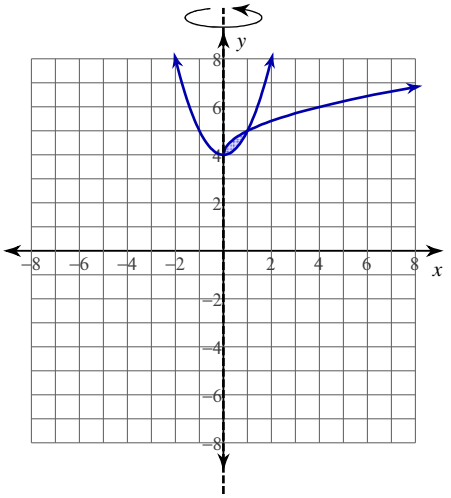
 Name_____

Volumes by Cylindrical Shells

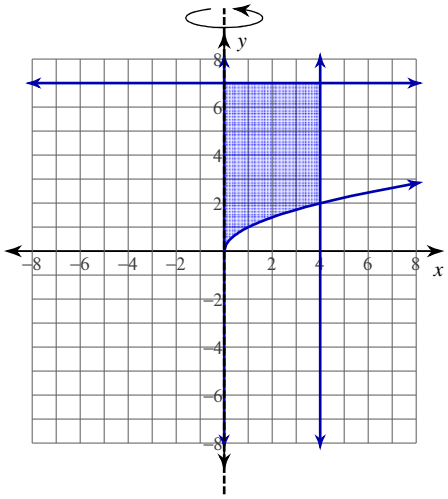
Date_____ Period____

For each problem, use the method of cylindrical shells to find the volume of the solid that results when the region enclosed by the curves is revolved about the the *y*-axis.

1) $y = \sqrt{x} + 4$
$y = x^2 + 4$



2) $y = 7$
$y = \sqrt{x}$
$x = 0$
$x = 4$

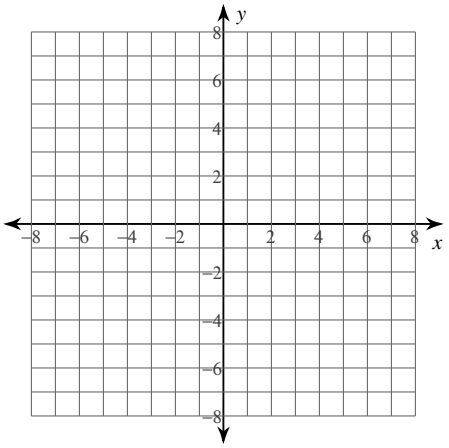


Critical thinking question:

3) Solve problem 2 using the method of washers. Why is this problem easier using cylindrical shells?

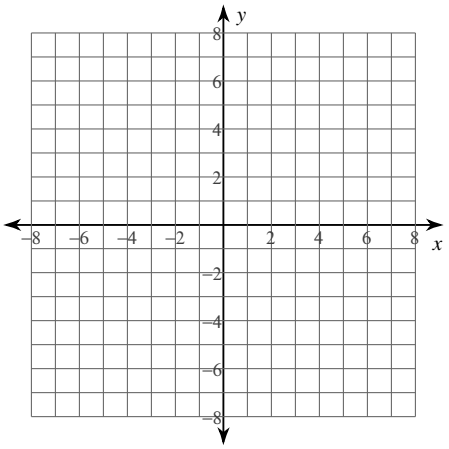
For each problem, use the method of cylindrical shells to find the volume of the solid that results when the region enclosed by the curves is revolved about the the *y*-axis. You may use the provided graph to sketch the curves and shade the enclosed region.

4) $y = 2x$
$y = x^2$



For each problem, use the method of cylindrical shells to find the volume of the solid that results when the region enclosed by the curves is revolved about the the given axis. You may use the provided graph to sketch the curves and shade the enclosed region.

5) $y = -x^2 + 7$
$y = x^2 + 5$
Axis: $x = 2$



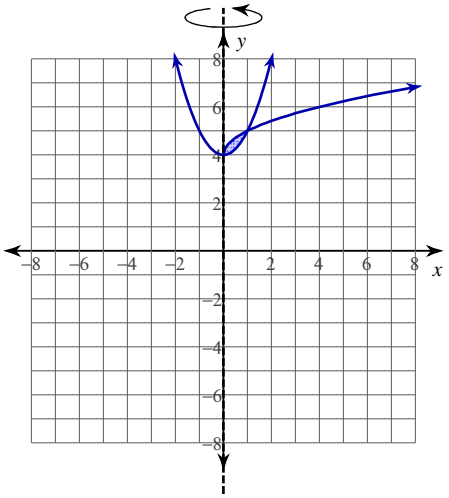
 Name_____

Volumes by Cylindrical Shells

Date_____ Period____

For each problem, use the method of cylindrical shells to find the volume of the solid that results when the region enclosed by the curves is revolved about the the *y*-axis.

