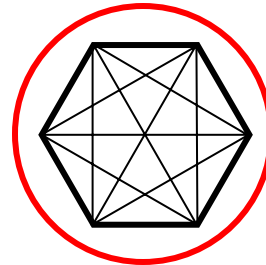
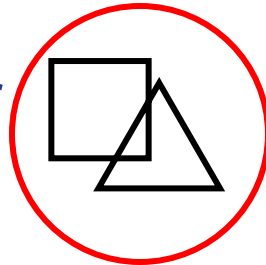


A+ Compass™

The Haberdasher Problem

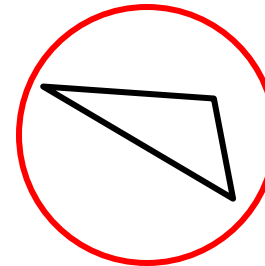


Distinct Diagonals of Regular Polygons

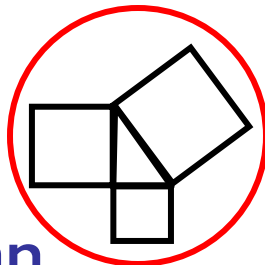


The Pythagorean Set #2

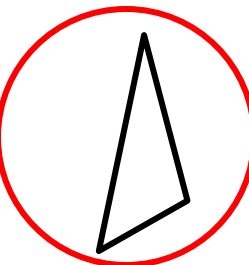
Problems & Puzzles in Plane & Solid Geometry



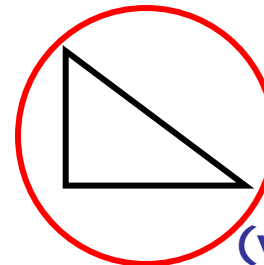
Constructing the Centroid (with Math-Vu Mirror)



The Pythagorean Set #1



Constructing the Centroid (by hanging figure)

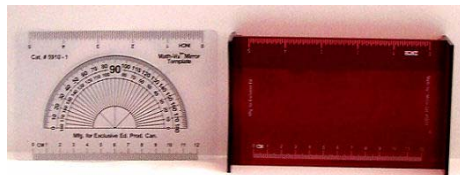


Constructing the Centroid (verify with A+ Pedestal)

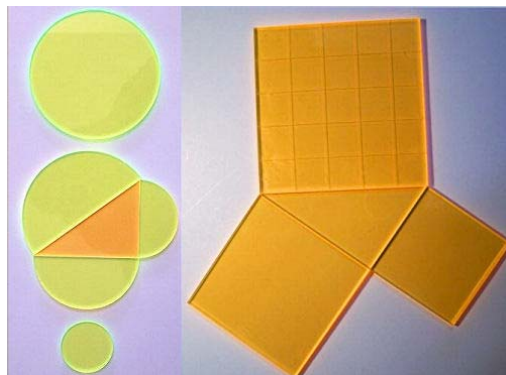
WEBSITE: www.apluscompass.com

RESOURCES:

