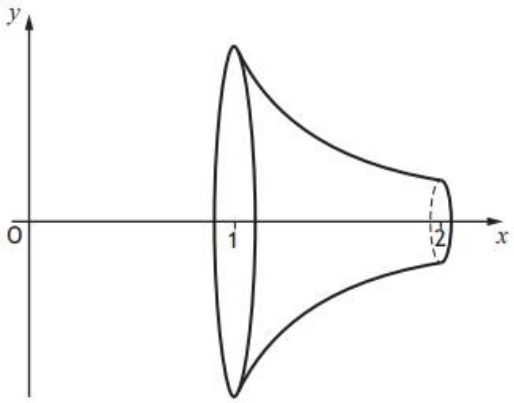
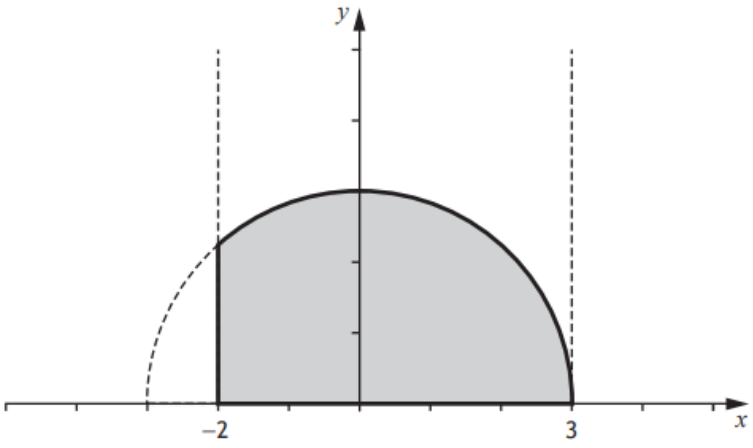
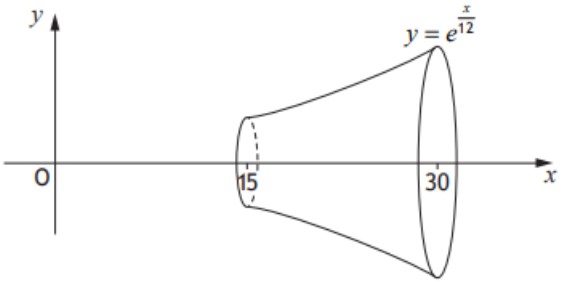
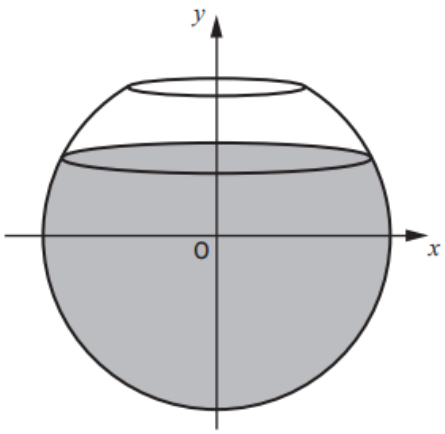
Y	Q	Volume of Revolution
2023	17	(a) Use integration by parts to find $\int x\sin 2x\,dx$. **3** A solid is formed by rotating the curve with equation $y=\sqrt{x\sin 2x}$ between $x=0$ and $x=1$ through 2π radians about the x-axis. (b) Calculate the volume of this solid. **3**
2022	9	An object is formed by rotating the curve $y=\dfrac{6x}{3x^3-1}$ between $x=1$ and $x=2$, through 2π radians about the x-axis.  Using the substitution $u=3x^3-1$, or otherwise, find the exact value of the volume of this object. **6**
2018	6	A part of the graph of $x^2+y^2=9$ is shown in the diagram below.  The shaded area is bounded by the graph, the x-axis and the lines $x=-2$ and $x=3$. This area is rotated 360° about the x-axis. Calculate the volume of the solid formed by this rotation. **4**

2016	13	A glass bowl is modelled by rotating the curve $y = e^{\frac{x}{12}}$ between $x = 15$ and $x = 30$ through 2π radians about the x-axis as shown in the diagram.  (a) Find the volume of the bowl. **3** (b) A line is to be put on the bowl to indicate when it is half full. How far above the base of the bowl should this line be marked? **3**
2016 Spec	11	A flower vase is modelled by rotating part of the curve $x = \sqrt{100 - y^2}$ through 2π radians about the y-axis as shown in the diagram.  (a) Find the volume of water needed to fill the vase to a depth of 16 cm. **4** (b) State **one** improvement that could be made to the design **1**