Geometry Packet

4/20/2020 - 5/11/2020
Mr. Savage and Mr. Hall

General Information:

- You must decide if you wish to receive your current grade or just take credit for the class. Regardless you **MUST** complete all assigned work.
  - You may inform your teacher though:
    - google classroom survey
    - email
    - on the packet you return on May 11, 2020
- If you have not already done so and are able to, please sign up for our google classroom **Today.**
  - Material will be made available weakly starting Tuesday April 21 2020.
  - All material is available on google classroom or in this packet.
  - Classroom code is: lxjtglm
- Weekly quizzes **must** be completed by Fridays (early is ok).
  - The best way to take a quiz is through our google classroom. This will provide you with immediate feedback. If you are unable to use google classroom you may take the included quiz and email answers back to your teacher. Another option is to turn the packet in on 5/11/2020, the turn in date.
  - These quizzes are the **only** thing that you will return to your teacher.
- If you have any questions or comments, please:
  - Post it to google classroom.
  - Email it to your teacher.

Due Dates:

- 11-1 quiz - **4/24/2020**
- 11-2 quiz - **5/01/2020**
- 11-3 quiz - **5/08/2020**
- Please take all quizzes on google classroom or email answers from the attached quizzes to your teacher.

Teacher contact:

Mr. Savage:

Email: savagep@lakewoodps.org

Mr. Hall:

Email: halle@lakewoodps.org

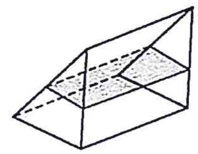
Name____Class ______________ Date______________

11-1 Reteaching (continued)

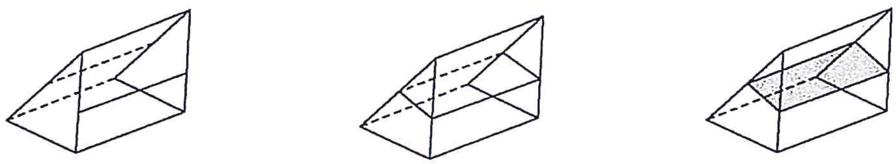
Space Figures and Cross Sections

A *cross section* is the intersection of a solid and a plane. Cross sections can be many different shapes, including polygons and circles.

The cross section of this solid and this plane is a rectangle. This cross section is a horizontal plane.

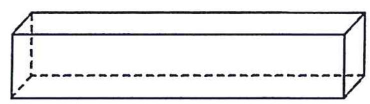


To draw a cross section, visualize a plane intersecting one face at a time in parallel segments. Draw the parallel segments, then join their endpoints and shade the cross section.



Exercises

Draw and describe the cross section formed by intersecting the rectangular prism with the plane described.

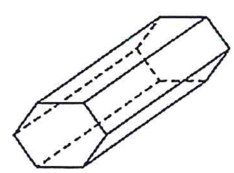


7. a plane that contains the vertical line of symmetry

8. a plane that contains the horizontal line of symmetry

9. a plane that passes through the midpoint of the top left edge, the midpoint of the top front edge, and the midpoint of the left front edge

10. What is the cross section formed by a plane that contains a vertical line of symmetry for the figure at the right?



11. **Visualization** What is the cross section formed by a plane that is tilted and intersects the front, bottom, and right faces of a cube?

Name ______________________________ Class____________ Date __________

11-1 Reteaching

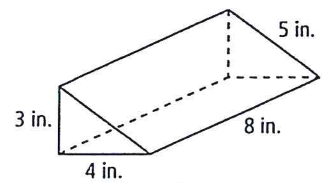
A *polyhedron* is a three-dimensional figure with *faces* that are polygons. Faces intersect at *edges,* and edges meet at vertices.

Faces, vertices, and edges are related by *Euler's Formula:* $F + V = E + 2$.

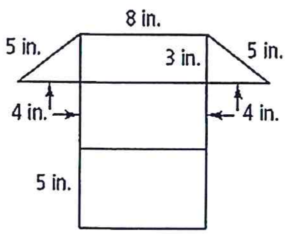
For two dimensions, such as a representation of a polyhedron by a *net,* Euler's Formula is $F + V = E + 1$. (F is the number of regions formed by V vertices linked by E segments.)

Problem

What does a net for the doorstop at the right look like? Label the net with its appropriate dimensions.



