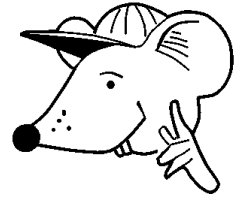


# MATHEMATICS



**Y6 Number and Place Value**  
**6130**

**Recognise and order negative numbers.**

## Equipment

Paper, pencil, ruler

# MathSphere

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## Concepts

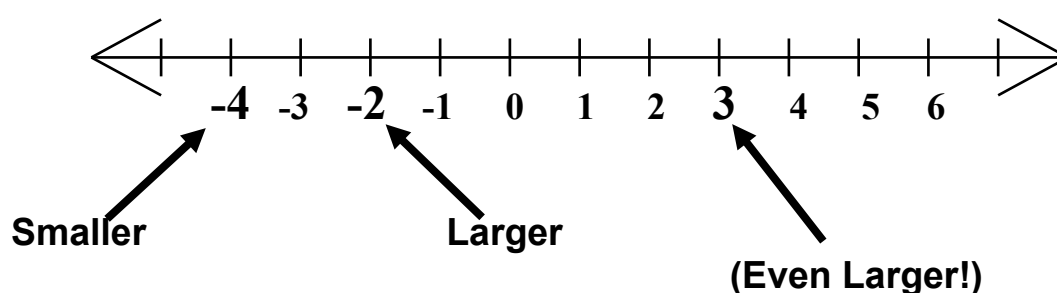
It is important with children to distinguish between using the 'minus' sign to perform subtraction and using it to indicate a negative number (ie a number less than zero). In the good old days, we used the word 'minus' for both concepts and this led to great confusion such as 'two minuses make a plus' (but only, unfortunately, in some circumstances). In the early days it is as well to avoid the use of 'minus' and use the words 'subtract' and 'negative', although sometimes in Key Stage 2 SATs the word 'minus' is used in the mental arithmetic test and 'minus' is in general use for temperature readings, of course.

When used to indicate a negative number, the sign may be written level with the middle of the number, as in  $-4$ , and sometimes it is raised, as in  $^{-}5$ . Both forms are used in Mathsphere units to familiarise children with the two types of usage.

### Larger or Smaller

When trying to decide which of two numbers is the larger, especially if at least one of them is negative, imagine the numbers on a number line with negatives to the left and positives to the right. **The number to the right is always the larger of the two:**

**e.g. Which is larger,  $-4$  or  $-2$ ?**



If this is still not clear, imagine the number line on its side with negative numbers below and positive numbers above as in a thermometer. The further up the thermometer a number is, the higher is the number, whether it is positive or negative. After all, a temperature of  $-3$  is warmer than a temperature of  $-12$ !

1. Discuss with your teacher or parent the meaning of these words:

***positive, negative, minus, above zero, below zero, rise, fall.***

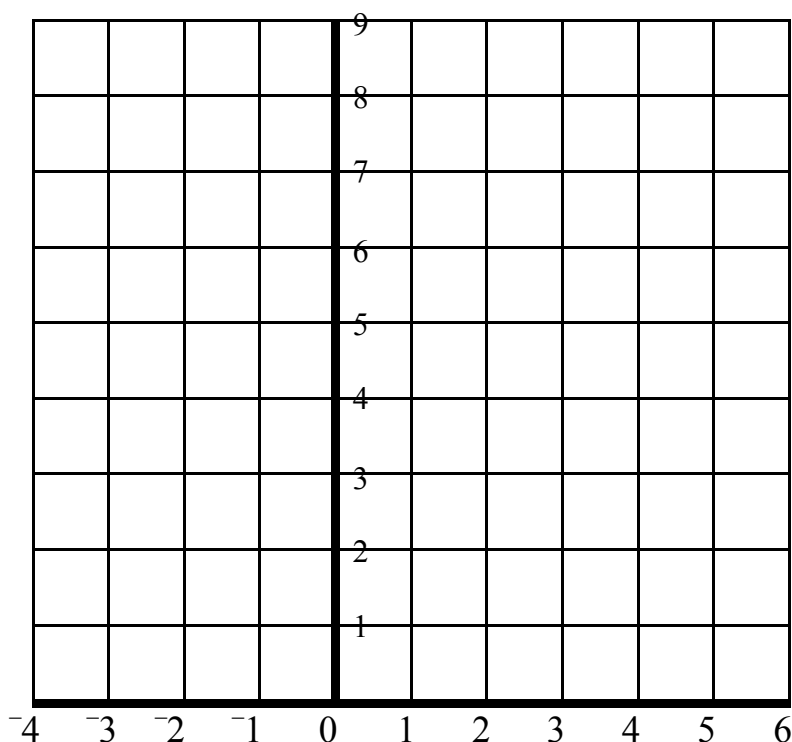
Can you spell them all correctly?

