarite huri
rotation symmetry
Open in Te Aka

Transformation (Translation, reflection, enlargement) — Foundation

Use simple transformation words and complete descriptions.

1. Point $A(1, 2)$ moves to $A'(4, 2)$. Is this a translation, reflection, or enlargement?

2. Point $B(-2, 3)$ moves to $B'(-2, -3)$. Name the transformation.

3. Point $C(2, 1)$ moves to $C'(4, 2)$ from centre $(0, 0)$. Is this an enlargement? If yes, give the scale factor.

4. A shape moves 5 units right and 2 units up. Write the translation vector.

5. A point at $(3, -1)$ is reflected in the y-axis. Write the new coordinates.

6. A point at $(-4, 2)$ is reflected in the x-axis. Write the new coordinates.

7. A square is enlarged from side length 2 cm to side length 6 cm. Find the scale factor.

8. A triangle is enlarged from side length 8 cm to side length 4 cm. Find the scale factor.

9. Point $P(-1, 4)$ is translated by $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$. Write the image coordinates.

10. Point $Q(5, -2)$ is translated by $\begin{pmatrix} -4 \\ 1 \end{pmatrix}$. Write the image coordinates.

11. Shape A is reflected in the line $x = 0$. What is another name for this line?

12. Shape B is reflected in the line $y = 0$. What is another name for this line?

Transformation (Translation, reflection, enlargement) — Proficient

Give full descriptions using vectors, mirror lines, or scale factors.

1. Triangle A has vertices $(1, 1)$, $(3, 1)$, $(2, 4)$. Translate it by $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$. Write the image coordinates.

2. Rectangle B has vertices $(-3, -1)$, $(-1, -1)$, $(-1, 2)$, $(-3, 2)$. Translate it by $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$. Write the image coordinates.

3. Point $C(4, -1)$ is reflected in the y-axis. Write the image coordinates and name the mirror line.

4. Point $D(-2, 5)$ is reflected in the x-axis. Write the image coordinates and name the mirror line.

5. Shape E is enlarged from centre $(0, 0)$ by scale factor 2. Find the image of $(1, 3)$.

6. Shape F is enlarged from centre $(0, 0)$ by scale factor $\frac{1}{2}$. Find the image of $(-6, 4)$.

7. A side changes from 5 cm to 15 cm under an enlargement. Find the scale factor.

8. A side changes from 12 cm to 3 cm under an enlargement. Find the scale factor.

9. Describe fully the transformation from $(2, 1)$ to $(2, -1)$.

10. Describe fully the transformation from $(-3, 4)$ to $(3, 4)$.

11. A point is reflected in the line $x = 2$. The point $(5, 1)$ maps to what image?

12. A point is reflected in the line $y = -1$. The point $(2, 3)$ maps to what image?

Transformation (Translation, reflection, enlargement) — Excellence

Work carefully. Give complete reasons using coordinates, equal distances, vectors, and scale factors.

1. A is translated by $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$. Write the coordinates of the image of each vertex: $(-2,-1), (-1,-1), (-1,1), (-2,0)$.

2. A triangle with vertices $(-2,-1), (0,-1), (-1,1)$ is reflected in the line $x = 1$. Write the image coordinates.

3. A shape is enlarged from centre $(0,0)$ by scale factor 2. Find the image of the points $(-1,-1), (1,-1), (0,2)$.

4. A shape is enlarged from centre $(0,0)$ by scale factor $\frac{1}{2}$. Find the image of the points $(-2,-2), (2,-2), (0,4)$.

5. Explain why a translation always keeps side lengths and angles the same.

6. Explain why a reflection changes orientation but keeps side lengths the same.

7. A rectangle has vertices $(-3, -1), (-1, -1), (-1, 1), (-3, 1)$. Describe a single translation that maps it to the rectangle with vertices $(1, 2), (3, 2), (3, 4), (1, 4)$.

8. A triangle has vertices $(-2, 1), (-1, 3), (0, 1)$. It is reflected in the line $y = 0$. Write the image coordinates and state what stays the same.

9. A shape and its image are similar. One side changes from 3 cm to 7.5 cm. Find the enlargement scale factor.

10. A shape is enlarged by scale factor 3 from centre $(0, 0)$. The point $(2, -1)$ is on the shape. Find its image.

11. A shape is enlarged by scale factor $\frac{1}{2}$ from centre $(0, 0)$. The point $(-4, 6)$ is on the shape. Find its image.

12. A point moves by the vector $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$. If it started at $(4, -2)$, where does it finish?

13. The point $P(2, 3)$ is reflected in the y-axis. Write the new coordinates and explain the change.

14. The point $Q(-4, 1)$ is reflected in the x-axis. Write the new coordinates and explain the change.

15. Which single transformation is impossible to describe fully without extra information: translation, reflection, or enlargement? Explain why.

16. Compare translation, reflection, and enlargement. Which preserve congruence, and which only preserve similarity?