Math-Vu Mirror



Exploring Right Triangles Set



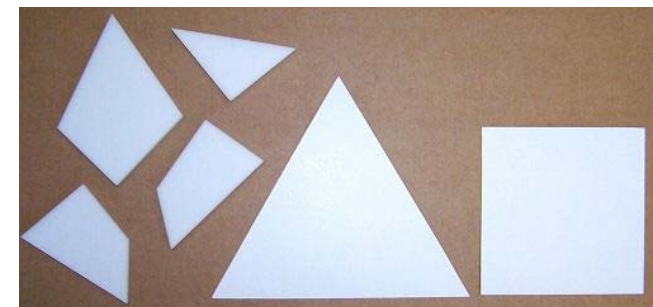
Centroid Set (Pedestal &



A+ Compass™ CD #2



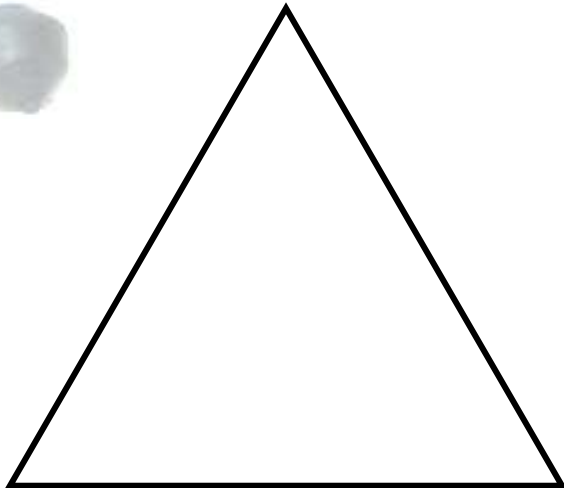
Haberdasher Set

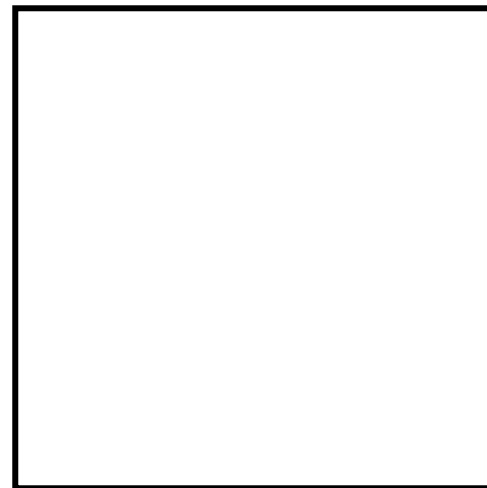




