

Coordinates - Activity 1

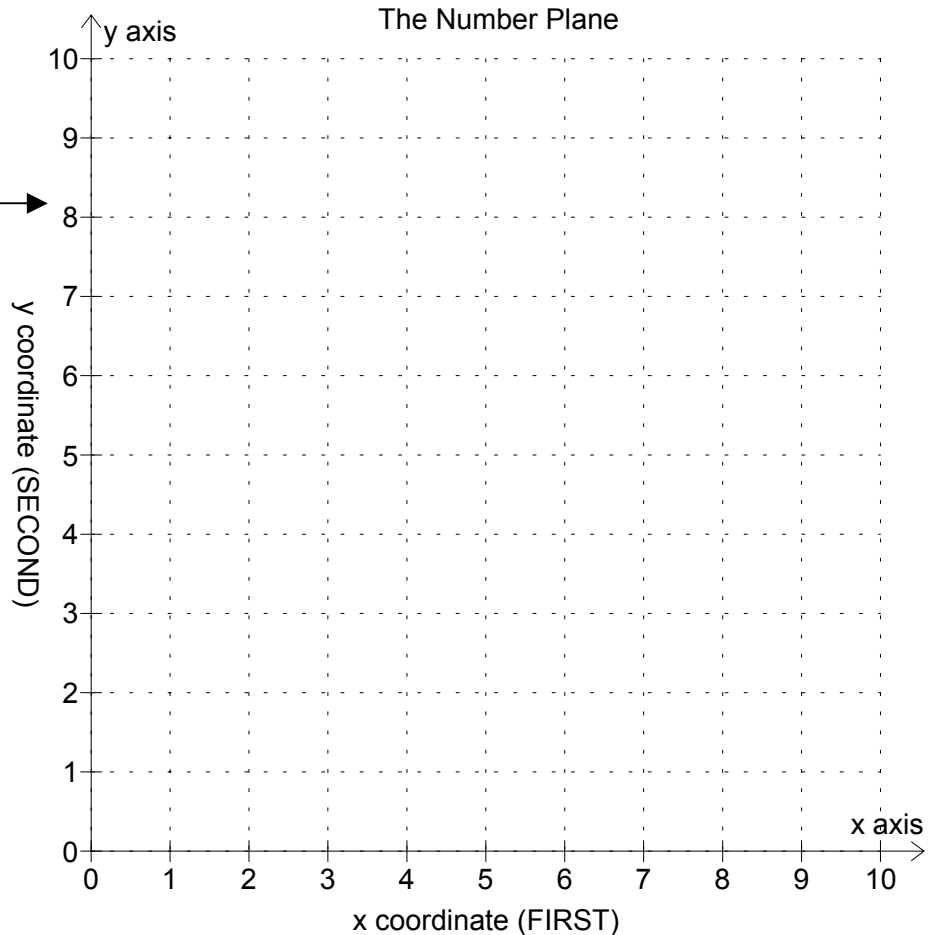
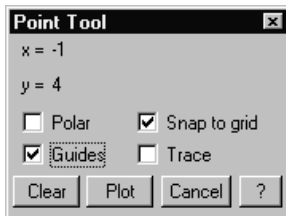
Plotting whole number ordered pairs.

1) Start Maths Helper Plus and open the 'Ordered Pairs 1' document. (Use the 'Open' command in the 'File' menu.) The graph view will then display a number plane like this: →

Two whole number coordinates can locate any point on this number plane where the dotted lines cross each other. An ordered pair of numbers, written like this: $(2, 8)$ locates a point on the number plane. The LEFT HAND number is located on the horizontal 'x' axis, while the RIGHT HAND number is located on the vertical 'y' axis.

2) Draw a dot on the graph (on this sheet) at the point $(2,8)$

3) Activate the 'point tool' in Maths Helper Plus by selecting the 'Point' command from the 'Tools' menu. The point tool dialog will be displayed: →



On the point tool dialog box, make sure both the 'Snap to grid' and 'Guides' check boxes are selected, but not others. You can move the point tool dialog to a new position if necessary. To move the dialog, point the mouse cursor to the words 'Point Tool' at the top of the dialog box, then drag with the mouse.

4) Move the mouse cursor over the graph area. The two intersecting lines will locate the coordinates of a point on the number plane. The point is always where the two lines meet. As you move the mouse, this point will change and its 'x' and 'y' coordinates will be displayed on the point tool dialog box.