2. Put these numbers in order, with the **least** first:

**56, -12, -19, 7, -23, -31, 31**

3. a) Here is a co-ordinate grid. Plot these points on the grid and join them up:

**(4, 2) (4, 8) (-3, 8) (-3, 2)**



b) What is the name of this shape?

c) What is the area of this shape?

d) What is the perimeter of this shape?

1. In your own words, write a short definition of these terms:

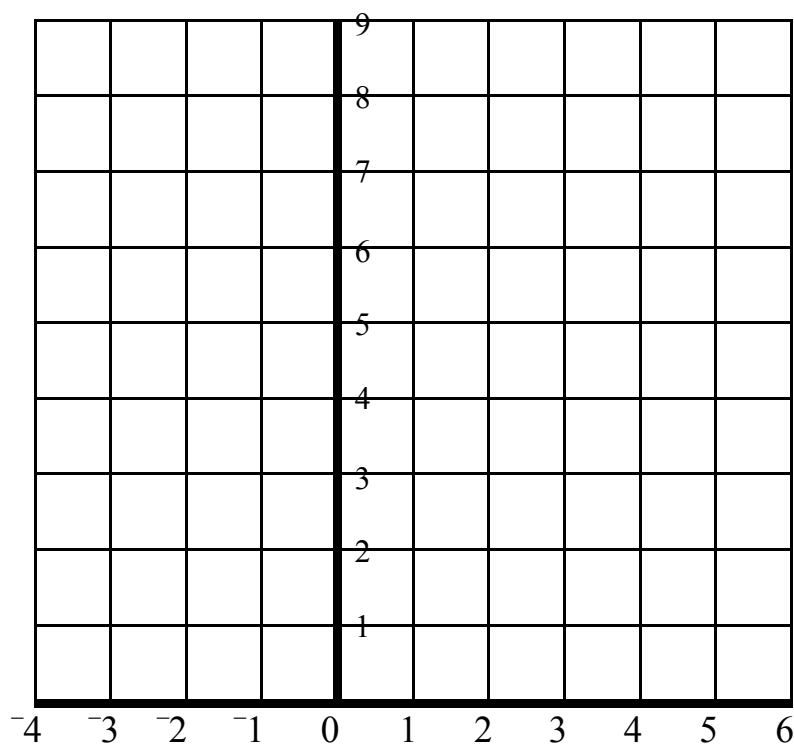
***positive, negative, minus, above zero, below zero, rise, fall.***

2. Put these numbers in order, with the **greatest** first:

**-18, -21, 36, -100, 9, -45, 23**

3. a) Here is a co-ordinate grid. Plot these points on the grid and join them up:

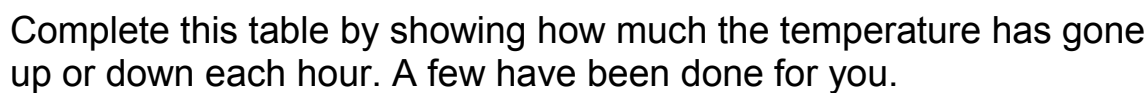
**(6, 7) (4, 9) (-3, 2) (-1, 0)**



b) What is the name of this shape?

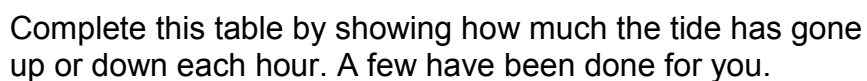
c) What is the area of this shape?

- | a.m.    |    |    |    |    | p.m. |    |    |    |    |    |    |   |   |   |
|---------|----|----|----|----|------|----|----|----|----|----|----|---|---|---|
| Time    | 8  | 9  | 10 | 11 | 12   | 1  | 2  | 3  | 4  | 5  | 6  | 7 | 8 | 9 |
| Temp °C | -5 | -1 | 2  | 5  | 1    | -2 | -4 | -4 | -5 | -2 | -1 | 0 | 0 | 1 |



