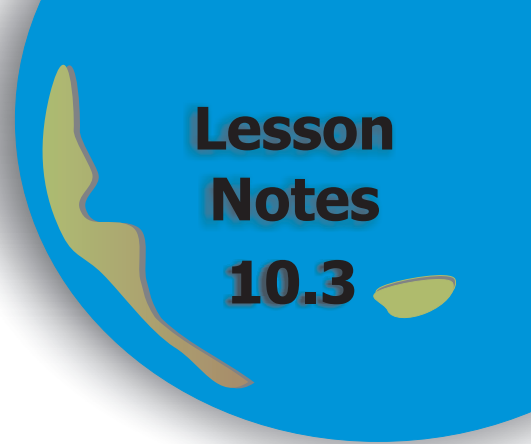


NAME _____

Module 10 Coordinate Geometry and Spatial Visualization
Lesson 3 Coordinate Geometry



Lesson Notes

10.3

Lesson Objectives

- Use coordinate geometry to explore the links between geometric and algebraic representations of problems (lengths of segments/distance between points, slope/perpendicular-parallel lines).
- Count the distance between two points on a horizontal or vertical line and compare the lengths of the paths on a grid.
- Find the distance between two points on a number line.
- Find the distance between two points on a number line and locate the midpoint.
- Find the distance between two points on a coordinate plane using the Pythagorean Theorem.

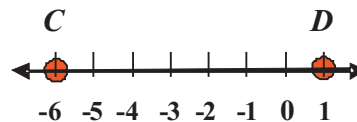
Subtopic 1 Distances on a Coordinate Plane

The distance between two points with coordinates a and b on a number line is $|a - b|$.

Midpoint

- Divides a line segment into two congruent line segments
- The coordinate of the midpoint of a segment whose endpoints are a and b is $\frac{a + b}{2}$.

- 1** Find the distance between C and D and the coordinate of the midpoint of \overline{CD} .

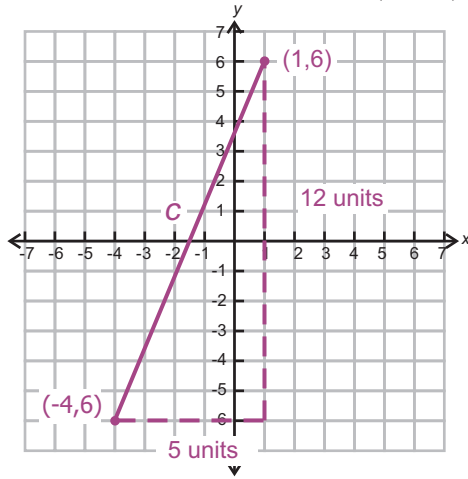


Distance: $|1 - (-6)| = |7| = 7$.

Midpoint: $\frac{-6 + 1}{2} = \frac{-5}{2} = -2.5$.

2

Find the distance between $(-4, -6)$ and $(1, 6)$.



$$\begin{aligned} 5^2 + 12^2 &= c^2 \\ 25 + 144 &= c^2 \\ 169 &= c^2 \\ 13 &= c \end{aligned}$$

The distance is 13 units.

Subtopic 2 Slope

Slope is a measure of the steepness of a line.

The slope of a line equals rise divided by run.

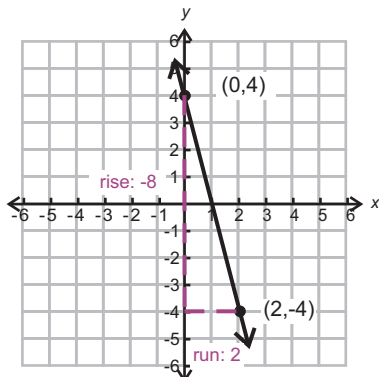
$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

The slope of a horizontal line is always zero.

The slope of a vertical line is always undefined.

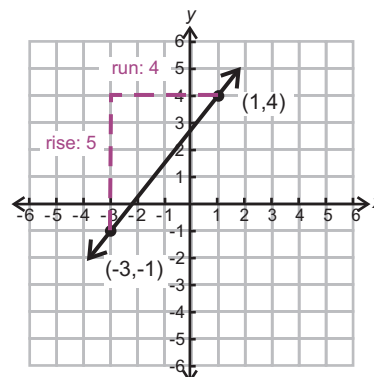
Find the slope of the line.

3



$$m = \frac{\text{rise}}{\text{run}} = \frac{-8}{2} = \frac{-4}{1} = -4$$

4



$$m = \frac{\text{rise}}{\text{run}} = \frac{5}{4}$$

Subtopic 3**Parallel and Perpendicular Lines**

Parallel lines are coplanar lines that never intersect.

Perpendicular lines are coplanar lines that intersect at a right angle.

Nonvertical parallel lines have equal slopes.

Except for horizontal and vertical lines, perpendicular lines have opposite reciprocal slopes.

Opposite numbers are the same distance from 0 but in opposite directions.

Two numbers are reciprocals if their product is 1.

- 5** Find the slope of any line parallel to line t and the slope of any line perpendicular to line t .

$$\text{Slope of line } t: \frac{3}{5}$$

$$\text{Slope of any line } \parallel \text{ to } t: \frac{3}{5}$$

$$\text{Slope of any line } \perp \text{ to } t: -\frac{5}{3}$$