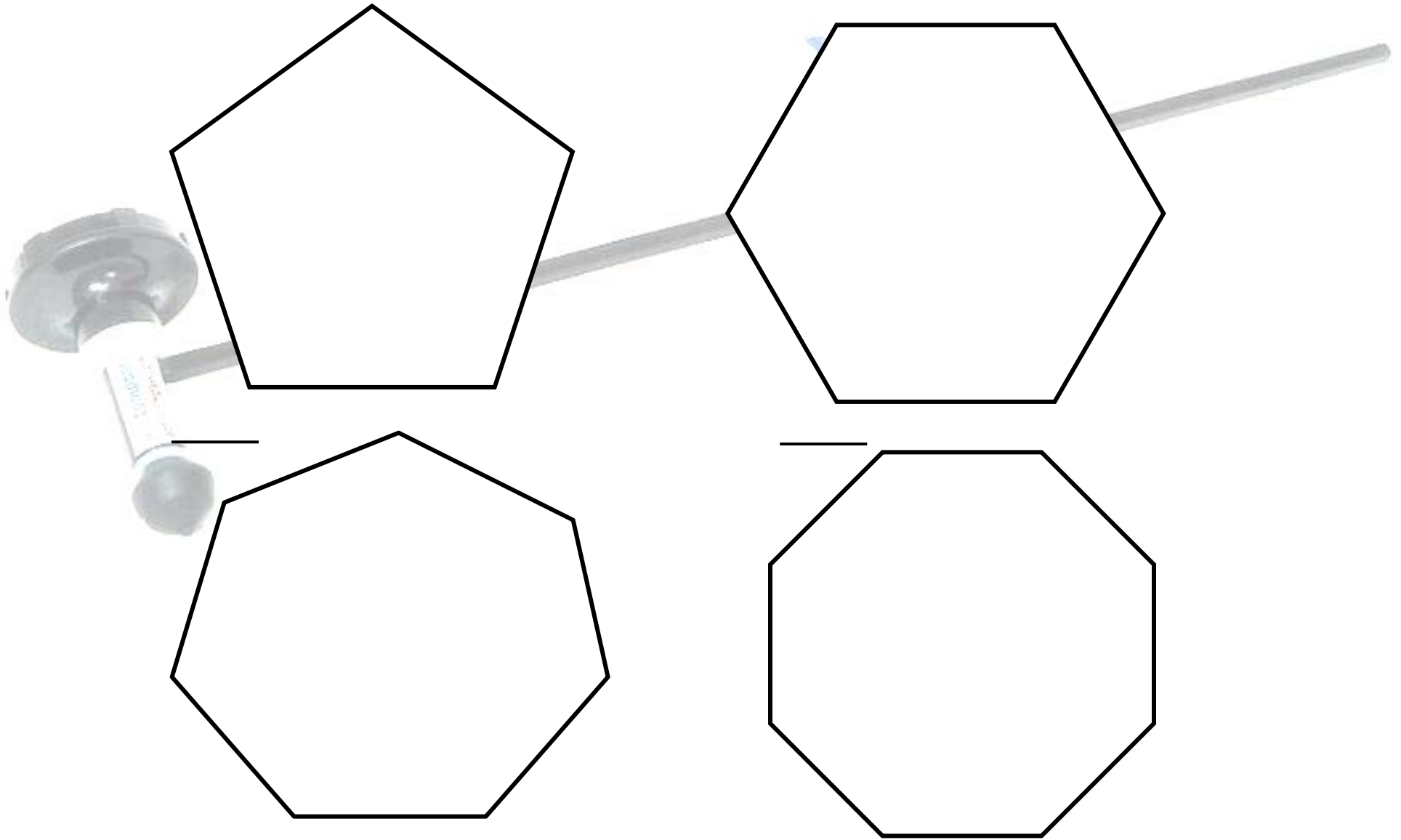
Distinct Diagonals of Regular Polygons

In each of the polygons below, use a straightedge to draw as many distinct diagonals as possible and write that number in the space below each figure.





[return to start page]