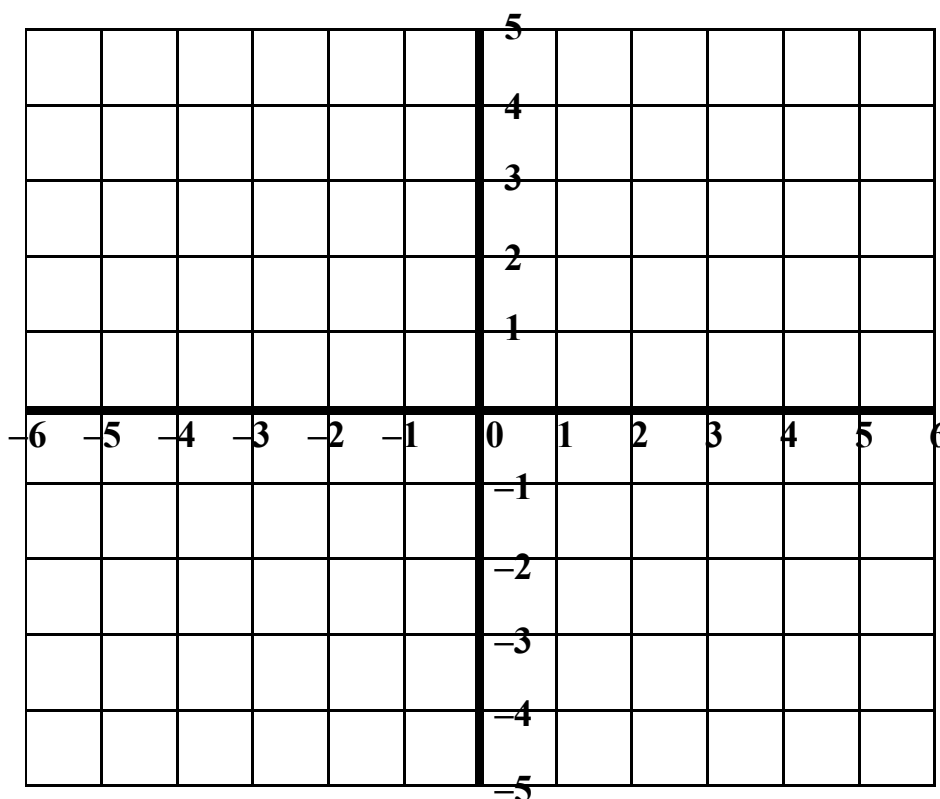
	a.m.					p.m.								
Time	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Temp °C	-5	-1	2	5	1	-2	-4	-4	-5	-2	-1	0	0	1
Difference		+4	+3						-1					

- |            | a.m |    |      |   |    |    |     | p.m. |     |     |    |    |    |  |
|------------|-----|----|------|---|----|----|-----|------|-----|-----|----|----|----|--|
| Time       | 6   | 7  | 8    | 9 | 10 | 11 | 12  | 1    | 2   | 3   | 4  | 5  | 6  |  |
| Height (m) | -4  | -3 | -1.5 | 0 | 1  | 2  | 2.5 | 2.5  | 1.5 | 0.5 | -1 | -2 | -3 |  |

[illegible]

1. Plot these points on the co-ordinate grid below and join them up to make a shape:

(2, -2) (4, -2) (3, -4) (-4, -4) (-5, -2) (2, -2) (2, 4) (-1, 2) (5, 1) (2, 4)



Great shape!  
Great possibilities!



