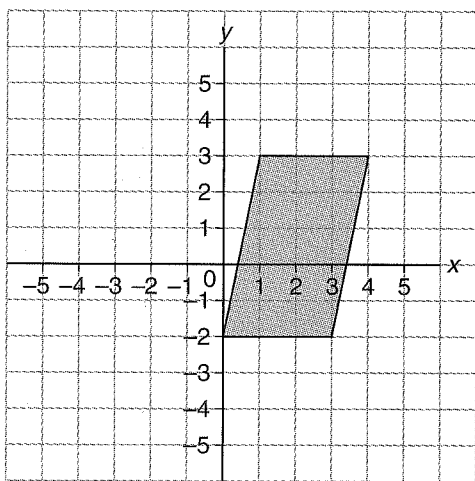


7.1 Translating Points

GOAL

Identify the points of a translated figure in all four quadrants of a Cartesian coordinate system.

Use the figure on the grid to answer the questions. You will need tracing paper or wax paper.



- Fill in the missing coordinates for the vertices of the parallelogram.

$(1, 3), (4, \underline{\quad}), (3, \underline{\quad}), (0, -2)$

- Trace the parallelogram. Translate the figure 1 unit right and 1 unit up on the grid. What are the new coordinates? The first one is done for you.

$(\underline{2}, \underline{5}), (\underline{\quad}, \underline{\quad}), (\underline{\quad}, \underline{\quad}), (\underline{\quad}, \underline{\quad})$

- Move the traced parallelogram back to the beginning. Now translate the figure 3 units left and 2 units down. What are the new coordinates? The first one is done for you.

$(\underline{-2}, \underline{1}), (\underline{\quad}, \underline{\quad}), (\underline{\quad}, \underline{\quad}), (\underline{\quad}, \underline{\quad})$

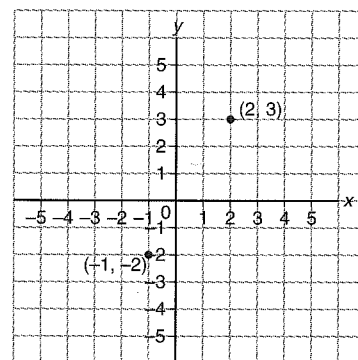
At-Home Help

The horizontal number line on a grid is the **x-axis**, and the vertical number line is the **y-axis**. You can identify points on a grid using numbers called **coordinates**.

These coordinates are written in brackets. The number on the x-axis is written first, and the number on the y-axis is written second: (x, y) .

For example, $(2, 3)$ means the point is 2 units to the right of 0 and 3 units up from 0.

$(-1, -2)$ means the point is 1 unit to the left of 0 and 2 units down from 0.

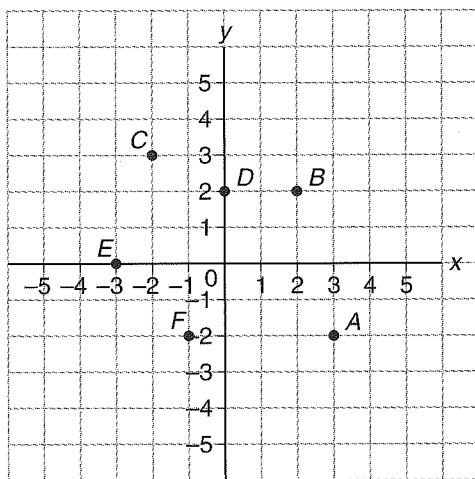


7.2 Comparing Positions on a Grid

GOAL

Locate positions on a grid with integer coordinates.

- Name the coordinates for each point. The first one is done for you.