[return to start page]

Predict the number of distinct diagonals in a regular nonagon (9-sided polygon): _____

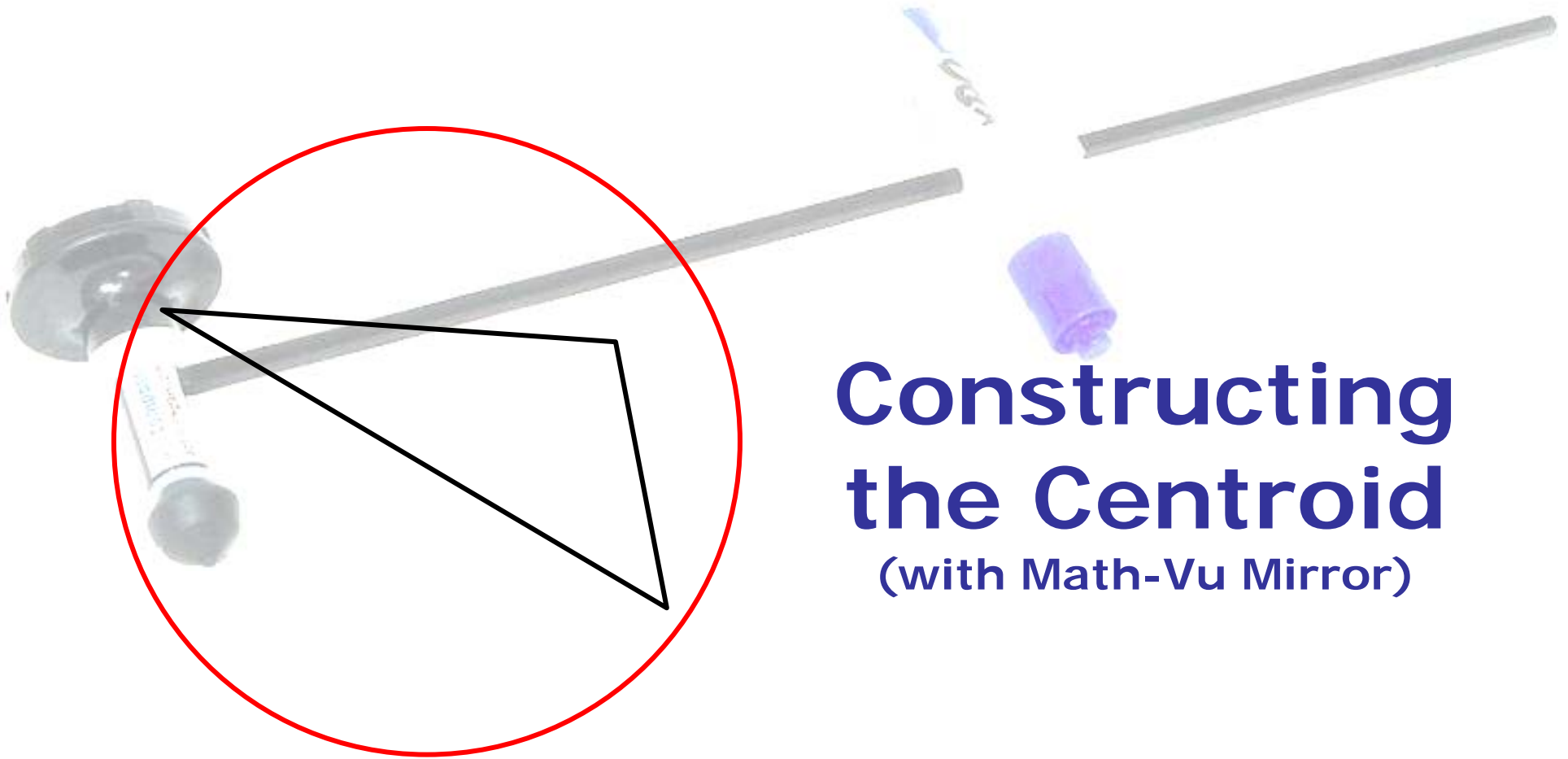
What equation relates the number of diagonals to the number of sides of these regular polygons?

