Geometry/Geo Honors

Poche

Week 3 & 4

Name:_____ Per.:_____
Teacher: B. Poche

Geometry/Geometry Honors Weeks 3-4 Packet

Complete the following packet and return to school by Friday, April 24th. An assignment template is included for you to show your work. You Do Not need to draw the pictures, but you must show work for every problem to receive full credit.

Week 3- Surface Area and Volume of Prisms
Read over the attached notes.
A#110, PWS 11.2, #s 4, 5, 6: PWS 11.4, #s 1, 2, 9
A#111, Reteaching WS 11.2, #s 2, 3: Reteaching WS 11.4, #s 1, 3, 7

Week 4- Surface Area and Volume of Cylinders
Read over the attached notes.
A#112, PWS 11.2, #s 7, 8, 9: PWS 11.4, #s 14, 15, 16
A#113, Reteaching WS 11.2, #s 1, 4: Reteaching WS 11.4, #s 2, 4, 10

If you have any questions please do not hesitate to contact me at pocheb@leonschools.net or through the class Remind account.

Be safe, tell your family and friends how much you love them, and I hope to see all of you soon.

11.2 and 11.4: Lateral Surface Area, Total Surface Area, and Volume of Prisms

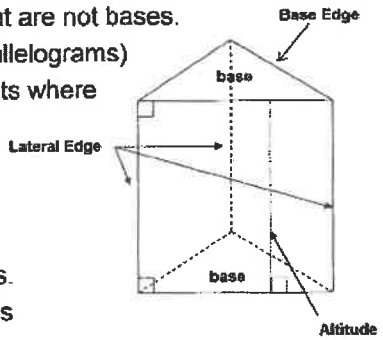
Prism: A polyhedron with two congruent, parallel faces.

Bases: 2 congruent, parallel faces

Lateral faces: The faces that are not bases. (Always parallelograms)

Lateral edges: The segments where the lateral faces intersect. Always parallel.

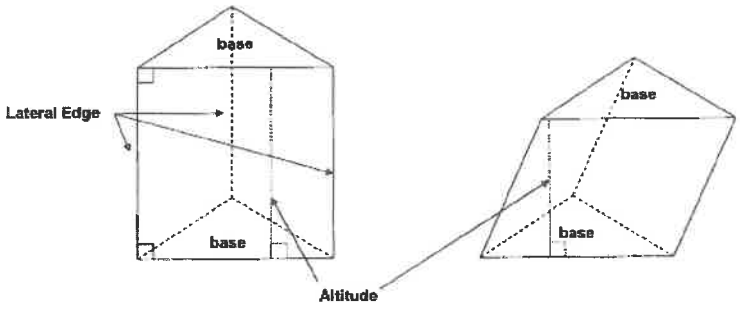
Altitude: A segment that is perpendicular to the bases. The length of the altitude is the height of the prism.



Right Prism

Right Prism: A prism with lateral edges that are also altitudes of the prism.

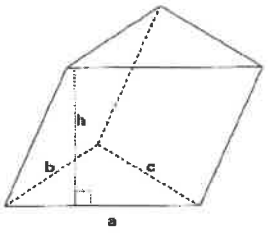
If the lateral edges are not perpendicular to the bases, then it is an **oblique prism**.



Right Prism

Oblique Prism

Lateral Area: The sum of the areas of the lateral faces (all sides except the bases).



LA= ah + bh + ch

= h(a + b + c)

= h(perimeter of the base)

$$LA_{(prism)} = P \cdot h$$

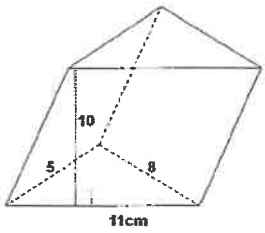
LA= Lateral area

P= Perimeter of the base

h= Height of the prism

(length of the altitude)

Ex. Find the Lateral Surface Area of the oblique prism.