Doorstop

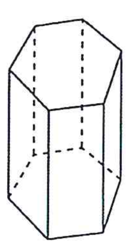


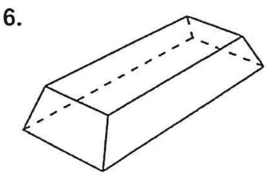
Exercises

Complete the following to verify Euler's Formula.

1. On graph paper, draw three other nets for the polyhedron shown above. Let each unit of length represent $\frac{1}{4}$ in.
2. Cut out each net, and use tape to form the solid figure.
3. Count the number of vertices, faces, and edges of one of the figures.
4. Verify that Euler's Formula, $F + V = E + 2$, is true for this polyhedron.

Draw a net for each three-dimensional figure.

5. 

6. 

Name Key Class ______ Date ______

11-1 Reteaching (continued)

Space Figures and Cross Sections

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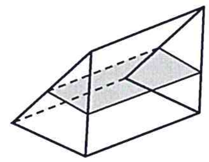

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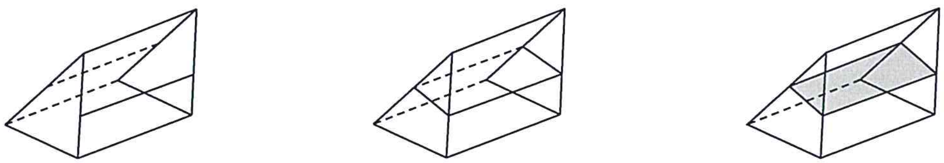

Exercises

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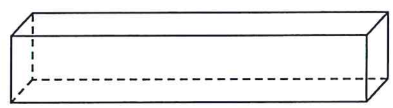
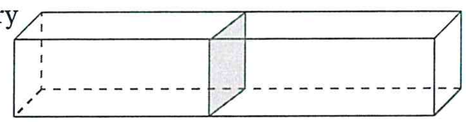
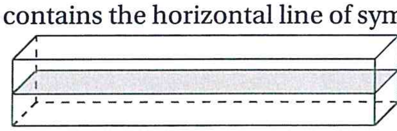


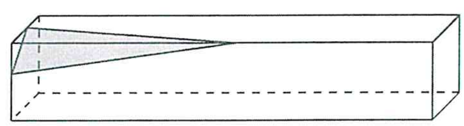
7. a plane that contains the vertical line of symmetry
Answers may vary. a rectangle or a square



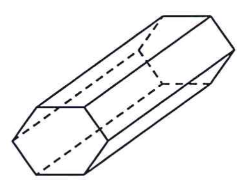
8. a plane that contains the horizontal line of symmetry
a rectangle



9. a plane that passes through the midpoint of the top left edge, the midpoint of the top front edge, and the midpoint of the left front edge
an isosceles triangle



10. What is the cross section formed by a plane that contains a vertical line of symmetry for the figure at the right?
Answers may vary. a hexagon or a rectangle



11. **Visualization** What is the cross section formed by a plane that is tilted and intersects the front, bottom, and right faces of a cube?
a triangle

Name ______________________ Class ______________ Date ______________

11-1 Reteaching

Space Figures and Cross Sections

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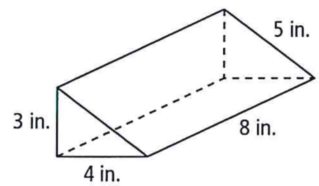
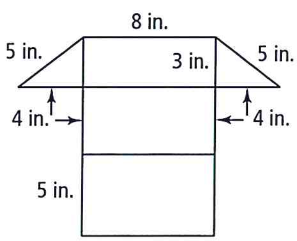


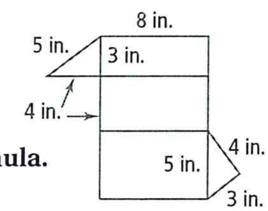
Doorstop

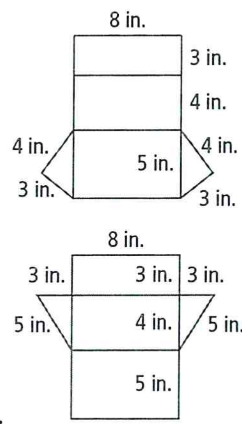


Exercises

Complete the following to verify Euler's Formula.

