

#### Vertical Progression:

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| <b>3<sup>rd</sup> Grade</b> | <p><b>3.NF.A Develop understanding of fractions as numbers.</b></p> <ul style="list-style-type: none"> <li>○ <b>3.NF.A.2</b> Understand a fraction as a number on the number line; represent fractions on a number line diagram.</li> <li>○ <b>3.NF.A.2.a</b> Represent a fraction <math>1/b</math> on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into <math>b</math> equal parts. Recognize that each part has size <math>1/b</math> and that the endpoint of the part based at 0 locates the number <math>1/b</math> on the number line.</li> <li>○ <b>3.NF.A.2.b</b> Represent a fraction <math>a/b</math> on a number line diagram by marking off a lengths <math>1/b</math> from 0. Recognize that the resulting interval has size <math>a/b</math> and that its endpoint locates the number <math>a/b</math> on the number line.</li> </ul>  |
| <b>5<sup>th</sup> Grade</b> | <p><b>5.G.A Graph points on the coordinate plane to solve real-world and mathematical problems.</b></p> <ul style="list-style-type: none"> <li>○ <b>5.G.A.1</b> Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).</li> <li>○ <b>5.G.A.2</b> 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.</li> </ul>   |
| <b>6<sup>th</sup> Grade</b> | <p><b>6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.</b></p> <ul style="list-style-type: none"> <li>○ <b>6.NS.C.6</b> Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</li> <li>○ <b>6.NS.C.6.a</b> Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., <math>-(-3) = 3</math>, and that 0 is its own opposite.</li> <li>○ <b>6.NS.C.6.b</b> Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.</li> <li>○ <b>6.NS.C.6.c</b> Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.</li> </ul> <p><b>6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.</b></p> <ul style="list-style-type: none"> <li>○ <b>6.G.A.3</b> Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.</li> </ul> |

#### Students will demonstrate command of the ELG by:

- Plotting ordered pairs in quadrant I of a coordinate grid.
- Determining distances between two ordered pairs.
- Locating ordered pairs on the coordinate grid by starting at the origin (0, 0).
- Explaining that the intersecting lines that form the coordinate plane are number lines.
- Explaining the relationship of an ordered pair and the location on the coordinate plane.

#### Vocabulary:

- axis/axes
- coordinate plane
- coordinate system
- coordinates
- first quadrant
- horizontal
- intersection of lines
- number line
- ordered pairs
- origin
- perpendicular lines
- vertical
- x-axis
- x-coordinate
- y-axis
- y-coordinate

#### Sample Instructional/Assessment Tasks:

##### 1) Standard: 5.G.A.1

**Source:** Illustrative Mathematics

<https://www.illustrativemathematics.org/content-standards/5/G/A/1/tasks/489>

**Item Prompt:** Battleship

**Materials:**

- grid paper
- colored pencils; color for the ships and (for example) red for explosions on theirs and their enemy's ships- this is how they'll keep track of what ordered pairs have been called

**Setup:**

Students begin by folding the grid paper in half. They need to draw coordinate axes on both the top half and the bottom half and label the x and y axes with the numbers 1-10 on each axis. The students will need to draw in 5 ships on ordered pairs and label the ordered pairs. They should draw:

- Two ships that are sitting on 2 ordered pairs
- One ship that is sitting on 3 ordered pairs
- One ship that is sitting on 4 ordered pairs
- One ship that is sitting on 5 ordered pairs

Remind them the bottom half has their boats and the top half has their opponent's boats.

**Actions:**

Students play in pairs sitting opposite each other and take turns calling out ordered pairs. Players should keep a list of the ordered pairs they call out written in (x, y) form on a piece of paper that both players can see so there is no disagreement later on about what has been called (it is common for students to transpose coordinates). Then they are to mark the ordered pair they call out on the top coordinate plane. They should mark in black if they missed and red if they hit their opponent's boat. On the bottom half of the grid paper they are to color black for the ordered pairs their opponent calls out and color red for the ordered pairs that hit their ship.

#### 2) Standard: 5.G.A.2

**Source:** Illustrative Mathematics

<https://www.illustrativemathematics.org/content-standards/5/G/A/2/tasks/1516>

**Item Prompt:** Meerkat Coordinate Plane Task

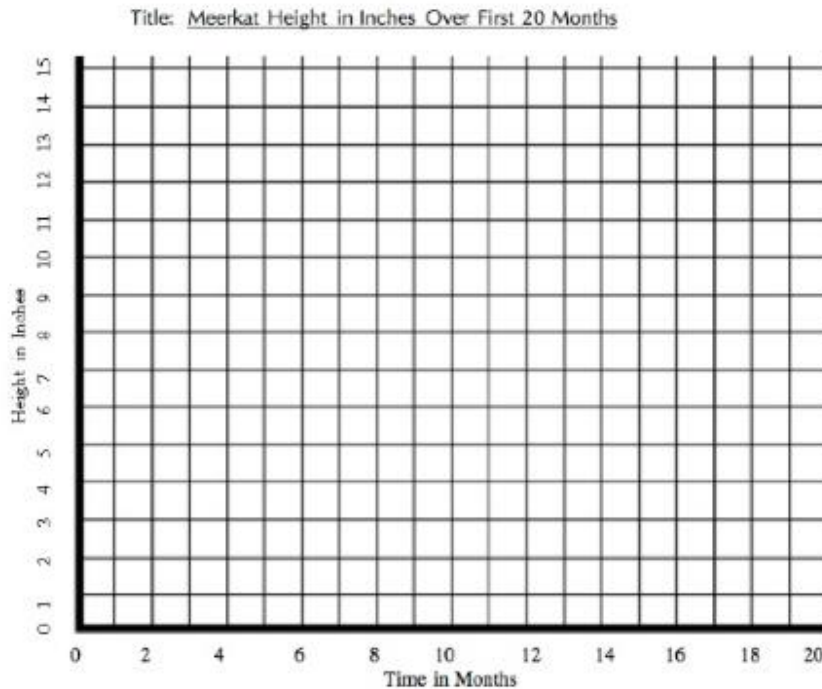
Greetings from the Kalahari Desert in South Africa! In this activity, you will learn a lot about the Kalahari's most playful residents: meerkats.

a. The following ordered pairs show the height of a typical meerkat at different times during the first 20 months of life. Graph the corresponding points and see what you can discover about meerkats. Once you have graphed them all, connect the points in the order they are given to form a line graph.



See if you can graph these ordered pairs:

- (0 months, 3 inches)
- (2 months, 5 inches)
- (4 months, 6 inches)
- (6 months, 7 inches)
- (8 months, 8 inches)
- (10 months, 9 inches)
- (12 months, 10 inches)
- (14 months, 12 inches)
- (16 months, 12 inches)
- (18 months, 12 inches)
- (20 months, 12 inches)



- b. What does the point (0 months, 3 inches) mean for a typical meerkat's height?
- c. How tall do you think a typical meerkat gets? Why?
- d. At what age do meerkats reach their full height? How do you know from this graph?
- e. If this graph were about a human instead of a meerkat, at what age do you think the height would stop getting larger?

**Correct Answer(s)**

- b. When a meerkat is born, it's typical height is 3 inches.
- c. about 12 inches tall
- d. 14 months old
- e. Answers may vary but about 17 years old