

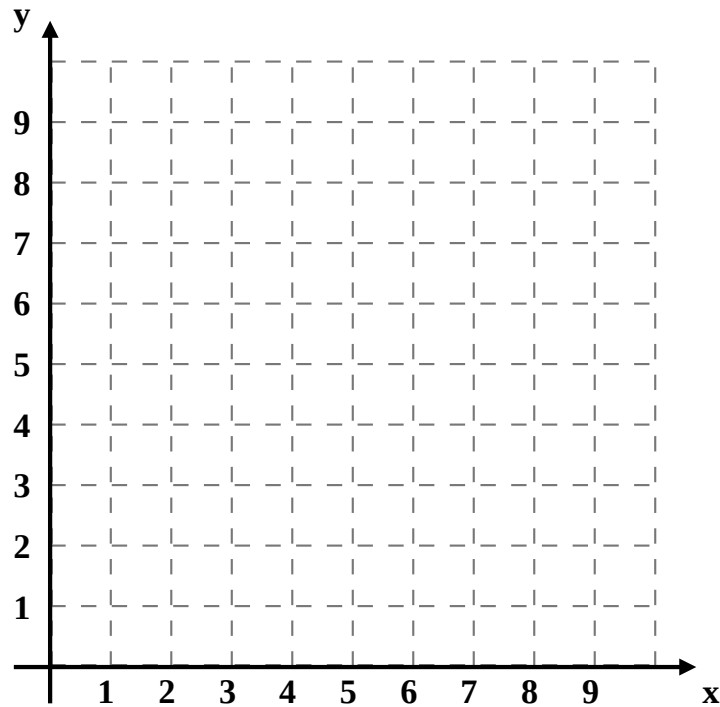
Lesson 2

Coordinate Geometry : Year 9

2.1 Average

Example

On the grid below plot the triangle with vertices (2, 9), (4, 3) and (9, 6).



- (i) Find the average (mean) of the x parts of the coordinates.

$$\bar{x} =$$

- (ii) Find the average (mean) of the y parts of the coordinates.

$$\bar{y} =$$

- (iii) Plot the point $(\bar{x}, \bar{y})$.

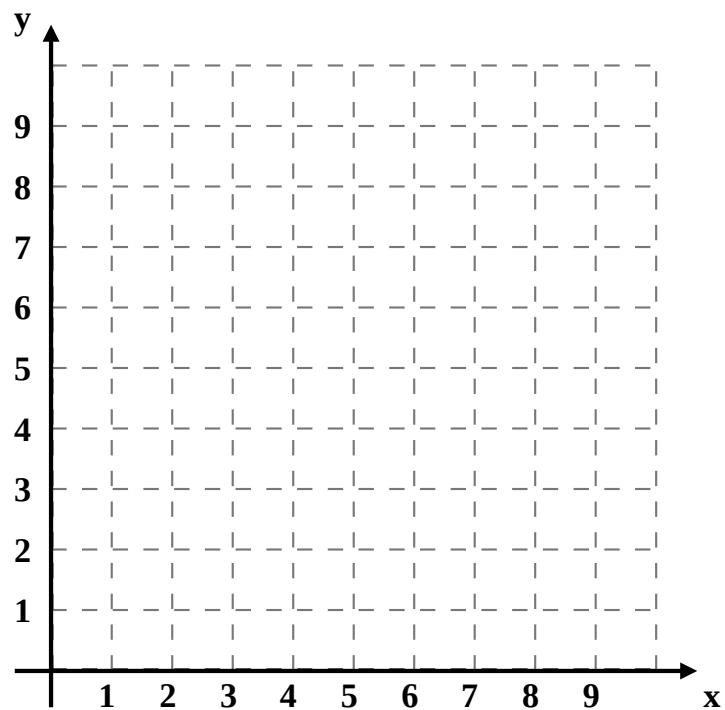
If each point was an equal weight, say 1 kg, then $(\bar{x}, \bar{y})$ would be the centre of gravity of the three weights.

This is the special point, called the **centroid**, about which the system freely rotates.