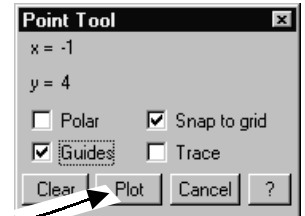
5) Move the point tool cursor to locate the point $(2,8)$ that you marked on the diagram in question 2. The point tool dialog box should display: $x = 2$ and $y = 8$. If you plotted the point incorrectly on the diagram, fix your mistake now.

6) The 'origin' is the point where the 'x' axis crosses the 'y' axis. What are the coordinates of the origin? Use the point tool to check. _____

7) Move the point tool to several points along the 'x' axis. What is the 'y' value of any point on the 'x' axis? _____

8) Use the point tool to plot five points on the 'x' axis.

To do this, move the intersecting lines to where you want to plot a point, then click the left mouse button. This only stores the point and marks the spot where a point will be plotted. If you make a mistake, click the 'clear' button on the point tool dialog box to start again. When you have marked five points on the 'x' axis, click the 'Plot' button to plot them.



The coordinates of the points you plotted appear on the Maths Helper Plus text view. Write them in the space below:

9) Use the point tool to investigate points along the 'y' axis. Plot five points on the 'y' axis and write their coordinates in the space below:

10) Draw 10 points with whole number coordinates on the graph on the other side of this sheet. On the same graph, write the coordinates beside each point.

Use the point tool to locate and mark each of your points on the Maths Helper Plus graph grid. Click the Plot button on the point tool dialog to plot the points on the graph. Cancel the point tool by pressing the Esc key on your keyboard.

Carefully point the mouse cursor to the middle of one of these 10 points. Double click the left button to display the points option dialog. Click to select the 'display' option under 'Point Labels'. Click OK.

Compare the coordinates you wrote near your points on this sheet with the Maths Helper Plus graph. Correct your mistakes.

Extension Activity:

11) In the space below, write the coordinates of all points that will fit on the graph on this sheet where the sum of the 'x' and 'y' coordinates is 9.

Mark and plot these points using the point tool. What do you notice?

[You can change the colour and shape of the markers used by Maths Helper Plus to plot points. This is useful where there are many sets of points plotted. To do this, first cancel the point tool by pressing the Esc key. Now double click the mouse in the exact centre of a plotted point, then use the 'Colour' and 'Marker style' options to make the changes.]

12) Use the point tool to mark and plot the points where the 'x' and 'y' coordinates are the same number. For example (1,1) and (5,5).

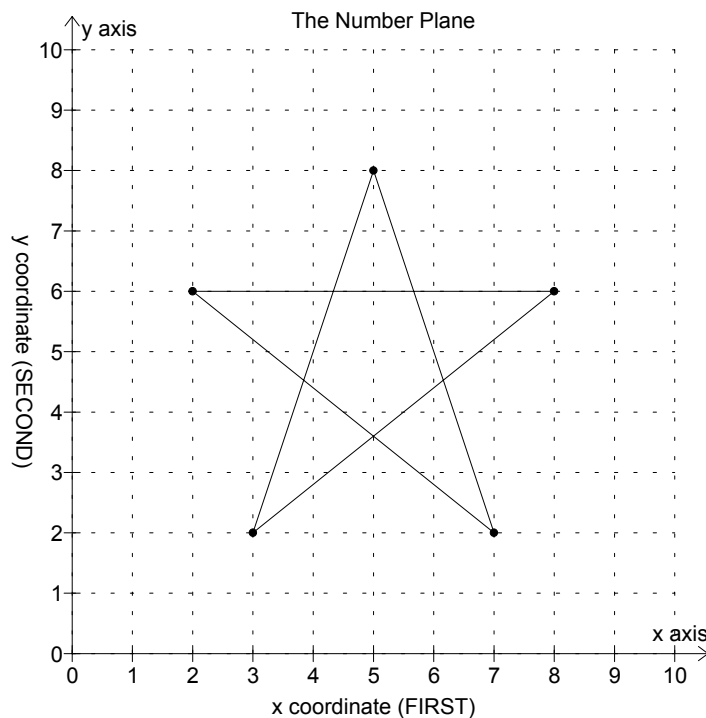
What do you notice?

13) Can you explain the patterns you observed in questions 11 and 12 above?

Coordinates - Activity 2

Ordered pairs that define 2d shapes.

