Lesson 5

GCSE Mathematics
Kinematics

5.1 Change, Δ

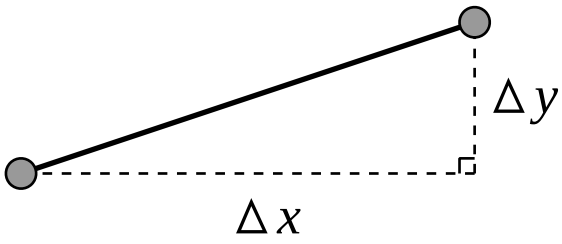
In mathematics the Greek upper case letter delta, Δ, is used to mean *change.*

Example

A car increases its speed, S, from 3 ms^{-1} to 11 ms^{-1}

What is ΔS ?

5.2 Definition of Gradient



For the solid line shown,

$$m = \frac{\Delta y}{\Delta x}$$

where;

m is the gradient

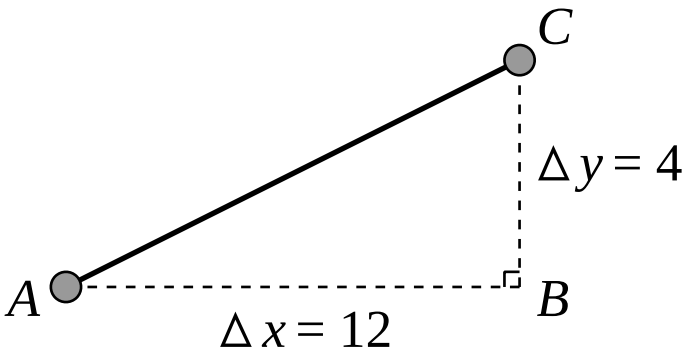
Δy is the change in y

Δx is the change in x

Example

Consider the triangle ABC.

What is the gradient of the line between the points A and C ?



5.3 Exercise

Question 1
A train increases its speed, S, from 7 ms^{-1} to 31 ms^{-1}
What is ΔS ?

Question 2
A man's weight, W, increases from 67.8 kg to 71.7 kg
What is ΔW ?

Question 3
A DJ on Radio 1 gives a time check: 6. 08 am
A little later, the DJ gives another time check: 6.33 am
What is the change in time, ΔT, between the two time checks ?

Question 4
A jogger's speed, S, decreases from 8.3 ms^{-1} to 3.1 ms^{-1}
What is ΔS ?
(Your answer should have a minus sign in it !)

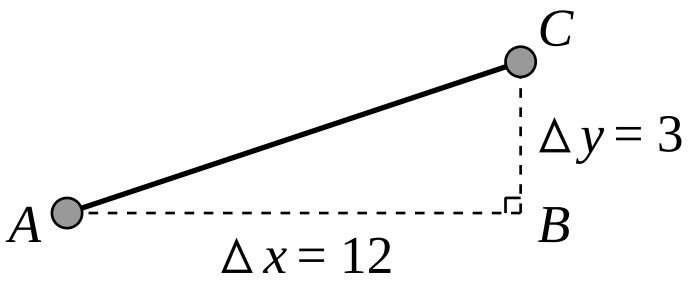
Question 5
A sunflower's height, H, changes by 45 cm.
i.e. $\Delta H = 45$ cm
It used to be 57 cm high.
How high is it now ?

Question 6
In a triangle, Δy is 39 cm, and Δx is 13 cm.
Use the appropriate formula to calculate the gradient associated with the triangle.

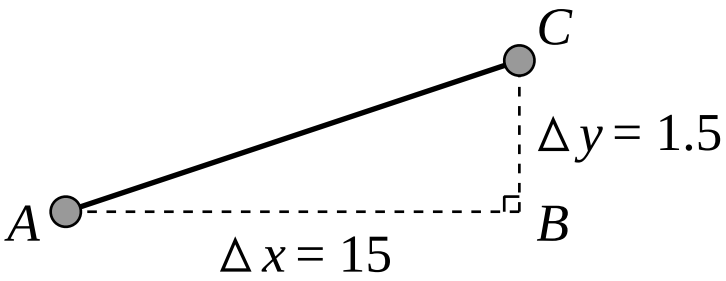
Question 7

Determine the gradient associated with the line *AC* on each of the following triangles;

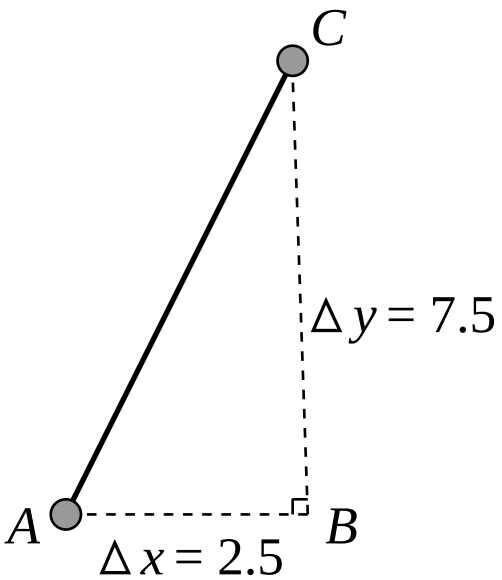
(i)



(ii)



(iii)



Question 8

(i) I move from a point with x coordinate 3 to a point with x coordinate 11. What is Δx ?

(ii) I move from a point with y coordinate 8 to a point with y coordinate 32. What is Δy ?

(iii) Use your part **(i)** and part **(ii)** answers to help calculate the gradient between the points with coordinates (3, 8) and (11, 32).

Question 9

(i) I move from a point with x coordinate 4 to a point with x coordinate 7. What is Δx ?

(ii) Use your part **(i)** answer to help calculate the gradient between the points with coordinates (4, 10) and (7, 25).

Question 10

(i) I move from a point with y coordinate 6 to a point with y coordinate 42. What is Δy ?

(ii) Use your part **(i)** answer to help calculate the gradient between the points with coordinates (1, 6) and (10, 42).

Question 11
Calculate the gradient between the points $(4, 12)$ and $(11, 26)$.

Question 12
Calculate the gradient between the points $(-2, 1)$ and $(3, 21)$.

Question 13
Calculate the gradient between the points $(-4, 4)$ and $(2, 7)$.

Question 14
Calculate the gradient between the points $(8, -4)$ and $(10, 6)$.

Question 15
Calculate the gradient between the points $(-8, -4)$ and $(-2, 2)$.