2.2 Exercise

Question 1

On the grid below plot the triangle with vertices $(2, 3)$, $(7, 2)$ and $(9, 7)$.



- (i) Find the average (mean) of the x parts of the coordinates.

$$\bar{x} =$$

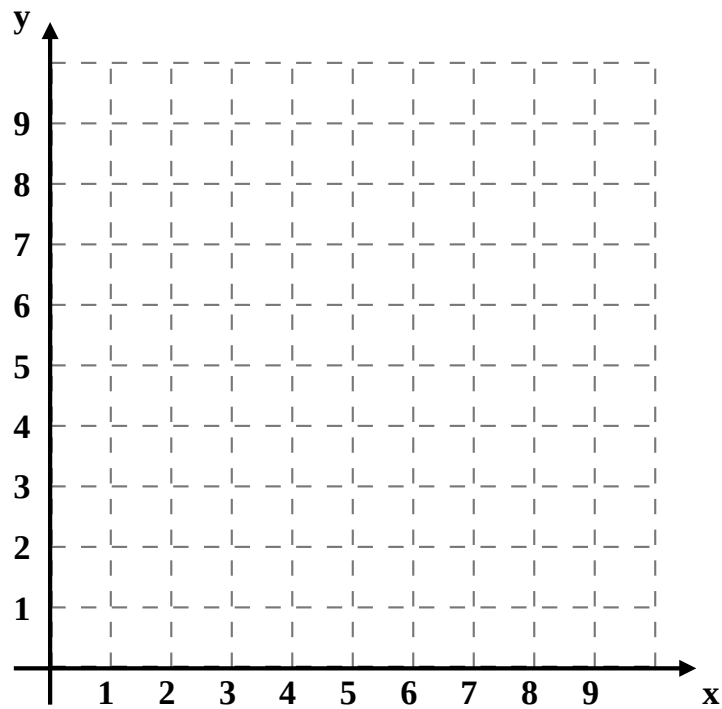
- (ii) Find the average (mean) of the y parts of the coordinates.

$$\bar{y} =$$

- (iii) Plot the point $(\bar{x}, \bar{y})$.

Question 2

On the grid below plot the (non-regular) pentagon with vertices $(3, 1)$, $(1, 4)$, $(5, 9)$, $(8, 4)$ and $(8, 2)$.



- (i) Find the average (mean) of the x parts of the coordinates.

$$\bar{x} =$$

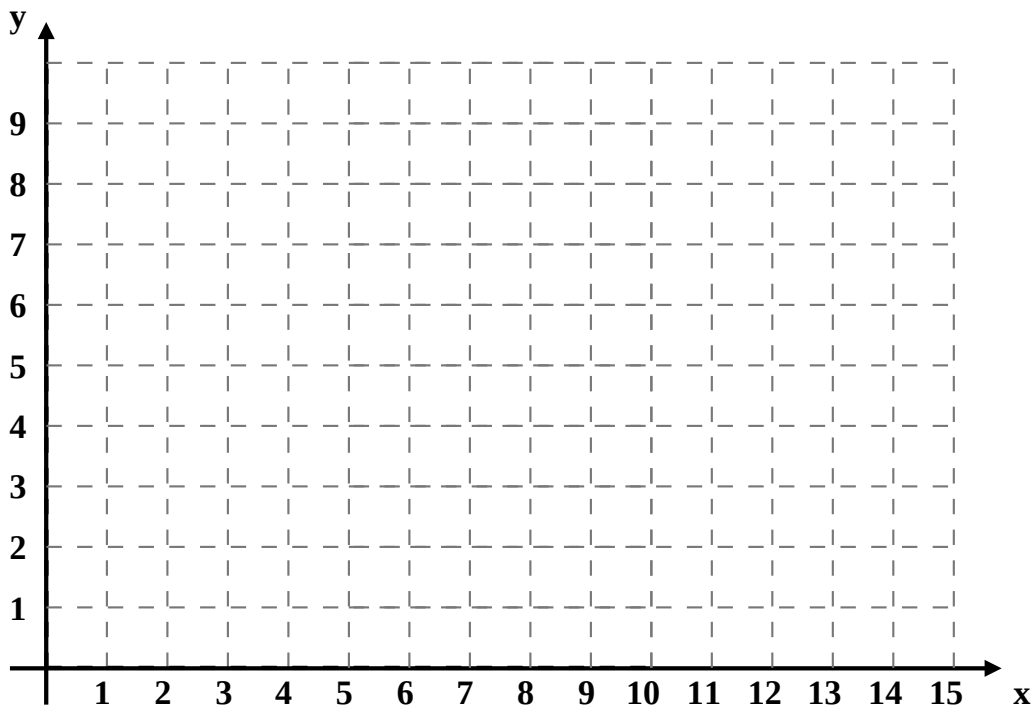
- (ii) Find the average (mean) of the y parts of the coordinates.

