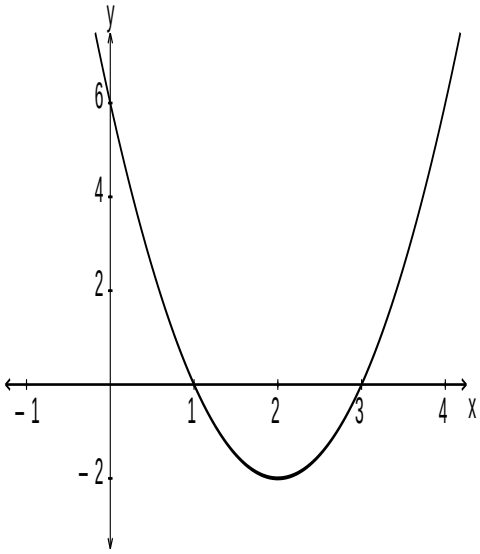
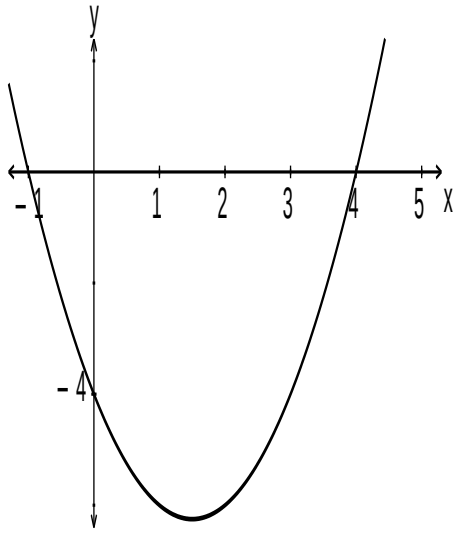
Perth Academy **National 5 Relationships** **Homework 13**

1. Establish the equation of each of these parabolas in the form $y = k\ \ x - a\ \ \ x - b$ .y=

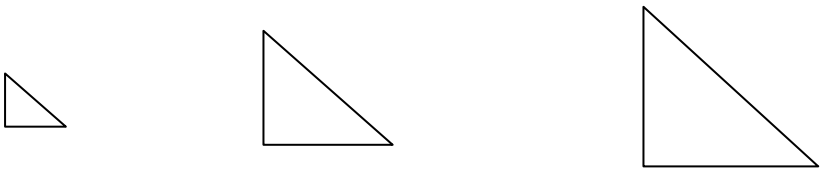
(a)



(b)



2.

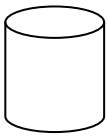


These triangles are mathematically similar, the ratios of corresponding sides being $1:2:3$.
The middle triangle has area 40cm^2. Calculate the area of the other two triangles.

3. (a) A rectangle has area 20cm^2. What happens to its area if its sides are doubled?
What is the new area?

(b). A cube has volume 15cm^3. What is the volume of a cube with edges twice as long?

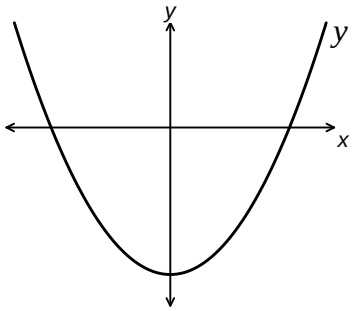
(c)



This cylinder has volume 100cm^3. A second cylinder is similar to this one, enlarged by a linear scale factor of 3 .
Calculate the volume of the bigger cylinder.

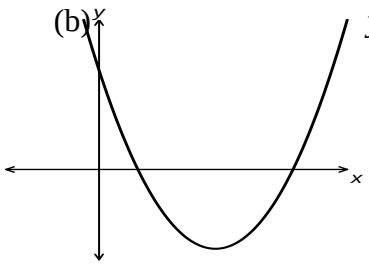
4. Find the coordinates of the points of intersection with the coordinate axes and also the turning points of each of the following sketch graphs:

(a)



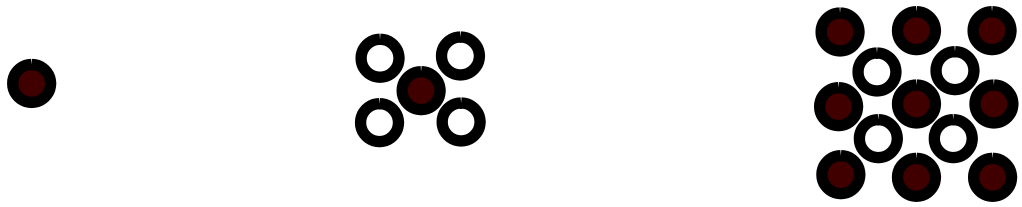
$y = x^2 - 16$

(b)



$y = x^2 - 6x + 5$

5. **Centred-Square Numbers**



$C_1 = 1$ $C_2 = 5$ $C_3 = 13$

The diagrams above show the first three centred-square numbers.

(a) Draw diagrams to show C_4 and C_5.

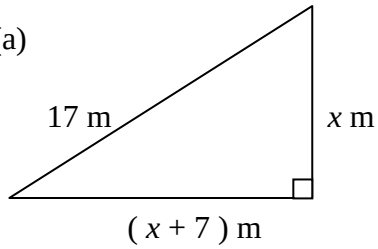
(b) Write down the values of C_4 and C_5.

(c) It can be shown that $C_n = an^2 + bn + 1$.

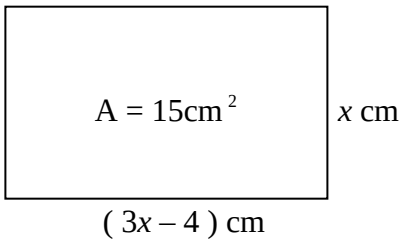
By considering C_1 and C_2, find the values of the integers a and b.

6. For each of the following find the value of x and hence the length of the sides of the figure.

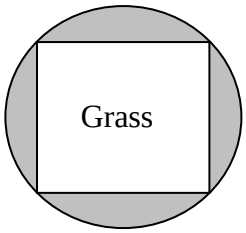
(a)



(b)



7. The garden layout of grass and rosebeds shown here is formed by constructing a circle through the corners of the square lawn.
If the grass has area 289 m^2 calculate the area of each rosebed.



8. Express in simplest form:

(a) $\sqrt{8}$ (b) $\sqrt{45}$ (c) $3\sqrt{18}$ (d) $2\sqrt{12}$

8. Simplify the following:

(a) $a^3 \times a^5$ (b) $a^6 \div a^2$ (c) $3x^{1/2} \times 2x^{-1/2}$

(d) $\left(\sqrt{a}\right)^6$ (e) $x^{1/2}\left(2x^{1/2} + x^{-1/2}\right)$ (f) $x^{1/3}\left(x^{2/3} + x^{-1/3}\right)$

9. Evaluate:

(a) $4^{3/2}$ (b) $8^{-1/3}$ (c) $25^{-3/2}$ (d) $32^{1/5}$