



Algebra Practice

Expressions:

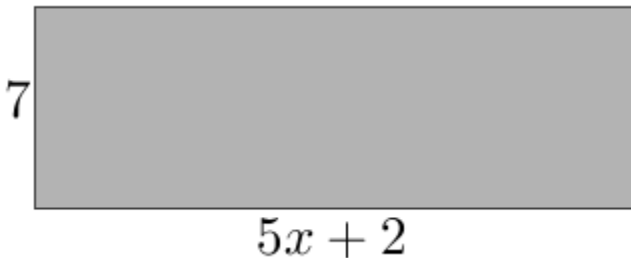
- 1) Simplify $3x - 2y + 5x + 7 - y$
- 2) Expand $5(3 - 2x)$
- 3) Factorise fully $12x^2 - 18xy^2$

Formulae:

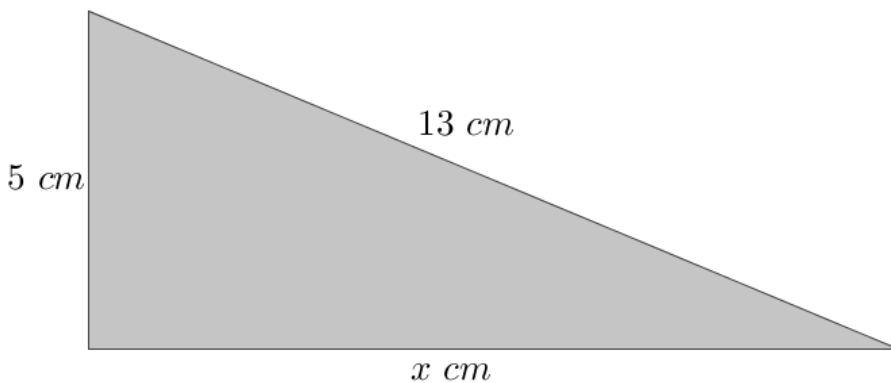
- 1) A boiler repairman charges £50 for every call-out, plus a fee of £40 an hour. Set up a formula for the total cost, C , of a call-out lasting H hours.
- 2) Use the formula $s = ut + \frac{1}{2}at^2$ to find the value of s when $t = 10$, $a = 4$ and $u = 4$.

Shapes:

- 1) A triangle has one side of length $2x$ centimetres. One of the other sides is twice the size. The third side is 5 centimetres longer than the first side. Find the perimeter in terms of x .
- 2) Write an expression for the area of the rectangle shown below:



- 3) Find the value of x in this right angled triangle:

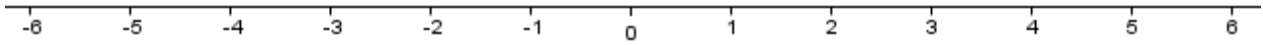


Sequences:

- 1) Write down the term-to-term rule for the sequence 18 24 30 36 ...
- 2) Find the n^{th} term rule for the sequence 18 24 30 36 ...

Inequalities:

- 1) x is an integer. Write down all values of x which solve the inequality $-4 < x \leq 2$
- 2) Show the inequality $x \leq 5$ on the number line below:



