

3 - 1

Symmetric Figures

Line Symmetry (1)

Instruction Balanced figures.

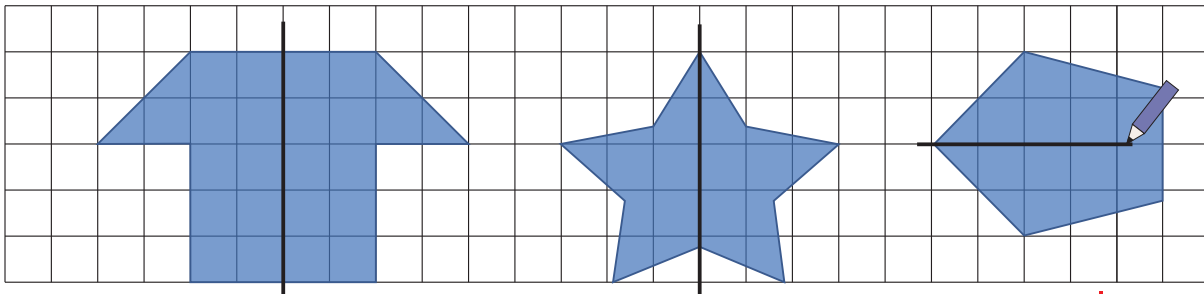
Look at the figures below and find out how they can be grouped.



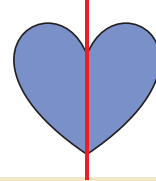
They look balanced.
Why do we see so?



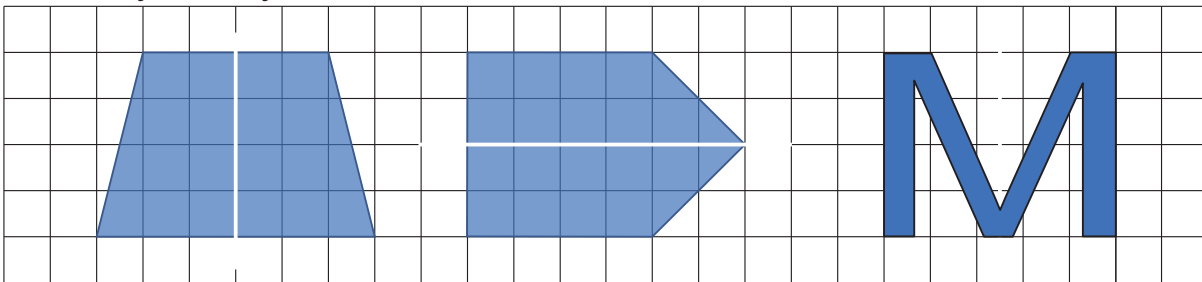
Example 1 The following figures can be overlapped when folded in two. Where should the figures be folded? Draw the folding line.



A figure has line symmetry when it can be folded along a straight line and both sides overlap exactly. The folding line is called the **axis of symmetry** or **line of symmetry**.



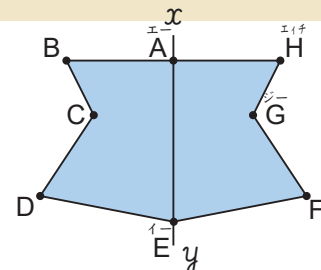
1 The following figures can be overlapped when folded in two. Draw the line of symmetry.



Example 2 The following figure is a line symmetric figure. What happens with the length of the overlapping sides and the size of the overlapping angles? Answer the following questions.

1 What is the respective overlapping point for point C?

G



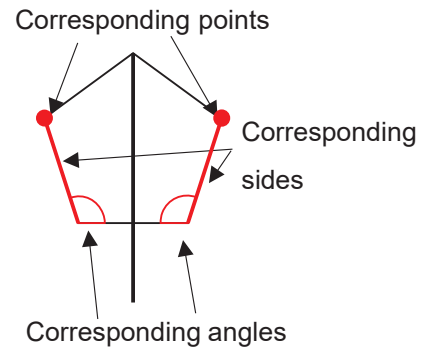
2 What is the respective overlapping sides for side BC?

HG

3 What is the respective overlapping angle for angle D?

F

- When a line symmetric figure is folded on the line of symmetry, the overlapping points, the overlapping sides, the overlapping angles are called **corresponding points**, **corresponding sides**, and **corresponding angles** respectively.
- In line symmetric figures, the length of the corresponding sides and the size of the corresponding angles are respectively equal.

