

iFLY Ball Flight Measurement Worksheet Name: _____

| Object | Weight (kg) | Frontal Area (m ²) | Predicted wind speed (kph) | Actual wind speed (kph) | Predicted movement | Observed movement |
|-----------------|-------------|--------------------------------|----------------------------|-------------------------|--------------------|-------------------|
| Tennis Ball | | | | | | |
| Basketball | | | | | | |
| Rugby Ball | | | | | | |
| Pink Fuzzy Ball | | | | | | |
| Googly Ball | | | | | | |
| Vortex | | | | | | |
| Water | | | | | | |

1. Use the scale to measure the mass of the ball

$$m = \text{_____} \text{ g} = \frac{\text{_____}}{\div 1000} \text{ kg}$$

2. Measure the circumference (C) of the ball

$$C = \text{_____} \text{ cm} = \frac{\text{_____}}{\div 100} \text{ m}$$

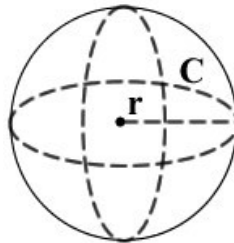
3. Find the radius of the ball (see rearranged formula below)

$$C = 2\pi r$$

$$r = \frac{C}{2\pi} \quad r = \text{_____} \text{ m}$$

4. Use the circumference to calculate the frontal area (the area the wind "sees")

$$A_f = \pi r^2 \quad A_f = \text{_____} \text{ m}^2$$



5. Now using the formula calculate the objects theoretical terminal velocity.

$$m = \text{_____} \text{ kg}$$

$$g = \text{_____} \text{ m/s}^2$$

$$A_f = \text{_____} \text{ m}^2$$

$$C_D = \text{_____} \text{ m}^2$$

$$\rho = \text{_____} \text{ m}^2$$

$$v = \sqrt{\frac{2mg}{A_f C_D \rho}}$$

$$v = \text{_____} \text{ m/s} \quad \times 3.6$$

$$= \text{_____} \text{ kph}$$

6. With your group, discuss how area and weight would contribute to the ball's terminal velocity.

7. How does your ball compare to those of the other groups?