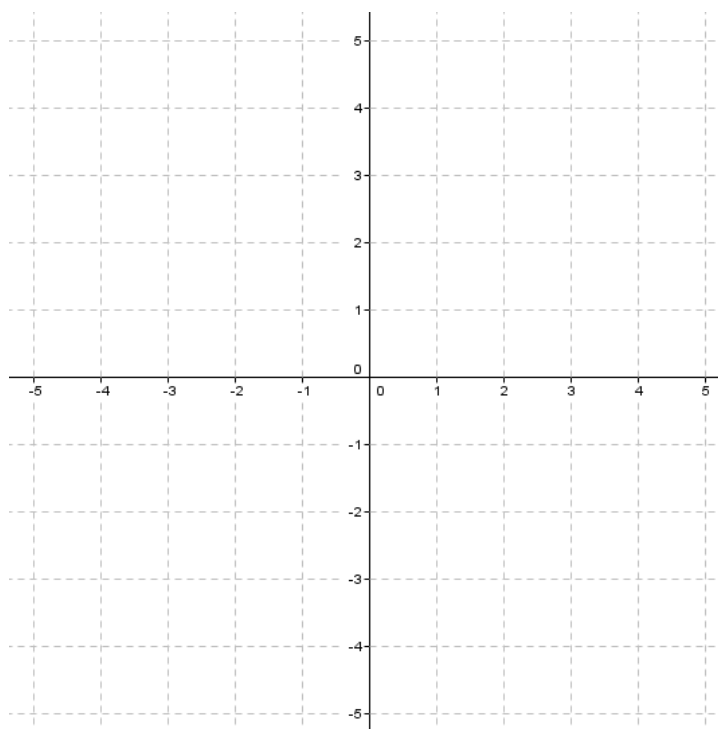
Equations:

- 1) James has £6 more than Anna. Together they have £30.
Write an equation from this information. Solve it to find out how much Anna has.
- 2) Solve $x + 12 = 8$
- 3) Solve $\frac{3+x}{2} = 7$
- 4) Solve $4x^2 = 36$
- 5) The equation $x^3 - 5x = 0$ has a solution between 2 and 3.
Use trial and improvement to find this solution correct to 1 decimal place.

Graphs:

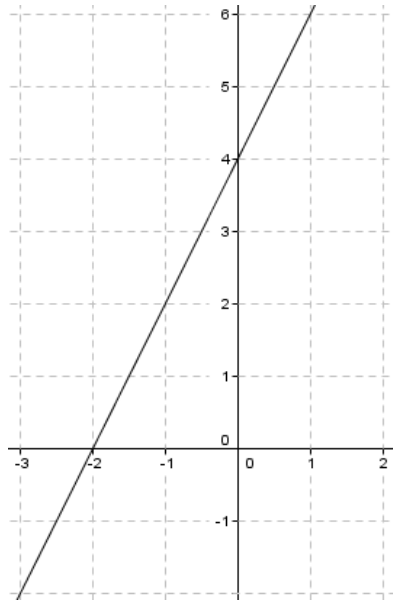
- 1) Complete the table of values below and draw the straight line graph for $y = \frac{1}{2}x - 2$

x	-2	-1	0	1	2	3
y						



2) What is the gradient of the line $y = -4x + 2$?

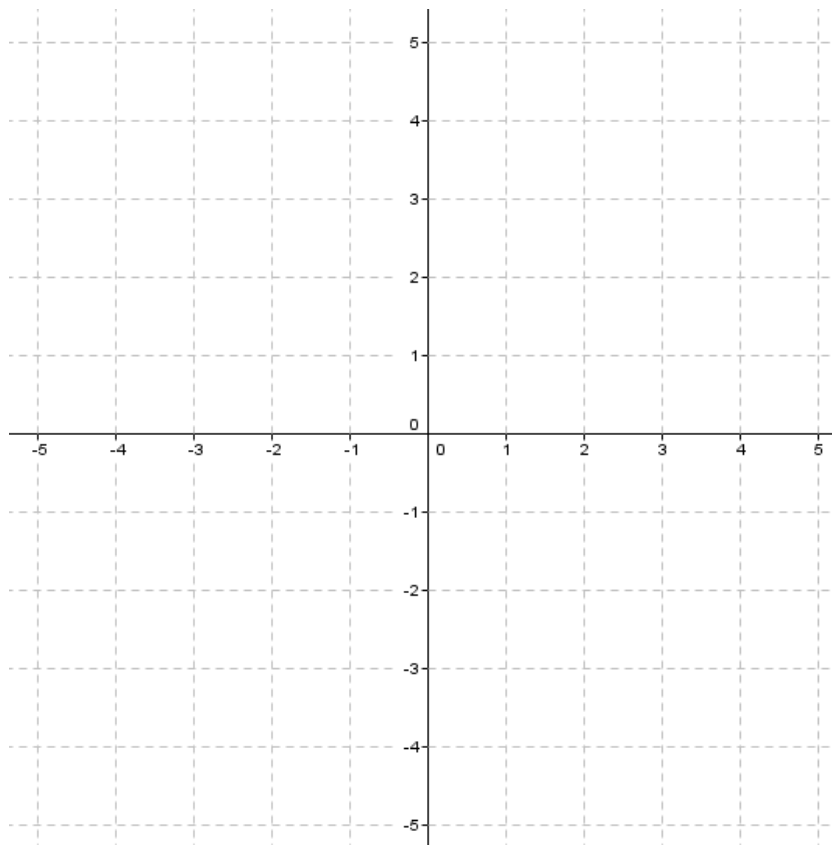
3) The line shown below is $y = 2x + C$. Write down the value of C .



