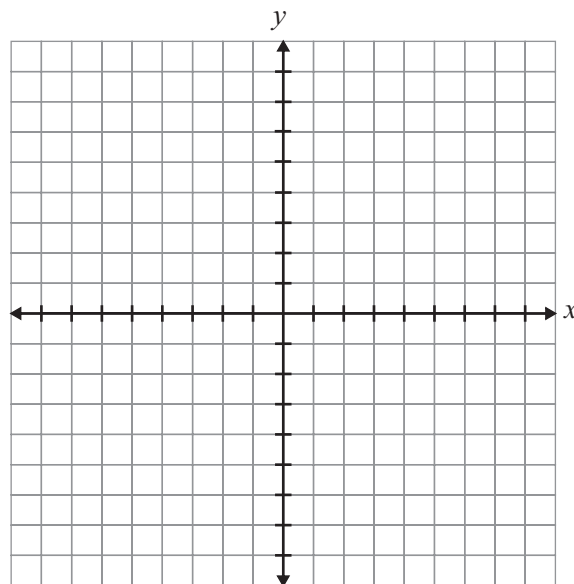


**22 Is It a Line?**

Determine whether each of the relations in the chart below is linear or non-linear.

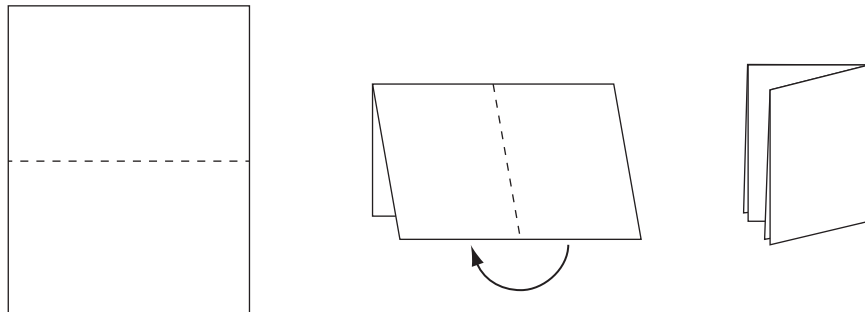
Justify your answers. You may use the grid if you wish.

$-2x + 6y = 18$			$y = 4x^2 + 3$		
<b>Circle one:</b>	Linear	Non-linear	<b>Circle one:</b>	Linear	Non-linear
<b>Justification</b>			<b>Justification</b>		



**10 Folding Time**

A piece of paper is folded in half, which results in two layers of paper. Then the paper is folded in half again to make four layers, and so on.



The number of layers and the number of folds are recorded in the chart.

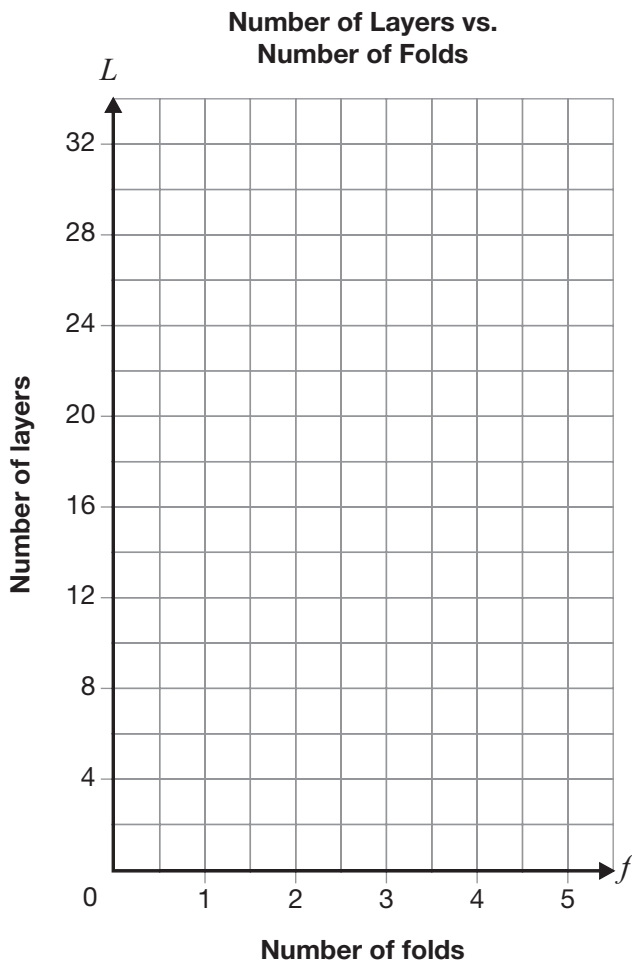
Number of folds	Number of layers
0	1
1	2
2	4
3	
4	

Determine whether this relationship is linear or non-linear.

