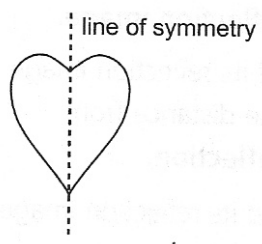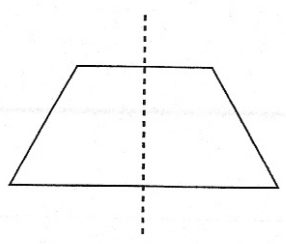# 7.5 Skill Builder

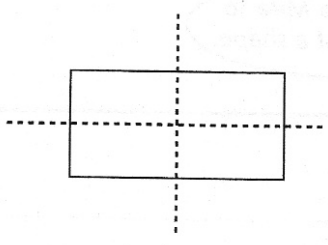## Lines of Symmetry in Quadrilaterals

A **line of symmetry** divides a shape
into 2 matching, or **congruent** parts.
If we fold a shape along its line of symmetry,
the parts match exactly.

line of symmetry

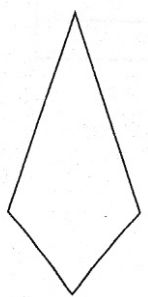This trapezoid has 1 line of symmetry.

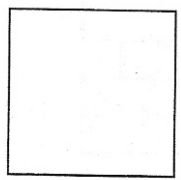This rectangle has 2 lines of symmetry.

Check

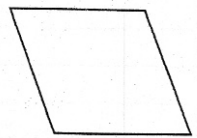**1.** How many lines of symmetry does each shape have? Draw in the lines.
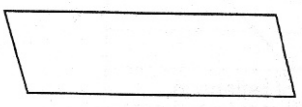
a)

Number of lines of symmetry: ____

b)

Number of lines of symmetry: ____

c)

Number of lines of symmetry: ____

d)
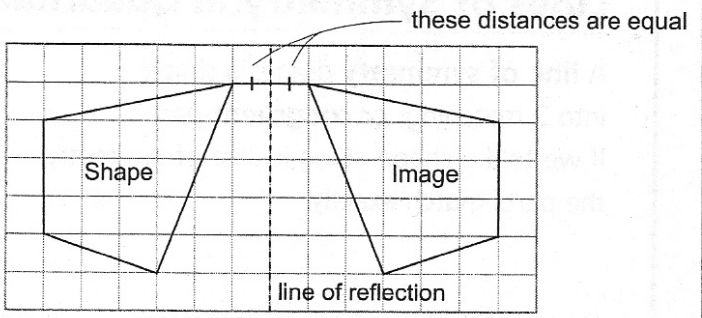
Number of lines of symmetry: ____

Reflections

When a shape is reflected in a mirror, we see a **reflection image.**

A point and its reflection image are the same distance from a **line of reflection.**
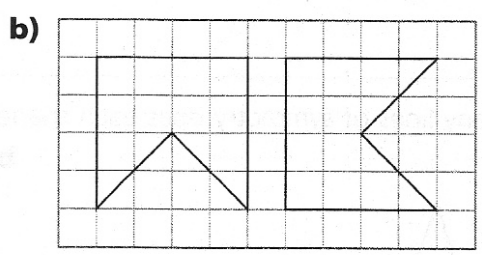
A shape and its reflection image face opposite ways.

We can use a Mira to help us reflect a shape.

these distances are equal
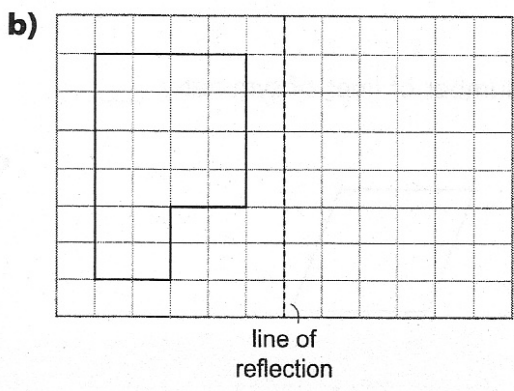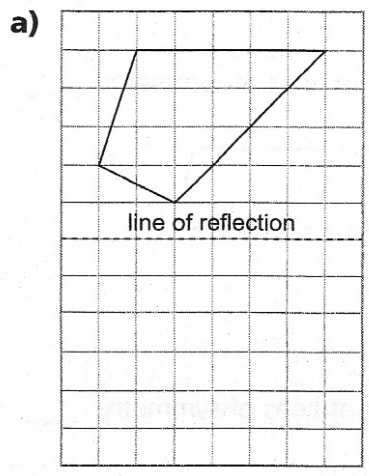
Shape   Image

line of reflection

Check

1. Do these pictures show reflections?

If your answer is Yes, draw the line of reflection.