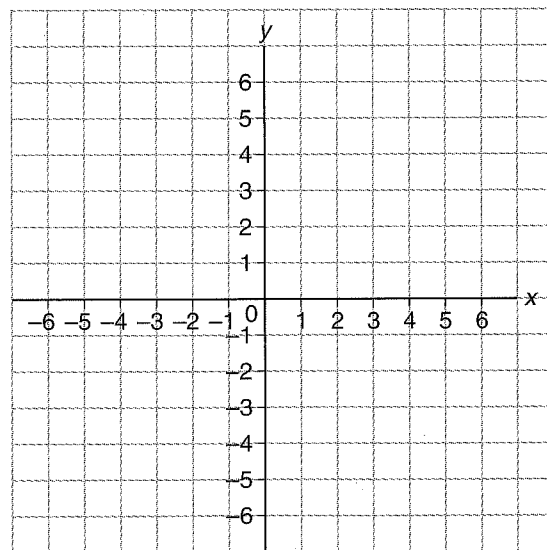


A (3, -2) D _____
 B _____ E _____
 C _____ F _____

- Plot the following points on the grid: $A(-5, -5)$, $B(5, 5)$, $C(-5, 5)$, $D(5, -5)$, $E(0, -3)$, $F(1, -2)$, $G(1, -4)$, $H(-2, 2)$, $I(3, 3)$, and $J(-4, -1)$.
- $A(4, 3)$ and $C(-3, -4)$ are two vertices of a square. What might the other two coordinates be?

At-Home Help

A **Cartesian coordinate system** is a method for describing a location by identifying the distance from a horizontal number line (the x -axis) and a vertical number line (the y -axis). The location is represented by an ordered pair of coordinates, (x, y) . The axes intersect at $(0, 0)$, which is called the **origin**.

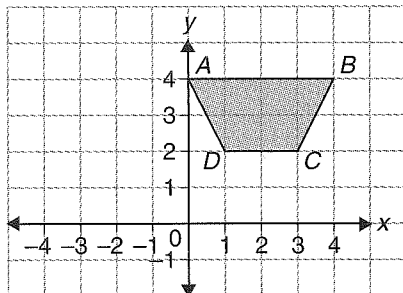


7.3 Translations and Reflections

GOAL

Perform and describe translations and reflections of a 2-D shape in all four quadrants of a Cartesian coordinate system.

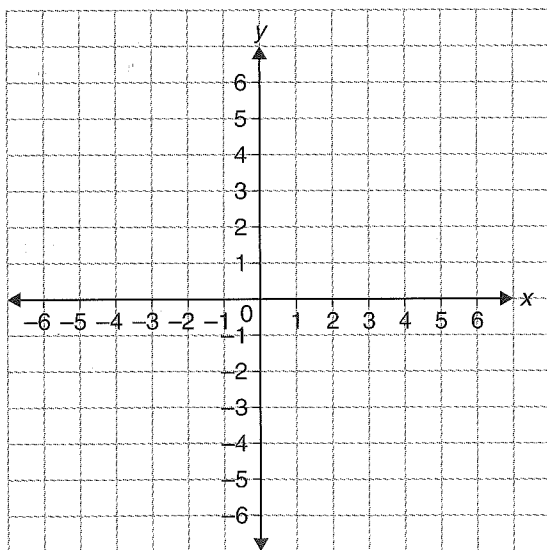
1. a) Draw the image of this shape after a translation 3 units left and 2 units down.



- b) What are the coordinates of the image?

2. The vertices of parallelogram $MNOP$ are $M(-4, -2)$, $N(-1, -2)$, $O(-2, -3)$, and $P(-5, -3)$.

- a) Draw parallelogram $MNOP$ on the grid.



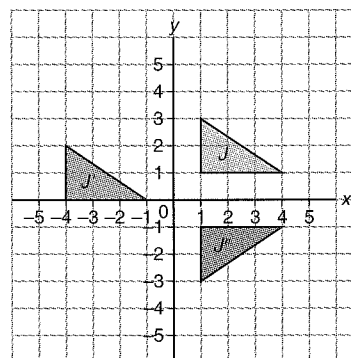
- b) Draw the image of the parallelogram after a reflection in the y -axis.
c) What are the vertices of the image?

At-Home Help

A **translation** is the result of a slide along straight lines (left or right, up or down). The new shape is called the **image**.

A **reflection** is the result of a flip of a 2-D shape. Each point in the 2-D shape flips to the opposite side of the line of reflection, but stays the same distance from the line.

For example,



Triangle J is translated 5 units left and 1 unit down to form image J' .

Triangle J is reflected in the x -axis to form image J'' .

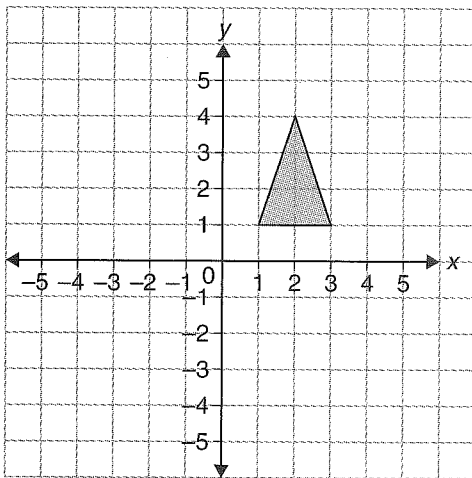
7.4 Rotations

GOAL

Perform and describe rotations in all four quadrants of a Cartesian plane.

