

Collinear Points

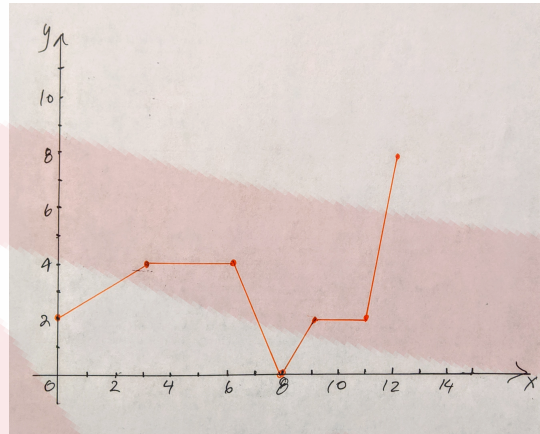
Raise My
MA **rks**

[RaiseMyMarks.com](https://www.RaiseMyMarks.com)

2020

What is a piecewise linear relation?

When I hear piecewise linear relation, I think of a relation or function as made up of lin segments that join together at their end points. An examble of a piecewise linear relation can be seen below:

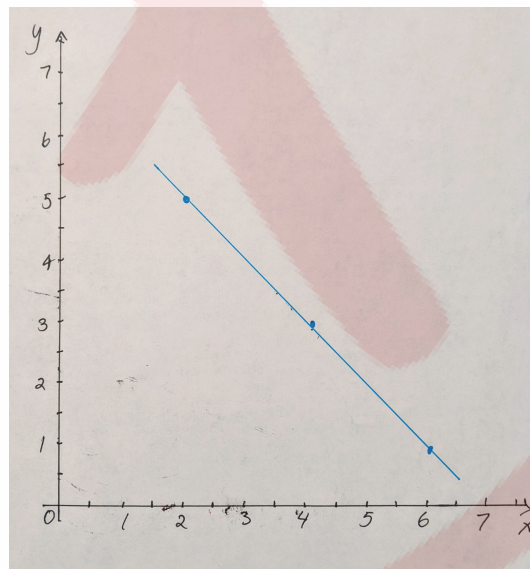


Collinear Points

Points are said to be **collinear** when they all lie on the same line. For example,

$$P_1(2, 5), P_2(4, 3), P_3(6, 1)$$

lie on the same line. To see this we can graph the points and join a line through them all.



Another way to determine if points are collinear is to determine the line that goes through two of the points and then verify if the others lie on the lines. In the previous example, let's find the equation of the line through $P_1(2, 5)$ and $P_2(4, 3)$. First, let's find the slope.

$$m_1 = \frac{y_1 - y_0}{x_1 - x_0} = \frac{3 - 5}{4 - 2} = \frac{-2}{2} = -1$$

Now we have,

$$y = -x + b$$

Let's find the y-intercept. We know that $P_1(2, 5)$ lies on the line. So we have,

$$\begin{aligned} y &= -x + b \\ 5 &= -2 + b \\ 7 &= b \end{aligned}$$

Now we have that the equation of the line that passes through $P_1(2, 5)$ and $P_2(4, 3)$ is,

$$y = -x + 7.$$

Now we need to determine if $P_3(6, 1)$ lies on the line as well.

$$\begin{aligned} y &= -x + 7 \\ r.s. &= -6 + 7 \\ &= 1 \\ &= l.s. \end{aligned}$$

Therefore, P_3 lies on the line that passes through P_1 and P_2 . So, P_1, P_2 and P_3 are **collinear**.

Exercises

1. Which sets of points are collinear?

a) $(0, 0)$, $(3, 3)$, $(10, 9)$

b) $(7, 1)$, $(4, 3)$, $(1, 5)$

c) $(-2, -3)$, $(6, 5)$, $(2, 1)$

d) $(6, -5)$, $(0, 2)$, $(3, -2)$

e) $(5, -5)$, $(1, 1)$, $(3, -2)$

2. Determine if the following points are collinear, $P_1(2, -3)$, $P_2(-1, 0)$, $P_3(5, -6)$.

3. Find the equation of the line that goes through the points P_2 and P_3 .