

## NICKS & TRICKS

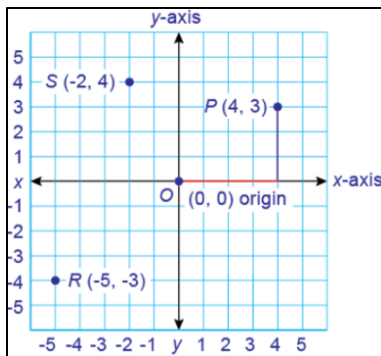
### LCHL Guide to – The Line

#### 1. What is 'i'? – An imaginary number

It means the square root of a negative value (usually -1). This number is impossible to find the value of, so we call it an imaginary number, or, 'i'.

$$\sqrt{-1} = i$$

#### 2. What is Co-Ordinate Geometry?



It's all about dots and lines on graphs like this!

#### 3. The equation of a line

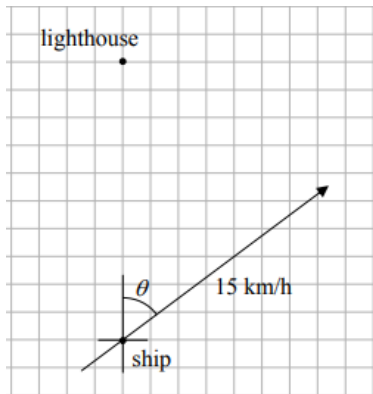
If we have the equation of a line in the form:  $ax + by + c = 0$  we can do a few things with it.....

- We can find where it crosses the **x-axis** by letting  $y = 0$
- We can find where it crosses the **y-axis** by letting  $x = 0$
- We can find the slope  $m$  by letting  $m = -\frac{a}{b}$
- We can find out whether a point  $(x_1, y_1)$  is on the line by subbing in  $x_1$  and  $y_1$  into the equation of the line

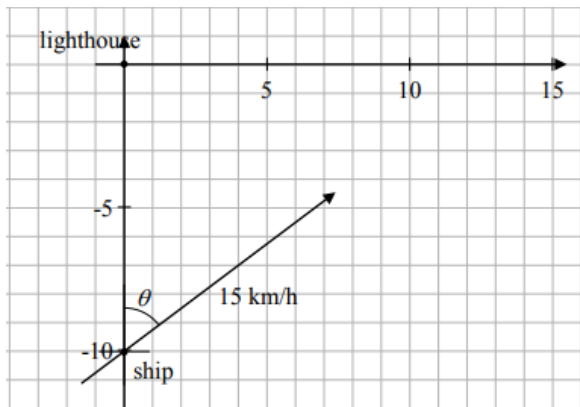
# Worked Example

A ship is 10 km due South of a lighthouse at noon.

The ship is travelling at 15 km/h on a bearing of  $\theta$ , as shown below, where  $\theta = \tan^{-1}\left(\frac{4}{3}\right)$ .



- (a) On the diagram above, draw a set of co-ordinate axes that takes the lighthouse as the origin, the line East-West through the lighthouse as the  $x$ -axis, and kilometres as units.



- (b) Find the equation of the line along which the ship is moving.

$$\tan \theta = \frac{4}{3}$$

Or  $y = mx + c$

$$\therefore m = \frac{3}{4}$$

$$y = \frac{3}{4}x - 10$$

$$y + 10 = \frac{3}{4}(x - 0)$$

$$4y + 40 = 3x$$

$$3x - 4y - 40 = 0$$

# Continuing from above – Time yourself!

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## Question 1

- (c) Find the shortest distance between the ship and the lighthouse during the journey.

## Question 1

- (d) At what time is the ship closest to the lighthouse?