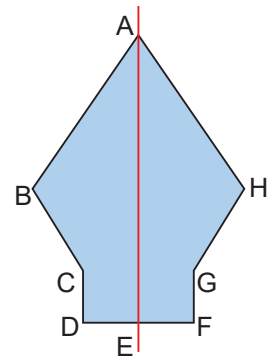


2 The following figure is a line symmetric figure. Answer the following questions.

1 Which are the respective overlapping points for point B?

2 Which are the respective overlapping sides for side CD?

3 Which are the respective overlapping angles for angle F?



Let's Try!

1 Find the symmetric signs below.

(A)



(B)



(C)



(D)



2 Find another symmetric sign in your surroundings.

3 - 2

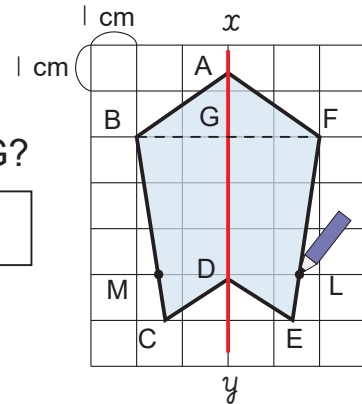
Symmetric Figures

Line Symmetry (2)

Example 1 The figure on the right is a line symmetric figure that has straight line xy as the line of symmetry. Answer the following questions.

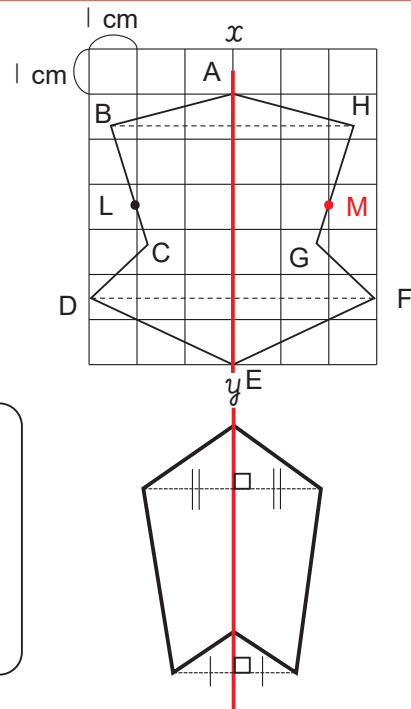
- 1 Draw the corresponding point L to point M.
- 2 The length of straight line BG is 2 cm. How many cm is the length of straight line FG?

The straight line BF, connecting the corresponding points B and F, and line xy intersect at a right angle.



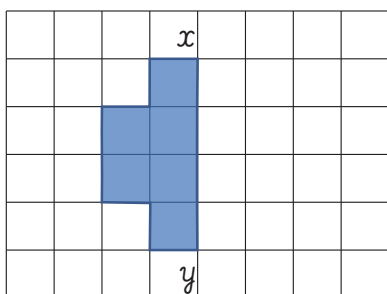
1 The figure on the right is a line symmetric figure that has straight line xy as the line of symmetry. Answer the following questions.

- 1 Draw in the figure the corresponding point M to point L.
- 2 Find the length of DF.



- For line symmetric figures, the intersection between the straight line that connects two corresponding points and the line of symmetry is perpendicular.
- The length from the line of symmetry to each of the corresponding points is equal.

Example 2 The following figure represents half of a line symmetric figure that has the straight line xy as the line of symmetry. Draw the remaining half.



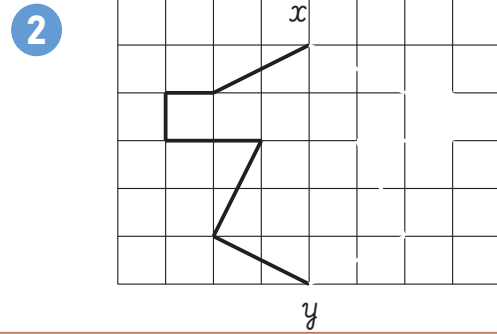
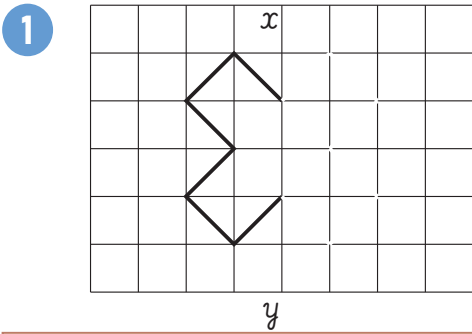
Remember the properties of line symmetry.