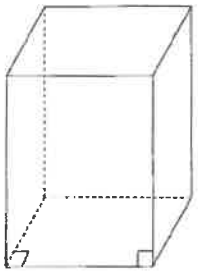


$$LA = (5+8+11)(10)$$
$$= (24)(10)$$
$$LA = 240\text{cm}^2$$

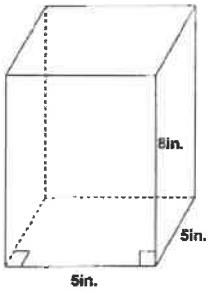
Total Surface Area of a prism is the lateral area plus the areas of the bases.

SA= LA + 2B

SA= Total surface area
LA= Lateral surface area
B= Area of a base



Ex. Find the Total Surface Area of the prism.



$$TA = LA + 2B$$
$$= (5+5+5+5)(8) + 2(5 \cdot 5)$$
$$= (20)(8) + 2(25)$$
$$= 160 + 50$$
$$TA = 210 in^2$$

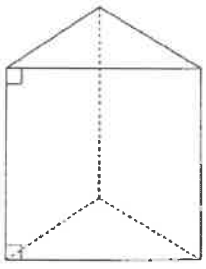
Volume: The measure of the amount of space that a solid encloses.

Volume is always given in cubic units.

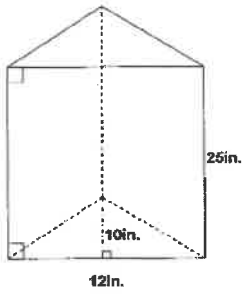
Volume of a Prism:

$$V_{(prism)} = B \cdot h$$

V= Volume
B= Area of a base
h=Height of the prism



Ex. Find the volume of the prism.



$$V_{(prism)} = B \cdot h$$
$$= \left(\frac{1}{2} \cdot 12 \cdot 10\right)(25)$$
$$= (60)(25)$$
$$= 1500 \text{ in}^3$$

Name:_____ Teacher: B. Poche

Per.:_____ Assign.#____

Clearly number each problem and circle your answer. You DO NOT have to draw the pictures but remember to show your work for every problem.

* NOTE: Use this format/template for EACH assign.

Name _____ Class _____ Date _____

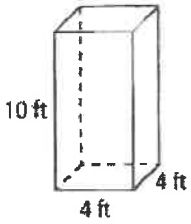
11-2 Practice

Form G

Surface Areas of Prisms and Cylinders

Use a net to find the surface area of each prism. Round your answer to the nearest whole number.

1.



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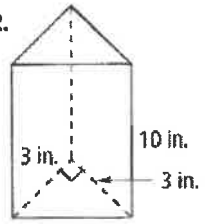
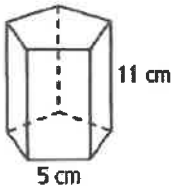


3. **a.** Classify the prism at the right.

   b. The bases are regular pentagons. Find the lateral area of the prism.

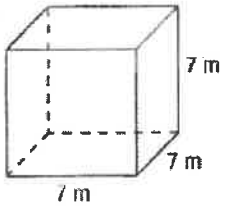
   c. The area of each is 43 cm^2. Find the sum of their areas.

   d. Find the surface area of the prism.

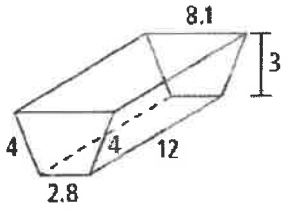


Use formulas to find the lateral area and surface area of each prism. Round your answer to the nearest whole number.

4.



5.



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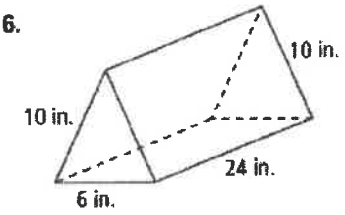
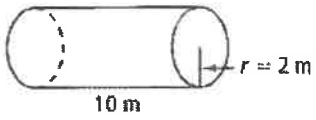
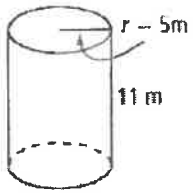


Find the lateral area of each cylinder to the nearest whole number.

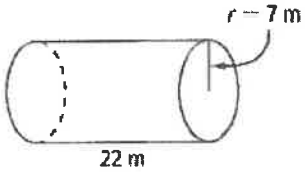
7.



8.