1) Find the coordinates of the points of the star in the diagram below. Write these coordinates as ordered pairs in the space provided. Start at any point and write them in order so as to trace out the star shape without lifting the pen:

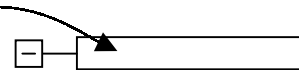


Do NOT use
the point tool
for this activity !

2) Start Maths Helper Plus and load the 'Ordered Pairs 1' document.

3) Type the points you found above into Maths Helper Plus.

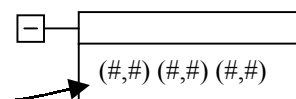
- Click the mouse pointer on the input box.
- Type your points with round brackets, like this: (2,7) (4,8)
- Click outside the input box to plot the points.



4) Join the points with lines. To do this, double click on one of the plotted points, then check these boxes for the 'Joining Lines' options: 'display', and 'join first to last'.

5) Correct your work. If your plotted shape is wrong then you need to change some of the plotted points. To edit the points you typed in step 3:

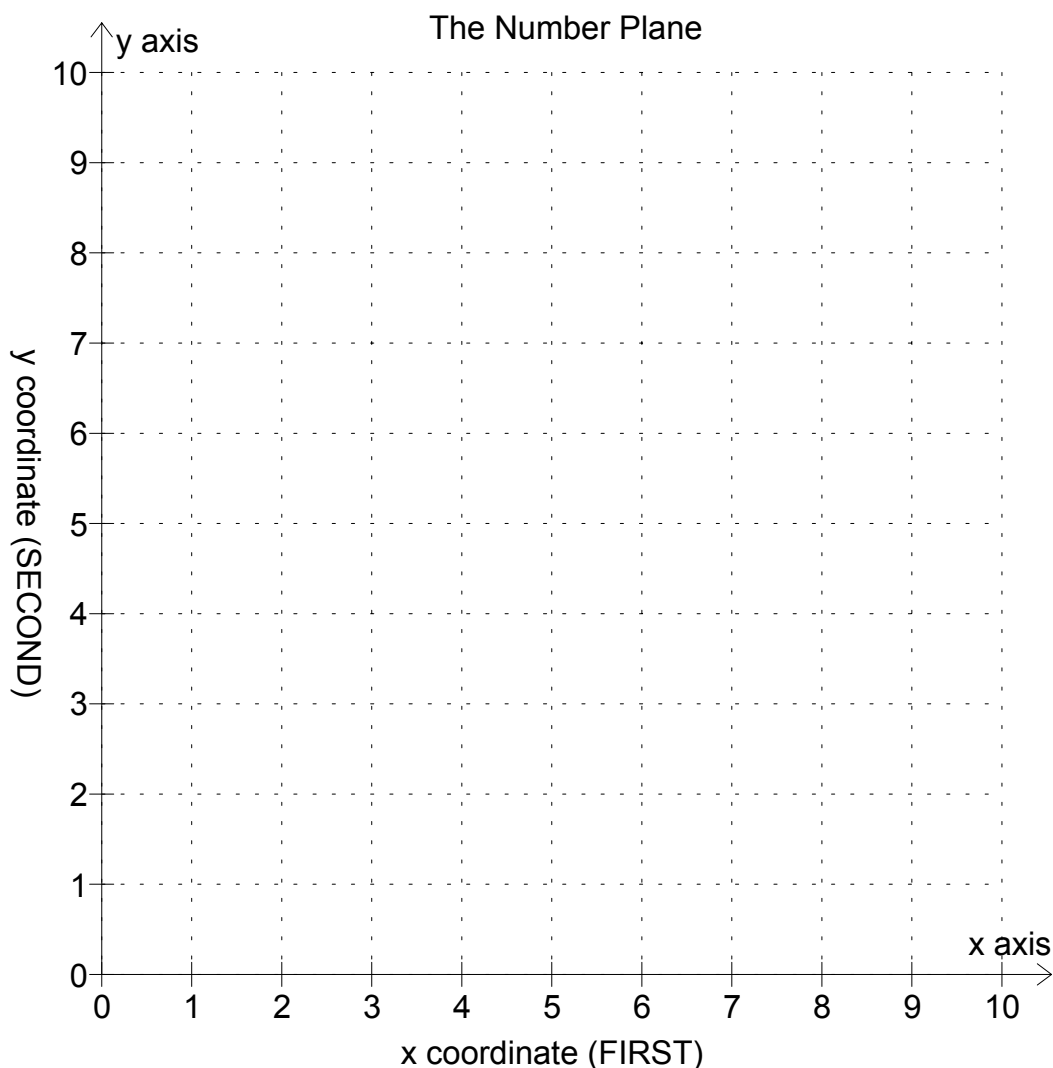
- Click on the data box containing the points,
- Make your changes, then
- Click outside of the data box.