- The line connecting two corresponding points and the line of symmetry is perpendicular.
- The line of symmetry is the middle line.

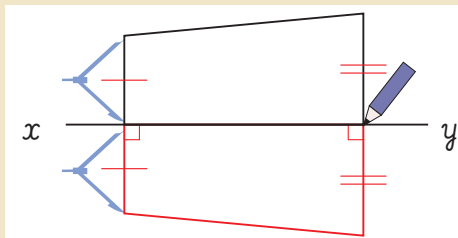


<p>1. Measure the length between each point and the line of symmetry.</p>	<p>2. Plot the corresponding points.</p>	<p>3. Connect all the points, point A, point F, and its corresponding points to draw the remaining half.</p>

2 The following figure represents half of a line symmetric figure that has the straight line xy as the line of symmetry. Draw the remaining half.



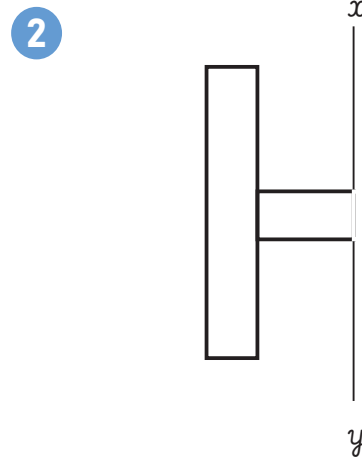
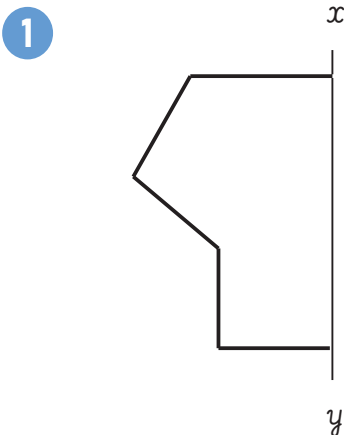
Example 3 The following figure represents half of a line symmetric figure that has the straight line xy as the line of symmetry. Draw the remaining half.



Using a compass, you can measure the lengths easily.



3 The following figure represents half of a line symmetric figure that has the straight line xy as the line of symmetry. Draw the remaining half.



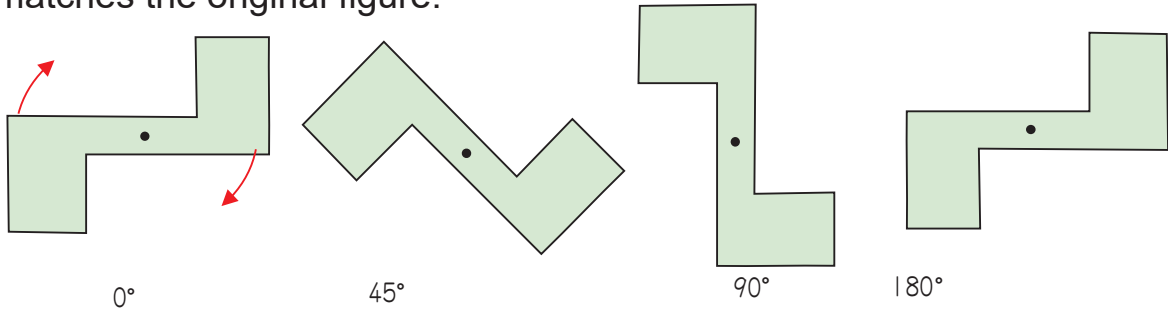
3 - 3

Symmetric Figures

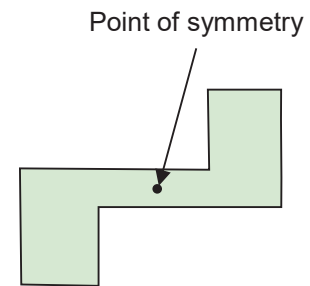
Point Symmetry (1)

