

UNIT 27 *Coordinates*

Introduction to SIM

Learning objectives

This is the first of four units based on analytic geometry, which brings algebra and geometry together. After completing this unit of STUDENT INSTRUCTIONAL MATERIAL (SIM) you should

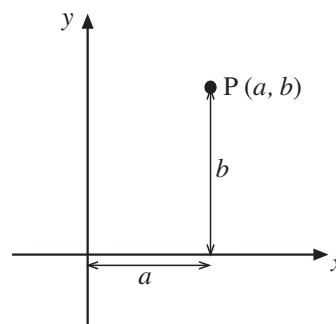
- be able to identify and illustrate points in two dimensions with positive coordinates
- be able to identify and illustrate points in two dimensions
- be confident in plotting straight lines
- be confident in plotting curves
- be able to identify and illustrate points in three dimensions
- be able to find the mid-point of a line segment.

Key points and principles

- Any point in 2 dimensions is uniquely defined by its coordinates (x, y)
- Any two distinct points are sufficient to define a straight line.
- Any point in 3 dimensions is uniquely defined by its coordinates (x, y, z) .

Facts to remember

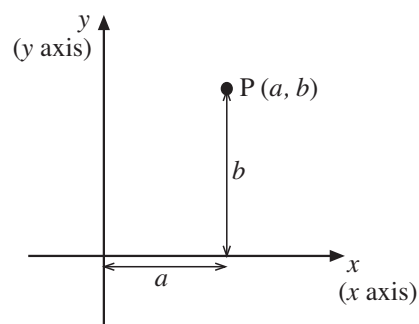
- The point with coordinates (a, b) means that $x = a$, $y = b$.
- The mid-point of the line segment joining the points (a, b) and (c, d) is given by $\left(\frac{a+c}{2}, \frac{b+d}{2}\right)$.



Glossary of terms

Coordinates (x, y) means that the point P with coordinates (a, b) is such that $x = a$, $y = b$.

Coordinate axes these are shown on the diagram opposite.

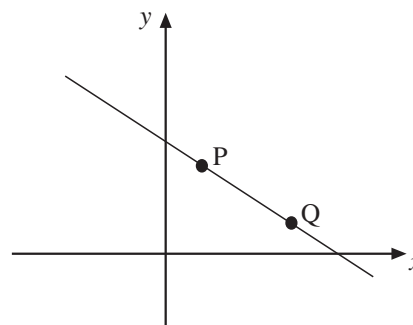


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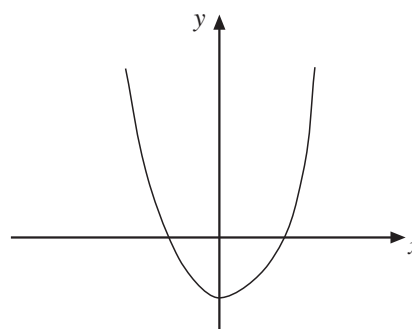
Introduction to SIM

Straight line

is defined by any two points on the line
P and Q in the diagram opposite.

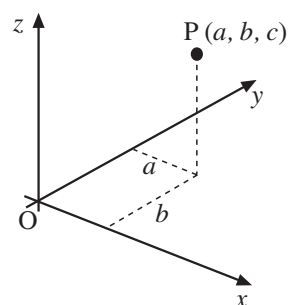
*Curves*

these are lines that are not straight
(see diagram opposite).



Three-dimensional coordinates mean that a point P (a, b, c)
is such that

$x = a, y = b, z = c$
(see diagram opposite).

*Line segment*

this is any part of a straight line between two points.

Mid-point of line segment This is the point X in the line segment PQ, such that

$$\text{length PX} = \text{length XQ}.$$

The coordinates of X are

$$\left(\frac{a + c}{2}, \frac{b + d}{2} \right)$$

