# Patterns and Relationships — Set 7

* *Note:* All of these below elements are interdependent on each other. Students should be provided one or two elements and be able to work out other sections from what has been provided.

Ⓐ *Can interpret a question that contains a linear or basic parabolic problem.*

Macy drops a ball off a 100m tall building. As it drops it speeds up. In the 1st second it falls 1m, in the 2nd second it falls an extra 3m (now 96m off the ground). In the 3rd second it falls another 5m (now 91m off ground). How long does it take to hit the ground?

Ⓑ *Can create graphs to solve linear or basic parabolic problems*
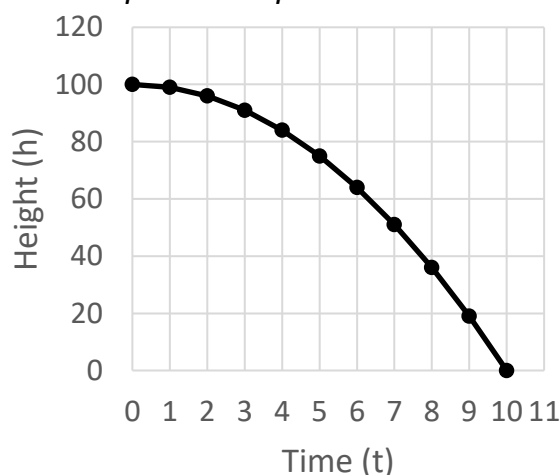
- Need numbers along both axis.
- Dots or crosses put in the correct place.
- Use dots or crosses when information is discrete. (things you count)
- Join the dots or crosses to create a line when information is indiscrete. (things you measure)

Ⓒ *Can use tables to solve linear or basic parabolic problems*

Time (t)	Height (h)
0	100
1	99
2	96
3	91
8	36

- Name each column
- Put a symbol to represent each column e.g. (h) and (m)
- Fill in both columns correctly
- Can work out numbers in both columns from a larger number in the opposite column.

Ⓓ *Can form equations to solve problems.*

$$h = 100 - t^2$$

First work out the pattern 100 99 96 91

Constant difference -1 -3 -5

Of -2 -2 -2

Half of the second difference is -1 so is a $-x^2$ relationship

Time (t)	Height (h)	$-t^2$	$100 - t^2$
0	100	-0	100
1	99	-1	99
2	96	-4	96
3	91	-9	91

How long until it hits ground (0 height) $0 = 100 - t^2$

Rearrange and solve $100 = t^2$

Write answer in context $t = 10$

It takes 10 seconds for the ball to hit the ground

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