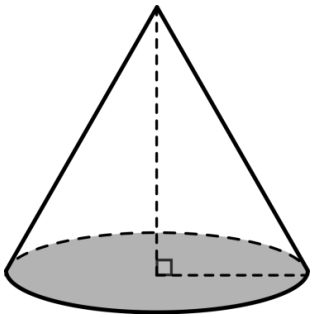
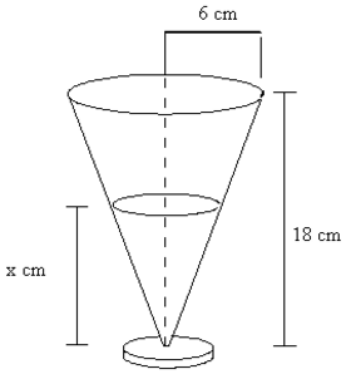
Name_____Date_____Section_____
Units 9&10 Review – 2016-17

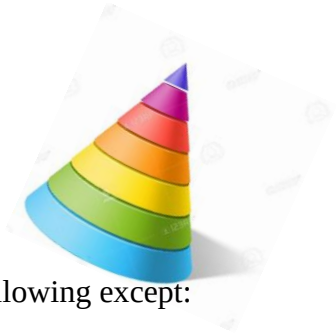
1. A cone with a radius of 8 in and an altitude of 16 in is sliced off $\frac{1}{4}$ of the way from the top. What is the area of the cross-section? Explain how you arrived at your answer.



2. A right cone with a height of 18 cm is partially filled with water. Determine the height of the water (the value of x) to the nearest tenth if the radius of the parallel cross section (surface of the water) is 2.7 cm.

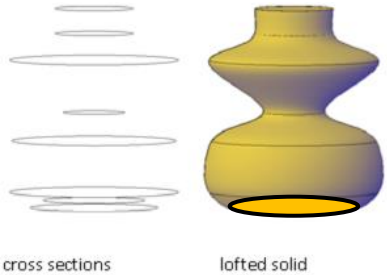


3. Which motions could produce the solid at right?
   a. Dilation
   b. Rotation
   c. Translation
   d. Either a or b

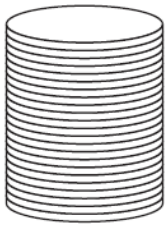
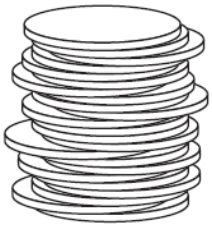


4. The slices of a right regular pentagonal prism could be any of the following except:
   a. Parallelogram
   b. Pentagon
   c. Triangle
   d. Parabola

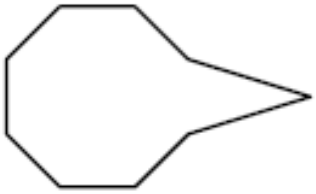
5. When will all the cross sections of the lofted solid be similar to the circle on the bottom?



6. Two stacks of 23 quarters each are shown below. One stack forms a cylinder; the other stack does not form a cylinder. Use Cavelieri's Principle to explain why the volumes of these two stacks are equal.

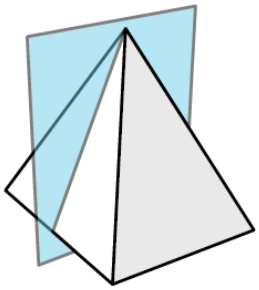



7. Using dissection, identify the 2-D shapes that were used to create the composite planar figure:
    a. A square and a rectangle
    b. A square and a pentagon
    c. A rectangle and a heptagon
    d. An octagon and a triangle

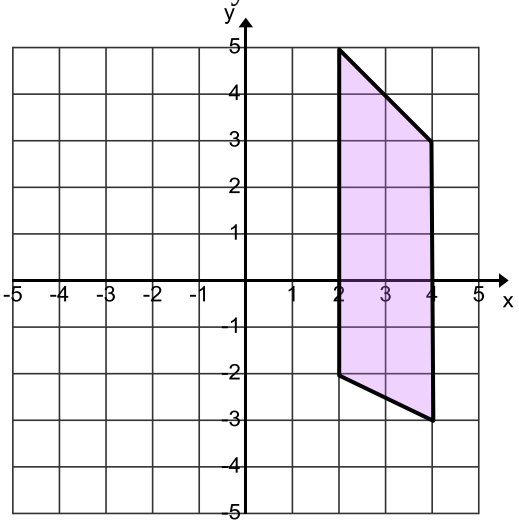


8. Which regular polygon has a rotation of 120° around its center that would carry the polygon onto itself?
    a. Square
    b. Octagon
    c. Triangle
    d. Pentagon

