

## Session 4.1

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## Recap of last time

1. Suppose I tag and release 80 buffalo. Later, I fly over the grasslands and 20 out of 100 buffalo we see are tagged. How big would you estimate is the size of the buffalo population?

$$\frac{\text{tagged}}{\text{total}} = \frac{20}{100} \stackrel{\times 4}{=} \frac{80}{\boxed{400}}$$

2. If Jose can bake 7 cakes in 3 hours, and Nishith can bake 5 cakes in 4 hours, how many complete cakes can they, as a team, bake in 15 hours?

$$\frac{\text{cakes}}{\text{hour}} = \frac{7}{3} + \frac{5}{4} \stackrel{\times 5}{=} \frac{35}{15} + \frac{5}{4} \stackrel{\times 4}{=} \frac{35}{15} + \frac{20}{16} \approx \frac{35}{15} + \frac{19}{15} \longrightarrow 35 + 19 = \boxed{54}$$

## Main problems

- Assortment of warm-up problems
  - Suppose 78% of air is Nitrogen. If we are in a room with 1500 gallons of air, how many gallons of Nitrogen are there?
  - Suppose 15% of American adults suffer from high cholesterol. In a room where 300 adults suffer from high cholesterol, how big would you expect the room to be?
  - If Mr. Hernandez can type 200 words per 2 minutes and Mr. Parker can type 600 words per 5 minutes, then about how many words can they type in 12 minutes as a team?
- Find the area of each of the following figure
  - Square with side length 5 cm
  - Rectangle with dimensions 4 cm  $\times$  7 cm
  - Right triangle with dimensions 3 cm  $\times$  4 cm
  - Circle with radius 2 cm (leave it in terms of  $\pi$ )
  - Circle with radius 4 cm (leave it in terms of  $\pi$ )
  - Circle with diameter 6 cm (leave it in terms of  $\pi$ )
  - Circle with diameter 2 cm (leave it in terms of  $\pi$ )
- Find the dimensions of each figure with the given clues:
  - Square with perimeter 28 cm
  - Square with area 81 cm<sup>2</sup>
  - Rectangle with perimeter 24 cm, where  $Width = 2 * Length$
  - Rectangle with area 35 cm, where  $Width = Length + 2$
  - Triangle with area  $\frac{12}{2}$  cm<sup>2</sup> where  $Width = Length + 1$
  - Circle with perimeter 12 $\pi$  cm

- (g) Circle with area  $16\pi \text{ cm}^2$   
(h) Circle with area  $49\pi \text{ cm}^2$
4. Explain, in your own words, why each equation for area makes sense to you? Think of how you would break it down for your classmates?
  5. What is the area of a square of a  $2 \times 2$  rectangle?  $4 \times 2$  rectangle?  $4 \times 4$  rectangle? As we increase one side, how does the area change? As we increase both sides, how does the area change?
  6. What is the area of a circle of radius 2? Radius 4? Radius 6? As we increase the radius, how does the area change?
  7. 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  $12\pi$ , what would you expect to be the area of the larger patty?
  8. 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