Session 6.2

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Recap of last time

1. **Rectangle**: 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. **Right triangle**: key dimensions are **length** and **width**
   (a) $Area = \dfrac{Length * Width}{2} = \dfrac{1}{2} * Length * Width$
3. **Circle**: 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 $9 * \pi \approx 9 * 3.14 = 28.26$
7. Outer area – inner area = border area

Main problems

1. What is the ratio of the areas of a $7' \times 9'$ small rectangle and a $12' \times 14'$ large rectangle?
2. Suppose the rectangles in the previous problem are drywall. If price of drywall is calculated based on area, and the smaller rectangle costs \$15, what is the price of the larger rectangle?
3. What is the ratio of the areas of a 4" radius circle and a 6" radius circle?
4. Suppose the circles in the previous problem are burger patties. If price of a patty is calculated based on area, and the smaller patty costs \$12, what is the price of the larger patty?
5. What is the ratio of the areas of the following square pairs: 3×3 to 6×6? 4×4 to 8×8? 5×5 to 10×10?
6. What is the pattern you see in the ratios of the previous problem?
7. Suppose I have a small square and a large square. If the small square has dimensions 6×6, and the ratio of the areas of the small square to the large square is $1 : 4$, then what are the dimensions of the large square?
8. Consider a $4' \times 4'$ square bin on top of a $6' \times 6'$ square tarp. What is the ratio of the bin's area to the tarp's area? What fraction of the tarp is covered by the bin?

9. In the previous problem, suppose the bin is supposed to catch rain for environmental research. If a water droplet falls randomly on the tarp, what is the chance it'll land in the bin?

10. Consider two concentric circles on a dartboard. Suppose the outer circle has radius 10 cm, and the bullseye has radius 6 cm. If I throw a dart randomly at the board, what is the probability that I hit the bullseye?

11. Consider two concentric squares: outside red, and inside white, leaving a red border. If we wanted 1/4 of the full area to be white, and the inner square has side length 3", what should we make the dimensions of the squares?

12. Consider the previous problem, but now we want 1/9 of the full area to be white. What are some possible side lengths for both squares?

13. Suppose we have a white 4×6 rectangle inside of a red 9×10 rectangle. What fraction of the area is red?

14. If we have a 2×2 black-white checkerboard (each square is 1×1), what fraction of the area is black?

15. Consider the Target logo of three concentric circles where the outermost border and the innermost circles are red. If the three concentric circles have radii 3 cm, 6 cm, and 8 cm, then what is the area of the red on the logo? What fraction of the logo area is red?

16. Suppose I have a circle of radius 4 cm inside of a square of side length 8 cm. What fraction of the square's area is taken up by the circle? Leave your answer in terms of π.

17. If I had four circles of radius 1 cm inside the square of side length 8 cm, what fraction of the area is taken up by the circles?

18. Suppose I had a dartboard made of two concentric circles: the outside and the bullseye. If I wanted a 25% chance of hitting the bullseye, what would some possible dimensions of your dartboard be?

19. At a restaurant a small burger costs \$10 and a large burger costs \$40. 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?

20. In the previous problem, suppose a small burger costs \$9 and a large burger costs \$16. If the small patty has area 36π, what would you expect to be the area of the larger patty? What would be the radius of the larger patty?

21. 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