Instruction Point Symmetry

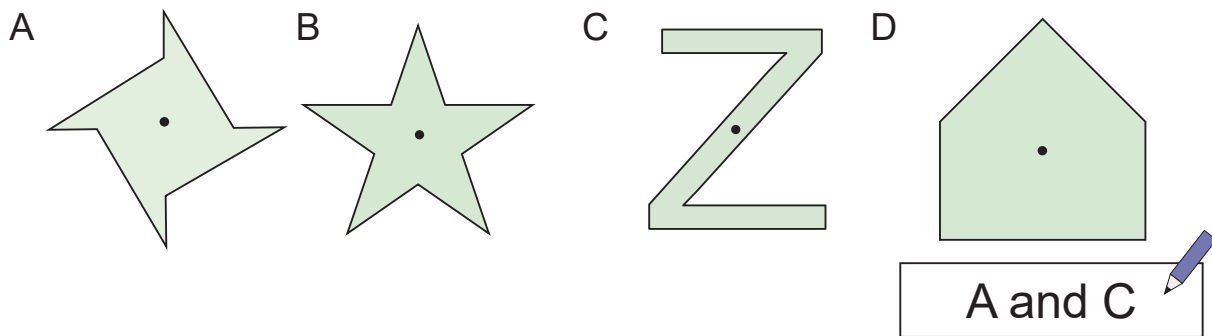
If the following figure is rotated 180° around the central point “·”, it matches the original figure.



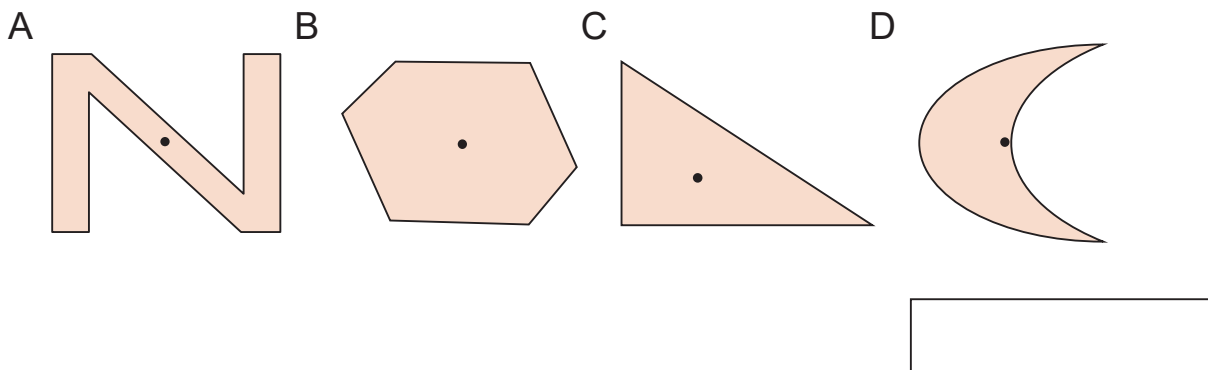
- A figure has a point of symmetry if the figure matches the original shape when it is rotated 180° with respect to a central point.
- The central point is called the **point of symmetry** or the **centre of symmetry**.



Example 1 Find point symmetric figures.

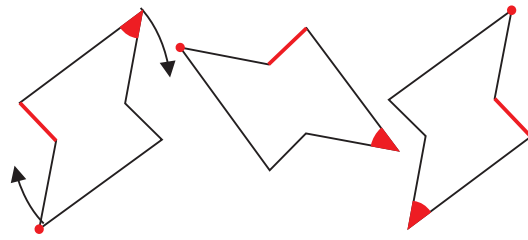


1 Find point symmetric figures.



Instruction Properties of Point Symmetry

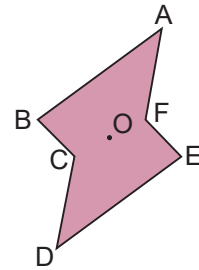
If the following figure is rotated 180° around the central point “.”, it matches the original figure.



- When a point symmetric figure is rotated 180° around the point of symmetry, the matching points, the matching sides, the matching angles are called corresponding points, corresponding sides, and corresponding angles respectively.
- In point symmetric figures, the length of the corresponding sides and the size of the corresponding angles are respectively equal.