2. Add these pairs of numbers:

a)  $6 + ^{-}3 =$

b)  $4 + ^{-}8 =$

c)  $^{-}2 + 7 =$

d)  $^{-}9 + 9 =$

e)  $5 + ^{-}4 =$

f)  $7 + ^{-}7 =$

3. Add these sequences of numbers:

a)  $7 + ^{-}3 + ^{-}5 + 4 + ^{-}2 =$

b)  $^{-}5 + 9 + ^{-}4 + 6 + ^{-}1 =$

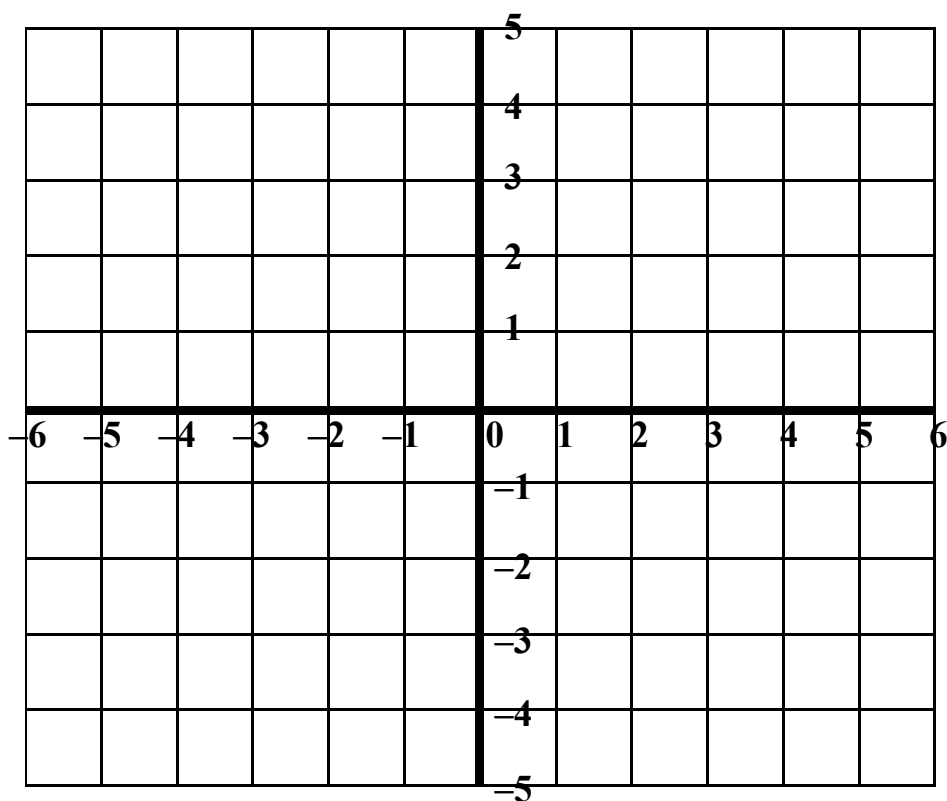
1. Plot these points on the co-ordinate grid below and join each shape up separately:

**Shape 1:**  $(-5, -3)$   $(2, -3)$   $(2, -1)$   $(1, -1)$   $(1, -3)$   $(5, -3)$   $(5, 3)$   $(4, 4)$   
 $(-3, 4)$   $(-3, 5)$   $(-2, 5)$   $(-2, 4)$   $(-4, 4)$   $(-5, 3)$   $(-5, -3)$

**Shape 2:**  $(-1, -1)$   $(-4, -1)$   $(-4, -2)$   $(-1, -2)$   $(-1, -1)$

**Shape 3:**  $(4, 1)$   $(4, 3)$   $(1, 3)$   $(1, 1)$   $(4, 1)$

**Shape 4:**  $(-1, 1)$   $(-1, 3)$   $(-4, 3)$   $(-4, 1)$   $(-1, 1)$



2. Michelle played a game of golf of nine holes. She recorded her score against par like this:

<b>+2</b>	<b>-3</b>	<b>-2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>-1</b>	<b>2</b>	<b>4</b>
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In golf low scores are good, high scores are poor.

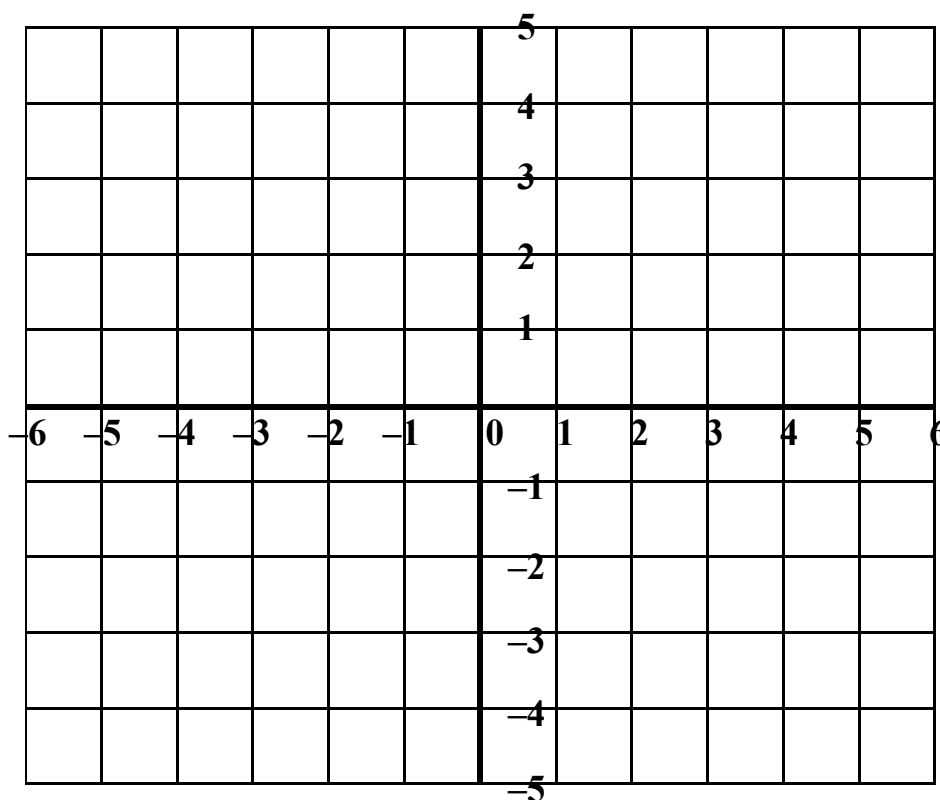
What was Michelle's **best** score?