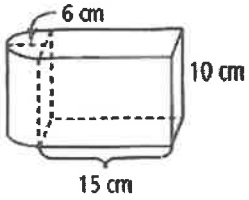


9.



10. A box of cereal measures 8 in. wide, 11 in. high, and 2 in. deep. If all surfaces are made of cardboard and the total amount of overlapping cardboard in the box is 7 in^2, how much cardboard is used to make the cereal box?

11. Judging by appearances, what is the surface area of the solid shown at the right? Show your answer to the nearest whole number.



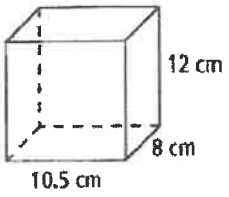
Name _____ Class _____ Date _____

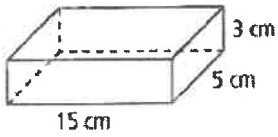
11-4 Practice

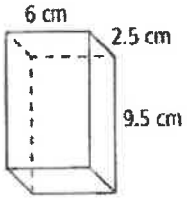
Form G

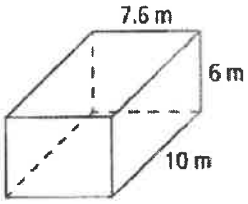
Volumes of Prisms and Cylinders

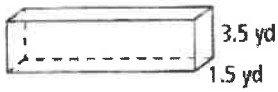
Find the volume of each rectangular prism.

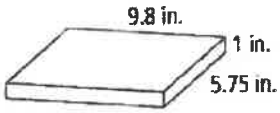
1. 

2. 

3. 

4. 

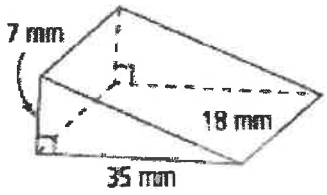
5. 

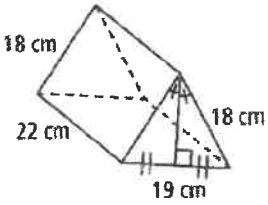
6. 

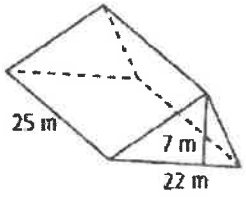
7. The base is a square, 4.5 cm on a side. The height is 5 cm.

8. The base is a rectangle with length 3.2 cm and width 4 cm. The height is 10 cm.

Find the volume of each triangular prism to the nearest tenth.

9. 

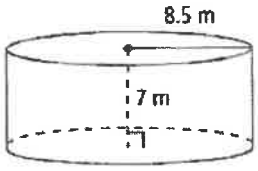
10. 

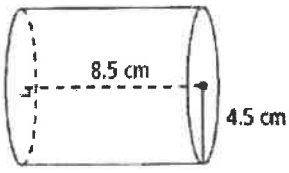
11. 

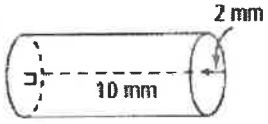
12. The base is a right triangle with a leg of 12 in. and hypotenuse of 15 in. The height of the prism is 10 in.

13. The base is a 30°-60°-90° triangle with a hypotenuse of 10 m. The height of the prism is 15 m. Find the volume to the nearest tenth.

Find the volume of each cylinder in terms of π and to the nearest tenth.

14. 

15. 

16. 

17. a right cylinder with a radius of 3.2 cm and a height of 10.5 cm

18. a right cylinder with a diameter of 8 ft and a height of 15 ft.

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11-2 Reteaching

Surface Areas of Cylinders and Prisms

A *prism* is a polyhedron with two congruent parallel faces called *bases*. The non-base faces of a prism are *lateral faces*. The dimensions of a right prism can be used to calculate its lateral area and surface area.

The lateral area of a right prism is the product of the perimeter of the base and the height of the prism.

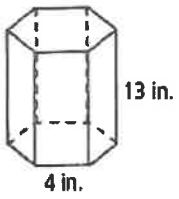
L.A. $= ph$

The surface area of a prism is the sum of the lateral area and the areas of the bases of the prism.

S.A. $=$ L.A. $+ 2B$

Problem

What is the lateral area of the regular hexagonal prism?