Circle one:    Linear    Non-linear

Justify your answer.

You have the option of using the grid if you wish.



**10 Fabric Purchase**

Two companies sell fabric online. The total cost,  $C$ , in dollars, for  $n$  metres of fabric for each company is given below.

- Fabric Fun:  $C = 4.25n + 3.00$
- Sew-a-Lot:  $C = 6.50n$

Complete the chart below by determining the initial value, rate of change and type of variation for the relationship for each company.

Justify the type of variation you have selected.

<b>Fabric Fun</b>	<b>Sew-a-Lot</b>
<p><b>Initial value:</b> _____</p> <p><b>Rate of change:</b> _____</p>	<p><b>Initial value:</b> _____</p> <p><b>Rate of change:</b> _____</p>
<p>Type of variation</p> <p>Circle one:</p> <p style="text-align: center;">Partial                      Direct</p> <p>Justification</p>	<p>Type of variation</p> <p>Circle one:</p> <p style="text-align: center;">Partial                      Direct</p> <p>Justification</p>

## 1.5 In Hot Water

Demetrius's science class is performing an experiment. Demetrius fills a beaker with **room temperature** water. He slowly **heats** the water over a source of constant heat and records the **water temperature** at **different times** in the table below.



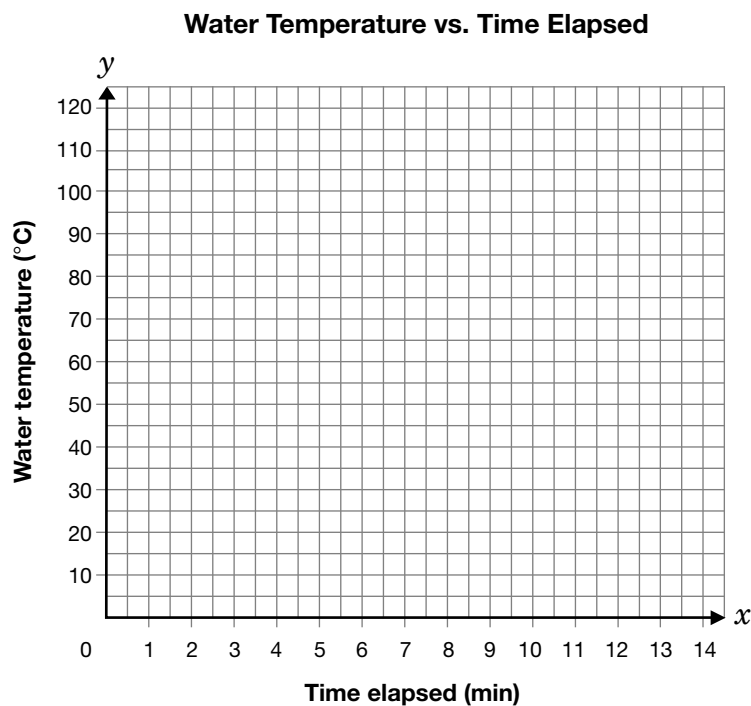
Time elapsed, $x$ (min)	Water temperature, $y$ (°C)	First differences
2	30	
4	43	
6	54	
8	66	
10	77	

- a) i) Complete the **first differences** column in the table of values above.
- ii) Is the **relationship** between the **water temperature** and the **time elapsed** linear or non-linear?

Check one:  linear or  non-linear

Give reasons for your answer.

- b) Graph the **data** from question a) on the grid below.  
Draw a **line of best fit**.



- c) Water **boils** when it reaches a temperature of **100 °C**.

Predict **how long** it will take the water in Demetrius's beaker to **boil**.  
Justify your answer.

- d) Suppose that Demetrius repeats the above experiment but fills his beaker with **cold** water taken from the refrigerator instead of **room temperature** water.

Compare **the line of best fit** for the data from this **new** experiment with the line in question b).