Use your TI-83 to find this equation

How does the number of sides in these regular polygons compare to the number of vertices? _____

When is the number of diagonals equal to zero? _____

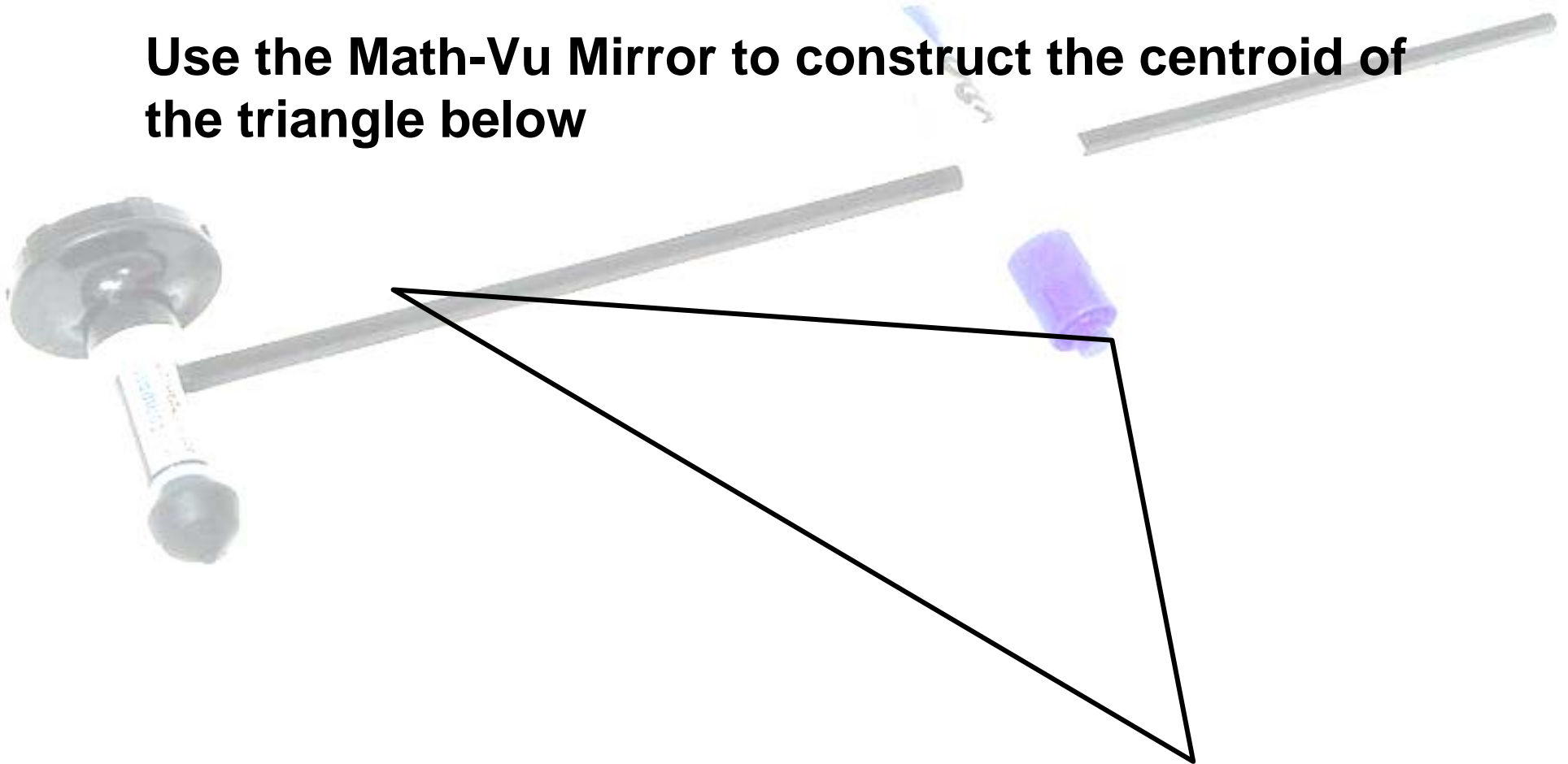
Why do you need to divide by two in this equation?