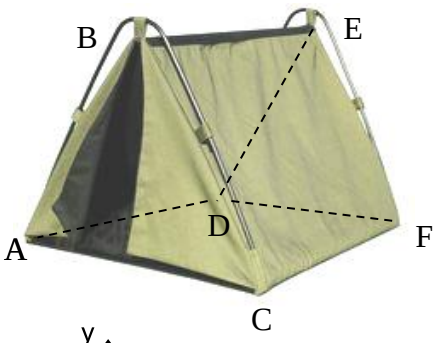
9. Describe the shape of the 2-D planar figure generated by the slice below:



10. Describe the 3-D solid as a composite that would be generated by rotating the 2-D figure around the line $x=2$. Include any radii and altitude measurements. Try to sketch the solid.



11. Identify the following for the tent (what will you use as a model?):



A) Base: _____

B) Translation Vector from B: _____

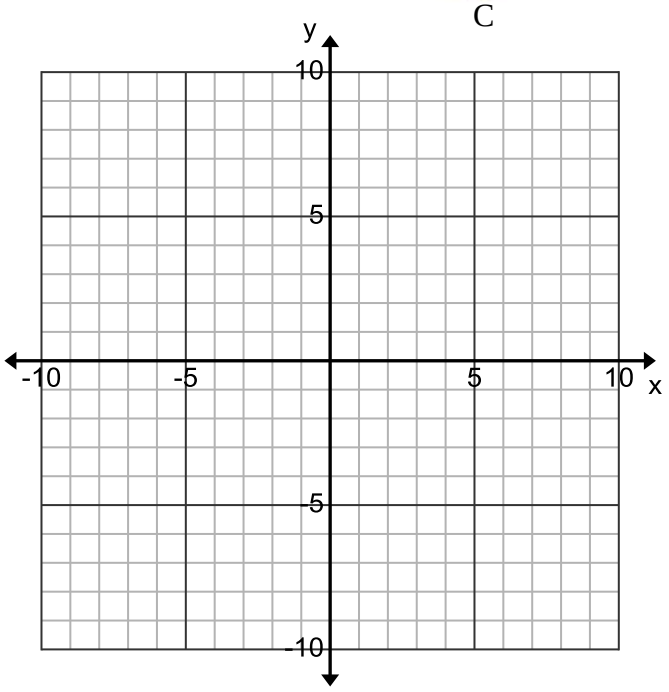
C) Segment skew to $\overline{EF}$ through B: _____

D) Segment parallel to $\overline{AC}$: _____

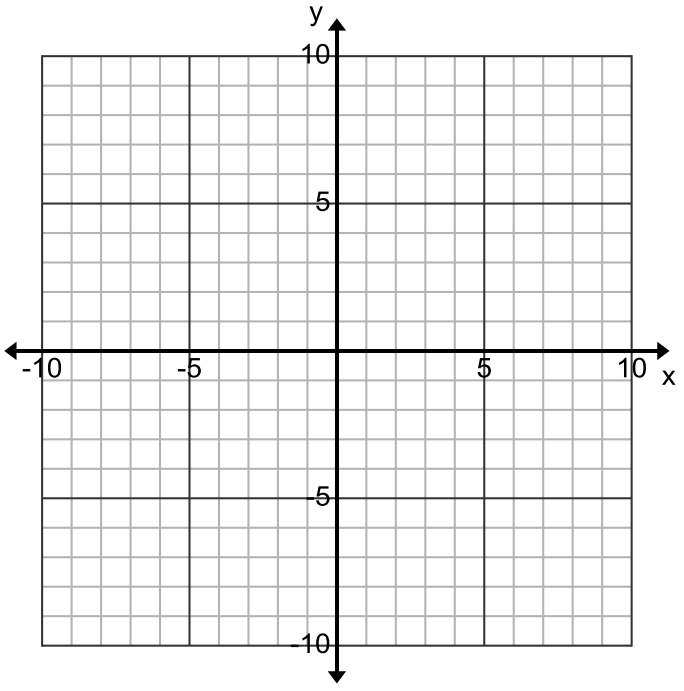
E) Segment perpendicular to $\overline{AC}$: _____

