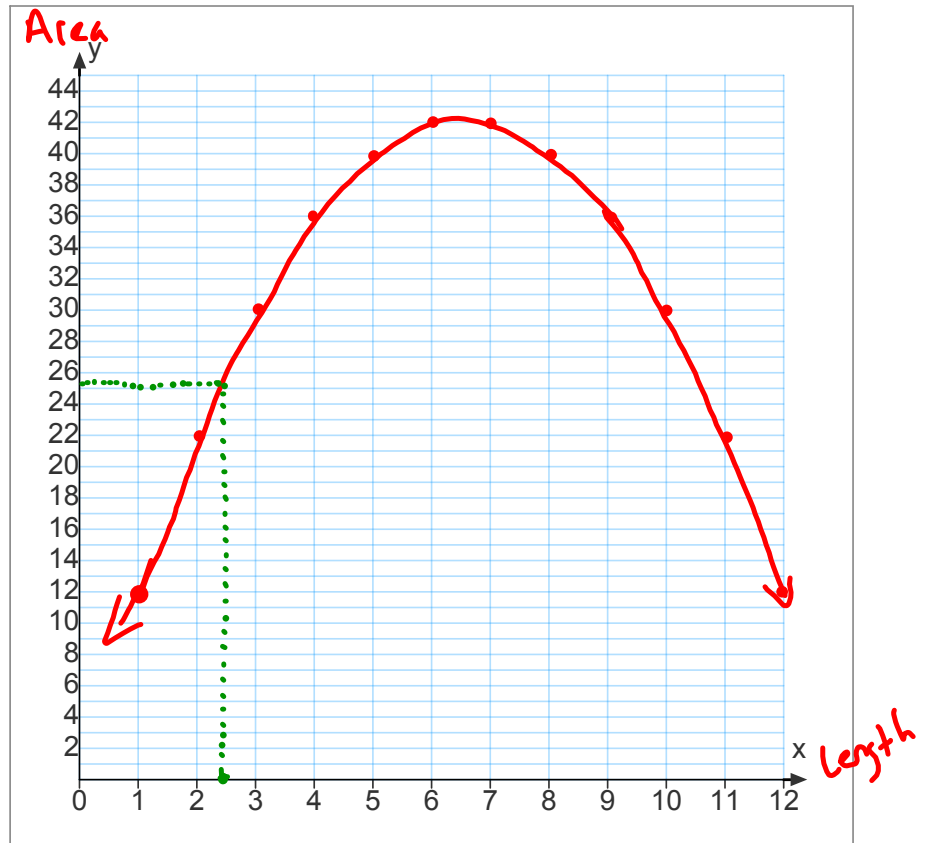


Consider a rectangle with a fixed perimeter of 26 units.

We will look at how the area of the rectangle changes as the length and width change. Complete the following table for lengths 1 through 12 units. Plot the points on the grid.

Length (units) x	Width (units) y	Area (units <sup>2</sup> ) y
1	12	12
2	11	22
3	10	30
4	9	36
5	8	40
6	7	42
7	6	42
8	5	40
9	4	36
10	3	30
11	2	22
12	1	12



Which would work better (why?):

a line of best fit

a curve of best fit

Estimate the area of a rectangle with length 2.5 units.

the area would be about 26 units<sup>2</sup>

In this course, we explore one type of non-linear relation.