4) Write down the coordinates of the point where the line above crosses the x axis.

5) Complete the table of values below and draw the curve $y = x^2 - 3$

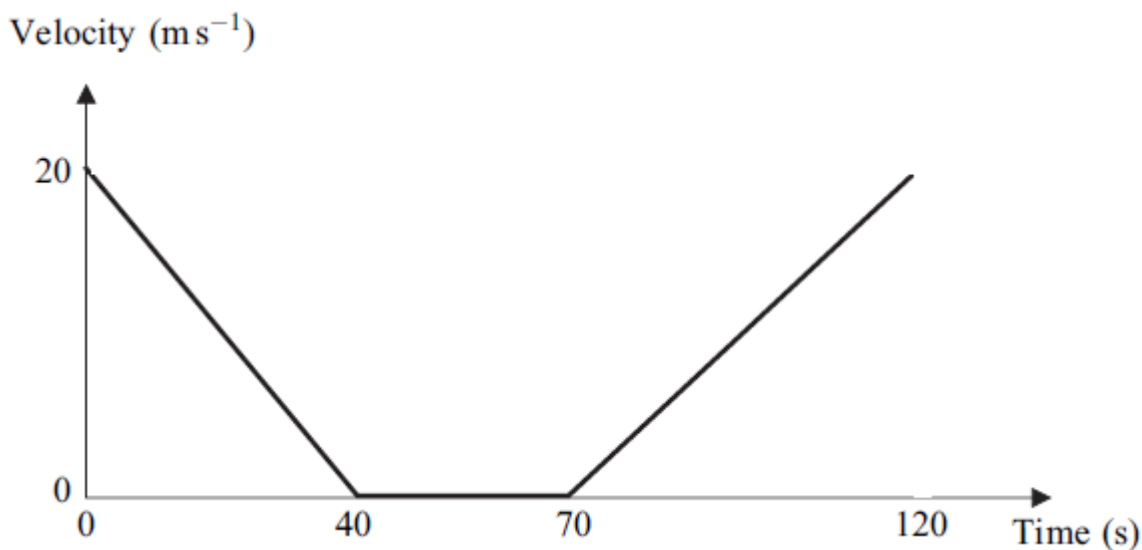
x	-2	-1	0	1	2
y					



6) The graph below shows the amount of money in someone's bank account over time. Describe what might have happened during the first few days of June.

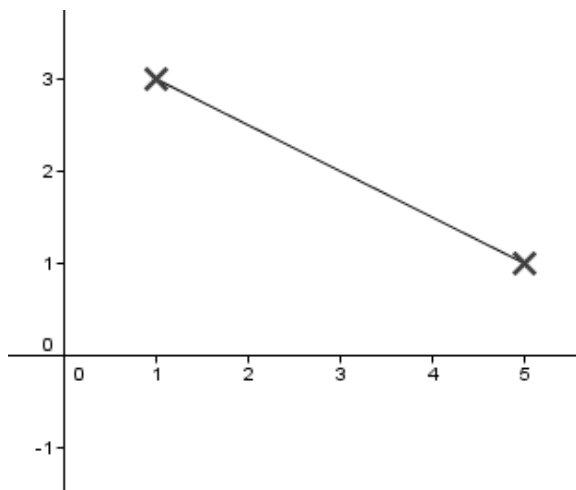


7) The graph below shows the velocity of a bus for part of its journey:



Describe this part of the journey.

