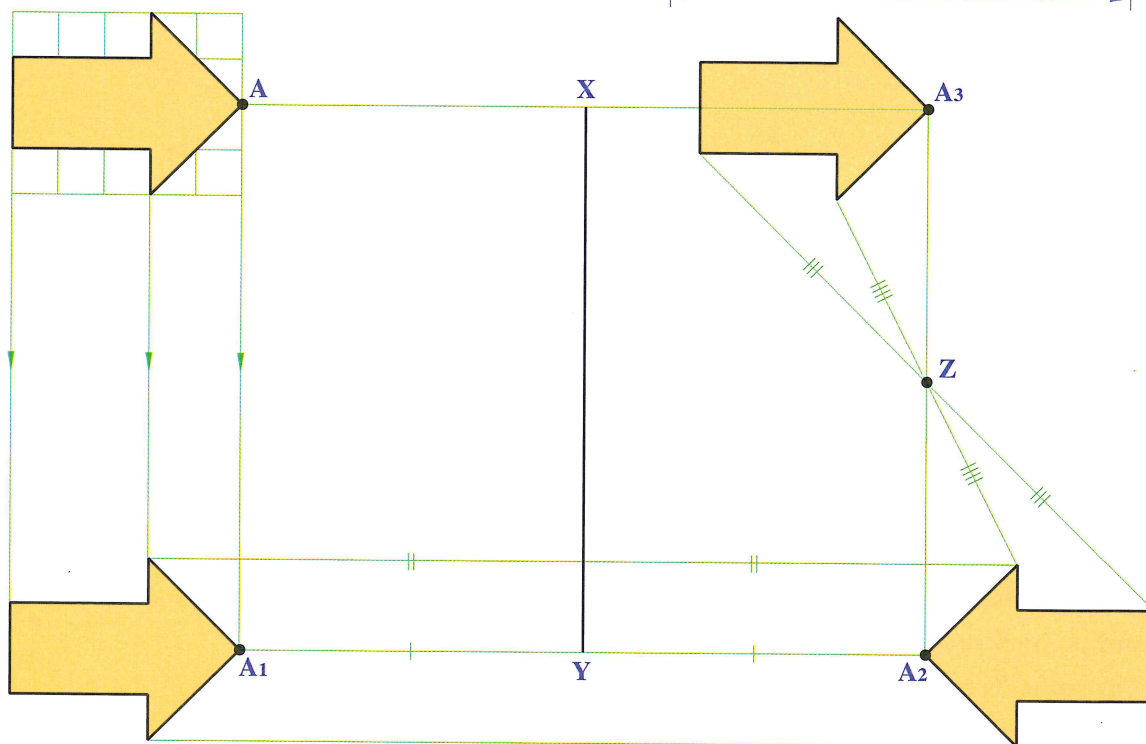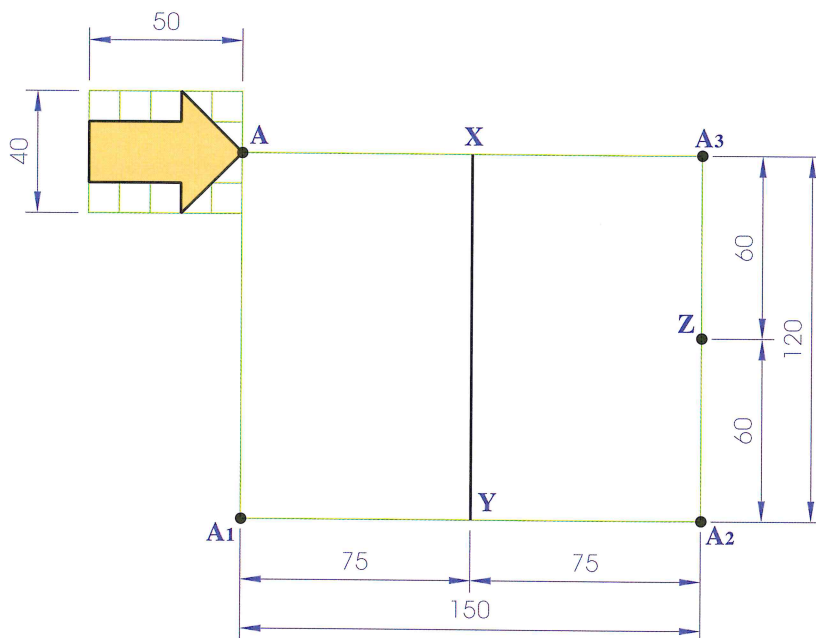**Example**

Draw the figure across and complete the rectangle 150 mm by 120 mm as shown.