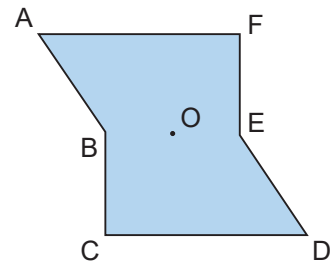
Example 2 The figure on the right is a point symmetric figure considering point O as the point of symmetry. Answer the following questions.

- 1 What is the respective matching point for point B?
- 2 What is the respective matching side for side CD?
- 3 What is the respective matching angle for angle D?



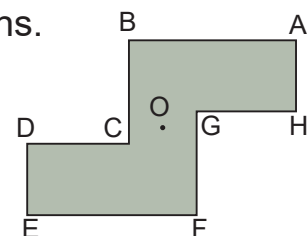
2 The figure on the right is a point symmetric figure considering point O as the point of symmetry. Answer the following questions.

- 1 What is the name of point O?
- 2 Which are the respective matching point for point A?
- 3 Which are the respective matching side for side BC?
- 4 Which are the respective matching angle for angle C?



3 The figure on the right is a point symmetric figure considering point O as the point of symmetry. Answer the following questions.

- 1 What is the respective matching point for point B?
- 2 What is the respective matching side for side DE?



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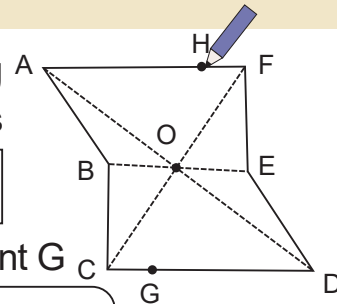
Symmetric Figures

Point Symmetry (2)

Example 1 The figure on the right is a point symmetric figure considering point O as the point of symmetry. Answer the following questions.

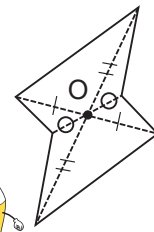
1 The straight line AD, BE, and CF are connecting corresponding points. Where do these lines intersect?

Point of symmetry
(centre of symmetry)



2 Draw in the figure the corresponding point H to point G

- For point symmetric figures, the straight line that connects two corresponding points passes through the point of symmetry.
- The length from the point of symmetry to each of the corresponding points is equal.



For Example 1, the length of line AO is the same as line DO.

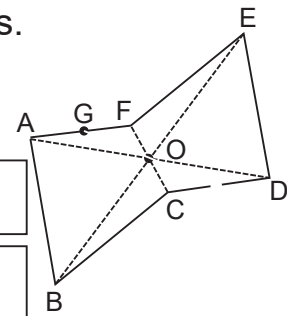


1 The figure on the right is a point symmetric figure considering point O as the point of symmetry. Answer the following questions.

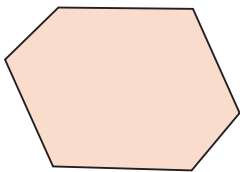
1 The straight line AD, BE, and CF are connecting corresponding points. Where do these lines intersect?

2 Which line is the same length as line BO?

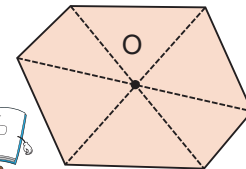
3 Draw in the figure the corresponding point H to point G



Example 2 The figure below is a point symmetric figure. Draw the point of symmetry on the figure.

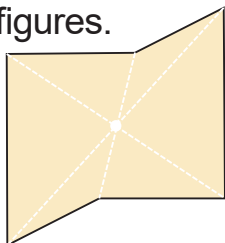


If we want to find the point of symmetry, we draw the straight lines that connects two corresponding points to find the intersection.

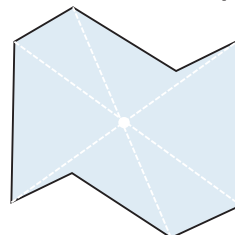


2 The figure below is a point symmetric figures. Draw the point of symmetry in the figures.

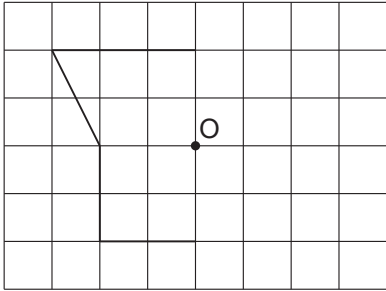
1



2



Example 3 The following figure represents half of a point symmetric figure that has the point O as the point of symmetry. Draw the remaining half.