What was the **range** of her scores?



1. Draw a shape of your own on the co-ordinate grid below and make a list of the co-ordinate pairs. Remember to write them down in the order the shape is drawn.







You could give the co-ordinates to a friend to see if they can draw your shape.



2. What is the **range** and **average (mean)** of these numbers?

**2, -5, -8, 4, -3**

1. Look at these lines:

- a) 
- b) 
- c) 
- d) 
- e) 
- f) 

**Guess** the length of each line to the nearest millimetre and write your estimate in the table.

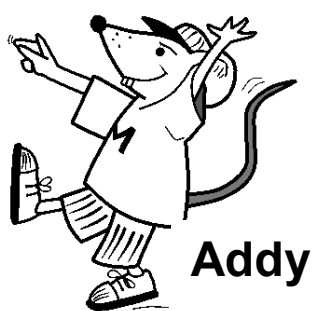
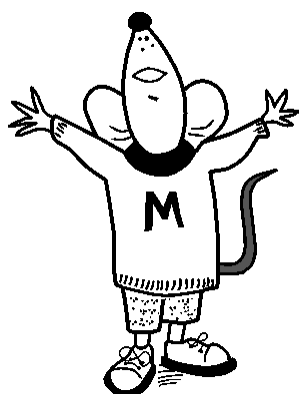
Line	Guessed length	Measured length	Error in millimetres
a)			
b)			
c)			
d)			
e)			
f)			

Now **measure** the lines accurately and write the lengths in the table.

Work out your **errors** and put these in the table.

Use a plus sign (e.g. **+12 mm**) when you overestimated and a negative sign (e.g. **-9mm**) when you underestimated.

What was your **average (mean)** error?

1. Look at the **Maths Rats**:**Addy****Divvy****Multy****Subby**

**Guess** the full height of each **Maths Rat** to the nearest millimetre and write your estimate in the table.

<b>Maths Rat</b>	<b>Guessed height</b>	<b>Measured height</b>	<b>Error in millimetres</b>
<b>Addy</b>			
<b>Divvy</b>			
<b>Multy</b>			
<b>Subby</b>			

Now **measure** the **Rats** accurately and write the heights in the table.

Work out your **errors** and put these in the table.

Use a plus sign (e.g. **+12 mm**) when you overestimated and a negative sign (e.g. **-9mm**) when you underestimated.

What was your **average (mean)** error?

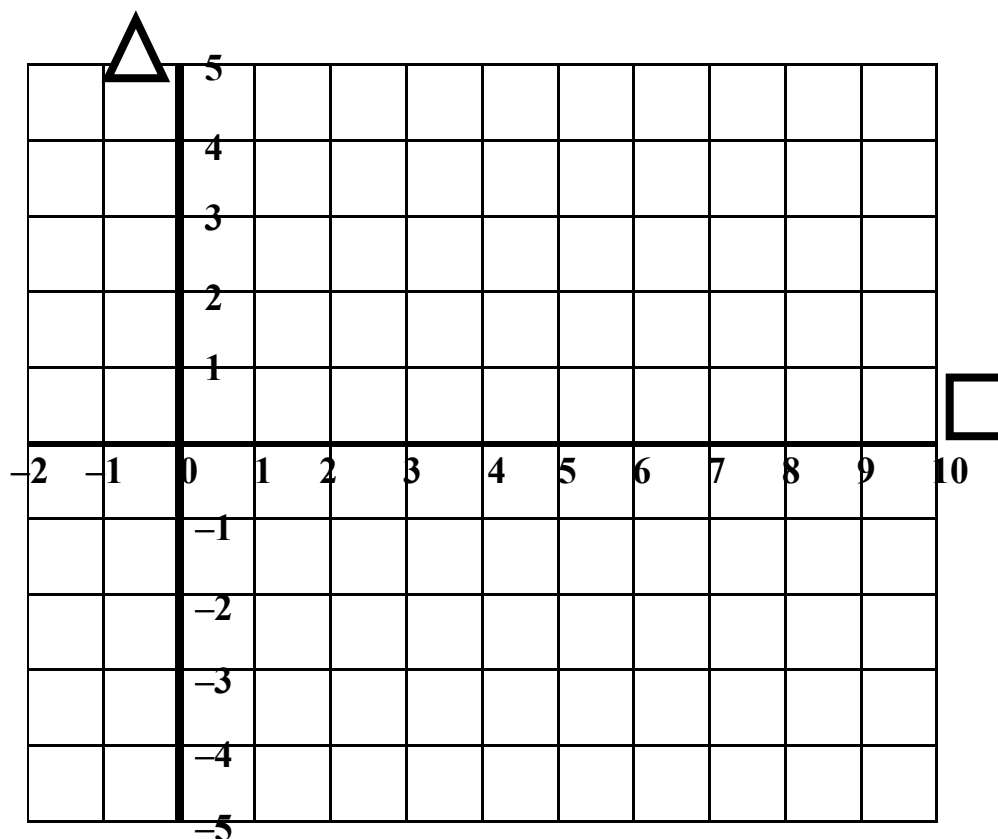
1.  $\square$  and  $\triangle$  are two numbers which may be positive or negative.

