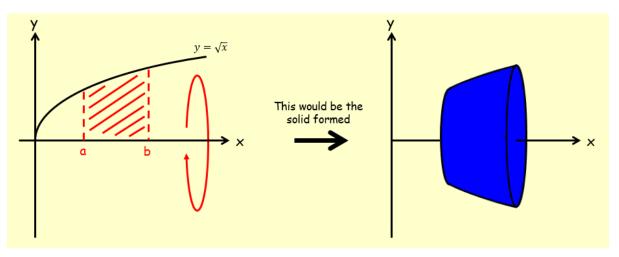
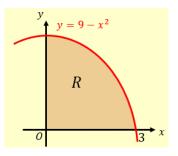
5A Rotations Around the x-axis

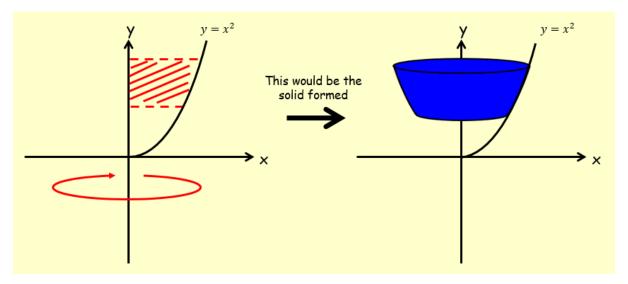


1. The diagram shows the region *R* which is bounded by the x-axis, the y-axis and the curve with equation $y = 9 - x^2$.

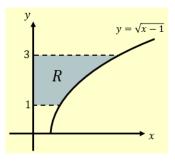
The region is rotated through 360° about the x-axis. Find the exact volume of the solid generated.



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.

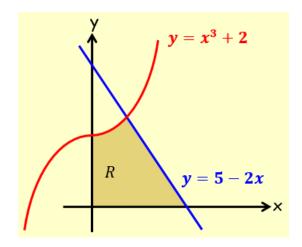


5C Composite Volumes of Revolution

Cylinder = $\pi r^2 h$

Cone =
$$\frac{1}{3}\pi r^2 h$$

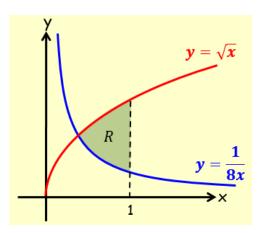
- 1. The region R is bounded by the curve with equation $y = x^3 + 2$, the line y = 5 2x, and the x and y axes.
- a) Verify that the coordinates of A are (1,3)



b) A solid is created by rotating the region 360° about the x-axis. Find the volume of this solid

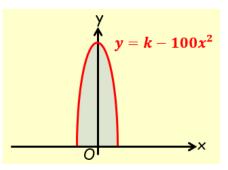
2. The diagram shows the region R bounded by the curves with equations:

 $y = \sqrt{x}$ 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.



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