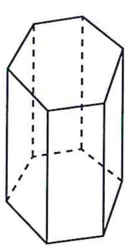
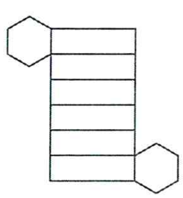
1. On graph paper, draw three other nets for the polyhedron shown above. Let each unit of length represent $\frac{1}{4}$ in. Sample:

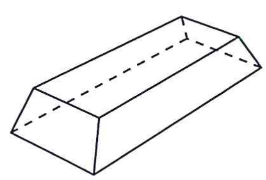
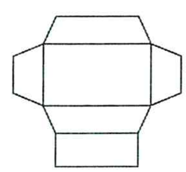




2. Cut out each net, and use tape to form the solid figure.
   Check students' work.
3. Count the number of vertices, faces, and edges of one of the figures.
   6 vertices, 5 faces, 9 edges
4. Verify that Euler's Formula, $F + V = E + 2$, is true for this polyhedron.
   $F + V = E + 2$, $5 + 6 = 9 + 2$, $11 = 11$

Draw a net for each three-dimensional figure. Samples:

5.  

6.  

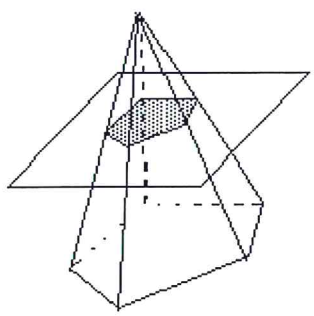
Name: ________________________ Class: __________________ Date:

Geometry ch 11.1 Quiz

____ 1. Use Euler's Formula to find the missing number.
Faces: 25
Vertices: 17
Edges: __?__
A. 43 B. 41 C. 39 D. 40

____ 2. Use Euler's Formula to find the missing number.
Edges: 29
Faces: 17
Vertices: __?__
A. 13 B. 14 C. 15 D. 17

____ 3. Pierre built the model shown in the diagram below for a social studies project. He wants to be able to show the inside of his model, so he sliced the figure as shown. Describe the cross section he created.



A. hexagon B. pentagon C. pyramid D. rectangle

Name________________________________ Class ____________ Date____________

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.

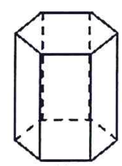
L.A. = ph

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 in.) = 24 in.	Calculate the perimeter.
L.A. = 24 in. × 13 in.	Substitute.
L.A. = 312 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 m + 8 m)	Calculate the perimeter.
p = 30 m	Simplify.
L.A. = ph	
L.A. = 30 m × 30 m	Substitute.
L.A. = 900 m^2	Multiply.
B = 8 m × 7 m	Find base area.
B = 56 m^2	Multiply.
S.A. = L.A. + $2B$	
S.A. = 900 m^2 + 2 × 56 m^2	Substitute.
S.A. = 1012 m^2	Simplify.

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

Name____________________________________ Class ______________ Date______________

11-2 Reteaching (continued)

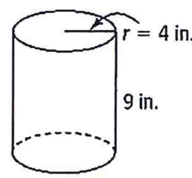
A *cylinder* is like a prism, but with circular bases. For a right cylinder, the radius of the base and the height of the cylinder can be used to calculate its *lateral area* and *surface area.*

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.

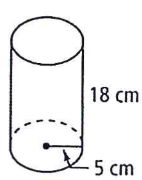
S.A. $= 104\pi$ in.^{2} Add.

The surface area is 104π in.^{2}.

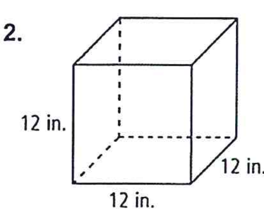
Exercises

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

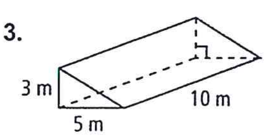
1.



2.



3.



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.

Name Key Class ______ Date ______

11-2 Reteaching

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

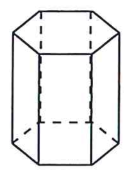
L.A. $= ph$

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.

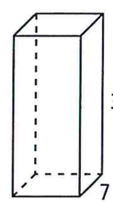
L.A. $= 24\text{ in.} \times 13\text{ in.}$ Substitute.

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.

11-2 Reteaching (continued)

Surface Areas of Cylinders and Prisms

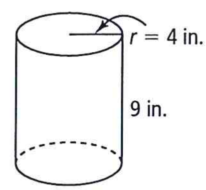
A *cylinder* is like a prism, but with circular bases. For a right cylinder, the radius of the base and the height of the cylinder can be used to calculate its *lateral area* and *surface area.*

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 ($2\pi r^2$).