## QUADRATIC RELATION

- an equation that describes a parabola
- an equation of the form  $y = ax^2 + bx + c$ , where  $a \neq 0$



## PARABOLA

- a symmetrical U-shaped graph
- the graph of a quadratic relation

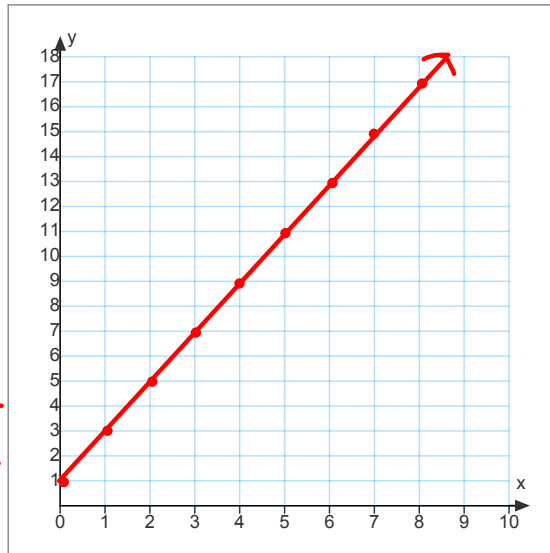
Example 1: Draw a line or curve of best fit.

Graph the data in each table. Draw a line or a curve of best fit through the points. Explain your choice.

a)

X	Y
0	1
1	3
2	5
3	7
4	9
5	11
6	13
7	15
8	17

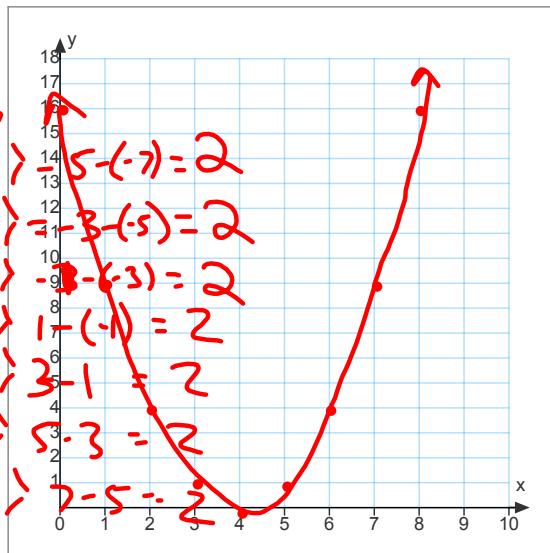
$$\begin{aligned} 3-1 &= 2 \\ 5-3 &= 2 \\ 7-5 &= 2 \\ 9-7 &= 2 \\ 11-9 &= 2 \\ 13-11 &= 2 \\ 15-13 &= 2 \\ 17-15 &= 2 \end{aligned}$$



b)

X	Y
0	16
1	9
2	4
3	1
4	0
5	1
6	4
7	9
8	16

$$\begin{aligned} 9-16 &= -7 \\ 4-9 &= -5 \\ 1-4 &= -3 \\ 0-1 &= -1 \\ 1-0 &= 1 \\ 4-1 &= 3 \\ 9-4 &= 5 \\ 16-9 &= 7 \end{aligned} \quad \begin{aligned} 5-(-7) &= 2 \\ -3-(-5) &= 2 \\ -1-(-3) &= 2 \\ 1-(-1) &= 2 \\ 3-1 &= 2 \\ 5-3 &= 2 \\ 7-5 &= 2 \end{aligned}$$

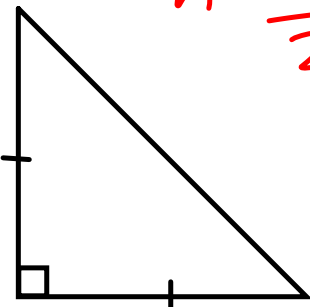


Example 2: The formula for the area of a triangle is  $A=0.5bh$ , where  $b$  represents the length of the base and  $h$  represents the height.

(a) Find the area of a right isosceles triangle with each base length from 1 cm to 6 cm. Record your results in the table.

(b) Graph the data. Draw a smooth curve through the points.

$$A = \frac{b \times h}{2}$$



$$A = \frac{1 \times 1}{2} = 0.5$$

$$1^2 \quad 2^2$$

(a)

Base Length (cm)	Area (cm <sup>2</sup> )
1	0.5
2	2
3	4.5
4	8
5	12.5
6	18

