

# Midpoints Investigation

## Student Activity

7 8 9 10 11 12



## Introduction

In this investigation you will determine a formula for finding the midpoints of two given points and then apply this to find the midpoint of a fixed point and a point on a line.


Start a new document and insert a Graphs application. If the dot-grid is not displayed press:

 > Settings > dot grid

With the dot grid displayed, press P and select Point.

Place two points on the grid, one in quadrant one and the other in quadrant 2. Placing the points on the grid will ensure the points will be whole numbers.

Add the coordinates to both points:

 > Actions > Coordinates & Equations

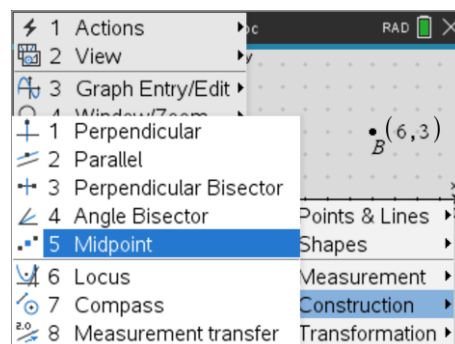
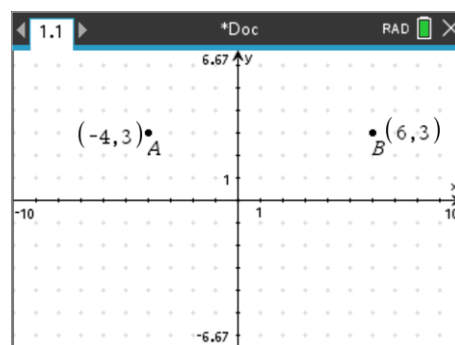
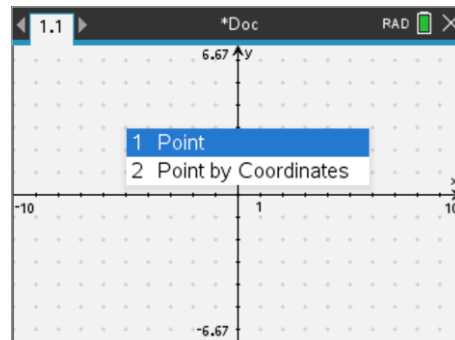
Place point A at  $(-4, 3)$  and point B at  $(6, 3)$ .

The next task is to automatically locate the midpoint of A and B.

 > Geometry > Construction > Midpoint

With the midpoint tool active, click on point A followed by point B, then get the coordinates of this point.

This resource can now be used to answer the following questions by dragging point A or B to the required location(s).



### Question: 1.

Determine the coordinates of the midpoint for each of the following pairs of points:

- $(-4, 3)$  &  $(6, 3)$
- $(2, 3)$  &  $(6, 3)$
- $(2, -2)$  &  $(6, -2)$
- $(-6, 1)$  &  $(6, 1)$

**Question: 2.**

Each pair of points in Question 1 has a different abscissa (x coordinate) and a common ordinate (y coordinate). Based on your results, suggest a method of calculating the abscissa for the midpoint.

**Question: 3.**

Determine the coordinates of the midpoint for each of the following pairs of points:

- a) (2, 5) & (2, -3)
- b) (-3, 4) & (-3, -2)
- c) (-5, 6) & (-5, -4)
- d) (0, 5) & (0, -3)

**Question: 4.**

Each pair of points in Question 3 has a different ordinate and a common abscissa. Based on your results, suggest a method of calculating the ordinate for the midpoint.

**Question: 5.**

Determine the coordinates of the midpoint for each of the following pairs of points:

- a) (1, 4) & (7, 2)
- b) (-5, 4) & (7, 2)
- c) (-5, -4) & (3, 2)
- d) (-5, -5) & (1, 5)

**Question: 6.**

Does your calculation method from Questions 2 and 4 work for any pair of points?

**Question: 7.**

Point A is located at (-4, -6), the midpoint is at the origin. Determine the location of point B.

**Question: 8.**

Point A is located at (4, 4). The midpoint of point A and B is located on the y axis. Describe the location of point B.

**Question: 9.**

Point A is located at (3, -3). Point B is located on the line  $y = x$ . Describe the location of the midpoint.

**Question: 10.**

Point A is located at (4, 1). Point B is located on the line  $y = x + 1$ . Describe the location of the midpoint.

**Question: 11.**

Point A is located at (4, 1). Point B is located on the line  $y = 2x + 1$ . Describe the location of the midpoint.

**Extension:**

Point A is located at (6, 2). Point B is located on the line  $y = x^2$ . Describe the location of the midpoint.