$$\square + \triangle = 3$$



Fill in the missing numbers in the table:

$\square$	-2	-1	0			3	4			7	
$\triangle$				2	1			-2	-3		-5

Take each pair of points and, using them as a pair of co-ordinates, plot them on the grid below.





Join up the points. What shape do they make?

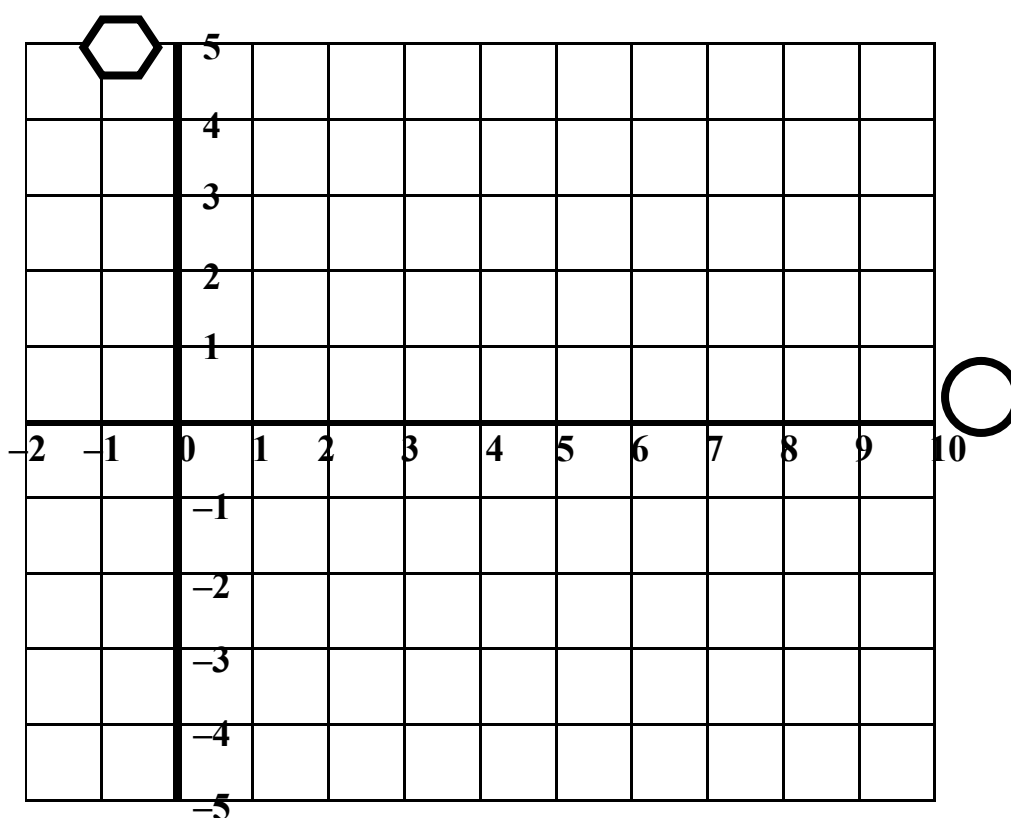
1.  and  are two numbers which may be positive or negative.

$$2 \times \text{circle} + \text{hexagon} = 4$$

Fill in the missing numbers in the table:

	0	1	2		
				-2	-4

Take each pair of points and using them as a pair of co-ordinates, plot them on the grid below.