You will need a protractor to measure angles.

1. Draw the image of the triangle after each rotation.
Use the origin as the centre of rotation.

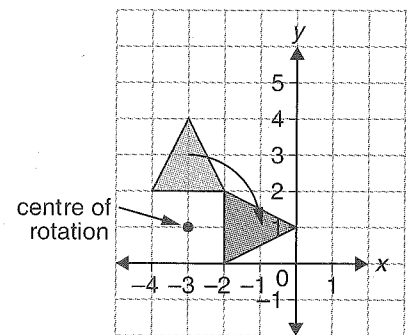


- a) 90° counterclockwise
 - b) 180° clockwise
2. While Ken worked in the garage, the minute hand on the clock rotated 90° cw. If Ken started work at 3:15 p.m., what time did he finish?
 3. Draw the image of the rectangle after each rotation around the labelled centre of rotation.
 - a) 90° clockwise
 - b) 180° counterclockwise

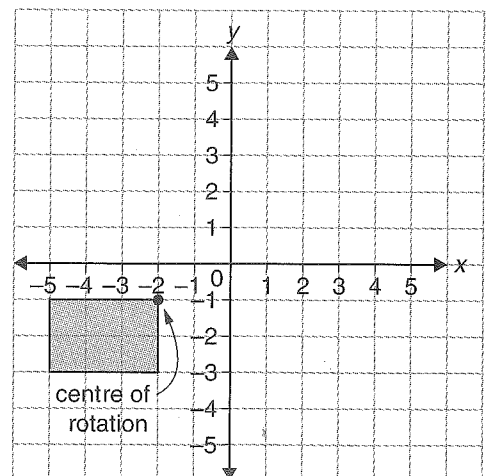
At-Home Help

The **centre of rotation** is a fixed point around which other points in a shape rotate in a clockwise (cw) or counterclockwise (ccw) direction. The centre of rotation may be inside or outside the shape.

For example,



The lighter triangle is rotated 90° around the centre of rotation to get the darker triangle image.



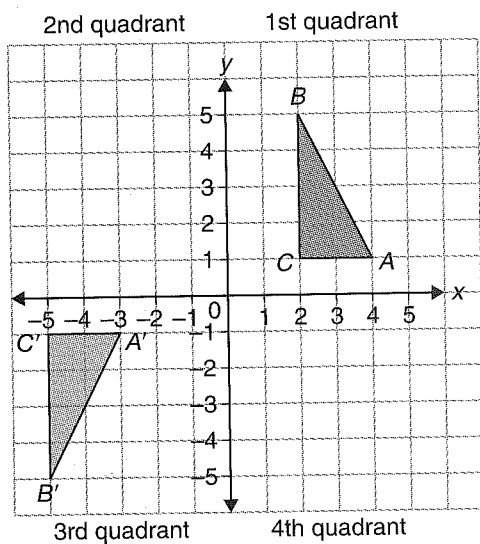
7.5 Communicate about Transformations

GOAL

Discuss mathematical ideas using mathematical terms.

1. Pavlo described the transformation from triangle ABC to triangle $A'B'C'$ like this:

"I labelled the four quadrants. First, the triangle was translated from the 1st quadrant to the 2nd quadrant. Next, the triangle was reflected."



At-Home Help

Communication Checklist

- Did you explain your thinking clearly?
- Did you use correct mathematical language?
- Did you support your description with diagrams?

- a) What details are missing from Pavlo's description?

- b) Write your own description of the transformation. Include all the details Pavlo missed.

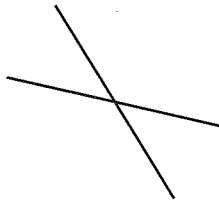
7.6 Perpendicular Bisectors

GOAL

Construct perpendicular bisectors.

1. Which diagram shows a perpendicular bisector?

A.



B.



C.