$\text{L.A.} = 2\pi rh$ or πdh $\quad\quad$ $\text{S.A.} = 2\pi rh + 2\pi r^2$

Problem

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



$\text{L.A.} = 2\pi rh$ or πdh

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

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

The lateral area is 72π in.^{2}.

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

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

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

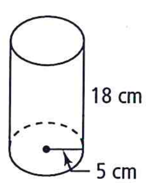
$\text{S.A.} = 104\pi \text{ in.}^2$ Add.

The surface area is 104π in.^{2}.

Exercises

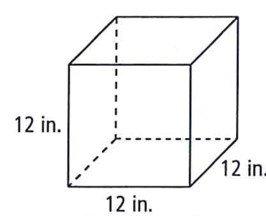
Find the lateral area and surface area of each figure. Round your answers to the nearest tenth, if necessary.

1.



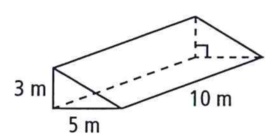
565.5 cm^2; 722.6 cm^2

2.



576 in.^{2}; 864 in.^{2}

3.



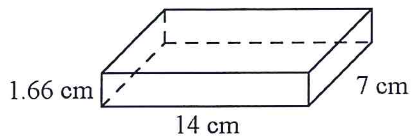
138.3 m^2; 153.3 m^2

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.
679 cm^2

Name: ________________________ Class: __________________ Date: __

Geometry Quiz 11.2

____ 1. A jewelry store buys small boxes in which to wrap items that they sell. The diagram below shows one of the boxes. Find the lateral area and the surface area of the box to the nearest whole number.



Not drawn to scale

A. 35 cm^2; 364 cm^2

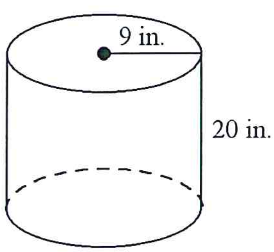
B. 70 cm^2; 364 cm^2

C. 35 cm^2; 266 cm^2

D. 70 cm^2; 266 cm^2

Find the surface area of the cylinder in terms of π.

____ 2.



Not drawn to scale

A. 396π in.^{2} B. 522π in.^{2} C. 360π in.^{2} D. 1008π in.^{2}

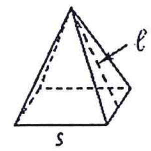
____ 3. Allison is planning to cover the lateral surface of a large cylindrical garbage can with decorative fabric for a theme party. The can has a diameter of 3 feet and a height of 3.5 feet. How much fabric does she need? Round to the nearest square foot.

A. 123 ft^2 B. 61 ft^2 C. 33 ft^2 D. 66 ft^2

Name______________________________________Class ____________ Date____________

11-3 Reteaching

A *pyramid* is a polyhedron in which the *base* is any polygon and the *lateral faces* are triangles that meet at the *vertex.* In a *regular pyramid,* the base is a regular polygon. The *height* is the measure of the altitude of a pyramid, and the *slant height* is the measure of the altitude of a lateral face. The dimensions of a regular pyramid can be used to calculate its lateral area (L.A.) and surface area (S.A.).

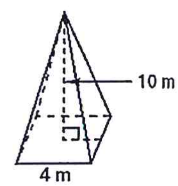


$\text{L.A.} = \frac{1}{2}p\ell$, where p is the perimeter of the base and l is slant height of the pyramid.

S.A. = L.A. + B, where B is the area of the base.

Problem

What is the surface area of the square pyramid to the nearest tenth?



S.A. =L.A. + B

$\text{L.A.} = \frac{1}{2}p\ell$ — Find lateral area first.

$p = 4(4\text{ m}) = 16\text{ m}$ — Find the perimeter.

$\ell^2 = \sqrt{2^2 + 10^2} = \sqrt{104}$

$\ell \approx 10.2$

$\text{L.A} = \frac{1}{2}(16\text{m})(10.2) = 81.6\text{m}^2$ — Substitute to find L.A.

$B = (4\text{ m})(4\text{ m}) = 16\text{ m}^2$ — Find area of the base.

$\text{S.A.} = 81.6\text{ m}^2 + 16\text{ m}^2 = 97.6\text{ m}^2$ — Substitute to find S.A.

The surface area of the square pyramid is about 97.6 m^2.

Exercises

Use graph paper, scissors, and tape to complete the following.