Extension Activity:

1) Make up your own drawing or pattern on the graph grid below. Use only straight lines ruled between points with whole number coordinates.

[If your drawing requires you to lift the pen from the paper, then you will have to plot more than one set of points.]



2) Write the coordinates of your points in this box:

3) Plot the points with Maths Helper Plus, display the lines joining the points and correct your work as described above.

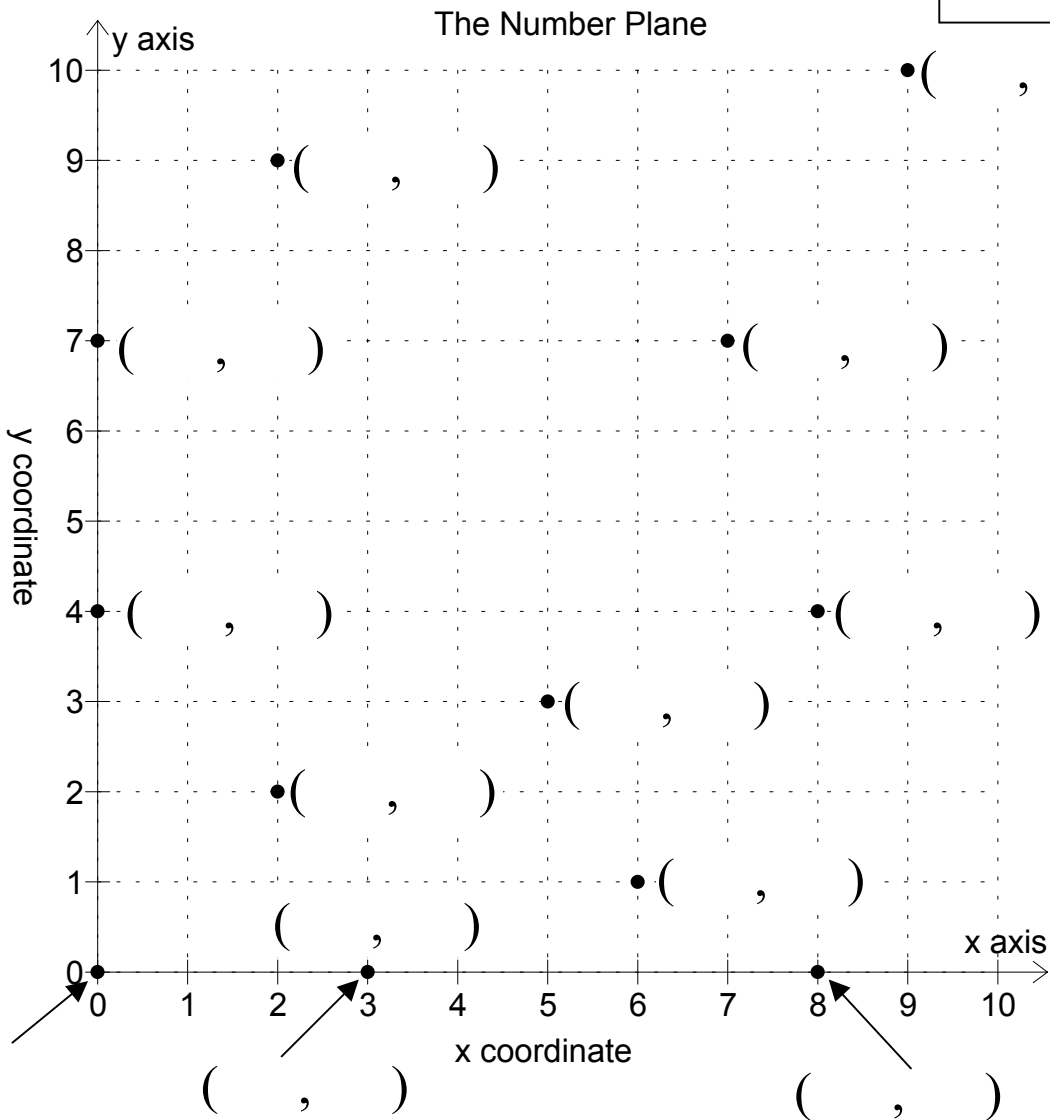
[You can delete the previous star pattern first if you like. To do this, first click beside the data box for the star points to select it. Now hold down Ctrl while you press the Delete key.]

