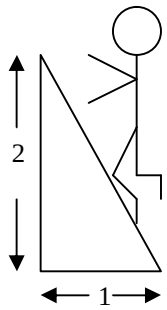
MATHEMATICS

SUPPORT CENTRE

Title: Gradient

Target: On completion of this worksheet you should be able to find the gradient of a straight-line graph.

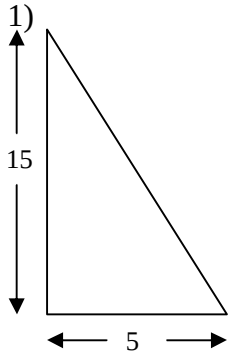
The **gradient** of something describes how steep it is. If a hill has gradient 2 it means that we travel 2 metres vertically for each metre travelled horizontally.



We can find the gradient of a slope by working out how much it goes up for each unit across.

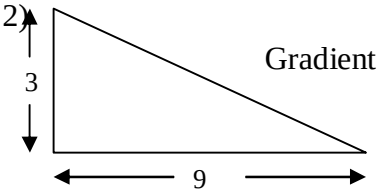
Examples.

1)



$$\text{Gradient} = \frac{15}{5} = 3.$$

2)



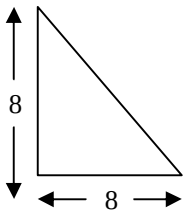
$$\text{Gradient} = \frac{3}{9} = \frac{1}{3}.$$

In general we divide the vertical distance by the horizontal distance.

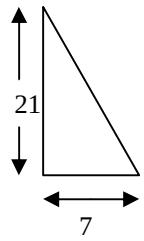
Exercise.

Find the gradients of the following slopes:

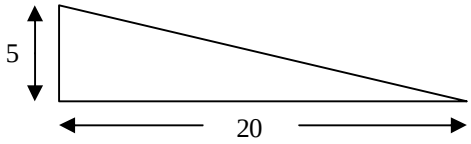
1)



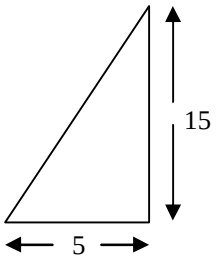
2)



3)



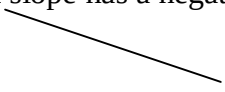
4)



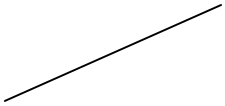
(Answers: 1; 3; ¼; 3).

When we find the gradients of lines we consider the direction of the line.

A downhill slope has a negative gradient.



An uphill slope has a positive gradient.

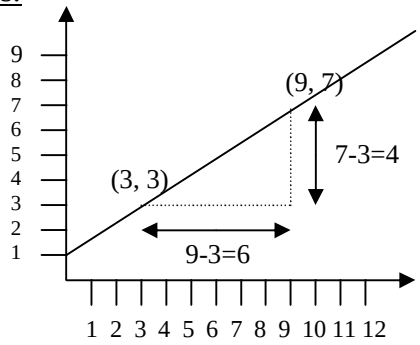


To find the gradient we should:

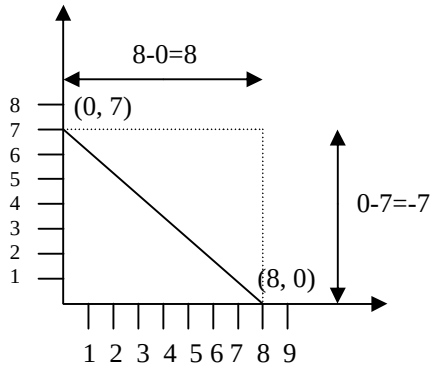
- Choose two points on the line.
- Form a triangle.
- Find the change in the y-coordinates.
- Find the change in the x coordinates.
- Evaluate

Gradient = Change in the *y*-coordinates / Change in the *x*-coordinates

Examples.



Gradient = 4/6.



Gradient = -7/8.

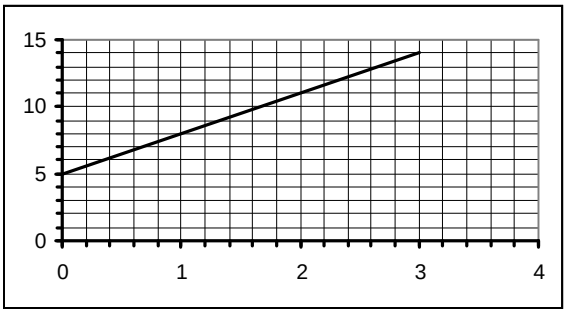
Remark.

Notice that it is important to start with the same point when we work out the change in the *x*-coordinates and the *y*- coordinates. It is often helpful to circle the point we choose to start with to remind ourselves.

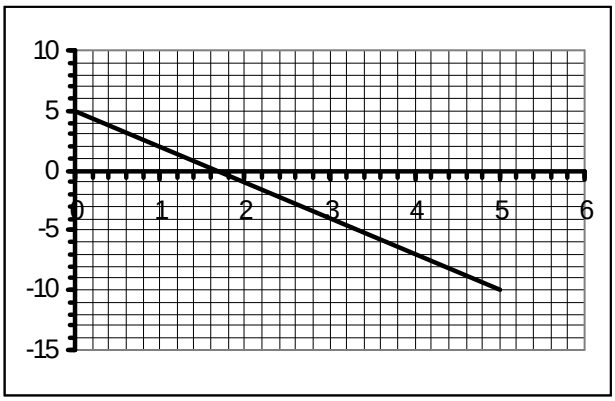
Exercise.

Find the gradients of the following lines.

1)



2)



(Answers: 3; -3.)

If we know two points that the graph goes through we do not need to draw the graph.

Example.

Find the gradient of the line which passes through (2, 8) and (4, 12)

Choose which point to start with. We'll pick (4,12).

Gradient = $\frac{12-8}{4-2} = 2$.

Exercise.

Find the gradients of the lines passing through the points:

1) (3, 6) and (6, 8).
2) (10, 5) and (4, 15)

(Answers: 2/3; -5/3.)