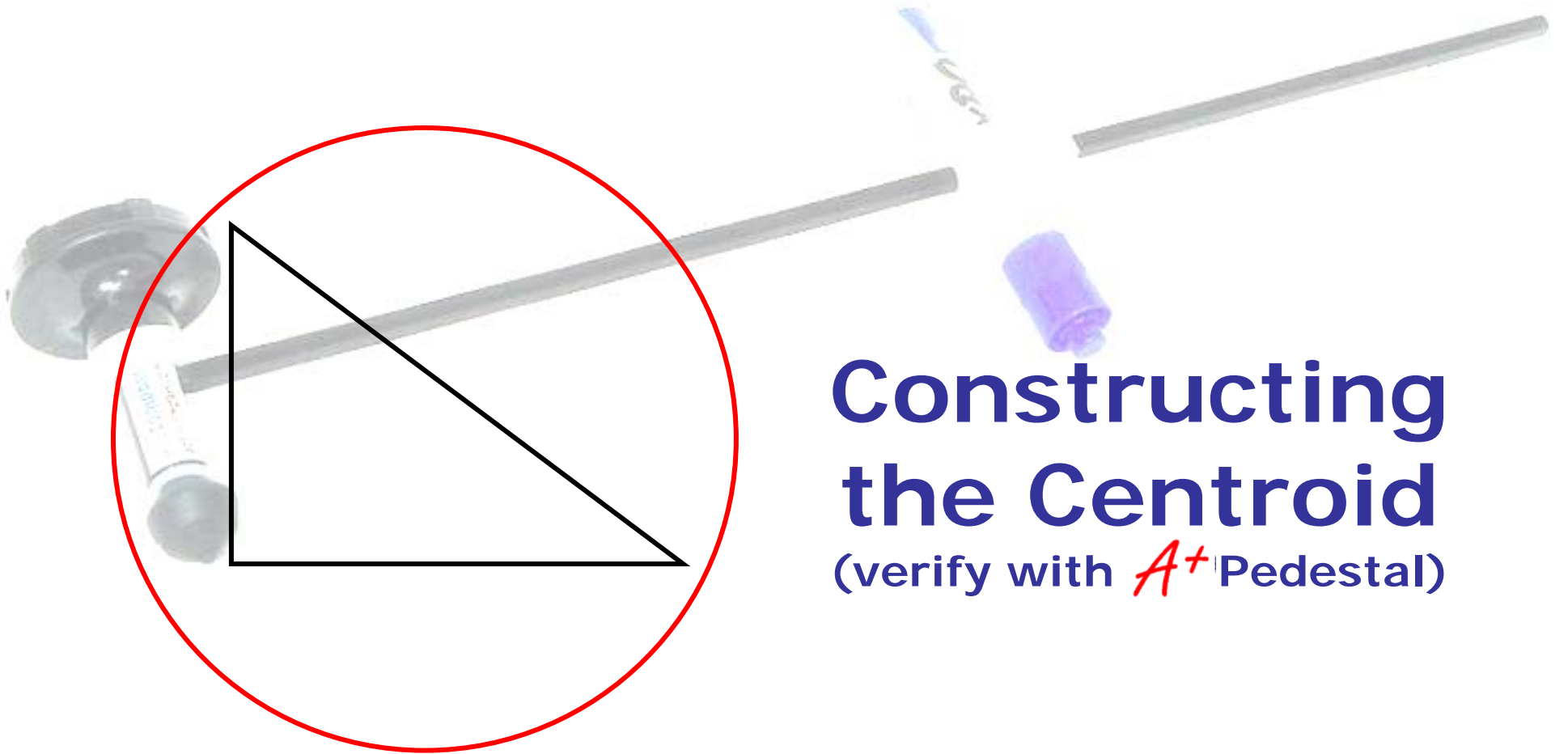


Constructing the Centroid

(with Math-Vu Mirror)