1. Draw a net of a square pyramid on graph paper.
2. Cut it out, and tape it together.
3. Measure its base length and slant height.
4. Find the surface area of the pyramid.

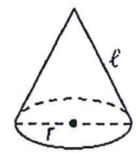
In Exercises 5 and 6, round your answers to the nearest tenth, if necessary.

5. Find the surface area of a square pyramid with base length 16 cm and slant height 20 cm.
6. Find the surface area of a square pyramid with base length 10 in. and height 15 in.

Name_______________________________ Class_____________ Date___________

11-3 Reteaching (continued)

A *cone* is like a pyramid, except that the base of a cone is a circle. The radius of the base and cylinder height can be used to calculate the lateral area and surface area of a right cone.



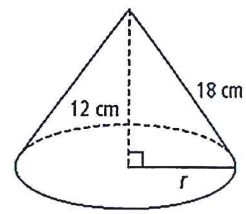
L.A. = $\pi r\ell$, where r is the radius of the base and ℓ is slant height of the cone.

S.A. = L.A. + B, where B is the area of the base ($B = \pi r^2$).

Problem

What is the surface area of a cone with slant height 18 cm and height 12 cm?

Begin by drawing a sketch.



Use the Pythagorean Theorem to find r, the radius of the base of the cone.

$$r^2 + 12^2 = 18^2$$

$$r^2 + 144 = 324$$

$$r^2 = 180$$

$$r \approx 13$$

Now substitute into the formula for the surface area of a cone.

$$\text{S.A.} = \text{L.A.} + B$$

$$= \pi r\ell + \pi r^2$$

$$= \pi(13.4)(18) + 180\pi$$

$$\approx 1323.2$$

The surface area of the cone is about 1323.2 cm^2.

In Exercises 7–10, round your answers to the nearest tenth, if necessary.

7. Find the surface area of a cone with radius 5 m and slant height 15 m.

8. Find the surface area of a cone with radius 6 ft and height 11 ft.

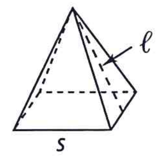
9. Find the surface area of a cone with radius 16 cm and slant height 20 cm.

10. Find the surface area of a cone with radius 10 in. and height 15 in.

Name Key Class ____________ Date ____________

11-3 Reteaching

Surface Areas of Pyramids and Cones



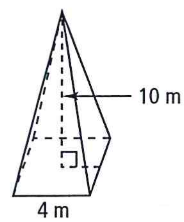
A *pyramid* is a polyhedron in which the *base* is any polygon and the *lateral faces* are triangles that meet at the *vertex*. In a *regular pyramid,* the base is a regular polygon. The *height* is the measure of the altitude of a pyramid, and the *slant height* is the measure of the altitude of a lateral face. The dimensions of a regular pyramid can be used to calculate its lateral area (L.A.) and surface area (S.A.).

L.A. $= \frac{1}{2}p\ell$, where p is the perimeter of the base and ℓ is slant height of the pyramid.

S.A. $=$ L.A. $+ B$, where B is the area of the base.

Problem

What is the surface area of the square pyramid to the nearest tenth?



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

L.A. $= \frac{1}{2}p\ell$ Find lateral area first.

$p = 4(4\text{ m}) = 16\text{ m}$ Find the perimeter.

$\ell^2 = \sqrt{2^2 + 10^2} = \sqrt{104}$ Use the Pythagorean Theorem.

$\ell \approx 10.2$

L.A. $= \frac{1}{2}(16\text{m})(10.2) = 81.6\text{ m}^2$ Substitute to find L.A.

$B = (4\text{ m})(4\text{ m}) = 16\text{ m}^2$ Find area of the base.

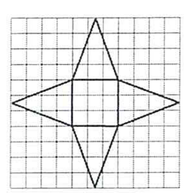
S.A. $= 81.6\text{ m}^2 + 16\text{ m}^2 = 97.6\text{ m}^2$ Substitute to find S.A.

The surface area of the square pyramid is about 97.6 m^2.

Exercises

Use graph paper, scissors, and tape to complete the following.

1. Draw a net of a square pyramid on graph paper. **Sample:**



2. Cut it out, and tape it together. **Check students' work.**
3. Measure its base length and slant height.
   Sample: base = 3 cm, slant height = 4 cm
4. Find the surface area of the pyramid. **Sample: 33 cm^2**

In Exercises 5 and 6, round your answers to the nearest tenth, if necessary.