12. Find the exact area of the region bounded by the equations :

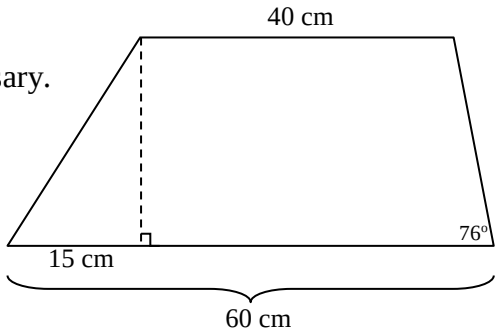
$y = \frac{5}{2}x + 8, \quad x = 4, \quad y = 3$, and the line formed by translating the line y = 3 by a translation vector of < 0, -10 >.



13. Find the exact area and perimeter of the triangle with CAT with vertices C(-5,3), A(2,6), T(-1,-1). Classify the triangle by its sides.

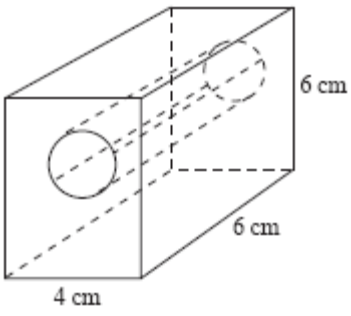


14. Find the area of the trapezoid. Round to the nearest tenth if necessary.

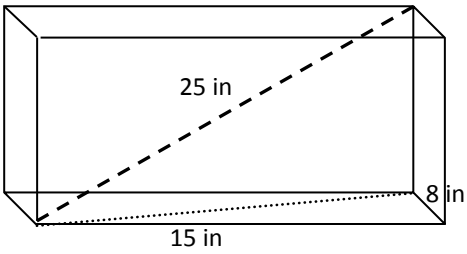


15. A cylinder has a volume of 640π cm^3. Its height is 10 cm. What is the circumference of the base in terms of π?

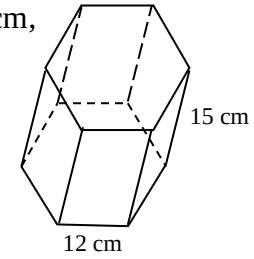
16. Determine the volume of the wooden block with a cylindrical hole with a diameter of *2 cm* drilled through it. Round your answer to the nearest hundredth of a cubic centimeter.



17. How many 12-oz cups of water will be needed to fill the tank with the given base edges and diagonal? (One 12-oz cup = 21.66 in^3).



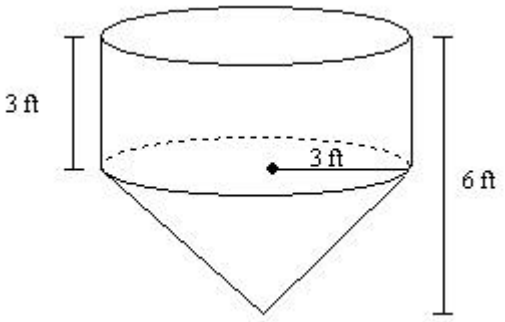
18. Given the regular hexagonal prism whose side length is 12 cm and whose height is 15 cm,



a. Find the volume to the nearest hundredth of a cubic centimeter.

b. Determine the amount of nickel to the nearest tenth of a gram that will be in the part. The part is manufactured out of stainless steel 304L, which has a density of 7.75 g/cm^3 and a nickel component of 8%.

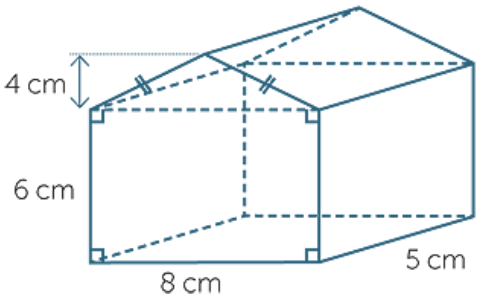
19. The metal tank pictured at right is full of water.