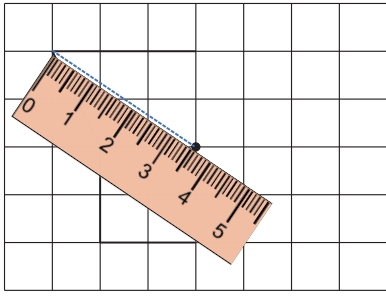


Remember the properties of line symmetry.

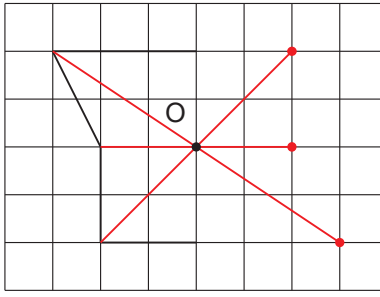
- The straight line that connects two corresponding points passes through the point of symmetry.
- The point of symmetry is the middle of the line.



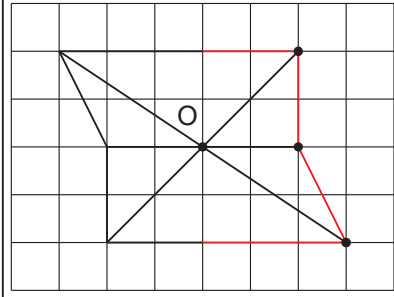
1. Measure the length between each point and the line of the symmetry.



2. Plot the corresponding points and connect them.

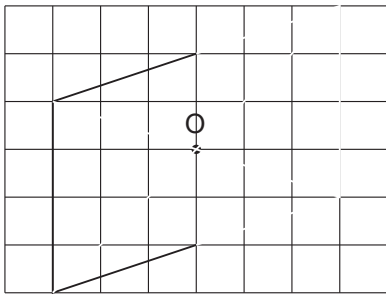


3. Connect all the points and extend sides to draw the remaining half.

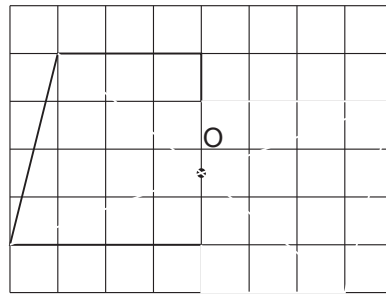


3 The following figure represents half of a point symmetric figure that has the point O as the point of symmetry. Draw the remaining half.

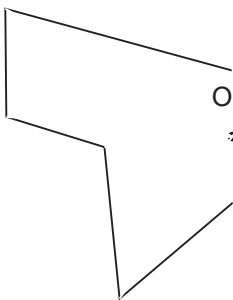
1



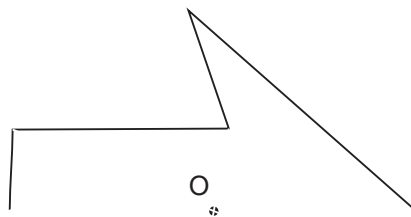
2



3



4

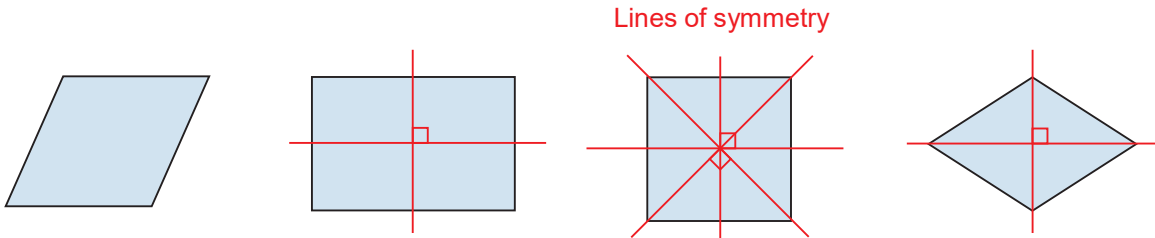


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Symmetric Figures

Polygons and Symmetry

Example 1 Look at the following quadrilaterals and answer the following questions.



