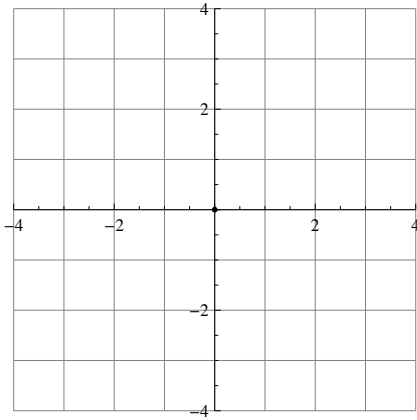

9.I Vectors in the Plane

Vectors in the Plane

1. Let $P = (1, 3)$ and $Q = (2, 1)$ be points in \mathbb{R}^2 .



- 1.1. Graph these points.
- 1.2. Graph the vector \overrightarrow{PQ} . What are the components?
- 1.3. Graph the equivalent vector with base at the origin.
- 1.4. Graph an equivalent vector that does not have its base at the origin.
- 1.5. Graph a parallel vector that is not equivalent.
- 1.6. Determine the length of the vector \overrightarrow{PQ} . Explain why this is the length.

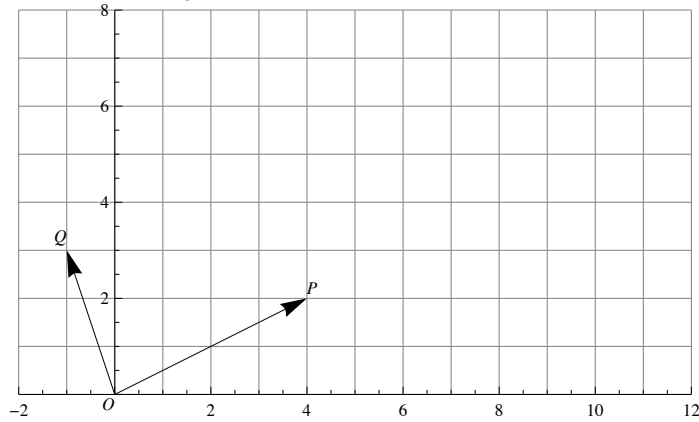
- 1.7. Draw the line that passes through the points P and Q .
- 1.8. Find a standard equation describing the line.

Because it is a line, the equation must be of the form $ax + by = c$.

- 1.9. Find a parametric equation describing the line.
$$\{(x, y) = (a, b) + t(c, d) : -\infty < t < \infty\}$$

- 1.10. Find a symbolic representation of the line segment between the points P and Q .

2. Consider the graphed vectors.



2.1. Find the components \mathbf{u} and \mathbf{v} of the vectors \overrightarrow{OP} and \overrightarrow{OQ} .

2.2. Determine $3\mathbf{u}$ and $\mathbf{u} + \mathbf{v}$ numerically and graphically.

2.3. Write $\mathbf{w} = \langle 2, 8 \rangle$ as a linear combination of \mathbf{u} and \mathbf{v} .