Find the image of the given figure under the following transformations:

(a)   From point A to A_1 by a **translation**.

(b)   From point A_1 to A_2 by an **axial symmetry** in the line XY.

(c)   From point A_2 to A_3 by a **central symmetry** in the point Z.

Copy the arrow onto a sheet of tracing paper and use this to help you visualise the solution.

1. Under the **translation**, the point A moves to a new position A_1, which is 120 mm directly below A. *Every point of the arrow is moved the same distance in the same direction.* Slide the tracing paper down the drawing sheet so that the point A lies on the point A_1. This is a **translation**.

2. Under an **axial symmetry** in the line XY, the point A_1 is moved to a new position A_2. *Every point of the arrow and its image are the same distance from the axis of reflection.* Flip the sheet of tracing paper over the axis of reflection XY to a position that is the mirror image. This is equivalent to an **axial symmetry** in the line XY.

3. Under a **central symmetry** in the point Z, the point A_2 is moved to a new position A_3. *Every point moves to Z, and then travels on from Z the same distance in the same direction.* Place the point of your pencil on the tracing paper at the point Z. Rotate the sheet of tracing paper about the pencil point through an angle of 180°. This is equivalent to a **central symmetry** in the point Z.

Exercises

1. Draw the given figure and complete the rectangle 140 mm by 100 mm as shown.

Find the image of the given figure under the following transformations:
- **(a)** From point A to A_1 by a **translation**.
- **(b)** From point A_1 to A_2 by an **axial symmetry** in the line PQ.
- **(c)** From point A_2 to A_3 by a **central symmetry** in the point Z.
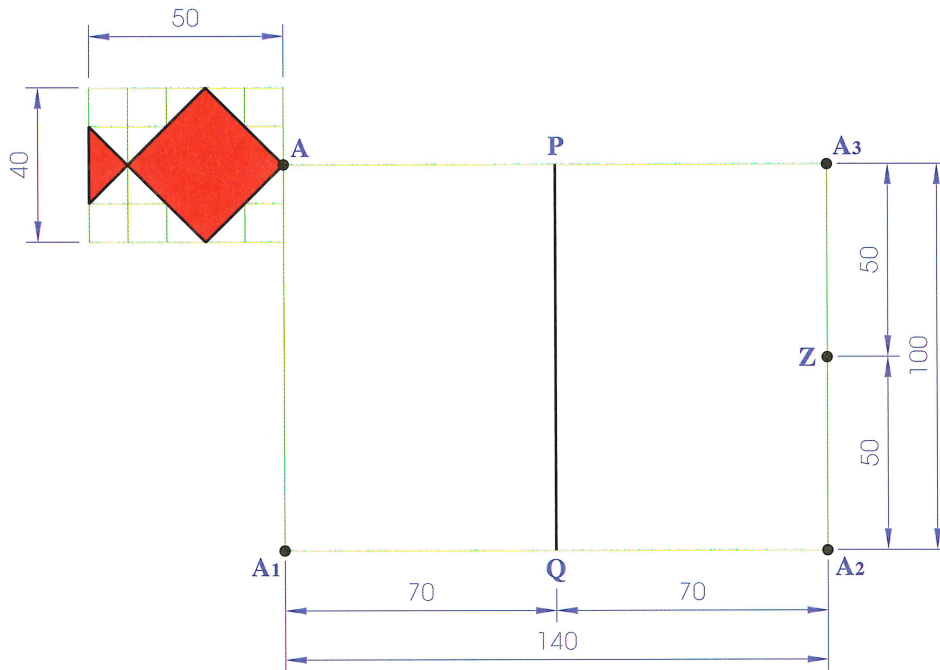
2. Draw the given figure and complete the rectangle 100 mm by 120 mm as shown.

