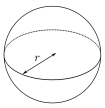
Name: _____

Part 1. Find the **volume** of each figure:

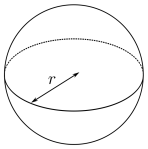
Hypothesis: How will the volume change with a dilation of 2 or 3?

Spheres: Volume = $(4/3)\pi r^3$



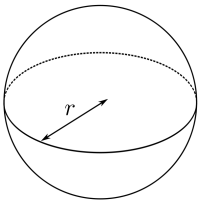
radius = 3

_____



radius = 6

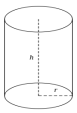
_____



radius = 9

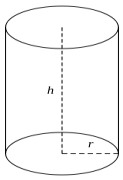
_____

Cylinders: Volume = $\pi r^2 h$



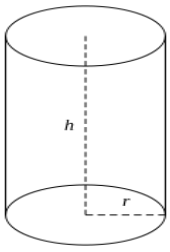
radius = 2
height = 3

_____



radius = 4
height = 6

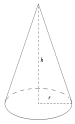
_____



radius = 6
height = 9

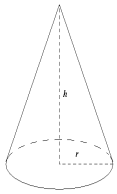
_____

Cones: Volume = $\pi r^2 h/3$



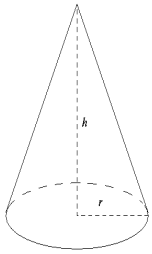
radius = 3
height = 4

_____



radius = 6
height = 8

_____



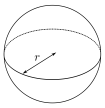
radius = 9
height = 12

_____

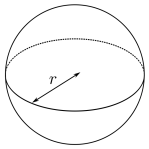
Part 2. Find the **surface area** of each figure:

Hypothesis: How will the surface area change with a dilation of 2 or 3?

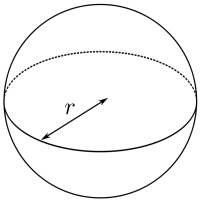
Spheres: Surface Area = $4\pi r^2$



radius = 3

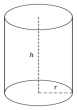


radius = 6

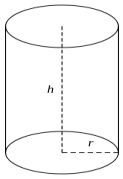


radius = 9

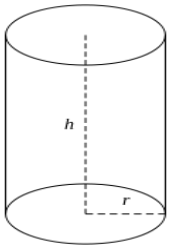
Cylinders: Surface Area = $2\pi rh + 2\pi r^2$



radius = 2
height = 3

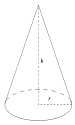


radius = 4
height = 6

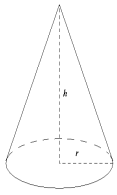


radius = 6
height = 9

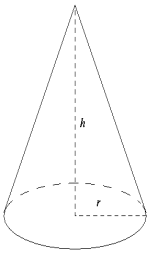
Cones: Surface Area = $\pi r\left(r+\sqrt{h^2+r^2}\right)$



radius = 3
height = 4



radius = 6
height = 8

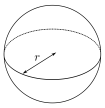


radius = 9
height = 12

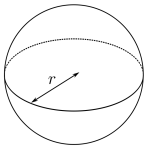
Part 3. Find the **surface area:volume ratio** of each figure:

Hypothesis: How will the surface area:volume ratio change with a dilation of 2 or 3?

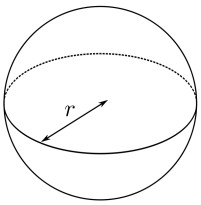
Spheres:



radius = 3

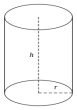


radius = 6

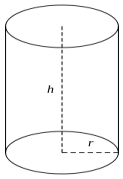


radius = 9

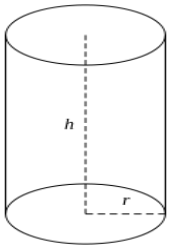
Cylinders:



radius = 2
height = 3

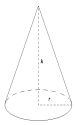


radius = 4
height = 6

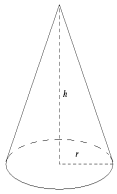


radius = 6
height = 9

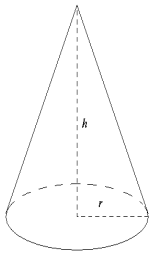
Cones:



radius = 3
height = 4



radius = 6
height = 8



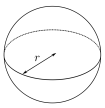
radius = 9
height = 12

ANSWER KEY

Part 1. Find the **volume** of each figure:

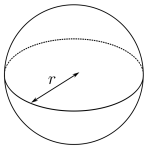
Hypothesis: How will the volume change with a dilation of 2 or 3?
The correct answer is they will go up by 8 and 27, but as this is meant as a guess, anything should be acceptable here.

