**5A Rotations Around the x-axis**



1. The diagram shows the region $R$ which is bounded by the x-axis, the y-axis and the curve with equation $y=9-x^{2}$.

The region is rotated through 360˚ about the x-axis.

Find the exact volume of the solid generated.



**5B Rotations Around the y-axis**



1. The diagram shows the curve with equation $y=\sqrt{x-1}$.

The region R is bounded by the curve, the y axis and the lines $y=1$ and $y=3$.

The region is rotated 360˚ about the y axis.

Find the volume of the solid generated.



**5C Composite Volumes of Revolution**

Cylinder = $πr^{2}h$

Cone = $\frac{1}{3}πr^{2}h$

1. The region R is bounded by the curve with equation $y=x^{3}+2$, the line $y=5-2x$, and the x and y axes.
2. Verify that the coordinates of A are (1,3)



1. A solid is created by rotating the region 360˚ about the x-axis. Find the volume of this solid
2. The diagram shows the region R bounded by the curves with equations:

$y=\sqrt{x}$ and $y=\frac{1}{8x}$ and the line $x=1$.

The region is rotated through 360˚ about the x-axis.

Find the exact volume of the solid generated.



**5D Modelling with Volumes of Revolution**

1. A manufacturer wants to cast a prototype for a new design for a pen barrel made out of solid resin. The shaded region shown in the diagram is used as a model for the cross section of the pen barrel. The region is bounded by the x-axis and the curve with equation $y=k-100x^{2}$, and will be rotated around the y-axis. Each unit on the coordinate axes represents 1cm.



1. Suggest a suitable value for k
2. Use your value of k to estimate the volume of resin needed to make the prototype
3. State one limitation of this model