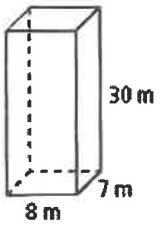


L.A. $= ph$	
$p = 6(4 \text{ in.}) = 24 \text{ in.}$	Calculate the perimeter.
L.A. $= 24 \text{ in.} \times 13 \text{ in.}$	Substitute.
L.A. $= 312 \text{ in.}^2$	Multiply.

The lateral area is 312 in^2

Problem

What is the surface area of the prism?



S.A. $=$ L.A. $+ 2B$	
$p = 2(7 \text{ m} + 8 \text{ m})$	Calculate the perimeter.
$p = 30 \text{ m}$	Simplify.
L.A. $= ph$	
L.A. $= 30 \text{ m} \times 30 \text{ m}$	Substitute.
L.A. $= 900 \text{ m}^2$	Multiply.
$B = 8 \text{ m} \times 7 \text{ m}$	Find base area.
$B = 56 \text{ m}^2$	Multiply.
S.A. $=$ L.A. $+ 2B$	
S.A. $= 900 \text{ m}^2 + 2 \times 56 \text{ m}^2$	Substitute.
S.A. $= 1012 \text{ m}^2$	Simplify.

The surface area of the prism is 1012 m^2.

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11-2 Reteaching (continued)

Surface Areas of Cylinders and Prisms

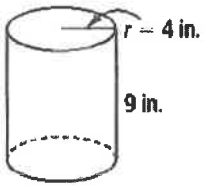
A *cylinder* is like a prism, but with circular bases. For a right cylinder, the radius of the base and the height of the cylinder can be used to calculate its *lateral area* and *surface area*.

Lateral area is the product of the circumference of the base ($2\pi r$) and the height of the cylinder. Surface area is the sum of the lateral area and the areas of the bases ($2\pi r^2$).

L.A. $= 2\pi rh$ or πdh S.A. $= 2\pi rh + 2\pi r^2$

Problem

The diagram at the right shows a right cylinder. What are the lateral area and surface area of the cylinder?



L.A. $= 2\pi rh$ or πdh

L.A. $= 2\pi \times 4$ in. $\times 9$ in. Substitute for r and h.

L.A. $= 72\pi$ in.^{2} Multiply.

The lateral area is 72π in.^{2}.

S.A. $= 2\pi rh + 2\pi r^2$

S.A. $= 2\pi \times 4$ in. $\times 9$ in. $+ 2\pi \times (4$ in.$)^2$ Substitute for r and h.

S.A. $= 72\pi$ in.$^2 + 32\pi$ in.^{2} Multiply.

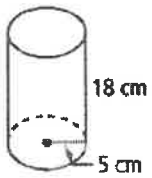
S.A. $= 104\pi$ in.^{2} Add.

The surface area is 104π in.^{2}.

Exercises

Find the lateral area and surface area of each figure. Round your answers to the nearest tenth, if necessary.

1.



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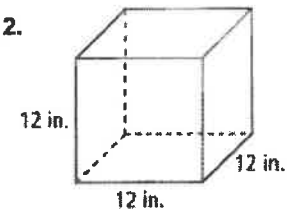

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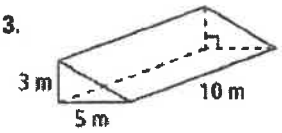

4. A cylindrical carton of raisins with radius 4 cm is 25 cm tall. If all surfaces except the top are made of cardboard, how much cardboard is used to make the raisin carton? Round your answer to the nearest square centimeter.

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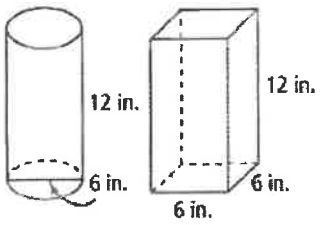
11-4 Reteaching

Volumes of Prisms and Cylinders

Problem

Which is greater: the volume of the cylinder or the volume of the prism?