$$\bar{y} =$$

- (iii) Plot the point $(\bar{x}, \bar{y})$.

Question 3

On the grid below plot the following vertices joining then with straight lines as you go;
(13, 2), (3, 2), (3, 6), (1, 6), (4, 9), (7, 6), (5, 6), (5, 4), (13, 4)



(i) Find the average (mean) of the x parts of the coordinates.

$$\bar{x} =$$

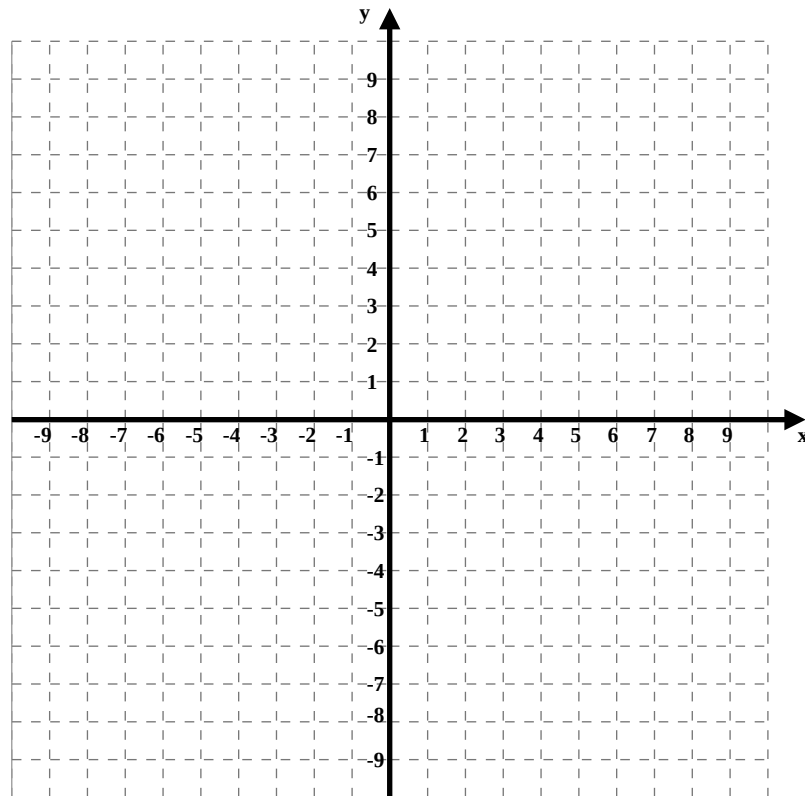
(ii) Find the average (mean) of the y parts of the coordinates.

$$\bar{y} =$$

(iii) Plot the point $(\bar{x}, \bar{y})$.

Question 4

On the grid below plot the triangle with vertices (- 3, 5), (7, 3) and (5, - 8).



