

FIELD-OF-VIEW (FOV) WITH MATH

We now use the FOV measurements from Student Worksheet 1 to calculate the FOV more precisely. If x marks your FOV (either in horizontal or vertical direction), the FOV can be calculated as

$$\text{FOV} = \frac{x \text{ ("how high you can see")}}{d \text{ ("how far you measured")}}$$

This measures the FOV in units called "radians." To convert to angular degrees, multiply this number by $180^\circ/\pi$, where $\pi = 3.14$. That is,

$$\text{FOV(degrees)} = \text{FOV(radians)} \times \frac{180}{3.14}$$

Convert your FOV measurements from Student Worksheet 1 to radians and degrees; d is the distance at which the FOV was measured. If you did the measurement right in front of the viewer, use $d = 10$ cm.

a) Vertical FOV measurement: $x = \underline{\hspace{2cm}}$ cm
 $d = \underline{\hspace{2cm}}$ cm
 → Vertical FOV = $\underline{\hspace{2cm}}$ radians
 = $\underline{\hspace{2cm}}$ degrees

b) Horizontal FOV measurement: $x = \underline{\hspace{2cm}}$ cm
 $d = \underline{\hspace{2cm}}$ cm
 → Horizontal FOV = $\underline{\hspace{2cm}}$ radians
 = $\underline{\hspace{2cm}}$ degrees

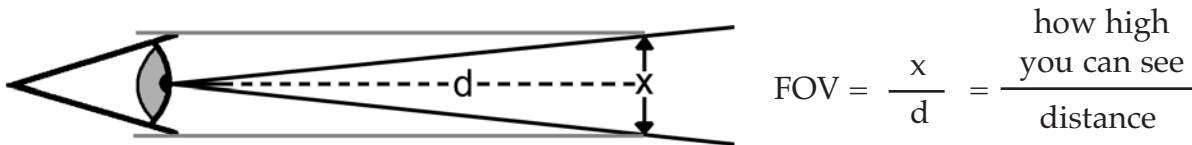
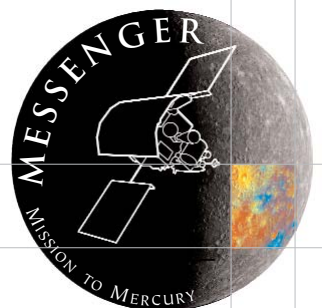


Figure S1. The simple formula for Field of View (FOV) – the angle a person can see without moving their eyes or their head.



Fill in the following charts for your group:

Vertical FOV

	MINIMUM FOR YOUR GROUP	MAXIMUM FOR YOUR GROUP	AVERAGE OF GROUP
<i>FOV without goggles</i>			
<i>FOV with goggles, Pattern A</i>			
<i>FOV with goggles, Pattern B</i>			

Horizontal FOV

	MINIMUM FOR YOUR GROUP	MAXIMUM FOR YOUR GROUP	AVERAGE OF GROUP
<i>FOV without goggles</i>			
<i>FOV with goggles, Pattern A</i>			
<i>FOV with goggles, Pattern B</i>			

Answer the following question individually:

1. Calculate the "reduction factor," that is, how much the goggles reduce the amount of light entering your eyes. This can be estimated by calculating the ratio between by the "area of the world" that you can see (known as "solid angle") without the goggles, and that which you can see with the goggles. Use the FOV results in radians.

Estimate the amount of light entering your eyes without goggles:

$$\begin{aligned}
 \text{Area}_1 &= \text{vertical FOV} \times \text{horizontal FOV} \\
 &= \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} \\
 &= \underline{\hspace{2cm}}
 \end{aligned}$$

Estimate the amount of light entering your eyes with goggles (Pattern _____):

$$\begin{aligned}
 \text{Area}_2 &= \text{vertical FOV} \times \text{horizontal FOV} \\
 &= \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} \\
 &= \underline{\hspace{2cm}}
 \end{aligned}$$

$$\begin{aligned}
 \text{Reduction factor} &= \text{Area}_1 / \text{Area}_2 \\
 &= \underline{\hspace{2cm}}
 \end{aligned}$$

