

1.1 The Coordinate Plane

Find the point that is one-fourth of the **distance** from the point $P(-1,3)$ to the point $Q(7,5)$ along the segment PQ .

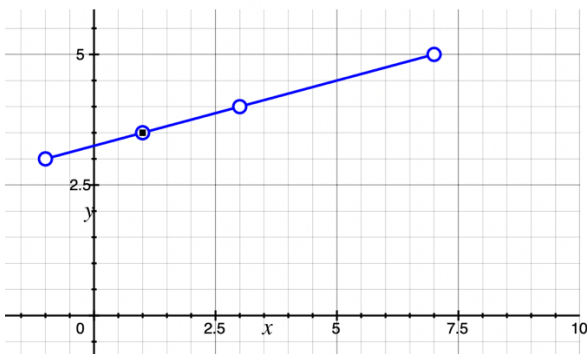
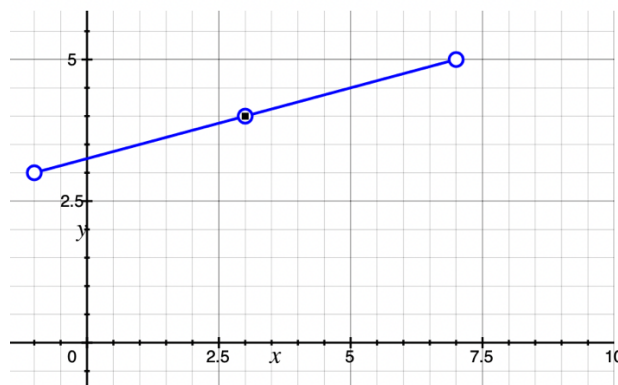
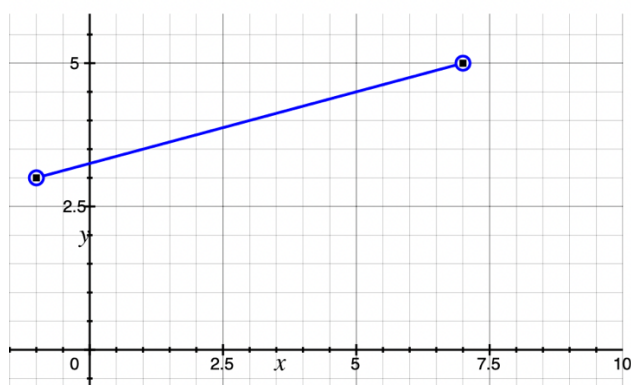
[1st – Formulae] **50% Credit**

We need to look for keywords that direct us to instructions. In this case, **distance** (or possibly midpoint) is the instruction. Find the distance formula.

From the textbook—verbatim:

The Distance Formula | Distance between points, $P(x_1, y_1)$, $Q(x_2, y_2)$

$$d(PQ) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



NOTE

However, this does look correct; it does not guarantee we are correct. We will use the back of the book to verify. This is just for practice on checking your work and getting used to using technology.

Strategize to find the point $\frac{1}{4}$ from $P \rightarrow Q$, we can use the midpoint formula twice. So, the distance formula *may not be correct* for this (there are always multiple ways to solve problems). We look to the midpoint formula instead.

The Midpoint Formula | Distance between points, $P(x_1, y_1)$, $Q(x_2, y_2)$ **50% of the Credit**

$$M(PQ) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

[2nd – Formulate] **Up to 50% credit**

Because we have an even segment cut twice, we apply the midpoint formula twice as follows.

$$M(PQ) = \left(\frac{-1 + 7}{2}, \frac{3 + 5}{2} \right) = (3, 4), \quad M(P, M_{PQ}) = \left(\frac{-1 + 3}{2}, \frac{3 + 4}{2} \right) = \left(1, \frac{7}{2} \right).$$

Check your work using a graphing utility. I use the built-in MacBook grapher.

[3rd – Finalize] **Point Loss**

Thus, the point $\frac{1}{4}$ distance from P is $\left(\frac{1, 7}{2} \right)$. [Book verifies this is correct.]