Volume of the cylinder: $V = Bh$

$= \pi r^2 \cdot h$

$= \pi(3)^2 \cdot 12$

$\approx 339.3 \text{ in.}^3$

Volume of the prism: $V = Bh$

$= s^2 \cdot h$

$= 6^2 \cdot 12$

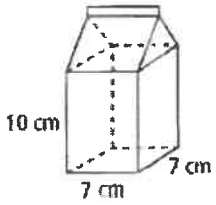
$= 432 \text{ in.}^3$ The volume of the prism is greater.

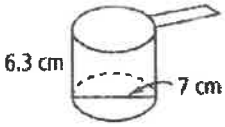
Exercises

Find the volume of each object.

1. the rectangular prism part of the milk container

2. the cylindrical part of the measuring cup





Find the volume of each of the following. Round your answers to the nearest tenth, if necessary.

3. a square prism with base length 7 m and height 15 m

4. a cylinder with radius 9 in. and height 10 in.

5. a triangular prism with height 14 ft and a right triangle base with legs measuring 9 ft and 12 ft

6. a cylinder with diameter 24 cm and height 5 cm

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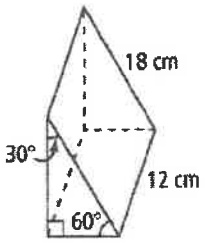
11-4 Reteaching (continued)

Volumes of Prisms and Cylinders

Problem

What is the volume of the triangular prism?

Sometimes the height of a triangular base in a triangular prism is not given. Use what you know about right triangles to find the missing value. Then calculate the volume as usual.



hypotenuse = 18 cm	Given
short leg = 9 cm	30°-60°-90° triangle theorem
long leg = $9\sqrt{3}$ cm	30°-60°-90° triangle theorem

$$V = \left(\frac{1}{2}\right)(9)(9\sqrt{3})(12)$$

Volume of prism: $V = Bh$

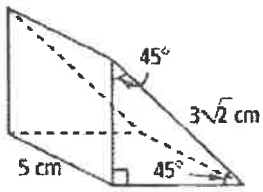
$$V \approx 841.8 \text{ cm}^3$$

The volume of the triangular prism is about 841.8 cm^3.

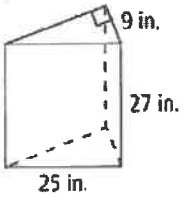
Exercises

Find the volume of each prism. Round to the nearest tenth.

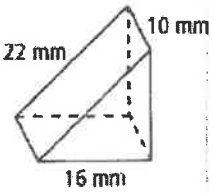
7.



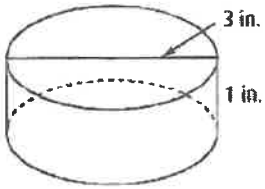
8.



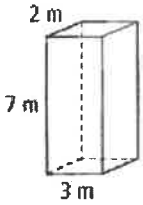
9.



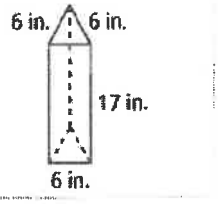
10.



11.

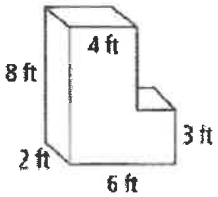


12.

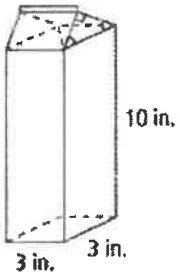


Find the volume of each composite figure to the nearest tenth.

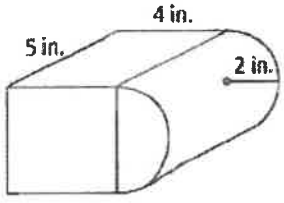
13.



14.



15.

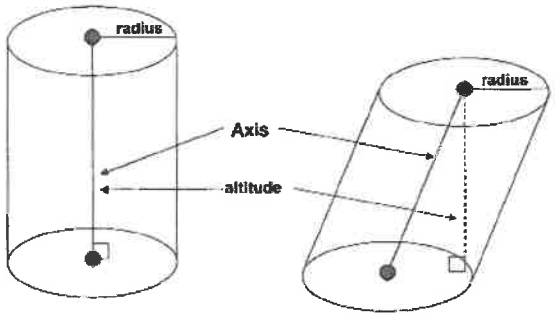


11.2 and 11.4: Lateral Surface Area, Total Surface Area and Volume of Cylinders

Cylinder: A solid that has two congruent, parallel bases that are circles.

