$x - y$ **plots**

In the health sciences, as in all the sciences, graphs are used to present information in a visual way. It is frequently necessary to extract and interpret information from graphs. On occasions you may be required to plot data that you have gathered on a graph of your own. Whilst there are computer packages available which will enable you to do this quite easily it will be very useful if you understand important features and conventions used when plotting graphs. This leaflet describes key features of graphs and important conventions used when plotting them.

Axes

The diagram shows two straight lines drawn at right-angles to each other. These lines are called **axes**, and so we have a **horizontal axis** and a **vertical axis**. Note the following important points.

- The horizontal axis is often referred to as the x-axis.
- The vertical axis is often referred to as the y-axis.
- The point where the two axes cross is called the **origin**.
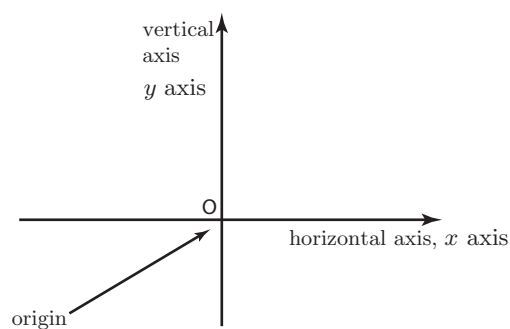
Scales on the axes

Upon each axis we now draw a **scale** which resembles the markings on a ruler. On the x-axis, to the right of the origin the numbers on the scale are positive; they increase in a uniform way as we move further to the right. To the left of the origin the numbers are negative; they decrease further below zero as we move further to the left.

As we move upwards from the origin on the y axis the numbers are positive and they increase; as we move down below the origin they decrease further below zero.
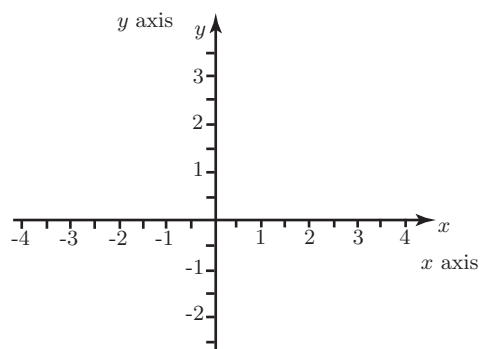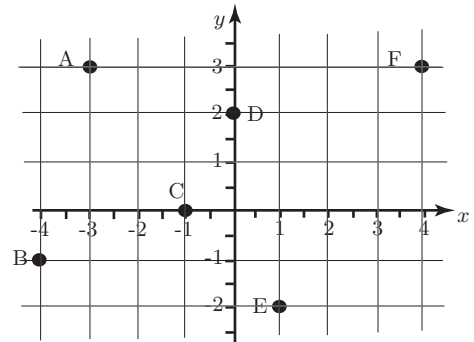
Coordinates

From any point we choose we can draw a vertical line to meet the x-axis and a horizontal line to meet the y-axis. We have picked a point: the dotted vertical line meets the x axis at the point labelled 3. The dotted horizontal line meets the vertical axis at the point labelled 2. We say that the point P has an x coordinate of 3 and a y coordinate of 2. We write these coordinates briefly as $(3, 2)$. The first number in the brackets is always the x coordinate; the second number is always the y coordinate. These coordinates can be positive, negative or zero.
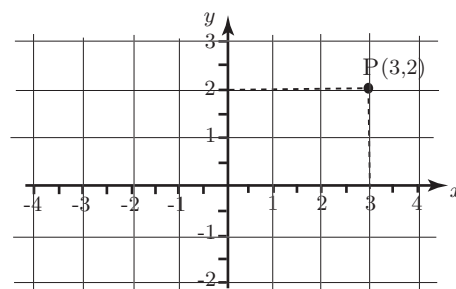
Example

Study the diagram and verify the coordinates of each of the points: $A(-3,3)$, $B(-4,-1)$, $C(-1,0)$, $D(0,2)$, $E(1,-2)$, $F(4,3)$.

Note that the origin has coordinates $(0,0)$. Note also that any point on the x axis, e.g. point C, has a y coordinate equal to 0. Any point on the y axis, e.g. point D, has an x coordinate equal to zero.

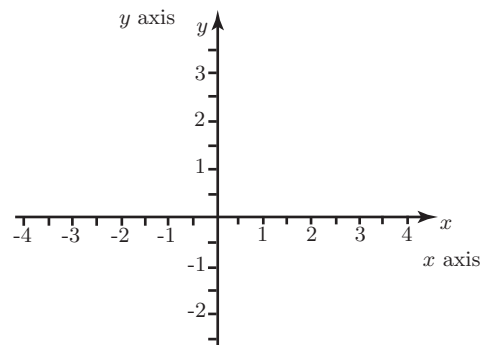If we are given the coordinates of a point, we can locate its position uniquely.

Exercise

On the given axes, plot the points with the given coordinates:

P has coordinates $(2,3)$.

Q has coordinates $(-1,1)$.

R has coordinates $(0,-2)$.

Check your answer with the diagram given at the foot of the page.

Where do coordinate pairs (x, y) come from ?

Each pair of coordinates (x,y) will arise from sets of data, or from a *mathematical function* which can be thought of as a formula relating the y value to the x value. Data pairs can arise, for example, by measuring the heights and weight of several people. This data can then be represented pictorially by plotting the data points with height on one axis, and weight on the other. Further information about obtaining coordinate pairs from a mathematical function can be found on leaflets *Linear functions* and *The equation and graph of a straight line*.

Solution to the Exercise

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