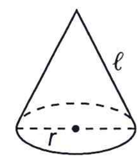
5. Find the surface area of a square pyramid with base length 16 cm and slant height 20 cm. **896 cm^2**
6. Find the surface area of a square pyramid with base length 10 in. and height 15 in. **416.2 in.^2**

Name ____________________ Class __________ Date __________

11-3 Reteaching (continued)

Surface Areas of Pyramids and Cones

A *cone* is like a pyramid, except that the base of a cone is a circle. The radius of the base and cylinder height can be used to calculate the lateral area and surface area of a right cone.



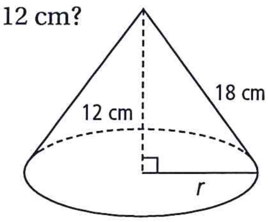
L.A. $= \pi r \ell$, where r is the radius of the base and ℓ is slant height of the cone.

S.A. $=$ L.A. $+ B$, where B is the area of the base ($B = \pi r^2$).

Problem

What is the surface area of a cone with slant height 18 cm and height 12 cm?

Begin by drawing a sketch.



Use the Pythagorean Theorem to find r, the radius of the base of the cone.

$$r^2 + 12^2 = 18^2$$
$$r^2 + 144 = 324$$
$$r^2 = 180$$
$$r \approx 13.4$$

Now substitute into the formula for the surface area of a cone.

$$\text{S.A.} = \text{L.A.} + B$$
$$= \pi r \ell + \pi r^2$$
$$= \pi(13.4)(18) + 180\pi$$
$$\approx 1323.2$$

The surface area of the cone is about 1323.2 cm^2.

In Exercises 7–10, round your answers to the nearest tenth, if necessary.

7. Find the surface area of a cone with radius 5 m and slant height 15 m. **314.2 m^2**

8. Find the surface area of a cone with radius 6 ft and height 11 ft. **349.3 ft^2**

9. Find the surface area of a cone with radius 16 cm and slant height 20 cm. **1809.6 cm^2**

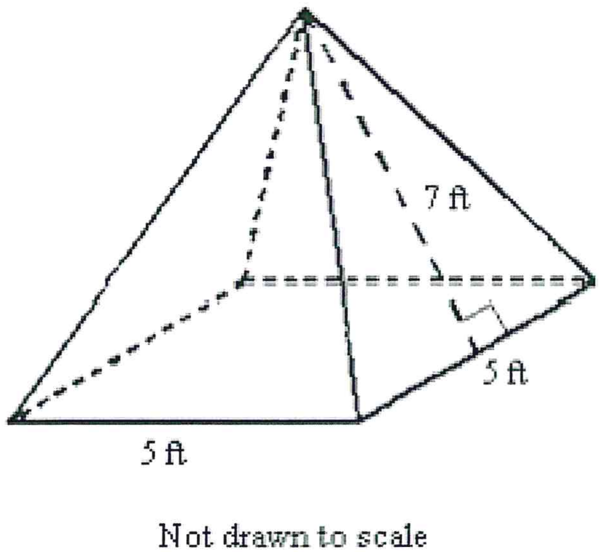
10. Find the surface area of a cone with radius 10 in. and height 15 in. **880.5 $in.^2$**

Name: ________________________ Class: __________________ Date: ___

Geometry Quiz 11.3

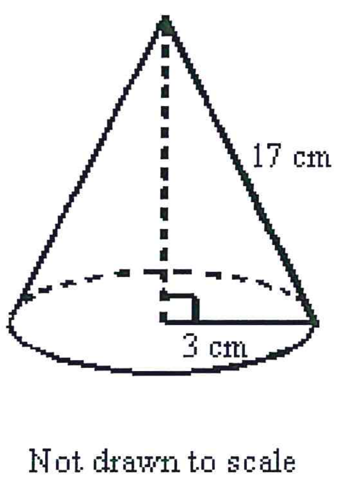
Find the surface area of the regular pyramid shown to the nearest whole number.

____ 1.



A. 165 ft^2 B. 95 ft^2 C. 70 ft^2 D. 28 ft^2

____ 2. Find the surface area of the cone in terms of π.



A. 111π cm^2 B. 57π cm^2 C. 60π cm^2 D. 55.5 cm^2

____ 3. Find the lateral area of a regular pentagonal pyramid that has a slant height of 14 in. and a base side length of 6 in.

A. 210 $in.^2$ B. 240 $in.^2$ C. 42 $in.^2$ D. 420 $in.^2$