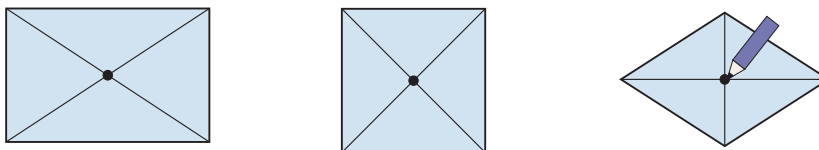
1 Write ○ or × in the table to separate line symmetric figures and point symmetric figures. In addition, for line symmetric figures how many lines of symmetry does each have?

The point of symmetry is the middle of the line.

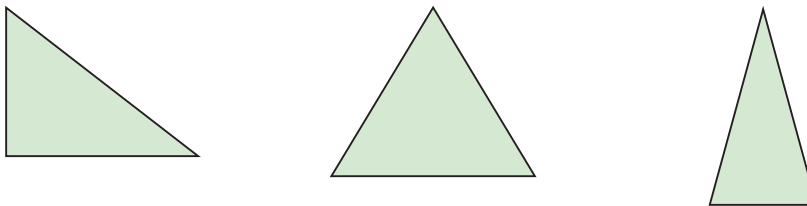


	Line symmetry	Number of lines of symmetry	Point symmetry
Parallelogram	×	0	○
Rectangle	○	2	○
Square	○	4	○
Rhombus	○	2	○

2 Draw the point of symmetry on each point symmetric figure.



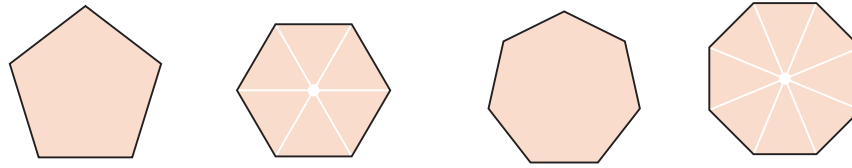
1 Look at the following triangles and answer the following questions.



Write ○ and × in the table to separate line symmetric figures and point symmetric figures. In addition, for line symmetric figures how many lines of symmetry does each have?

	Line symmetry	Number of lines of symmetry	Point symmetry
Right triangle			
Equilateral triangle			
Isosceles triangle			

2 Investigate the following regular polygons and answer the following questions.



1 Write \bigcirc and \times in the table to separate line symmetric figures and point symmetric figures. In addition, for line symmetric figures, how many lines of symmetry does each have?

Are there any findings on number of lines of symmetry and sides?

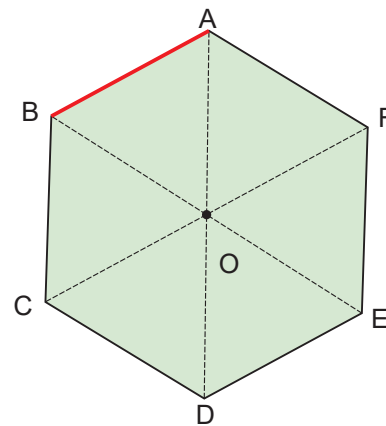
	Line symmetry	Number of lines of symmetry	Point symmetry
Pentagon			
Hexagon			
Heptagon			
Octagon			



2 Draw the point of symmetry on each point symmetric figure.

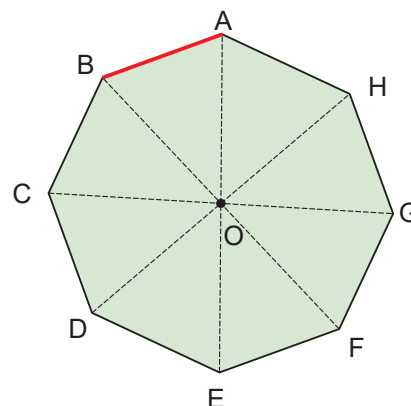
Example 2 A hexagon is a line symmetric figure as well as a point symmetric figure. What are the corresponding sides to side AB with the following conditions?

- When line AD is the line of symmetry.
- When line BE is the line of symmetry.
- When point O is the point of symmetry.



3 An octagon is a line symmetric figure as well as a point symmetric figure. What are the corresponding sides to side AB with the following conditions?

- When line BF is the line of symmetry.
- When line CG is the line of symmetry.
- When point O is the point of symmetry.



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Symmetric Figures

Review

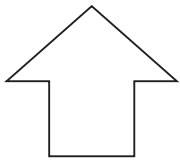
1 Fill in the blanks with words.

1 A figure has when it can be folded along a straight line and both sides overlap exactly. The folding line is called the axis of symmetry or .