8) The graph below shows a line segment between the points (1,3) and (5,1).



- a) Find the length of the line segment.
Give your answer correct to 3 significant figures.
- b) Write down the coordinates of the midpoint of the line segment.

Algebra Practice SOLUTIONS

Expressions:

1) Simplify $3x - 2y + 5x + 7 - y = 8x - 3y + 7$

2) Expand $5(3 - 2x) = 15 - 10x$

3) Factorise fully $12x^2 - 18xy^2 = 6x(2x - 3y^2)$

Formulae:

- 1) A boiler repairman charges £50 for every call-out, plus a fee of £40 an hour.
Set up a formula for the total cost, C , of a call-out lasting H hours.

$$C = 50 + 40H$$

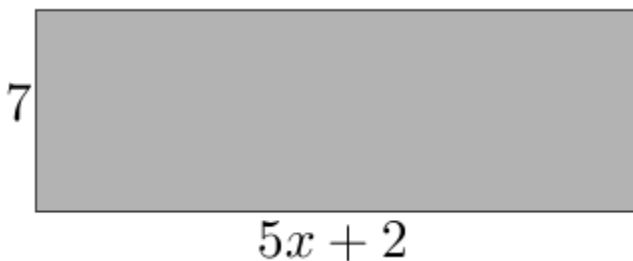
- 2) Use the formula $s = ut + \frac{1}{2}at^2$ to find the value of s when $t = 10$, $a = 4$ and $u = 4$.

$$s = 4 \times 10 + \frac{1}{2} \times 4 \times 10^2 = 240$$

Shapes:

- 1) A triangle has one side of length $2x$ centimetres. One of the other sides is twice the size. The third side is 5 centimetres longer than the first side. Find the perimeter in terms of x .

- 2) Write an expression for the area of the rectangle shown below:

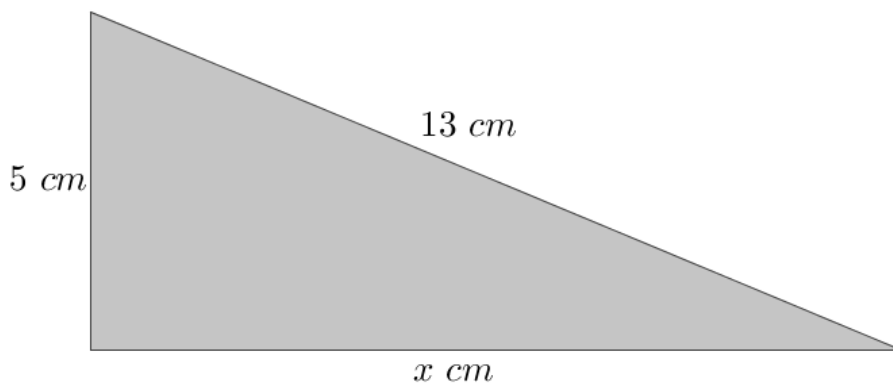


$$7(5x + 2)$$

or

$$35x + 14$$

- 3) Find the value of x in this right angled triangle:



$$a^2 + b^2 = c^2$$
$$5^2 + x^2 = 13^2$$
$$25 + x^2 = 169$$
$$x^2 = 144$$
$$x = 12$$

Sequences:

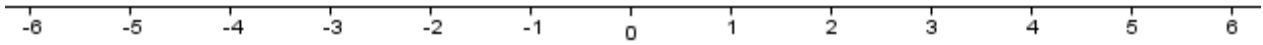
- 1) Write down the term-to-term rule for the sequence 18 24 30 36 ...

$$\text{Term to term rule: } + 6$$

- 2) Find the n^{th} term rule for the sequence 18 24 30 36 ... n^{th} term rule: $6n + 12$

Inequalities:

- 1) x is an integer. Write down all values of x which solve the inequality $-4 < x \leq 2$
- 2) Show the inequality $x \leq 5$ on the number line below:



Equations:

- 1) James has £6 more than Anna. Together they have £30.
Write an equation from this information. Solve it to find out how much Anna has.

$$x + x + 6 = 30 \text{ or } 2x + 6 = 30 \Rightarrow 2x = 24 \Rightarrow x = 12$$

- 2) Solve $x + 12 = 8$

$$x = -4$$

- 3) Solve $\frac{3+x}{2} = 7$

$$3 + x = 14 \Rightarrow x = 11$$

- 4) Solve $4x^2 = 36$

$$x^2 = 9 \Rightarrow x = \pm 3$$

- 5) The equation $x^3 - 5x = 0$ has a solution between 2 and 3.

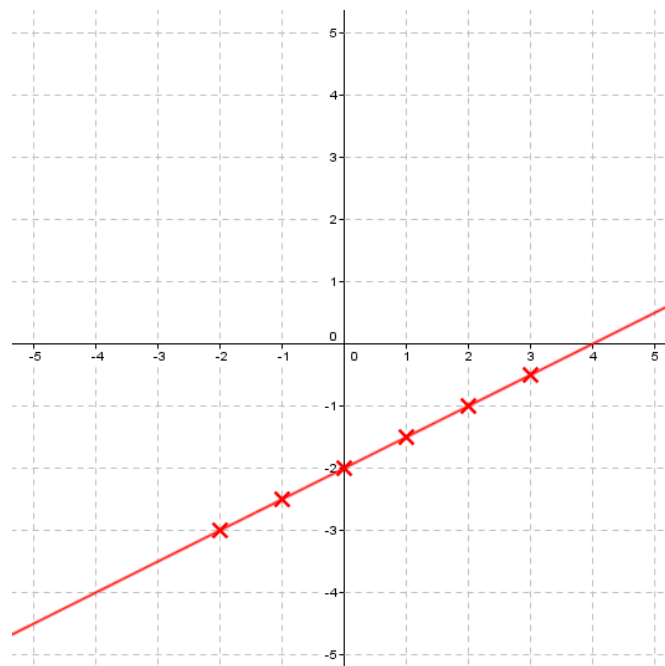
Use trial and improvement to find this solution correct to 1 decimal place.

$$x = 2.2 \text{ to 1 decimal place}$$

Graphs:

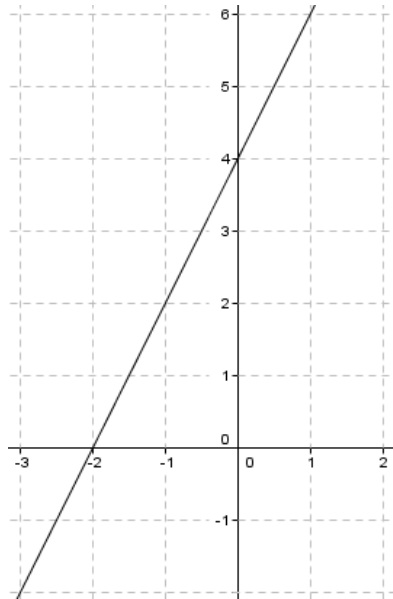
- 1) Complete the table of values below and draw the straight line graph for $y = \frac{1}{2}x - 2$

x	-2	-1	0	1	2	3
y	-3	-2.5	-2	-1.5	-1	-0.5



2) What is the gradient of the line $y = -4x + 2$? *Gradient = -4*

3) The line shown below is $y = 2x + C$. Write down the value of C .