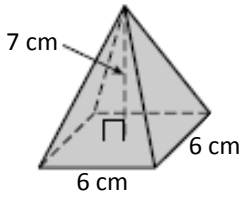
a. Find the volume of the tank in terms of π.

b. After half of the water was poured out, what would be the height of the water remaining in the tank?

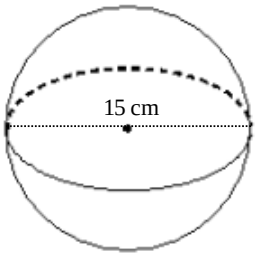
20. The drawing is a scale model of a greenhouse that will be built. Determine the amount of space that will be enclosed, to the nearest whole cubic cm.



21. Find the slant height in simplest radical form of the right regular rectangular pyramid if the altitude is 7 cm.



22. A ball bearing with a diameter of 15 cm made of steel has a density of 7.8 grams/cm^3. What is the mass of the ball bearing, to the nearest tenth of a **kilogram**?
(Recall: $Density = \frac{mass}{Volume}$)

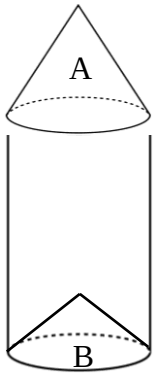


23. A round above-ground swimming pool has a diameter of 24 feet and a maximum depth of 48 inches. A truck comes to deliver 10,000 gallons of water. What is the height of the water in the pool to the nearest whole foot?
Use 1 ft^3 = 7.48 gallons.

(BTW, A ¾" garden hose can deliver water at a rate of approximately 10 gallons per minute. Mrs. Walkanowski and Mrs. Grube-Edwards in a moment of delerium on a Friday afternoon calculated that this would take approximately 22.56 hours to fill the pool!!!).

ANSWER KEY

1. 4π in^2 (the radius of the cross section circle is 2 in by similar triangles since the cross section is parallel, giving us two sets of corresponding angles that are congruent for AA~ criteria)
2. 8.1 cm
3. D
4. D
5. When the planes that slice through the lofted solid are parallel to the base
6. Since they are all quarters and there is the same number in each stack, then the altitude heights and cross sections of the two stacks will be equal. Therefore the volumes will be equal by Cavalieri's Principle.
7. D
8. C
9. A triangle
10. A cylinder with a radius of 2 and altitude of 6 with A) a cone on top with a radius of 2 and altitude of 2 and B) a hollowed out cone on the bottom with a radius of 2 and altitude of 1.



11. Model this as a right triangular prism.
    A) Base: Triangle ABC or Triangle DEF
    B) Translation Vector from B: $\overrightarrow{BE}$
    C) Segment Skew to EF through B: $\overline{BA}$ or $\overline{BD}$
    D) Segment Parallel to AC: $\overline{DF}$
    E) Segment Perpendicular to AC: $\overline{AD}$ or $\overline{CF}$
12. Area = 80 units^2 (trapezoid, right triangle + rectangle or box – right triangle)
13. Area = 20 units^2 (box is 49 – 3 right triangles)
    Perimeter = $2\sqrt{58} + 4\sqrt{2}$ units
    The triangle is Isosceles since the two sides CA=AT=$\sqrt{58}$ are therefore congruent
14. Area = 1002.7 cm^2 (altitude is $5\tan 76^o$)
15. Circumference = 16π cm (radius is 8 cm)
16. Volume = 125.15 cm^3
17. 102 cups (101 will not completely fill the tank volume; altitude is $\sqrt{336}$)
18. a. Volume = 5611.84 cm^3 (apothem is $6\sqrt{3}$; Base area = $216\sqrt{3}$);
    b. nickel mass is 3479.3 g (total mass is 43491.76 g)
19. a. Tank volume = 36π ft^3
    b. Height would be 1 foot
20. Volume = 320 cm^3
21. Slant Height = $\sqrt{58}$ cm
22. Mass = 13.7 kg (13783.7377 grams since volume = 562.5π cm^3)
23. Height = 3 ft (10000 gallons of water = 1336.8983 ft^3 = volume in the pool)