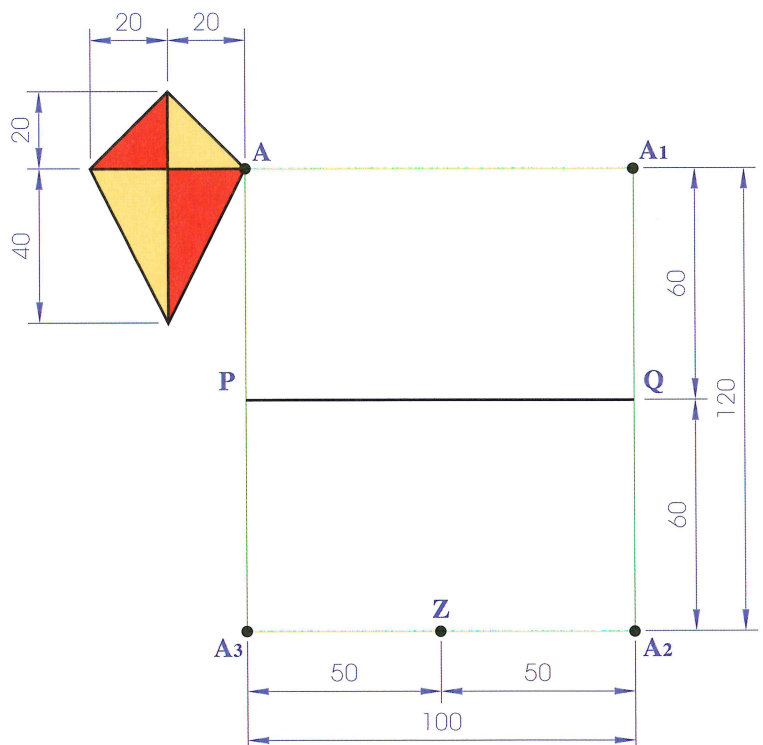Find the image of the given figure under the following transformations:
- **(a)** From point A to A_1 by a **translation**.
- **(b)** From point A_1 to A_2 by an **axial symmetry** in the line PQ.
- **(c)** From point A_2 to A_3 by a **central symmetry** in the point Z.

3. Draw the given figure and complete the rectangle 120 mm by 100 mm as shown.

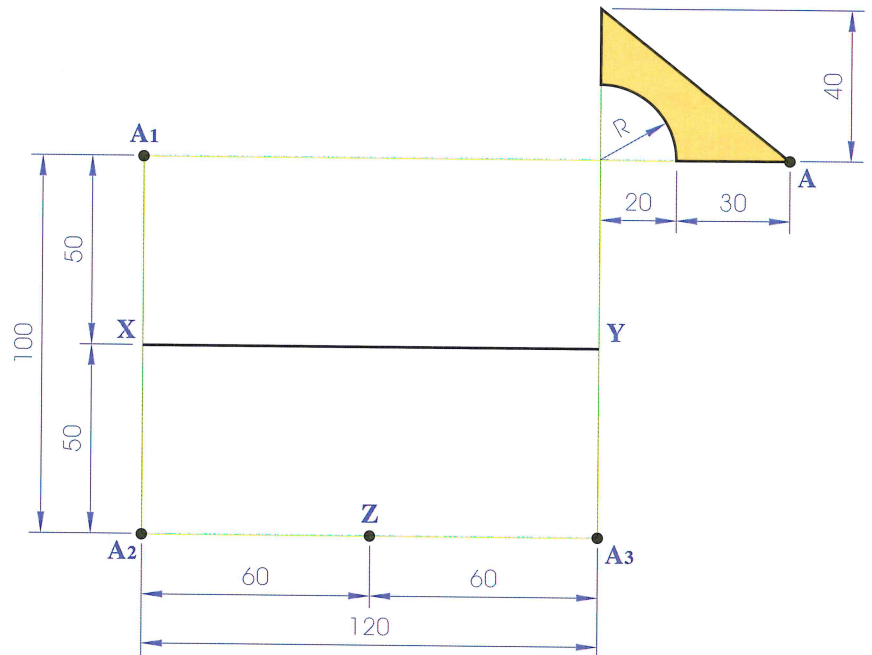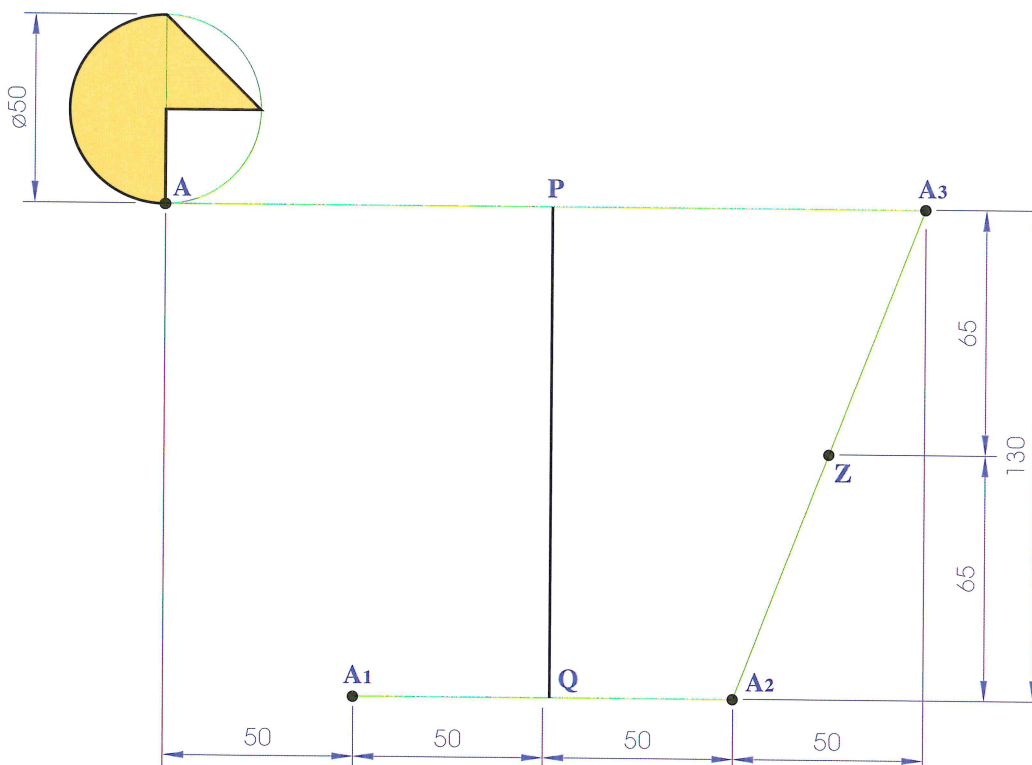Find the image of the given figure under the following transformations:

(a) From point A to A_1 by a **translation**.

(b) From point A_1 to A_2 by an **axial symmetry** in the line XY.

(c) From point A_2 to A_3 by a **central symmetry** in the point Z.

4. Draw the given figure and locate the image points A_1, A_2 and A_3.

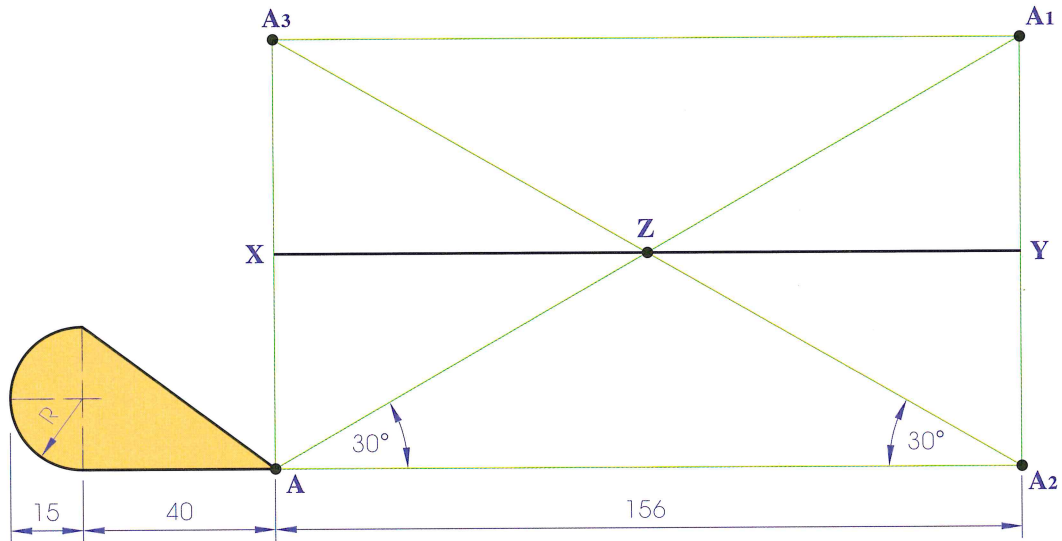Find the image of the given figure under the following transformations:

(a) From point A to A_1 by a **translation**.

(b) From point A_1 to A_2 by an **axial symmetry** in the line PQ.

(c) From point A_2 to A_3 by a **central symmetry** in the point Z.

5. Draw the given figure and complete the rectangle as shown.

Find the image of the given figure under the following transformations:

(a) From point A to A_1 by a **translation**.

(b) From point A_1 to A_2 by an **axial symmetry** in the line XY.

(c) From point A_2 to A_3 by a **central symmetry** in the point Z.

6. Draw the given figure and locate the image points A_1, A_2 and A_3.

Find the image of the given figure under the following transformations:

(a) From point A to A_1 by a **translation**.

(b) From point A_1 to A_2 by an **axial symmetry** in the line joining A to A_3.

(c) From point A_2 to A_3 by a **central symmetry** in the point Z.