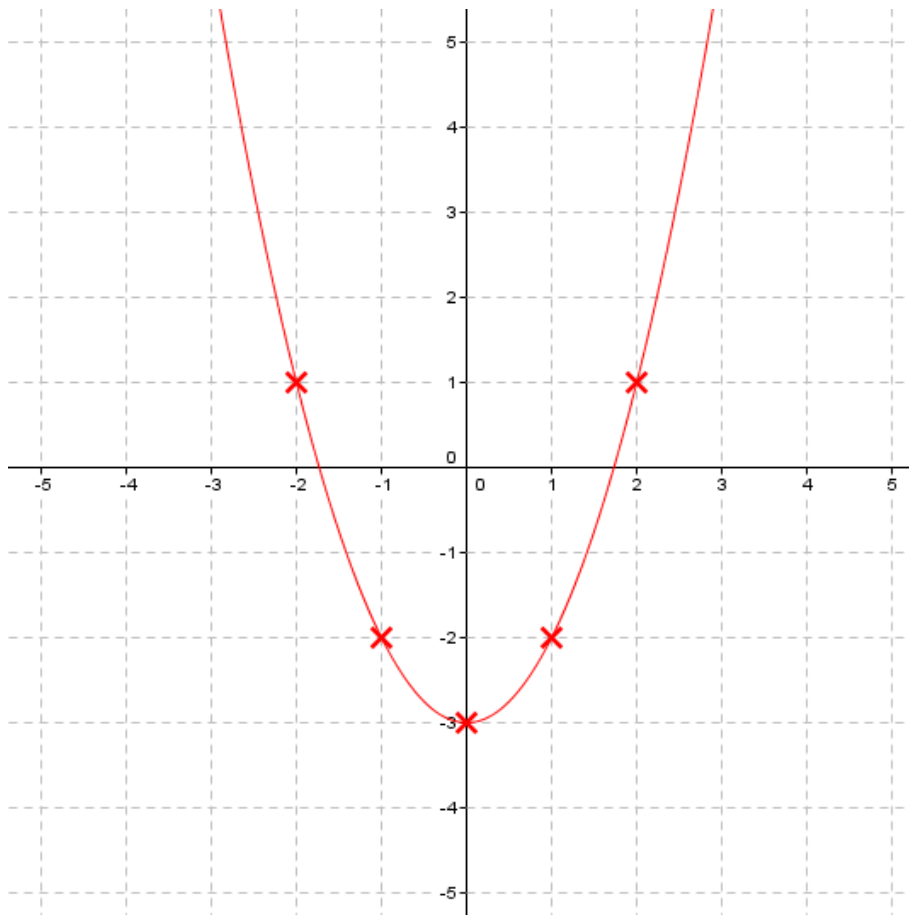
$C = 4$

4) Write down the coordinates of the point where the line above crosses the x axis.