Coordinates - Activity 3

Reading whole numbered ordered pairs from a graph.

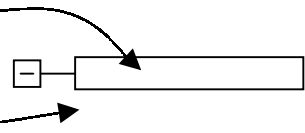
- 1) Find the coordinates of each of the plotted points on the grid below. Write the coordinates on the graph diagram near each point:

Do NOT use the point tool for this activity !



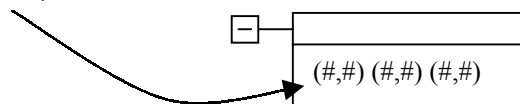
- 2) Start Maths Helper Plus and load the 'Ordered Pairs 2' document.
- 3) Type the coordinates of the points above into Maths Helper Plus, like this:

- Click the mouse pointer on the input box.
- Type your points with round brackets, like this: (2,7) (4,8)
- Click outside the input box to plot the points.



- 4) Correct your work. Correct answers will lie inside the blue circles. If you need to change some of the plotted points:

- Click on the data box containing the points,
- Make your changes, then
- Click outside of the data box.



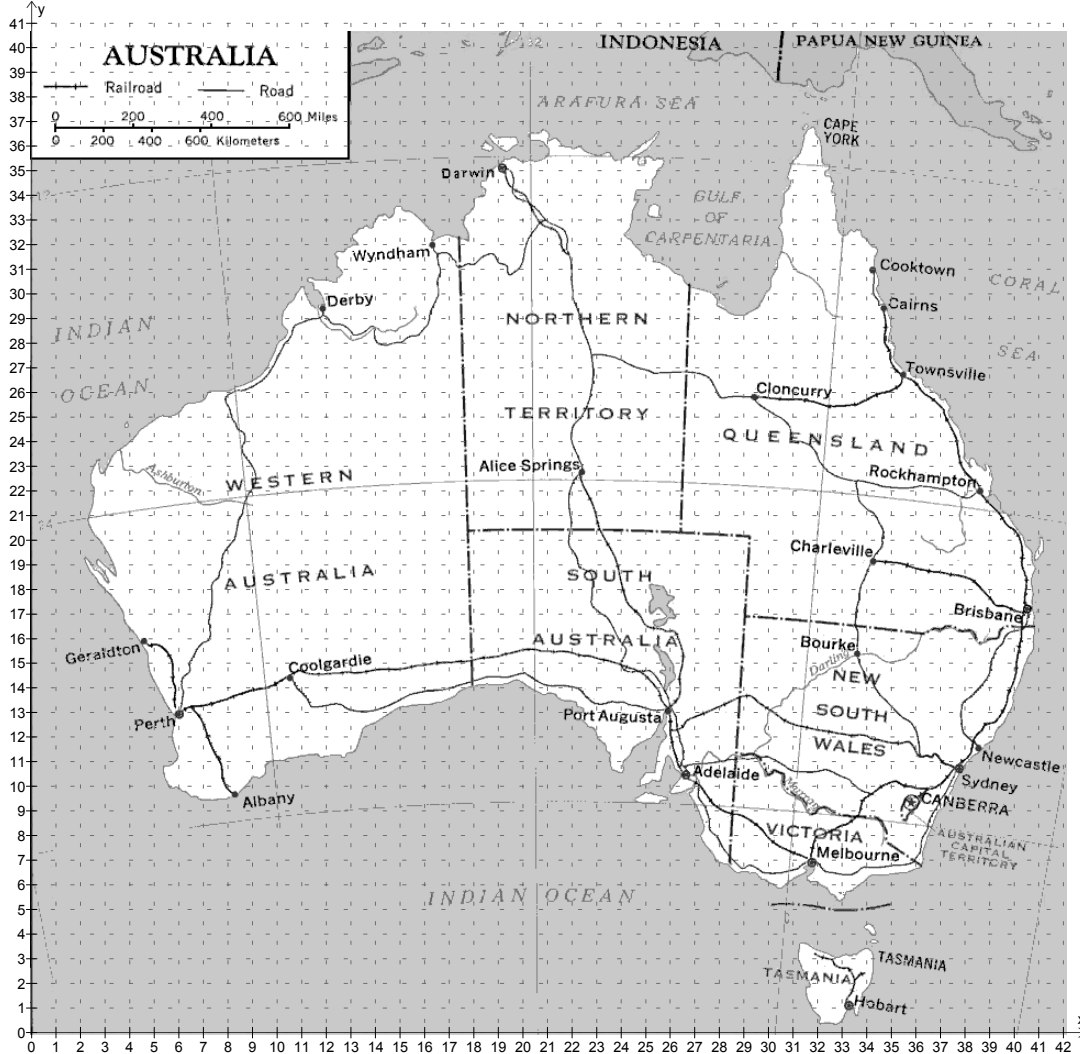
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Coordinates - Activity 4