- (i) Find the average (mean) of the x parts of the coordinates.

$$\bar{x} =$$

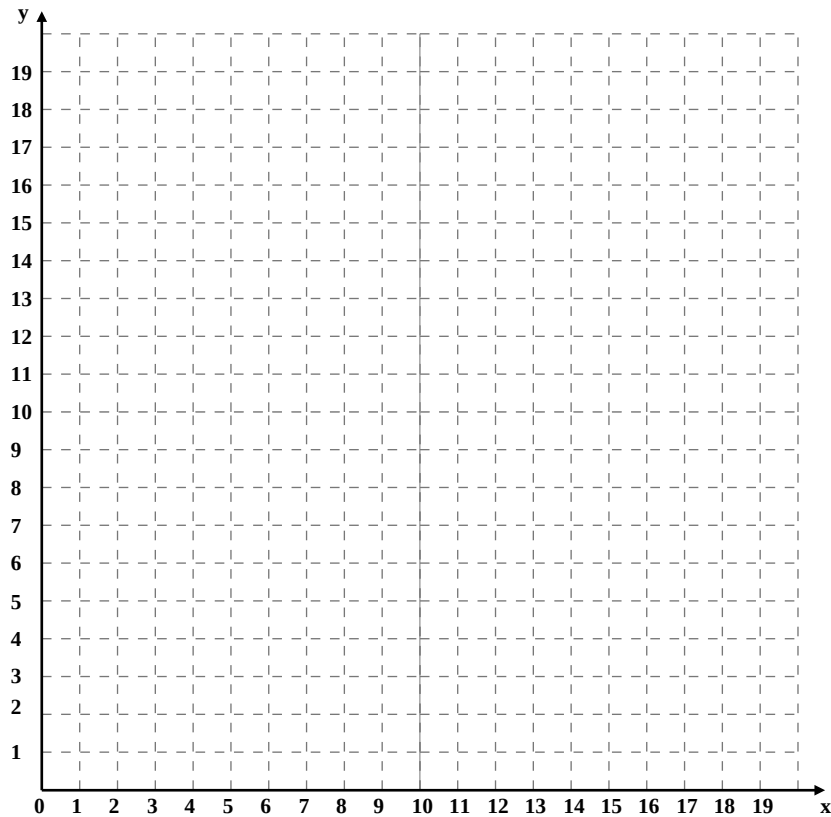
- (ii) Find the average (mean) of the y parts of the coordinates.

$$\bar{y} =$$

- (iii) Plot the point $(\bar{x}, \bar{y})$.

Question 5

Plot the triangle with vertices $A(4, 3)$, $B(8, 17)$ and $C(18, 13)$.



- (i) Work out and then plot the *centroid* $(\bar{x}, \bar{y})$ of the triangle ABC .

$$\begin{aligned} \text{centroid } \triangle ABC &= \left(\frac{4 + 8 + 18}{3}, \frac{3 + 17 + 13}{3} \right) \\ &= \end{aligned}$$

- (ii) Work out and then plot the *midpoint* of line AB .

$$\begin{aligned} \text{midpoint } AB &= \left(\frac{4 + 8}{2}, \frac{3 + 17}{2} \right) \\ &= \end{aligned}$$

Draw a line (called a *Median*) from point C to the *midpoint* AB .
Does it go through the *centroid* ?

- (iii) Work out and then plot the *midpoint* of line *BC*.

$$\begin{aligned} \text{midpoint } BC &= \left(\frac{+}{2}, \frac{+}{2} \right) \\ &= \end{aligned}$$

Draw a line (called a *Median*) from point *A* to the *midpoint BC*.
Does it go through the *centroid* ?

- (iv) Work out and then plot the *midpoint* of line *AC*.

$$\begin{aligned} \text{midpoint } AC &= \left(\frac{+}{2}, \frac{+}{2} \right) \\ &= \end{aligned}$$

Draw a line (called a *Median*) from point *B* to the *midpoint AC*.
Does it go through the *centroid* ?

Question 6

Find the *midpoint* of *P*(2, 23) and *Q*(18, 47)

Question 7

GCSE examination question from 2010

The point *A* has coordinates (3, 2) and the point *B* has coordinates (11, 10).
Find the coordinates of the midpoint of *AB*.

Question 8

GCSE examination question from 2008

The point *A* has coordinates (5, 13) and the point *B* has coordinates (- 1, 1).
Work out the coordinates of the midpoint of *AB*.