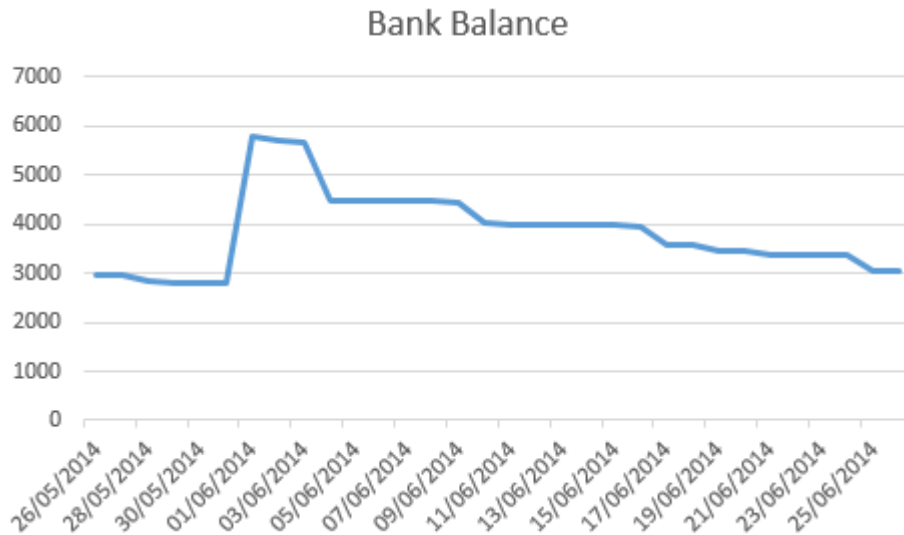
$(-2, 0)$

5) Complete the table of values below and draw the curve $y = x^2 - 3$

x	-2	-1	0	1	2
y	1	-2	-3	-2	1

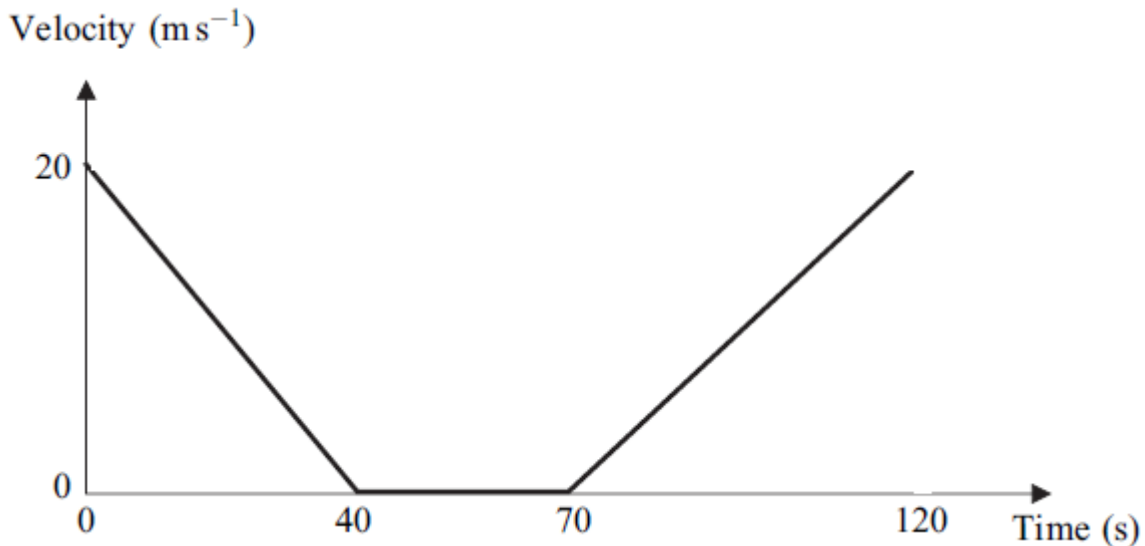


- 6) The graph below shows the amount of money in someone's bank account over time. Describe what might have happened during the first few days of June.



They get paid at the start of the month, then make a large payment (eg rent)

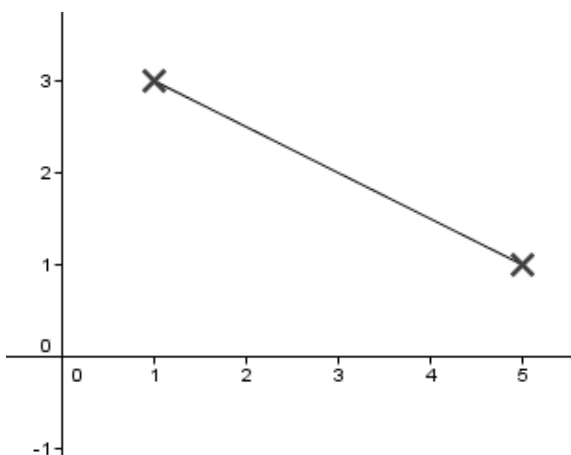
- 7) The graph below shows the velocity of a bus for part of its journey:



Describe this part of the journey.

The bus slows down then stops in one place (eg bus stop) for 30 seconds then speeds up again for the next 50 seconds.

- 8) The graph below shows a line segment between the points (1,3) and (5,1).



- a) Find the length of the line segment.

Give your answer correct to 3 significant figures.

$$a^2 + b^2 = c^2$$

$$4^2 + 2^2 = c^2$$

$$16 + 4 = c^2$$

$$20 = c^2$$

$$\sqrt{20} = c$$

$$c = 4.4721 \dots = \mathbf{4.47 \text{ to 3 s.f.}}$$

- b) Write down the coordinates of the midpoint

of the line segment. $\left(\frac{1+5}{2}, \frac{3+1}{2}\right)$ which is **(3, 2)**