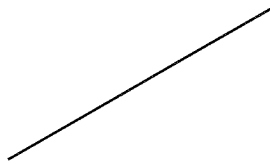


2. Draw a perpendicular bisector for each line segment.

a)



b)



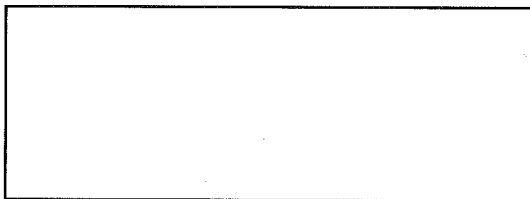
c)



d)



3. a) Construct perpendicular bisectors for each side of the rectangle.



b) Label the intersection point of the perpendicular bisectors.

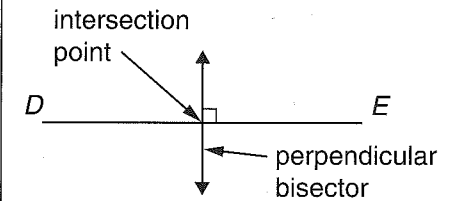
Is it the centre of the rectangle? Will this be true for any rectangle?

At-Home Help

An **intersection point** is the point where two lines or line segments cross each other.

A **perpendicular bisector** is a line that intersects a line segment at 90° and divides it into two equal lengths. In a diagram, perpendicular line segments are indicated by a little square.

For example,



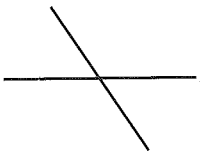
7.7 Parallel Lines

GOAL

Construct parallel line segments.

1. Which line segments are parallel?

A.



B.



C.

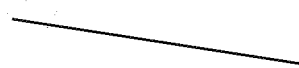


2. Draw a parallel line for each line segment.

a)



b)



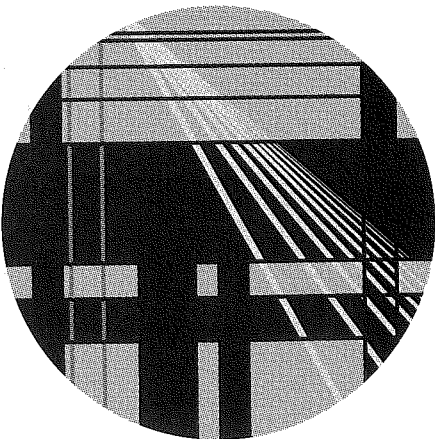
c)



d)



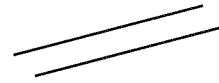
3. a) Circle two different sets of parallel line segments in the drawing below.



b) Beside the drawing, draw a line segment that is parallel to one of the sets of parallel lines in the drawing.

At-Home Help

Parallel lines never intersect each other, no matter how far in either direction you extend the lines. For example,



7.8 Angle Bisectors

GOAL

Construct angle bisectors.

You will need a protractor.

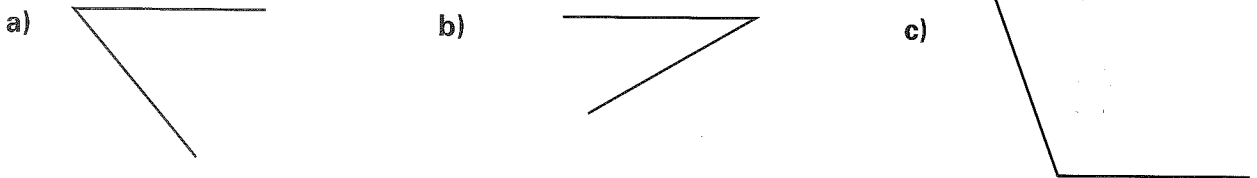
At-Home Help

An **angle bisector** is a line that cuts an angle in half to form two equal angles.

1. Which diagrams show an angle bisector?



2. Draw a bisector for each angle. Use a protractor.

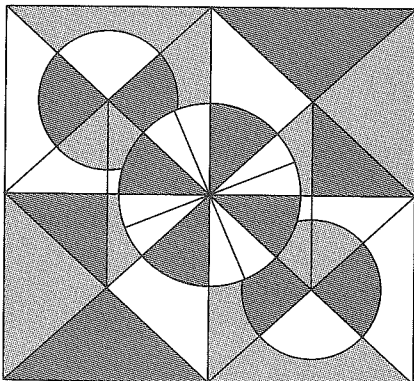


3. a) Use a protractor to draw a 120° angle.

b) If you draw an angle bisector, what will the two resulting angles be?

c) Draw the bisector and check your answer for part 3b).