Locating landmarks on a map with whole number ordered pairs.

Do NOT use the point tool for this activity !

1) Start Maths Helper Plus and load the 'Ordered Pairs 3' document. The graph view will display this map of Australia. Hold down 'Ctrl' and press 'G' to see all of the graph view.



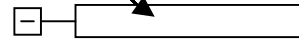
2) For each of the locations in the list below,

- Find the location on the map on your screen. Use the 'scroll bars' on the edge of the screen to view parts that are hidden.
- Determine the whole number coordinates of the nearest grid reference to this location. If there is doubt, then guess!
- Write your answers below in the spaces provided.

Town	Coordinates	Town	Coordinates
Cooktown		Charleville	
Bourke		Alice Springs	
Darwin		Adelaide	
Sydney		Coolgardie	
Perth		Geraldton	
Derby		Wyndham	

3) Type these points into Maths Helper Plus.

- Hold down 'Ctrl' and press the 'B' key to view both the text and graph views at once.
- Click the mouse pointer on the input box.
- Type your points, like this: (2,3) (4,7) etc.
- Click outside the input box to plot the points.

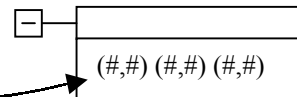


4) Change the style of the plotted points to open blue circles. To do this:

- Double click on the exact centre of one of your plotted points.
- Click the 'Colour...' button for 'Markers' and select dark blue.
- Click on the 'Marker Style' list box and select open circles.
- Click the OK button.

5) Correct your work. If any of your plotted points are wrong, then:

- Click on the data box containing the points,
- Make your changes, then
- Click outside of the data box.



Extension - Measurements from the map.

6) Look at the map scale at the top left corner.

How many kilometres is it from one grid line to the next?

7) How far north is Darwin from Hobart? _____ km

8) How far is Perth west of Cairns? _____ km

9) What assumption have we made in this exercise?

