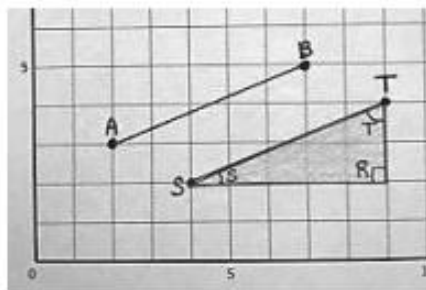## Problem Solving with the Coordinate Plane

In Module 6, students develop a coordinate system for the first quadrant of the coordinate plane and use it to solve problems. They explore the relationship between points, ordered pairs, patterns, and lines. The module finishes with an exploration of the coordinate plane in real world applications.

Drawing figures on the coordinate plane

The coordinate plane
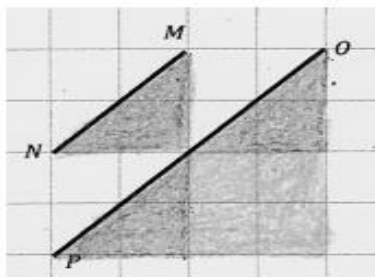
What Came Before this Module:

Students worked with three-dimensional shapes and explored cubic units and volumes of rectangular prisms. They also calculated area for figures with fractional side lengths.

New Terms in this Module:

Axis: fixed reference line for the measurement of coordinates

**Coordinate:** number that identifies a point on a plane

Coordinate pair: two numbers that are used to identify a point on a plane; written (x, y) where x represents a distance from 0 on the x-axis and y represents a distance from 0 on the y-axis

Coordinate plane: plane spanned by the x-axis and y-axis in which the coordinates of a point are distances from the two perpendicular axes

Ordered pair: two quantities written in a given fixed order, usually written as (x, y)

Origin: fixed point from which coordinates are measured; the point at which the x-axis and y-axis intersect

Quadrant: any of the four equal areas created by dividing a plane by an x-axis and y-axis
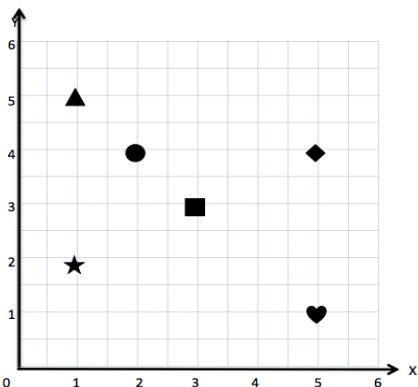
+ How You Can Help at Home:

- Play the game Battleship, if you have it! It gives good practice with locating points on a coordinate plane.
- Practice following rules to find ordered pairs, e.g. if the rule is y = double x plus 1, what is y if x is 3? 4? 5? (Answers are 7, 9, 11.)

Key Common Core Standards:

- *Write and interpret numerical expressions.*
  - Write simple expressions that record calculations with numbers, and interpret numerical expressions.

- *Analyze patterns and relationships.*
  - Generate two numerical patterns using two given rules, and identify apparent relationships between corresponding terms.

- *Graph points on the coordinate plane to solve real-world and mathematical problems.*
  - Use a pair of perpendicular number lines, called axes, to define a coordinate system.
  - Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Prepared by Erin Schweng, Math Coach

Rule: Double x, then subtract 1.

x	y	(x, y)
1	1	(1,1)
2	3	(2,3)
3	5	(3,5)
4	7	(4,7)
5	9	(5,9)

The rule table and the plotted points for the rule "Double x, then subtract 1"
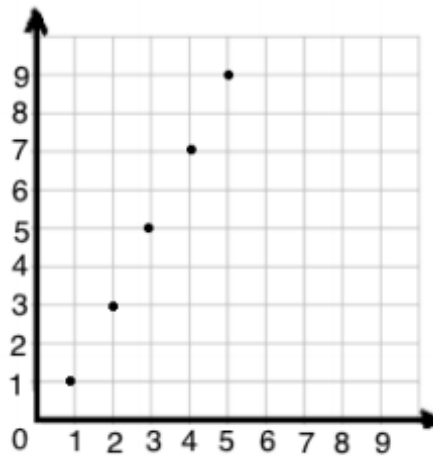
Spotlight on Math Skills:

Graphing Lines

Students learn this important skill in Module 6 of *A Story of Units*.

A Story of Units teaches students key mathematical skills that will be used throughout a student's elementary years and beyond.

Module 6, the final module of Grade 5, is a very important link to the algebraic skills students will need in later years. Students begin by investigating patterns, relating the x- and y-coordinates of the points on the line and reasoning about the patterns in the ordered pairs, which lays groundwork for Grade 6 work with proportional reasoning.

Students use given rules (e.g., "multiply by 2, then add 3") to generate coordinate pairs, plot points, and investigate relationships. Finally, students generate two number patterns from two given rules, plot the points, and analyze the relationships within the sequences of the ordered pairs and the graphs of the two lines.

Sample Problem from Module 6:
(Example taken from Module 6, Lesson 20)

Harry runs a hot dog stand at the county fair. When he arrived on Wednesday, he had 38 dozen hot dogs on his stand. The graph shows the number of hot dogs (in dozens) that remained unsold at the end of each day of sales.

1. How many dozen hot dogs did Harry sell on Wednesday? How do you know?
2. Between which two-day period did the number of hot dogs sold change the most? Explain how you determined your answer.