## 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 $360^{\circ}$ 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 $360^{\circ}$ about the $y$ axis.
Find the volume of the solid generated.


## 5C Composite Volumes of Revolution

$$
\begin{aligned}
& \text { Cylinder }=\pi r^{2} h \\
& \text { Cone }=\frac{1}{3} \pi r^{2} h
\end{aligned}
$$

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

b) A solid is created by rotating the region $360^{\circ}$ 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 $y=\frac{1}{8 x}$ and the line $x=1$.
The region is rotated through $360^{\circ}$ 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 $y=k-100 x^{2}$, and will be rotated around the $y$-axis. Each unit on the coordinate axes represents 1 cm .

a) Suggest a suitable value for k
b) Use your value of $k$ to estimate the volume of resin needed to make the prototype
c) State one limitation of this model