Spheres: Volume = $(4/3)\pi r^3$



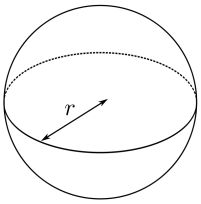
radius = 3

36π



radius = 6

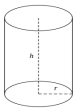
288π



radius = 9

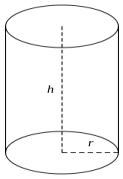
972π

Cylinders: Volume = $\pi r^2 h$



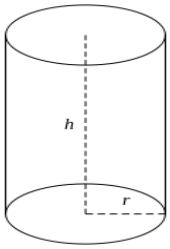
radius = 2
height = 3

12 π



radius = 4
height = 6

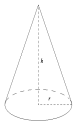
96 π



radius = 6
height = 9

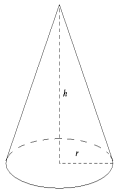
324 π

Cones: Volume = $\pi r^2 h/3$



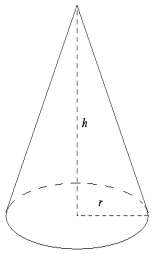
radius = 3
height = 4

12 π



radius = 6
height = 8

96 π



radius = 9
height = 12

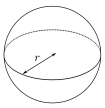
324 π

ANSWER KEY

Part 2. Find the **surface area** of each figure:

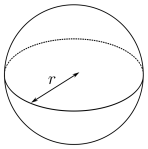
Hypothesis: How will the surface area change with a dilation of 2 or 3?
They should find that it goes up by 4 and 9, but any guess is okay.

Spheres: Surface Area = $4\pi r^2$



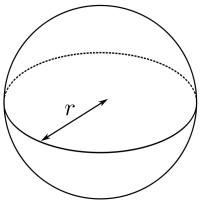
radius = 3

36π



radius = 6

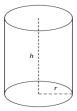
144π



radius = 9

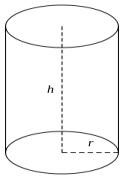
324π

Cylinders: Surface Area = $2\pi rh + 2\pi r^2$



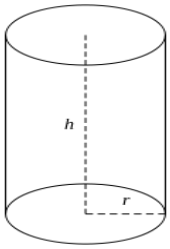
radius = 2
height = 3

20π



radius = 4
height = 6

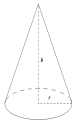
90π



radius = 6
height = 9

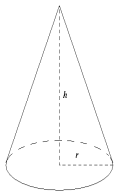
180π

Cones: Surface Area = $\pi r\left(r+\sqrt{h^2+r^2}\right)$



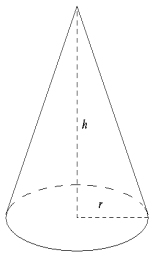
radius = 3
height = 4

24π



radius = 6
height = 8

96π



radius = 9
height = 12

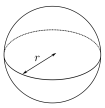
216π

ANSWER KEY

Part 3. Find the **surface area:volume ratio** of each figure:

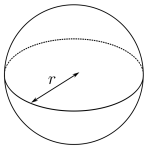
Hypothesis: How will the surface area:volume ratio change with a dilation of 2 or 3?
They should eventually find that it goes down by ½ and 1/3, but any guess is okay.

Spheres:



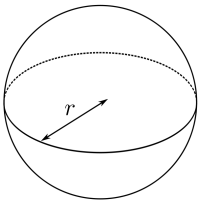
radius = 3

1



radius = 6

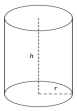
½



radius = 9

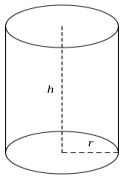
1/3

Cylinders:



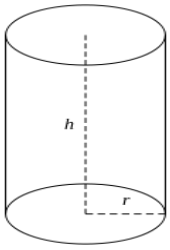
radius = 2
height = 3

1 2/3



radius = 4
height = 6

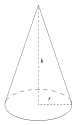
5/6=.833333



radius = 6
height = 9

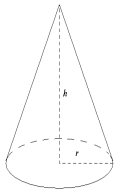
5/9 = .555555

Cones:



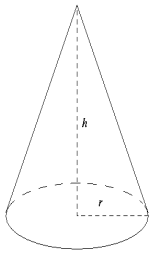
radius = 3
height = 4

2



radius = 6
height = 8

1



radius = 9
height = 12

2/3