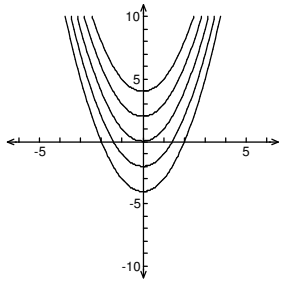
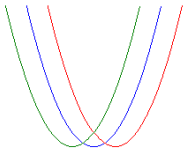
GRAPHS OF QUADRATIC FUNCTIONS: REVISION AND EXPLORATION

Task 1: Creations from transformations of quadratic functions

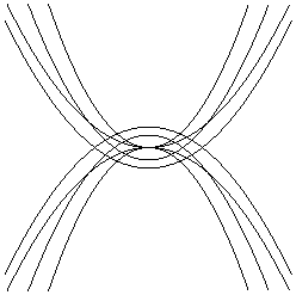
a) Open the program GridPic
b) Select Picture : from the **images** folder choose **parabola**
c) From the function options box on the right hand side of the image choose **quadratic** (or **quadratic 2).**
d) Set **a**=1 the **unhide** the graph
e) From the **Picture** menu choose **hide picture**
f) Click on the **ADD** button and select a colour for a new graph.
g) Again, choose **quadratic** (or **quadratic 2**) and choose values for **a, b** and **c (a,h,k) Update the graph** as you try different values. Repeat this process until you have created images similar each of those below. Beside each image write the function rule for each graph in the set you choose to create that image.



Strings of pearls



Trio of parabolas

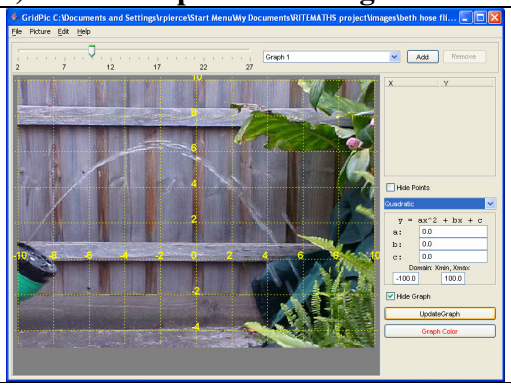


(Optional extra) Create a spider on a mirror

Task 2 Fitting a curve to an image

a) **Remove** each of the curves

b) Select the **picture** of the **garden hose**



c) Find the rule for a quadratic function that will fit neatly over the spray of the hose.

My rule is :

d) The spray currently leaves the hose at an angle of approximately 45^{o} to the horizontal. Sketch in the curve which you think the water would follow if the hose was moved so that the water sprayed out at an angle of approximately 30^{o}.

e) What other factors would affect the path of the water?

f) Mark the point on the photo where the water reaches its highest point? Use your rule to find the coordinates of this point on your curve.

g) If the cross beams of the fence are 100mm wide and the palings 150mm, how far from the hose does the water land? Explain how you worked this out?

TASK 3

a) Select a new picture: **spray2**

b) Find the rule for a graph of a quadratic which will 'fit' the curve of the spray. Write you rule here.

c) Assuming that the sprayer is rotating, but not moving forwards or backwards, describe or sketch the 3D-shape made, in the air, by the water coming from the sprinkler.

d) From this information and the photo, how can you work out an estimate for the total area on the ground that will be watered by this spray? (Not just the part in the photo) If you can think of more than one way briefly describe each method.

e) Change the grid size by moving the slider above the image. How does this change affect your answers to (b), (c) and (d)? Explain your reasoning.

Task 4

(a) Clear your work in GridPic and now select the image **spray-part**

(b) Here we can only see part of the curve of the water, use this, and your knowledge of the path followed by water sprays, along with other information you can glean from the photo, to estimate the likely distance and therefore area covered by this spray.

(c) I have a friend who likes to drive his 1968 green open top sports car along the side roads between Ballarat and Ballan– he finds these potato sprays a hazard! Suggest ways in which the farmer could make sure that they are not wasting water on the road. List any disadvantages for the farmer of these strategies.