Performing Rotations

You will need
- square dot paper
- pattern blocks
- drawing software

GOAL

Perform, describe, and identify rotations of shapes.

Rachel wants to draw a windmill on her computer.

? **How can Rachel draw a windmill?**

Rachel's Plan

rotation

The result of turning a shape; for example, triangle 2 is a rotation of triangle 1.

centre of rotation

The point that a shape turns around
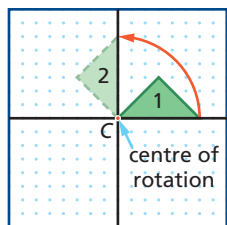
- **Step 1** First, I'll draw two lines that cross.
  I'll draw one blade of the windmill and label it blade 1.
  I'll draw the other blades as a **rotation** of blade 1.
  I'll use point C as the **centre of rotation**. The two crossing lines will guide the amount of the rotation.

- **Step 2** I'll label vertex X on one of the lines.
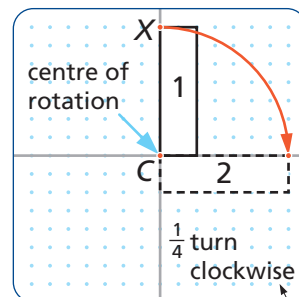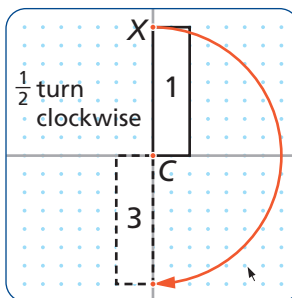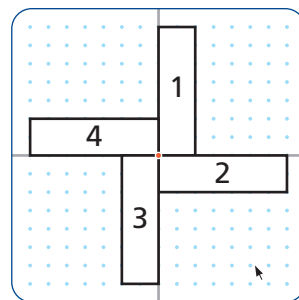 I'll rotate blade 1 using a $\frac{1}{4}$ turn cw around point C.
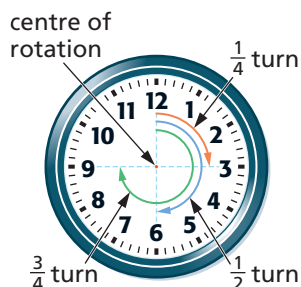
- **Step 3**   I'll rotate blade 1 again using a $\frac{1}{2}$ turn cw.

  X

  $\frac{1}{2}$ turn clockwise   1

  C

  3

- **Step 4**   I'll finish by rotating blade 1 using a $\frac{3}{4}$ turn cw.

  X

  1

  4

  C

 $\frac{3}{4}$ turn clockwise

  1

 4

  2

  3
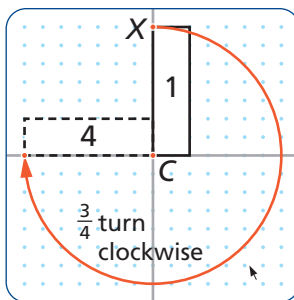
Reflecting

A. How does a shape change when it is rotated?

B. How does a shape stay the same when it is rotated?

Checking

1. a) Predict what the blade in Step 2 would have looked like if Rachel had rotated it using a $\frac{1}{4}$ turn ccw instead of a $\frac{1}{4}$ turn cw.

b) Test your prediction by drawing the rotation.

c) What do you notice?

Practising

2. Describe each rotation around point C by the amount ($\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ turn) and the direction (cw or ccw).

a)

c)

b)