a)

b)
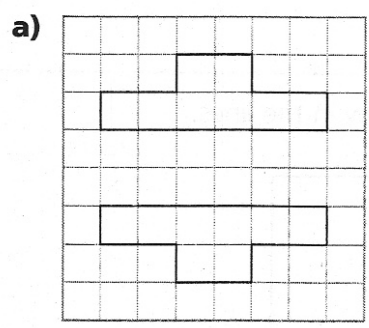
2. Draw each reflection image.

a)

line of reflection

b)

line of
reflection

▶ 7.5 Reflections and Line Symmetry

FOCUS Draw and classify shapes with line symmetry.

When congruent copies of a polygon are used to cover a flat surface with no overlaps or gaps, a **tessellation** is created. Some tessellations have line symmetry.

Congruent polygons match exactly but may have different orientations.

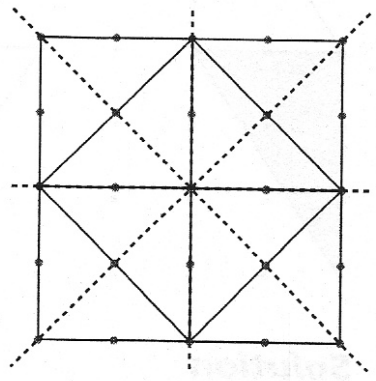### Example 1 | Identifying Lines of Symmetry in Tessellations

Identify the lines of symmetry in this tessellation.
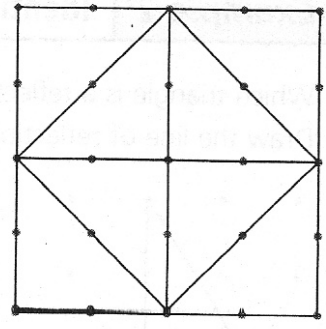
Solution

A line of symmetry must pass through the centre of the design. Use a Mira to check for vertical, horizontal, and diagonal lines of symmetry.

This tessellation has 4 lines of symmetry. The pattern on one side of each line is a mirror image of the pattern on the other side of the line.
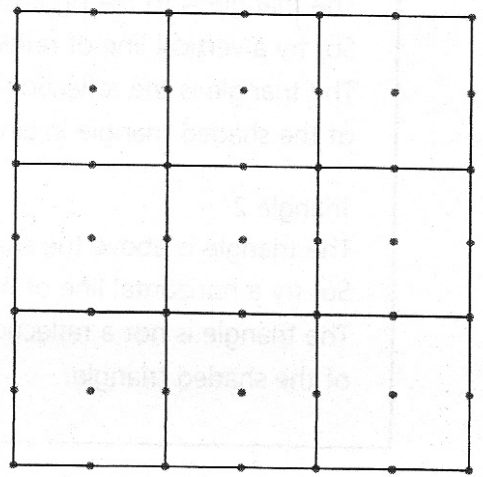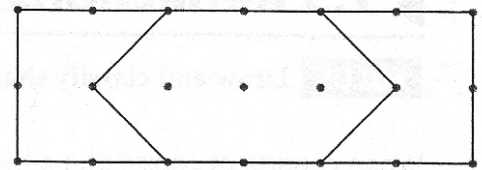

Check

1. Draw the lines of symmetry in each tessellation.

a) Use a Mira.
Is there a vertical line of symmetry? _____
Is there a horizontal line of symmetry? _____
Are there any diagonal lines of symmetry? _____
Draw the lines of symmetry.

*Remember that a line of symmetry must pass through the centre of the design.*

b) Is there a vertical line of symmetry? _____
Is there a horizontal line of symmetry? _____
Are there any diagonal lines of symmetry? _____
Draw the lines of symmetry.

Two shapes may be related by a line of reflection.

Example 2 | Identifying Reflected Shapes

Which triangle is a reflection of the shaded triangle?
Draw the line of reflection.
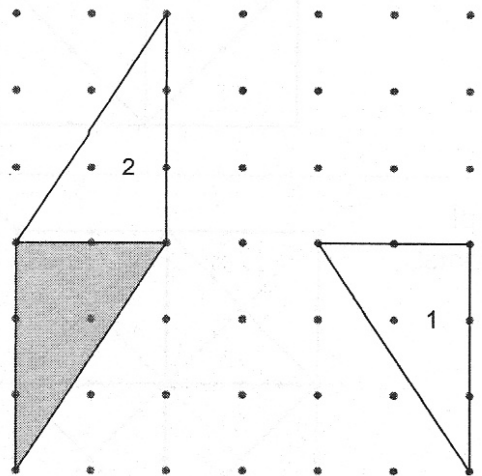
Solution

Use a Mira to check.