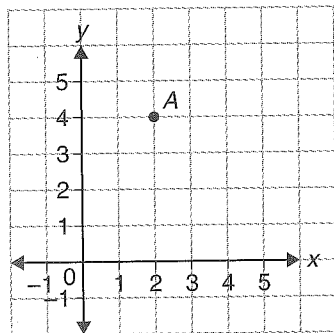
4. Circle three different angle bisectors in the diagram.



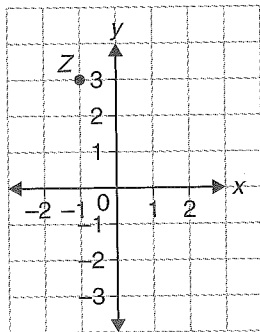
Chapter 7 Test Yourself

Circle the letter of the correct answer.

1. What are the coordinates of point A ?

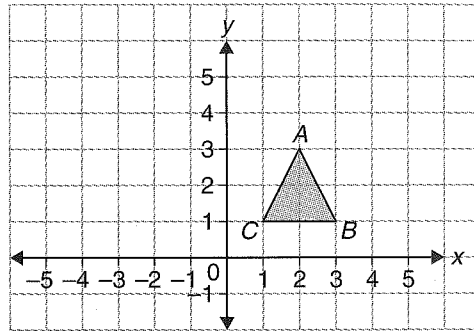


- A. $(2, 4)$ B. $(4, 2)$ C. $(-2, 4)$ D. $(4, -2)$
2. The point $(3, 3)$ is translated 1 unit to the right and 1 unit up. What are the new coordinates?
- A. $(2, 2)$ B. $(-3, -3)$ C. $(4, 4)$ D. $(2, 4)$
3. Point Z is reflected in the x -axis. What are the new coordinates?



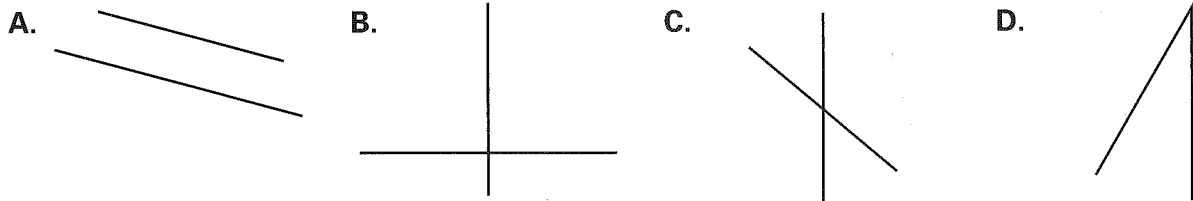
- A. $(3, 1)$ B. $(3, -1)$ C. $(1, 3)$ D. $(-1, -3)$

4. Triangle ABC is translated 3 units left and 2 units down. What are the new vertices?

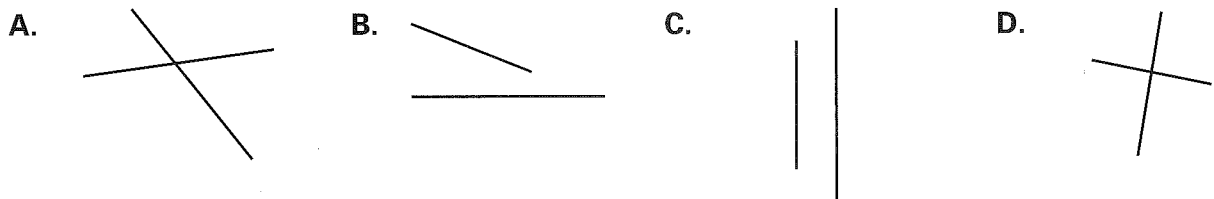


- A. $(2, 3)$, $(3, 1)$, and $(1, 1)$ C. $(-1, 3)$, $(0, 1)$, and $(-2, 1)$
 B. $(2, 1)$, $(3, -1)$, and $(1, -1)$ D. $(-1, 1)$, $(0, -1)$, and $(-2, -1)$
5. Nestor worked on his homework while the minute hand of the clock rotated 180° . If he started work at 5:00 p.m., what time did he finish?
- A. 5:15 p.m. B. 5:30 p.m. C. 5:45 p.m. D. 6:00 p.m.

6. Which diagram shows a perpendicular bisector?



7. Which diagram shows parallel lines?



8. Which diagram shows an angle bisector?

