**Unit 12**

**Surface Area & Volume**

**Homework Packet**

**12-1 – Surface Area of Rectangular Prisms and Cubes**

**12-2 – Surface Area of Triangular Prisms**

**12-3 – Surface Area of Square and Triangular Pyramids**

**12-4 – Volume of Rectangular Prisms and Cubes**

**12-5 – Volume of Triangular Prisms**

**12-6 – Volume of Square and Triangular Pyramids**

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**12-8 – Volume of a Cone**

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**12-10 – Volume of a Hemisphere**

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Math 7 – Unit 12 (Surface Area & Volume)**

**HW #12-1 – Surface Area of Rectangular Prisms and Cubes**

**Mrs. Frascatore**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**You may use a calculator on ALL questions, but be sure to show your work. Label your answers!**

1) Find the surface area of the rectangular prism.

13 in.

3 in.

9 in.

The surface area is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2) Find the surface area of the cube. Express your answer in simplest mixed number form.

 in.

The surface area is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3) Find the surface area of the cube.

4 ft

The surface area is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4) A box has the shape of a rectangular prism as shown below. If the height is increased by 0.6 cm, by how much does the surface area of the box ***increase***?

10 cm

3 cm

5 cm

The surface area increases by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Math 7 – Unit 12 (Surface Area & Volume)**

**HW #12-2 – Surface Area of Triangular Prisms**

**Mrs. Frascatore**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**You may use a calculator on ALL questions, but be sure to show your work. Label your answers!**

1) A block of wood has the shape of a right triangular prism. What is its surface area?



1.5 in.

2.5 in.

11 in.

2 in.

The surface area is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2) Find the surface area of the following right triangular prism.



8 cm

The surface area is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3) Find the surface area of the triangular prism. The base of the prism is an isosceles triangle.



 40 cm

41 cm

15 cm

45 cm

The surface area is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4) Find the surface area of the following right triangular prism.



15 cm

The surface area is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Math 7 – Unit 12 (Surface Area & Volume)**

**HW #12-3 – Surface Area of Square and Triangular Pyramids**

**Mrs. Frascatore**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**You may use a calculator on ALL questions, but be sure to show your work. Label your answers!**

1) Find the surface area of the square pyramid.



16 m

17 m

The surface area is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2) A paperweight has the shape of an equilateral triangular pyramid. Find the surface area of the paperweight.



9 in.

5 in.

6 in.

The surface area of the paperweight is \_\_\_\_\_\_\_\_\_\_.

3) Find the surface area of the regular triangular pyramid.



4.5 in.

4.5 in.

5 in.

The surface area of the regular triangular pyramid is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4) A student incorrectly says the surface area of the square pyramid is 868 cm2.



**Part A**

 What is the correct surface area?

24 cm

25 cm

14 cm

**Part B**

 What error did the student likely make?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Math 7 – Unit 12 (Surface Area & Volume)**

**HW #12-4 – Volume of Rectangular Prisms and Cubes**

**Mrs. Frascatore**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**You may use a calculator on ALL questions, but be sure to show your work. Label your answers!**

**Volume of a Prism**

V = Bh

1) Find the volume of the rectangular prism.

4 cm

4 cm

10 cm

The volume is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2) Find the volume of the cube.

 cm

The volume is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3) *How many times* larger is the volume of the 8 ft cube compared to the volume of the 4 ft cube. [You must find the volume of EACH cube first].

4 ft

8 ft

The volume of the 8 ft cube is \_\_\_\_\_\_\_\_\_\_ times larger than the volume of the 4 ft cube.

4) The volume of the rectangular prism shown below is 32.7375 ft3. What is its width?



The width of the volume is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5) The rectangular prism below has dimensions 11.7 in x 4.5 in x 8.2 in. What is the volume?



The volume is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Challenge Questions**

6) Freezer A has interior dimensions of 1 ft x 1 ft x 5 ft and sells for $349.99. Freezer B has interior dimensions of 1.5 ft x 1.5 ft x 4 ft and sells for $699.99. Which freezer is a better buy in terms of *dollars per cubic foot*?

Freezer \_\_\_\_\_\_\_\_

7) Determine the volume of the three-dimensional figure below. Explain how you got your answer.



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Math 7 – Unit 12 (Surface Area & Volume)**

**HW #12-5 – Volume of Triangular Prisms**

**Mrs. Frascatore**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**You may use a calculator on ALL questions, but be sure to show your work. Label your answers!**

**Volume of a Prism**

V = Bh

1) Find the volume of the triangular prism.



The volume is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2) Find the volume of the triangular prism.



The volume is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3) Find the volume of the triangular prism.



2.4 yd

7 yd

3.6 yd

The volume is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Challenge Question**

4) This section of a concrete skateboard ramp has the shape of a triangular prism.

**Part A**

Find the volume of the triangular prism.

6 ft

6 ft

9.2 ft

6 ft

The volume is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Part B**

A local skate park wants to create the same ramp as above. How much would the concrete cost if you pay $3.00 per cubic foot?

The cost of the concrete used in the ramp is $\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Math 7 – Unit 12 (Surface Area & Volume)**

**HW #12-6 – Volume of Square and Triangular Pyramids**

**Mrs. Frascatore**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**You may use a calculator on ALL questions, but be sure to show your work. Label your answers!**

**Volume of a Pyramid**

V = Bh

1) To the nearest cubic meter, find the volume of the square pyramid.



14 m

16 m

17 m

The volume is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2) A paperweight has the shape of an equilateral triangular pyramid. Find the volume of the paperweight.