Join up the points. What shape do they make?

Answers

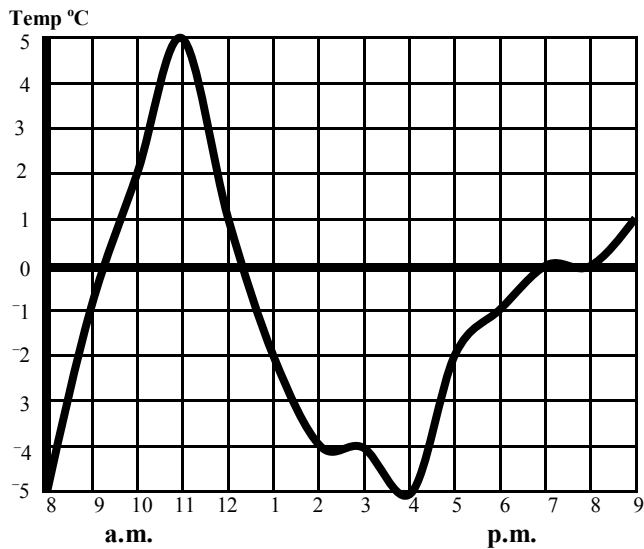
Page 3.

2. -31, -23, -19, -12, 7, 31, 56      3. b) Rectangle c)  $7 \times 6 = 42$  sq. units  
d)  $7 + 7 + 6 + 6 = 26$  units

Page 4

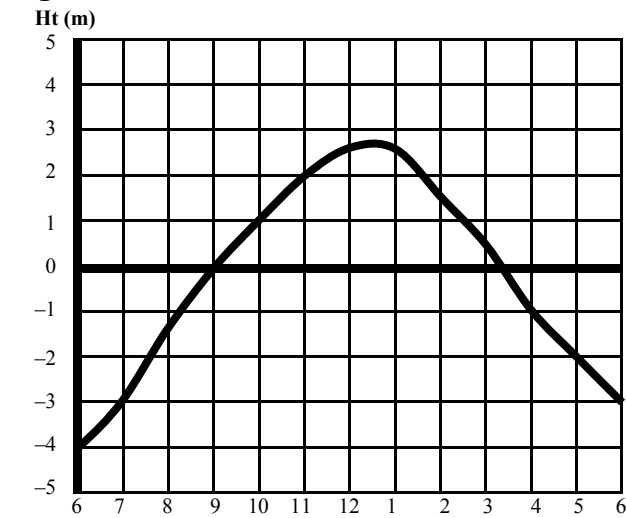
2. 36, 23, 9, -18, -21, -45, -100      3. b) Rectangle c) 28 sq. units (count squares)

Page 5



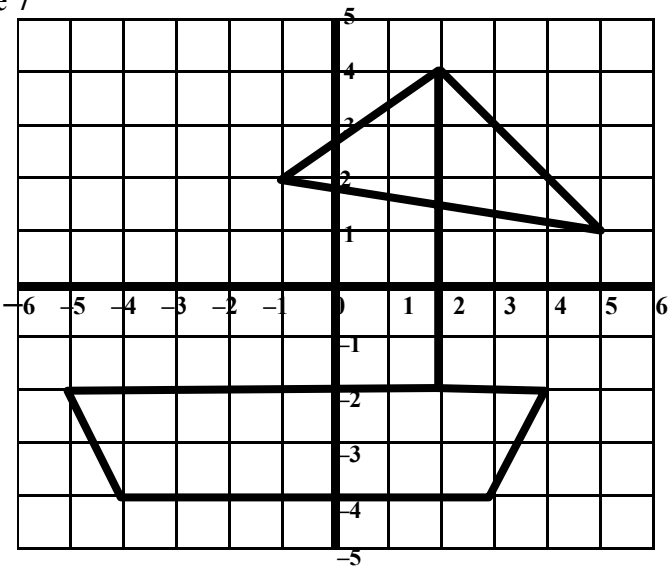
	a.m.					p.m.								
Time	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Temp °C	-5	-1	2	5	1	-2	-4	-4	-5	-2	-1	0	0	1
Difference		+4	+3	+3	-4	-3	-2	0	-1	+3	+1	+1	0	+1

Page 6



a.m.									p.m.				
Time	6	7	8	9	10	11	12	1	2	3	4	5	6
Height (m)	-4	-3	-1.5	0	1	2	2.5	2.5	1.5	0.5	-1	-2	-3
Difference		+1	+1.5	+1.5	+1	+1	+0.5	0	-1	-1	-1.5	-1	-1