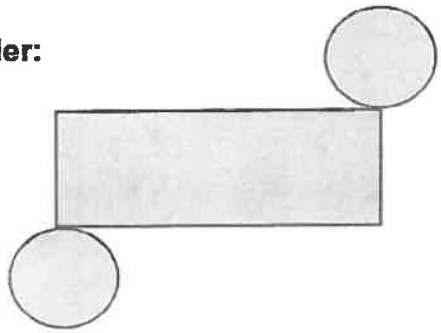
Axis: The segment joining the centers of the bases.

If the axis is also the altitude, then the cylinder is called a right cylinder. If not, then the cylinder is an oblique cylinder.



Net: A two-dimensional diagram that you can fold to form a three-dimensional figure. A net shows all of the surfaces of a solid in one view.

Net of a Cylinder:



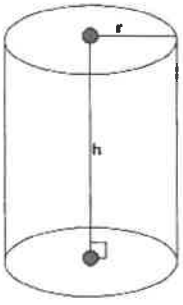
Lateral Area of a Cylinder: The lateral area of a cylinder is equal to the **circumference** of the circular base times the height of the cylinder.

$$LA_{(cylinder)} = (2\pi r)(h)$$

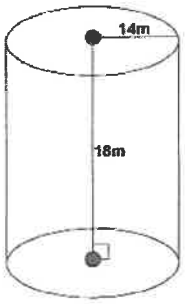
LA= Lateral Area

r= Radius of the base

h= Height of the cylinder



Ex. Find the Lateral Surface Area of the cylinder.



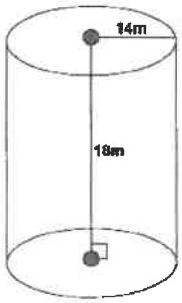
$$LA = (2 \cdot \pi \cdot 14)(18)$$
$$= (28\pi)(18)$$
$$LA = 504\pi \text{ m}^2$$
$$LA \approx 1583.4 \text{ m}^2$$

Total Surface Area: The Total Surface Area of a cylinder is equal to the Lateral Surface Area plus the area of the 2 bases.

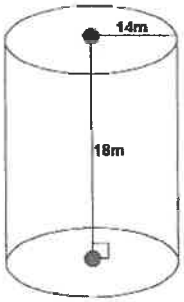
$$SA_{(\text{cylinder})} = LA + 2(\text{Area of the base})$$

$$SA = 2\pi rh + 2(\pi r^2)$$

Ex. Find the Total Surface Area of the cylinder.



Ex. Find the Total Surface Area of the cylinder.



$$SA = 2\pi rh + 2(\pi r^2)$$
$$= (2 \cdot \pi \cdot 14 \cdot 18) + (2 \cdot \pi \cdot 14^2)$$
$$= 504\pi + 392\pi$$
$$SA = 896\pi \text{ m}^2$$
$$SA \approx 2814.9 \text{ m}^2$$

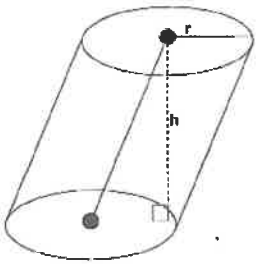
Volume of a cylinder: The volume of a cylinder is equal to the <u>area</u> of the circular base times the height of the cylinder.

$$V_{(\text{cylinder})} = Bh$$
$$V = (\pi r^2)h$$

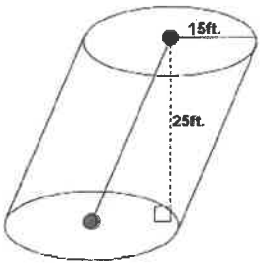
B= The area of a base

r= The radius of a base

h= The height of the cylinder



Ex. Find the Volume of the cylinder.



$$V_{(\text{cylinder})} = \pi r^2 h$$

$$= \pi \cdot 15^2 \cdot 25$$

$$V = 5625\pi \text{ ft}^3$$

$$V \approx 17{,}671.5 \text{ ft}^3$$