10 in.

5 in.

6 in.

The volume of the paperweight is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3) A pyramid has a square base of side 4 in. and a height of 9 in. Find the volume of the square pyramid.

The volume of the square pyramid is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4) Find the volume of the following triangular pyramid.



The volume of the triangular pyramid is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Math 7 – Unit 12 (Surface Area & Volume)**

**HW #12-7 – Volume of a Cylinder**

**Mrs. Frascatore**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Remember to show exact answers before rounding. You may use a calculator on ALL questions, but be sure to show your work. Label your answers!**

**Volume of a Cylinder**

V = πr2h

1) Use the diagram to help you find the *exact* volume of the right circular cylinder.



The exact volume of the right circular cylinder is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2) Use the diagram to help you find the *exact* volume of the right circular cylinder.



1 ft

1 ft

The exact volume of the right circular cylinder is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3) The circular cylinder has a radius of 2 cm, and a height of 5.3 cm. *To the nearest cubic centimeter*, find the volume.



The approximate volume of the right circular cylinder is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4) The right cylinder below has a diameter of 12 inches and height of 25 inches. Use the diagram to help you, *to the nearest tenth*, find the volume.



The approximate volume of the right circular cylinder is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5) Use the diagram to help you find the *exact* volume of the right circular cylinder.



The exact volume of the right circular cylinder is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Math 7 – Unit 12 (Surface Area & Volume)**

**HW #12-8 – Volume of a Cone**

**Mrs. Frascatore**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Remember to show exact answers before any rounding. You may use a calculator on ALL questions, but be sure to show your work. Label your answers!**

**Volume of a Cone**

V = πr2h

1) Use the diagram to find the *exact* volume of the right circular cone.



The exact volume of the right circular cone is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2) Use the diagram to find the approximate volume of the right circular cone, *to the nearest tenth*.



The approximate volume of the right circular cone is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3) Use the diagram to find the volume of the right circular cone *to the nearest cubic meter*.



The approximate volume of the right circular cone is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4) The cylinder below has a height of 6 cm, and a radius of 4 cm. The right circular cone has a height of 8 cm, and a radius of 6 cm. Use the diagram below to determine *which has the greater volume*, the cylinder or the cone.



**Volume of a Cylinder**

V = πr2h

The exact volume of the right circular cylinder is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The exact volume of the right circular cone is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has the greater volume.

5) You want to fill the cylinder shown below with water. All you have is a container shaped like a cone with a radius of 4 inches and a height of 3 inches; you can use this cone-shaped container to take water from a faucet and fill the cylinder.

**Part A**

 Exactly how much water will fit in the cylinder?

in.

in.

**Part B**

 Exactly how much water will fit in the cone?

**Part C**

 Using your answers to parts A and B, determine how many full cones will fit in the cylinder ***without overflowing*** the cylinder. Explain, in words, your reasoning.

\_\_\_\_\_\_\_\_\_\_ full cones will fit in the cylinder, because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Math 7 – Unit 12 (Surface Area & Volume)**

**HW #12-9 – Volume of a Sphere**

**Mrs. Frascatore**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**You may use a calculator on ALL questions, but be sure to show your work. Label your answers!**

**Volume of a Sphere**

V = πr3

1) Use the diagram to find the *exact* volume of the sphere.



The exact volume of the sphere is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2) Use the diagram to find the *exact* volume of the sphere.



The exact volume of the sphere is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3) A cylinder has a radius of 3 inches and a height of 4¾ inches. A sphere has a radius of 3 inches. What is the *difference* between the volumes, to the nearest tenth of a cubic inch, of the cylinder and the sphere? (Remember to show BOTH volumes). **HINT:** Find the EXACT difference of the figures, then find the rounded difference.

**Volume of a Cylinder**

V = πr2h

(A) 21.2

(B) 51.8

(C) 68.3

(D) 96.6

4) The average basketball has a diameter of 9.5 inches. *To the nearest tent*h of a cubic inch, find the volume of an average basketball.

The approximate volume of the average basketball is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5) Use the diagram to answer the following questions.

**Volume of a Cone**

V = πr2h



 2.8 mm

a) Predict which of the figures shown above has the greater volume. Explain, in words, your reasoning.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) Use the diagram to find the exact volume of the cone.

c) Use the diagram to find the exact volume of the sphere.

d) Which shape, the cone or the sphere has the greatest volume?

***ONE MORE QUESTION 🡪 : )***

6) A cylinder has a diameter of 20 centimeters and a height of 20 centimeters. What is the exact volume of the largest sphere that will fit into the cylinder?



**Math 7 – Unit 12 (Surface Area & Volume)**

**HW #12-10 – Volume of a Hemisphere**

**Mrs. Frascatore**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**You may use a calculator on ALL questions, but be sure to show your work. Label your answers!**

**Volume of a Sphere**

V = πr3

1) Use the diagram to find the *exact* volume of the *hemisphere*.



The exact volume of the hemisphere is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2) Use the diagram to find the volume of the hemisphere, *to the nearest cubic centimeter*.



The approximate volume of the hemisphere is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3) Use the diagram to find the exact volume of the hemisphere.



The exact volume of the hemisphere is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4) Find the exact volume of the following three-dimensional object.

**Volume of a Cylinder**

V = πr2h



The exact volume of the three-dimensional shape is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5) Find the exact volume of the following three-dimensional object.



The exact volume of the three-dimensional shape is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6) Find the exact volume of the following three-dimensional object.

**Volume of a Cone**

V = πr2h



The exact volume of the three-dimensional shape is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.