Geometry Regents Lomac 2015-2016   Date 3/24   due 3/25   **3D: Modeling**   **9.6R**

Name _____ **Per**_____

LO: I can use 3D mathematical models to solve problems involving densities and volumes of General Cones and General Cylinders.

☐ **DO NOW**   On the back of this packet

___

☐ **(1)**   **3D Mathematical Modeling for industry**
calculator   A square metal plate has a density of 10.2 g/cm^3 and weighs 2.193 kg.

    a.   Calculate the volume of the plate.

    b.   If the base of this plate has an area of 25 cm^2, determine its thickness.

(2) **3D Mathematical Modeling for industry**

calculator

A machine part is manufactured from a block of iron with circular cylindrical slots. The block of iron has a width of 14 inches, a height of 16 inches, and a length of 20 inches. The number of cylinders drilled out of the block is determined by the weight of the leftover block, which must be less than 1,000 lbs.

 (a) If iron has a weight of roughly 191 lb/ft^3, how many cylinders with the same height as the block and with radius 2 inches must be drilled out of the block in order for the remaining solid to weigh less than 1,000 lbs.?

(b) If iron ore costs $115 per ton (1 ton = 2200 lbs.) and the price of each part is based solely on its weight of iron, how many parts can be purchased with $1,500? Explain your answer

☐ (3)   **3D Mathematical Modeling**
calculator

Trees that are cut down and stripped of their
branches for timber are approximately cylindrical.
A timber company specializes in a certain type of
tree that has a typical diameter of 50 cm and a
typical height of about 10 meters. The density of
the wood is 380 kilograms per cubic meter, and the
wood can be sold by mass at a rate of $4.75 per
kilogram. Determine and state the minimum
number of whole trees that must be sold to raise at
least $50,000.

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☐ (4)   **3D Mathematical Modeling**
calculator
To reduce the amount of chocolate needed to make a chocolate dome, a cone is removed from the solid
   hemisphere as shown. Calculate the volume of the resulting chocolate. In addition to your solution, provide an
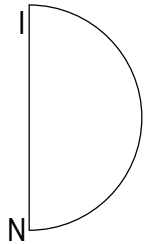   explanation of the strategy you used in your solution.
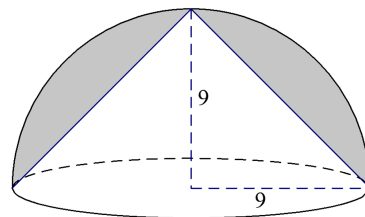
☐ (6) **Exit Ticket**
calculator

ON THE LAST PAGE

☐ (7) **Homework**
calculator

Provide sufficient evidence for each response.

☐ (1) The semicircle at right is rotated about segment IN. Describe the shape that is formed.
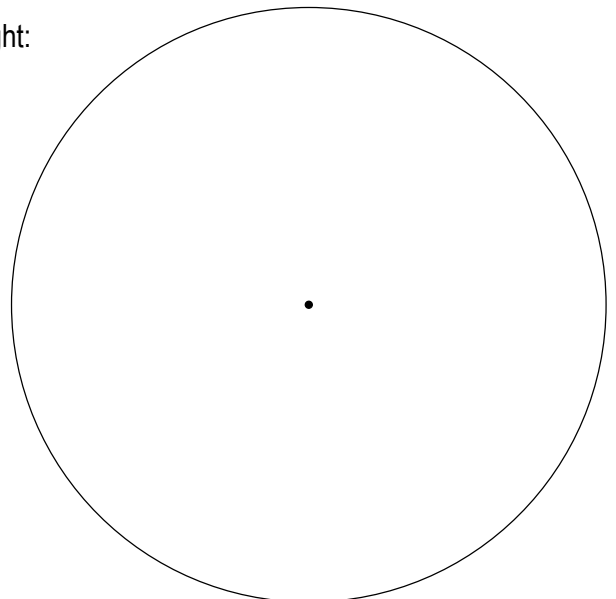   Find the volume of the shape if segment IN is 8 centimeters long.

I

N

☐ (2) Name 2 different 3 dimensional figures that have a cross section that is a:

    (a) circle: _____   _____

    (b) rectangle: _____   _____

    (c) hexagon: _____   _____

☐ (3) Construct a regular hexagon inscribed in the circle at right:

•

☐ (7) **Homework**
internet

☐ (4)

Filament for 3D printing is sold in spools that contain something shaped like a wire of diameter 3 mm. John wants to make 3D printings of a cone with radius 2 cm and height 3 cm. The length of the filament is 25 meters. About how many cones can John make?

☐ (5)

Gold has a density of 19.32 g/cm^3. If a square pyramid has a base edge length of 5 cm, height of 6 cm, and a mass of 942 g, is the pyramid in fact solid gold? If it is not, what reasons could explain why it is not? Recall that density can be calculated with the formula density $= \frac{\text{mass}}{\text{volume}}$.

Exit Ticket   **Name**_____ **Date** _____ **Per**_____   **9.6R**

The LO (Learning Outcomes) are written below your name on the front of this packet. Demonstrate your achievement of these outcomes by doing the following:

The density of peanut butter is approximately 1300kg/m³. A jar of peanut butter has a radius of 5cm and a height of 10 cm. What is the weight in kg. of the peanut butter in 1 jar? (CAREFUL: convert units before you calculate!)

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(1) Describe a shape and a method of rotation that will result in a:

     (a) cone

     (b) sphere

     (c) cylinder

     (d) pyramid

(2) What about the cartoon is supposed to make people smile?