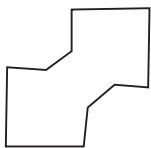
2 A figure has if the figure matches the original one when it is rotated 180° with respect to a central point. This central point is called the or centre of symmetry.

2 Find the line symmetric figures and point symmetric figures from the figures below.

A



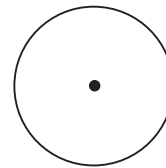
B



C



D



Line symmetry

Point symmetry

3 The figure on the right is a line symmetric figure. Answer the following questions.

1 What is the name of line xy ?

2 Find the corresponding points to the following points.

Point B

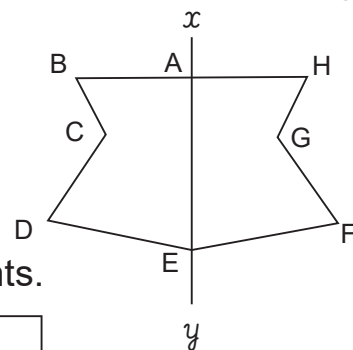
Point D

3 Find the corresponding sides to the following sides.

Side BC

Side CD

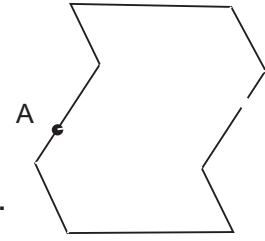
4 Find the corresponding angles to angle F



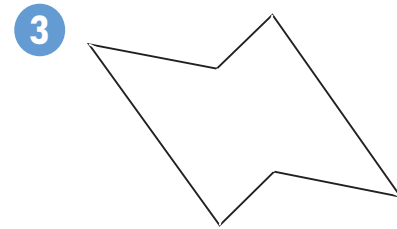
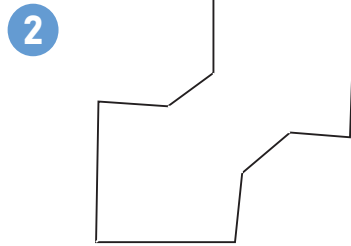
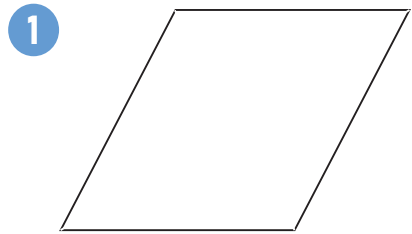
4 The figure on the right is a point symmetric figure. Answer the following questions.

1 Draw the point of symmetry.

2 Draw in the figure the corresponding point B to point A.



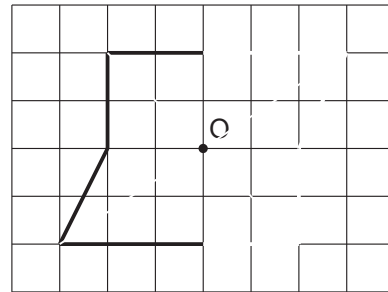
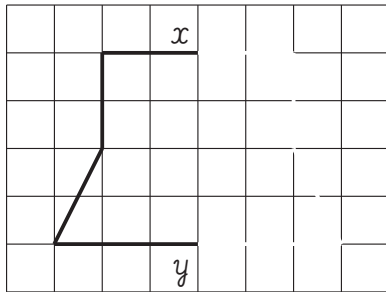
5 The figure below is a point symmetric figure. Draw the point of symmetry on the figures.



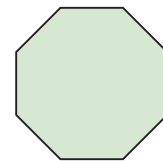
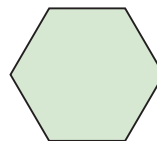
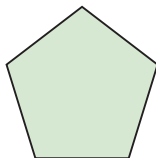
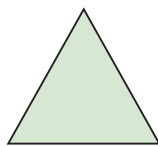
6 Draw the following figures.

1 A line symmetric figure that has the straight line xy as the line of symmetry.

2 A point symmetric figure that has point O as the point of symmetry.



7 Look at the following regular polygons and answer the following questions.



1 Write \bigcirc and \times in the table to separate line symmetric figures and point symmetric figures. In addition, for line symmetric figures how many lines of symmetry does each have?

	Line symmetry	Number of lines of symmetry	Point symmetry
Equilateral triangle			
Pentagon			
Hexagon			
Octagon			