Session 5.1

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Recap of last time

1. **<u>Rectangle</u>**: key dimensions are **length** and **width**

   (a) $Area = Length * Width$

   (b) $Perimeter = 2 * Length + 2 * Width$

   (c) Dimensions are normally shown as $length \times width$

2. **<u>Right triangle</u>**: key dimensions are **length** and **width**

   (a) $Area = \dfrac{Length * Width}{2} = \dfrac{1}{2} * Length * Width$

3. **<u>Circle</u>**: key dimension is the **radius**

   (a) $Diameter = 2 * Radius$

   (b) $Area = (Radius)^2 * \pi$

   (c) $Perimeter = 2 * Radius * \pi = Diameter * \pi$

4. Area is in terms of $units^2$, such as cm^2, in^2, ft^2, etc.

5. Volume is in terms of $units^3$, such as cm^3, in^3, ft^3, etc.

6. Leaving a number "in terms of π" means to leave it as $9 * \pi$ instead of $9 * \pi \approx 9 * 3.14 = 28.26$

Main problems

1. Assortment of warm-up problems

   (a) Explain in your own words the formula for the *area* of a rectangle — use a picture too! Talk about it with the people at your table and see how your intuition is similar and/or different from theirs.

   (b) Find the radius of a circle with perimeter 12π cm

   (c) Find the dimensions of a rectangle with area 15 cm^2 where $length = 2 + width$

2. What is the area of a rectangle of a 2×2 rectangle? 4×2 rectangle? 4×4 rectangle? As we increase one side, how does the area change? As we increase both sides, how does the area change?

3. What is the are of a circle or radius 2? Radius 4? Radius 6? As we increase the radius, how does the area change?

4. Consider a 4" $\times$ 6" picture that will fit inside of of a 5" $\times$ 8" rectangle frame (concentric). What is the area of the wood that will be used for the frame? Ignore the thickness of the wood.

5. Consider a 5" square inside of a 6" square (concentric). If we want to paint a red "frame" around the inner square, what is the area of the painted area?

6. Suppose we have a red circle with radius 6" and we color in a white inner circle of radius 4". What is the area that is left red (outer ring)?

7. How much wood finish (paint) would you need for a $4' \times 9'$ table compared to a $3' \times 12'$ table? Simplify/reduce the ratio.

8. How much area of grass would you need for a $4' \times 4'$ lawn compared to a $3' \times 8'$ lawn? Simplify/reduce the ratio.

9. Consider the same red circle with radius 6" with the white inner circle of radius 4". What is ratio of the inner circle's area to the outer circle's area?

10. Suppose we have a 3×3 square small table and a larger table of unknown dimensions. We know that the ratio of the small table's area to the large table's area is $1 : 4$. What is the area of the larger square table? What are its dimensions?

11. At a restaurant a small burger costs \$9 and a large burger costs \$16. Assuming no discounts and equal heights of the circular burger patties, if the small patty has area 12π, what would you expect to be the area of the larger patty?

12. Suppose the target logo has three concentric circles, with diameters of length 2, 4, and 6 centimeters, respectively. What fraction of the area is red?

Extra problems

1. Problems from 2010 AMC 8