



Determining rules

Year 11
Mathematical Methods

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Learning Objectives

By the end of the lesson, I hope that you understand and can apply the following to a range of questions from the Year 11 Mathematical Methods course.

- Be able to determine rule of graphs from information given in a question



RECAP

This is a chance to demonstrate what we have learned over the past few lessons. We have learned about a number of graphs which we can expect to see over the forthcoming chapters. To be able to determine a rule we need to be given the following:

- An indication of the format of the graph
- One or more points which lie on the curve

A key thing to remember is that a coordinate is nothing more than an x and y value. These will generally be substituted into an equation.

When given an equation with two unknown pronumerals we will be expected to use simultaneous equations.

Note: This is a CAS course. As such you need to know how to solve equations and simultaneous equations by hand AND using the CAS



Example 1

The best way to demonstrate is to do a number of examples.

- a** The rectangular hyperbola $y = \frac{a}{x} + 8$ passes through the point $(-2, 6)$. Find the value of a .
- b** The rectangular hyperbola $y = \frac{a}{x} + k$ passes through the points $(2, 7)$ and $(-1, 1)$. Find the values of a and k .

$$y = \frac{a}{x} + 8$$

$$6 = \frac{a}{-2} + 8$$

$$-2 = \frac{a}{-2}$$

$$a = \underline{\underline{4}}$$



Example 2

- a** The rectangular hyperbola $y = \frac{a}{x} + 8$ passes through the point $(-2, 6)$. Find the value of a .
- b** The rectangular hyperbola $y = \frac{a}{x} + k$ passes through the points $(2, 7)$ and $(-1, 1)$. Find the values of a and k .

$$y = \frac{a}{x} + k$$

$$1 = \frac{a}{1} + k$$

$$7 = \frac{a}{2} + k$$

$$1 = \frac{a + k}{1}$$

$$14 = a + 2k$$

$$a = 1 - k$$

$$\therefore 14 = 1 - k + 2k \quad a = -12$$

$$14 = 1 + k$$

$$k = 13$$



Example 3

A graph which has rule $y = a\sqrt{x-h}$ passes through the points (4, 2) and (7, 4). Find the values of a and h .

$$2 = a\sqrt{4-h}$$

$$4 = a\sqrt{7-h}$$

$$\therefore a = \underline{\underline{2}} \quad h = \underline{\underline{3}}$$



Example 4

Find the equation of the circle whose centre is at the point $(1, -1)$ and which passes through the point $(4, 3)$.

$$(x - 1)^2 + (y + 1)^2 = r^2$$

$$(4 - 1)^2 + (3 + 1)^2 = r^2$$

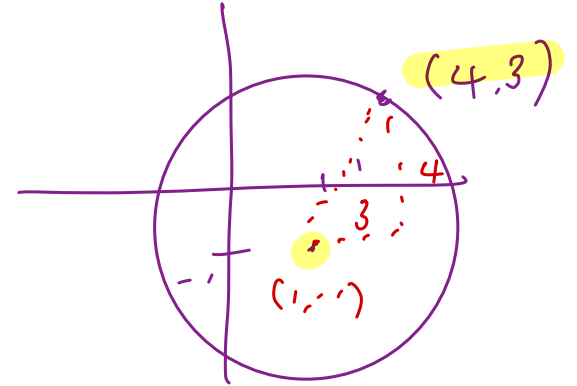
$$3^2 + 4^2 = r^2$$

$$9 + 16 = r^2$$

$$25 = r^2$$

$$r = \pm 5$$

$$\therefore r = 5 \text{ as } \underline{\underline{r > 0}}$$



$$\therefore \underline{\underline{(x - 1)^2 + (y + 1)^2 = 25}}$$



Learning Objectives: Reviewed

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