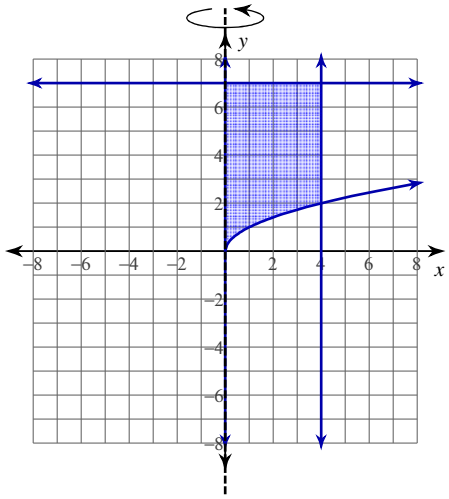
1) $y = \sqrt{x} + 4$
$y = x^2 + 4$



$2\pi \int_0^1 x\left(\sqrt{x} + 4 - \left(x^2 + 4\right)\right) dx$

$= \frac{3}{10}\pi$

2) $y = 7$
$y = \sqrt{x}$
$x = 0$
$x = 4$



$2\pi \int_0^4 x\left(7 - \sqrt{x}\right) dx$

$= \frac{432}{5}\pi$

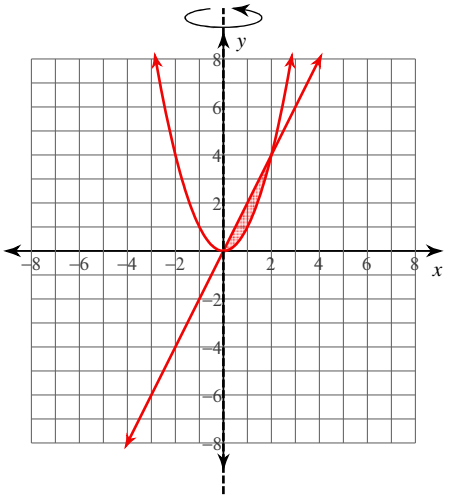
Critical thinking question:

3) Solve problem 2 using the method of washers. Why is this problem easier using cylindrical shells?

$\pi \int_0^2 \left(y^2\right)^2 dy + \pi \int_2^7 4^2 dy = \frac{432}{5}\pi$ The cylindrical shell method requires one integral, while the disk method requires two.

For each problem, use the method of cylindrical shells to find the volume of the solid that results when the region enclosed by the curves is revolved about the the *y*-axis. You may use the provided graph to sketch the curves and shade the enclosed region.

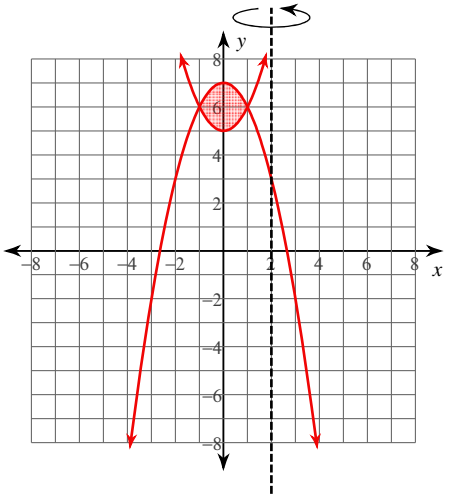
4) $y = 2x$
$y = x^2$



$$2\pi \int_0^2 x(2x - x^2)\, dx$$
$$= \frac{8}{3}\pi$$

For each problem, use the method of cylindrical shells to find the volume of the solid that results when the region enclosed by the curves is revolved about the the given axis. You may use the provided graph to sketch the curves and shade the enclosed region.

5) $y = -x^2 + 7$
$y = x^2 + 5$
Axis: $x = 2$



$$2\pi \int_{-1}^1 (2 - x)(-x^2 + 7 - (x^2 + 5))\, dx$$
$$= \frac{32}{3}\pi$$