d)
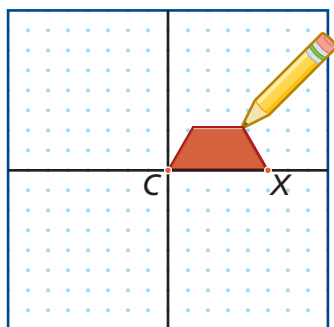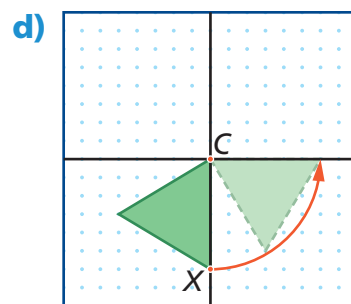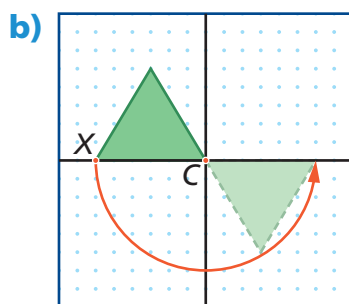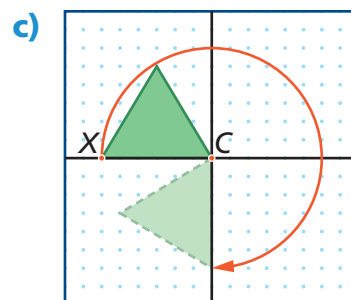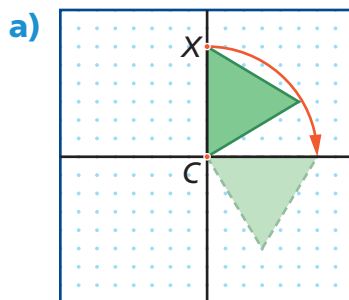
3. a) Trace a red pattern block, as shown at the left, and label your tracing shape 1. Place the block back on shape 1.
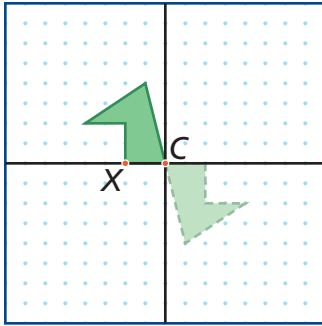

Rotate the block using a $\frac{1}{4}$ turn cw around point C. Trace the new shape. Label it shape 2.

b) Place the block back on shape 1, and rotate it using a $\frac{3}{4}$ turn ccw around point C. Trace the new shape. Label it shape 3.

c) What do you notice about shapes 2 and 3?

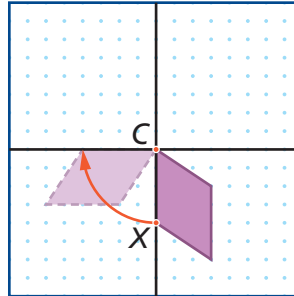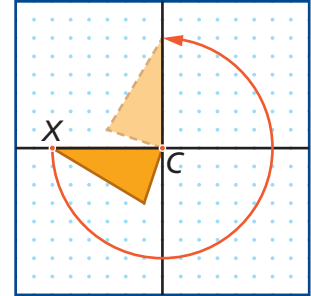4. Describe the amount and direction of each rotation around point C.

a)

b)
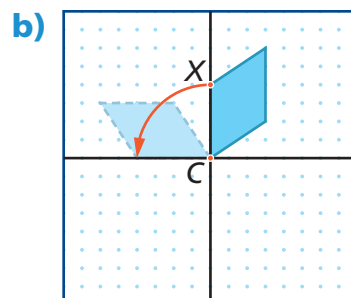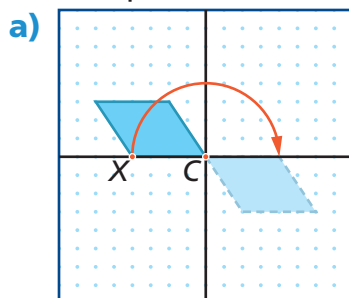
5. A green shape is rotated around point *C,* as shown at the left.
   a) Describe the rotation by the amount, direction, and centre of rotation.
   b) Does it matter if you change the direction of rotation? Explain your answer.

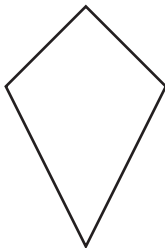**6.** Describe each rotation by the amount, direction, and centre of rotation.
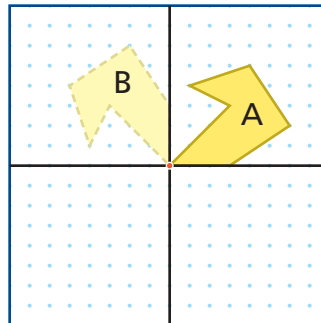
a)

b)

7. Give an example of a rotation of a polygon in your classroom.

8. a) Draw the shape at the left using drawing software. Decide on a centre of rotation and the size and direction of the rotation.
   b) Predict what the result of the rotation might be.
   c) Test your prediction by performing the rotation.

9. How do you know that shape B is a rotation of shape A?

10. a) How is a rotation different from a translation?
   b) How is a rotation different from a reflection?