Page 7

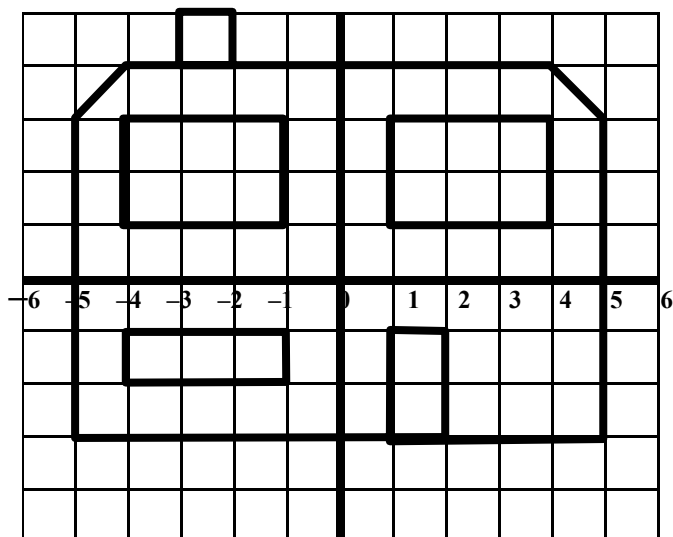


2. a) 3    b) -4    c) 5    d) 0    e) 1    f) 0

3. a) 1    b) 5

## Page 8

1.

2. Best score =  $-3$     Range = 7

## Page 9

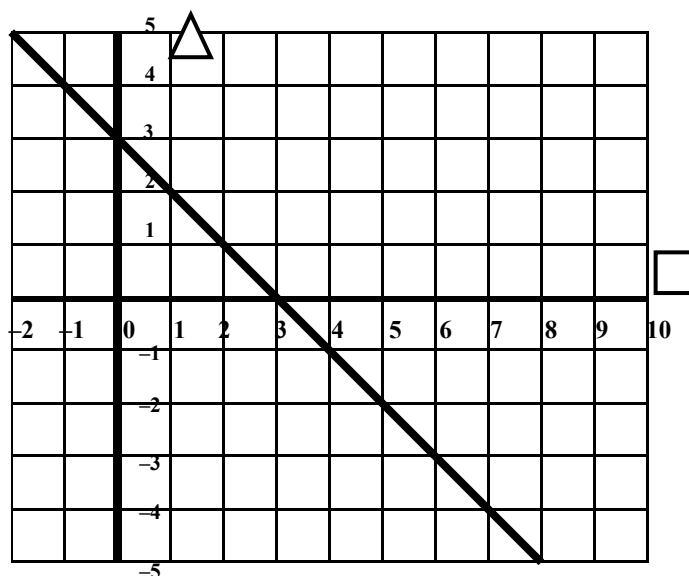
2. Range = 12    mean =  $-10 \div 5 = -2$



## Page 12

1.

□	-2	1	0	1	2	3	4	5	6	7	8
△	5	4	3	2	1	0	-1	-2	-3	-4	-5

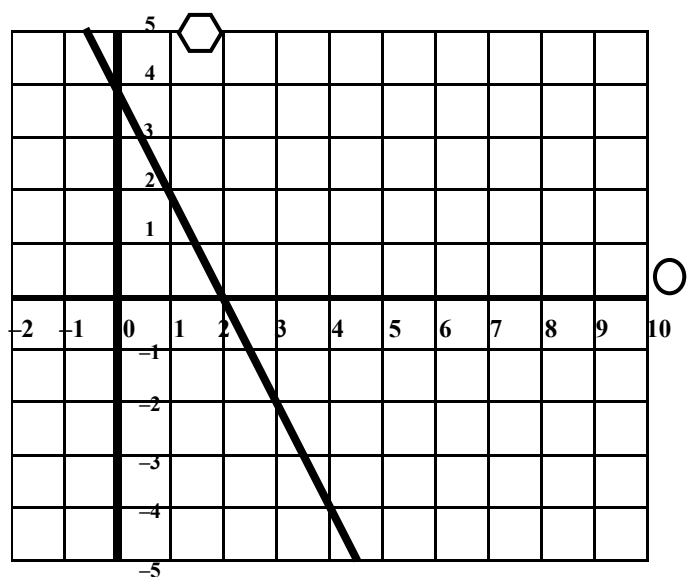


The points  
make a straight  
line.

## Page 13

1.

○	0	1	2	3	4
⬡	-4	-2	0	-2	-4



The points  
make a straight  
line.