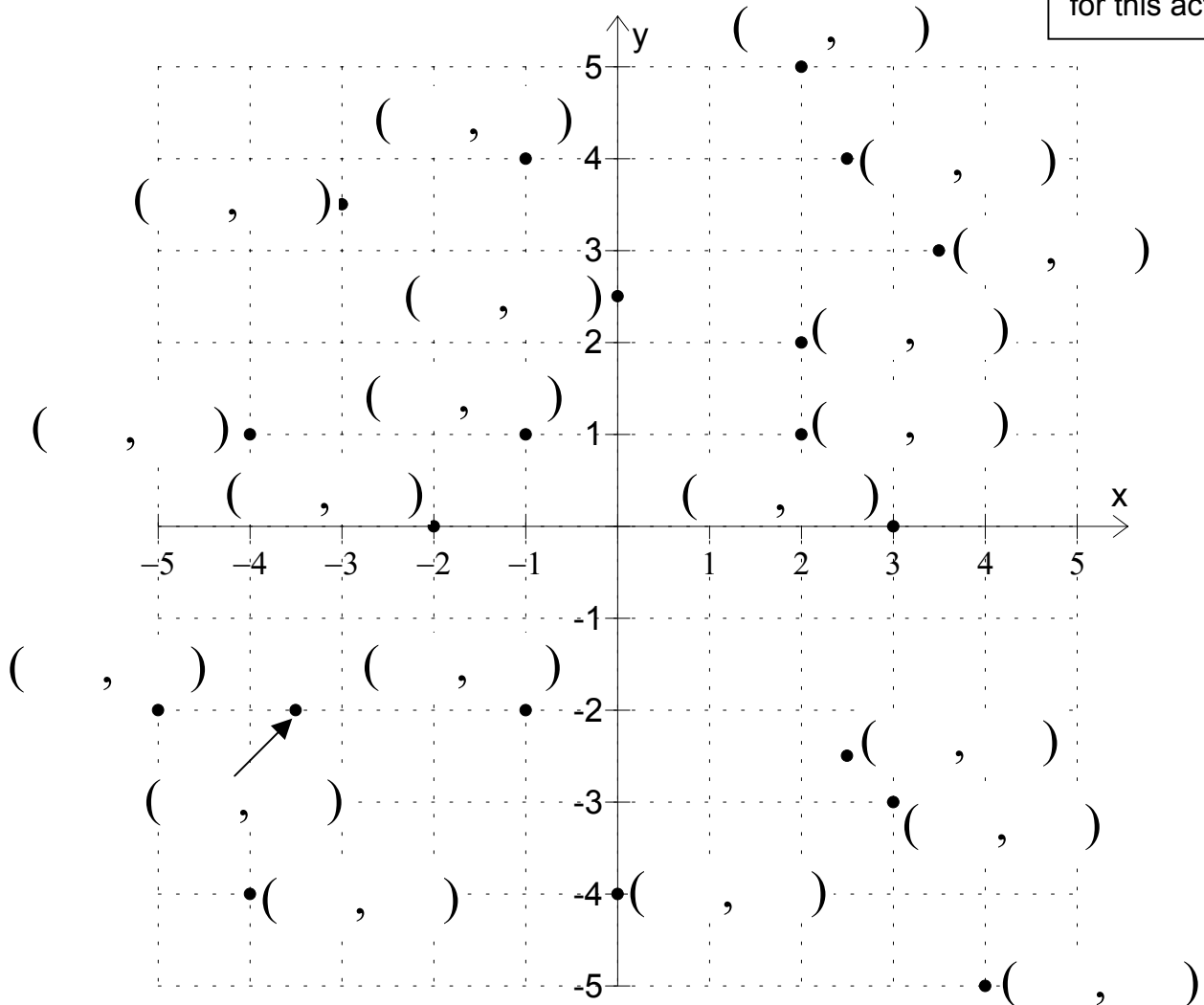
10) How many kilometres is it in a straight line from Adelaide to Cairns ? (Show working.)

Coordinates - Activity 5

Reading ordered pairs in four quadrants, including fractional coordinates.

- 1) Find the coordinates of each of the plotted points on the grid below.
Write the coordinates on the graph diagram near each point:

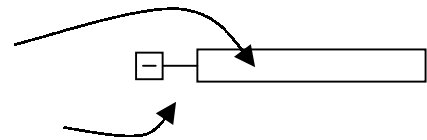
Do NOT use the point tool for this activity !



- 2) Start Maths Helper Plus and load the 'Ordered Pairs 4' document.

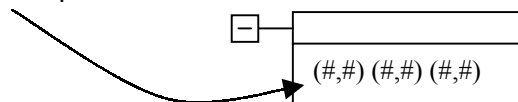
- 3) Type the points you found above into Maths Helper Plus.

- Click the mouse pointer on the input box.
- Type your points like this: (2,3) (4,5) etc.
- Click outside the input box to plot the points.



- 4) Correct your work. Correct answers will lie inside the blue circles. If you need to change some of the plotted points:

- Click on the data box containing the points,
- Make your changes, then
- Click outside of the data box.



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Coordinates - Activity 6

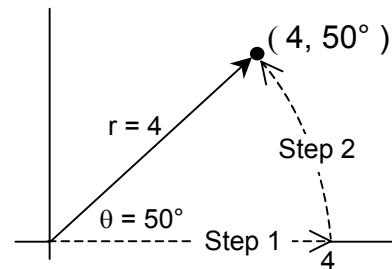
Plotting polar coordinates.

Polar coordinates locate a point on a plane with one distance and one angle. The distance 'r' is measured from the origin. The angle, 'θ' (Greek letter 'theta') is measured from some agreed starting point.