Triangle 1:
The triangle is to the right of the shaded triangle.
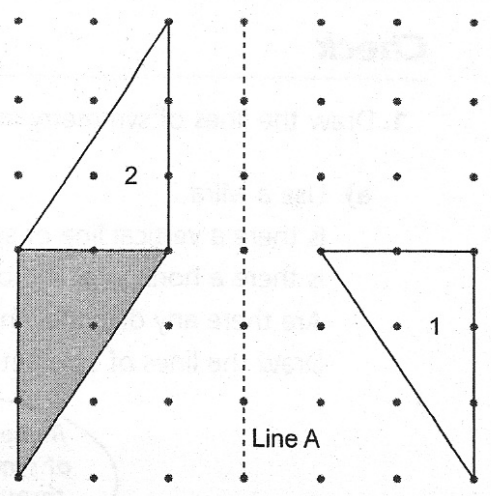So, try a vertical line of reflection.
The triangle is the reflection image
of the shaded triangle in Line A.

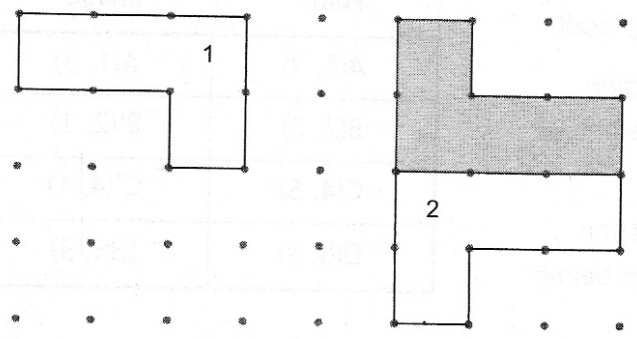Triangle 2:
The triangle is above the shaded triangle.
So, try a horizontal line of reflection.
The triangle is not a reflection image
of the shaded triangle.

Check

1. Which polygon is a reflection of the shaded polygon?
Draw the line of reflection.

Use a Mira to check.

Polygon 1:

The polygon is to the _____ of the shaded polygon.

So, try a _____ line of reflection.

The polygon _____ a reflection image

of the shaded polygon.

If the polygon is a reflection image, draw the line of reflection.
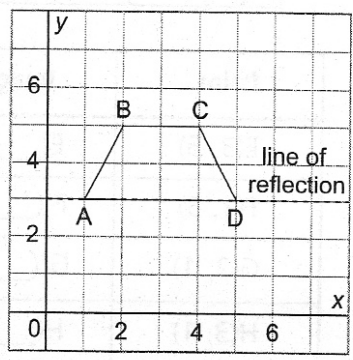

Polygon 2:

The polygon is _____ the shaded polygon.

So, try a _____ line of reflection.

The polygon _____ a reflection image

of the shaded polygon.

If the polygon is a reflection image, draw the line of reflection.

Example 3	Completing a Shape Given its Line of Symmetry

Reflect quadrilateral ABCD in the line of reflection to make a larger shape.

Solution

A point and its image must be the same distance from the line of reflection.

Point A: on the line of reflection
Reflection image: Point A reflects onto itself.

Point B: 2 squares above line of reflection
Reflection image: Point B′ is 2 squares below
line of reflection.

Point C: 2 squares above line of reflection
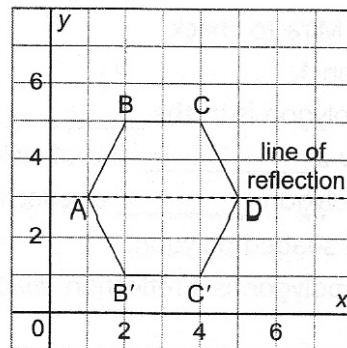Reflection image: Point C′ is 2 squares below
line of reflection.

Point D: on the line of reflection
Reflection image: Point D reflects onto itself.

Plot the points. Join the points in order
to complete the larger shape.