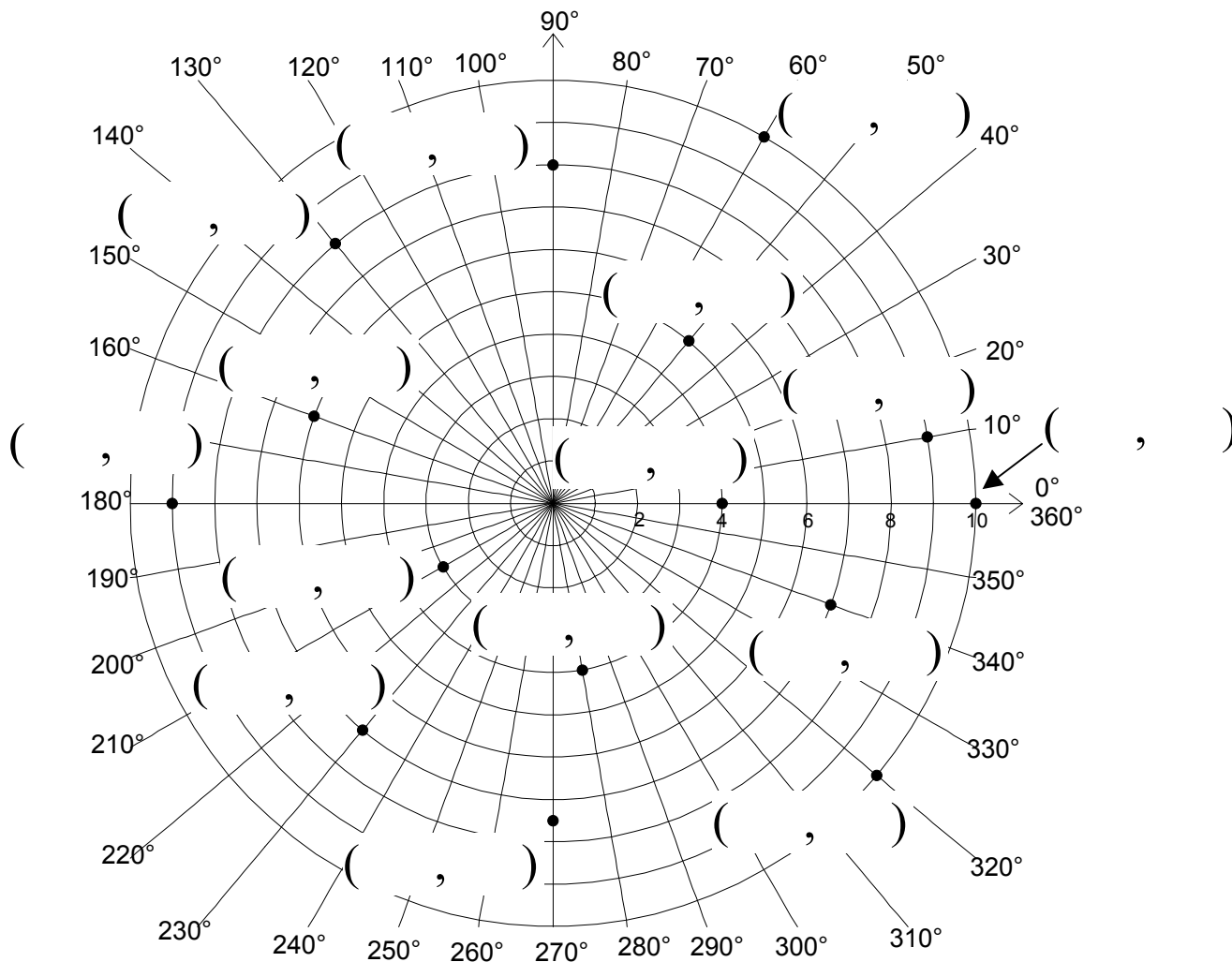
We will use the positive 'x' direction as the starting point for measuring angles. Positive angles will be anticlockwise from the positive 'x' direction.

This diagram shows how the polar point (4, 50°) is located:

1. Measure the distance to a point 4 units from the origin along the 'x' axis.
2. Rotate the point anticlockwise about the origin through angle 50°.



1) Find the polar coordinates of each of the points plotted on the graph below. Write the coordinates on the graph diagram near each point as: (r, θ):



Use Maths Helper Plus to correct your work:

Do NOT use
the point tool
for this activity !

2) Start Maths Helper Plus and load the 'Ordered Pairs 5.mhp' document.

3) Type the points you found above into Maths Helper Plus.

- Click the mouse pointer on the input box.
- Type your polar points with square brackets, like this:
[4,50deg] meaning a polar point with 'r' = 4 and $\theta = 50^\circ$.
OR you can type '50°' instead of 50deg, by clicking the ° symbol on the shortcut box.
- Click outside the input box to plot the points.



4) Correct your work. Correct answers will lie inside the blue circles. If you need to change some of the plotted points:

- Click on the data box containing the points,
- Make your changes, then
- Click outside of the data box.