Point B′ is the image of point B.
We say: "B prime"

Point	Image
A(1, 3)	A(1, 3)
B(2, 5)	B′(2, 1)
C(4, 5)	C′(4, 1)
D(5, 3)	D(5, 3)

Check

1. Reflect quadrilateral EFGH in the line of reflection
to make a larger shape.

Point E: on the line of reflection
Reflection image: _____

Point F: 2 squares left of line of reflection
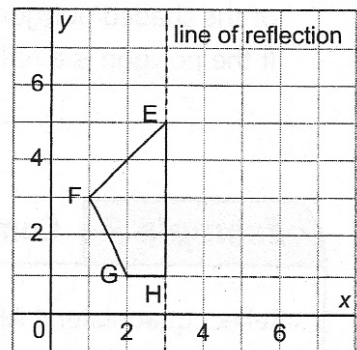Reflection image: _____
_____

Point G: _____
Reflection image: _____
_____

Point H: _____
Reflection image: _____

Plot the points.
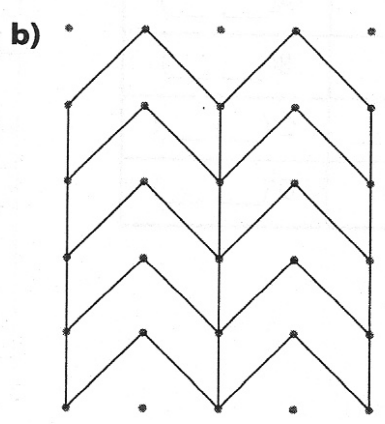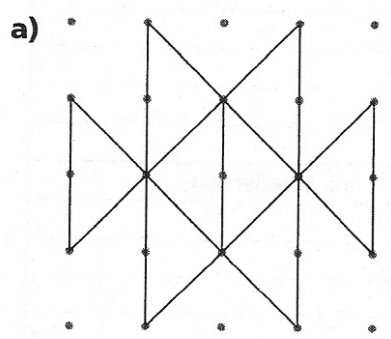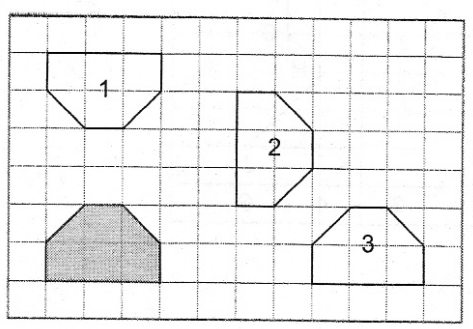Join the points to complete the larger shape.

Point	Image
E(3, 5)	E(___, 5)
F(1, 3)	F′(___, 3)
G(2, 1)	G′(___, 1)
H(3, 1)	H(___, 1)

Practice

1. Draw the lines of symmetry in each tessellation.

a)

b)

2. Which hexagons are reflections of the shaded hexagon?
Draw the line of reflection each time.

Hexagon 1:
The hexagon is _____ the shaded hexagon.
So, try a _____ line of reflection.
The hexagon _____ a reflection image of the shaded hexagon.
If the polygon is a reflection image, draw the line of reflection, Line A.

Hexagon 2:
The hexagon is _____ and to the _____ of the shaded polygon.
So, try a _____ line of reflection.
The hexagon _____ a reflection image of the shaded hexagon.
If the polygon is a reflection image, draw the line of reflection, Line B.

Hexagon 3:
The hexagon is to the _____ of the shaded hexagon.
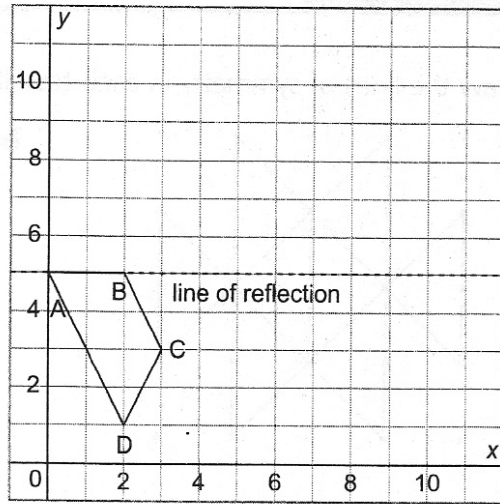So, try a _____ line of reflection.
The hexagon _____ a reflection image of the shaded hexagon.
If the polygon is a reflection image, draw the line of reflection, Line C.

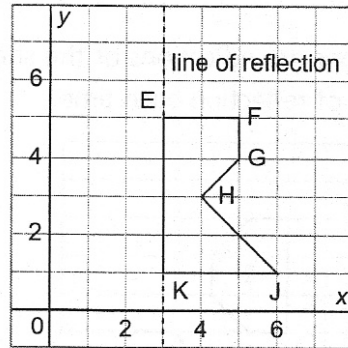**3.** Reflect each shape in the line of reflection to make a larger shape.

a)

Point	Image
A(0, 5)	A(__, __)
B(2, 5)	B(__, __)
C(3, 3)	C'(__, __)
D(2, 1)	D'(__, __)

b)

Point	Image
____	____
____	____
____	____
____	____
____	____

c)

Point	Image
____	____
____	____
____	____