Use the Math-Vu Mirror to construct the centroid of the triangle below



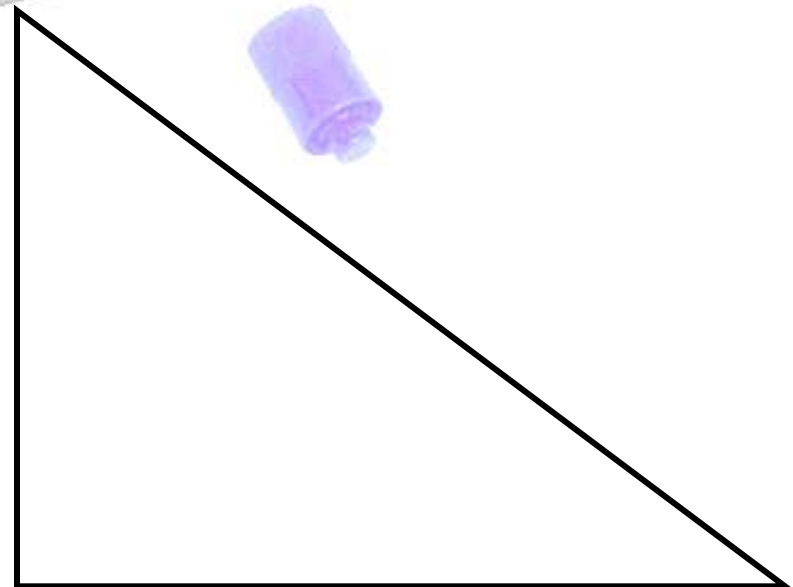


Constructing the Centroid

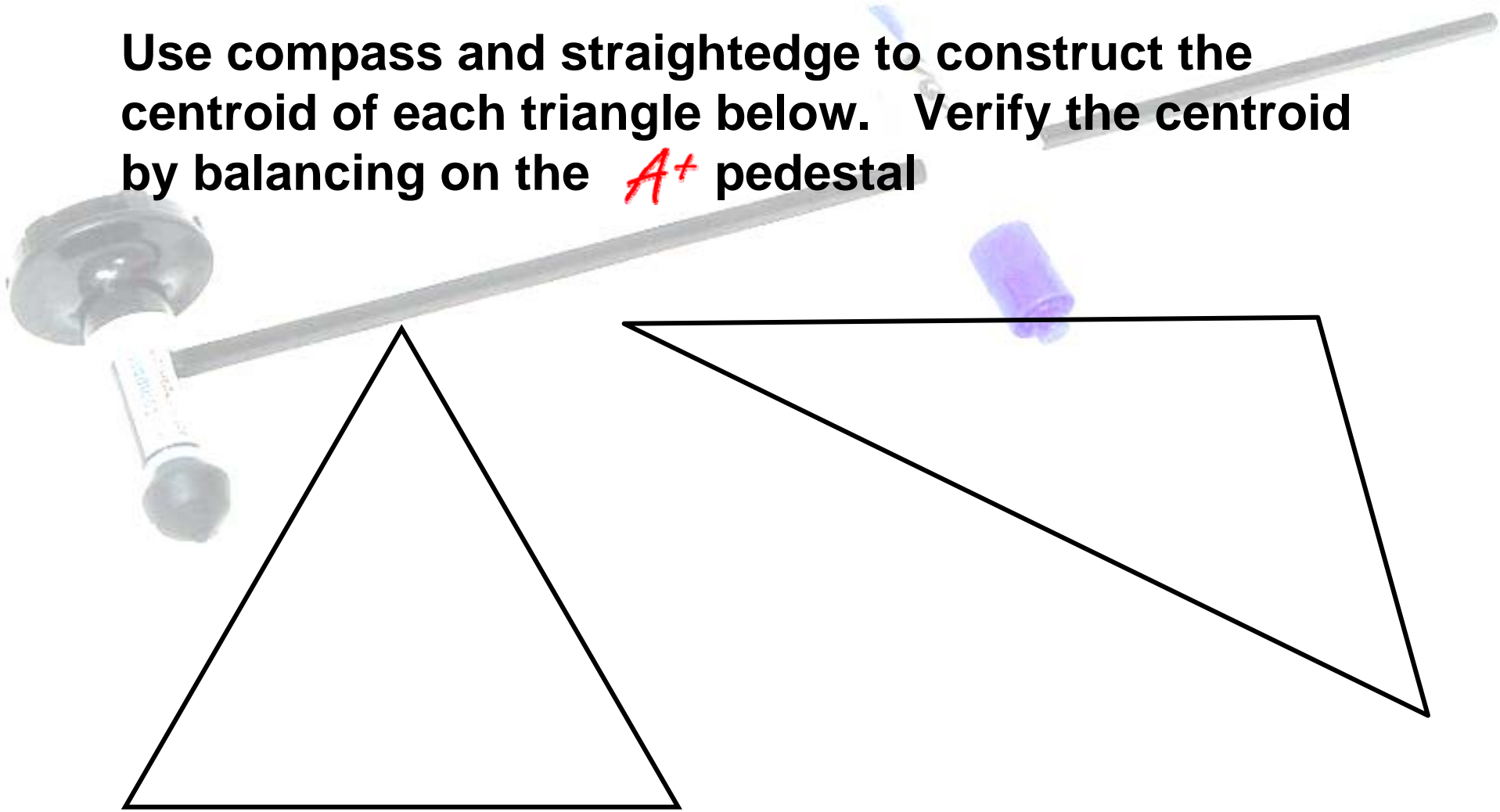
(verify with *A+* Pedestal)

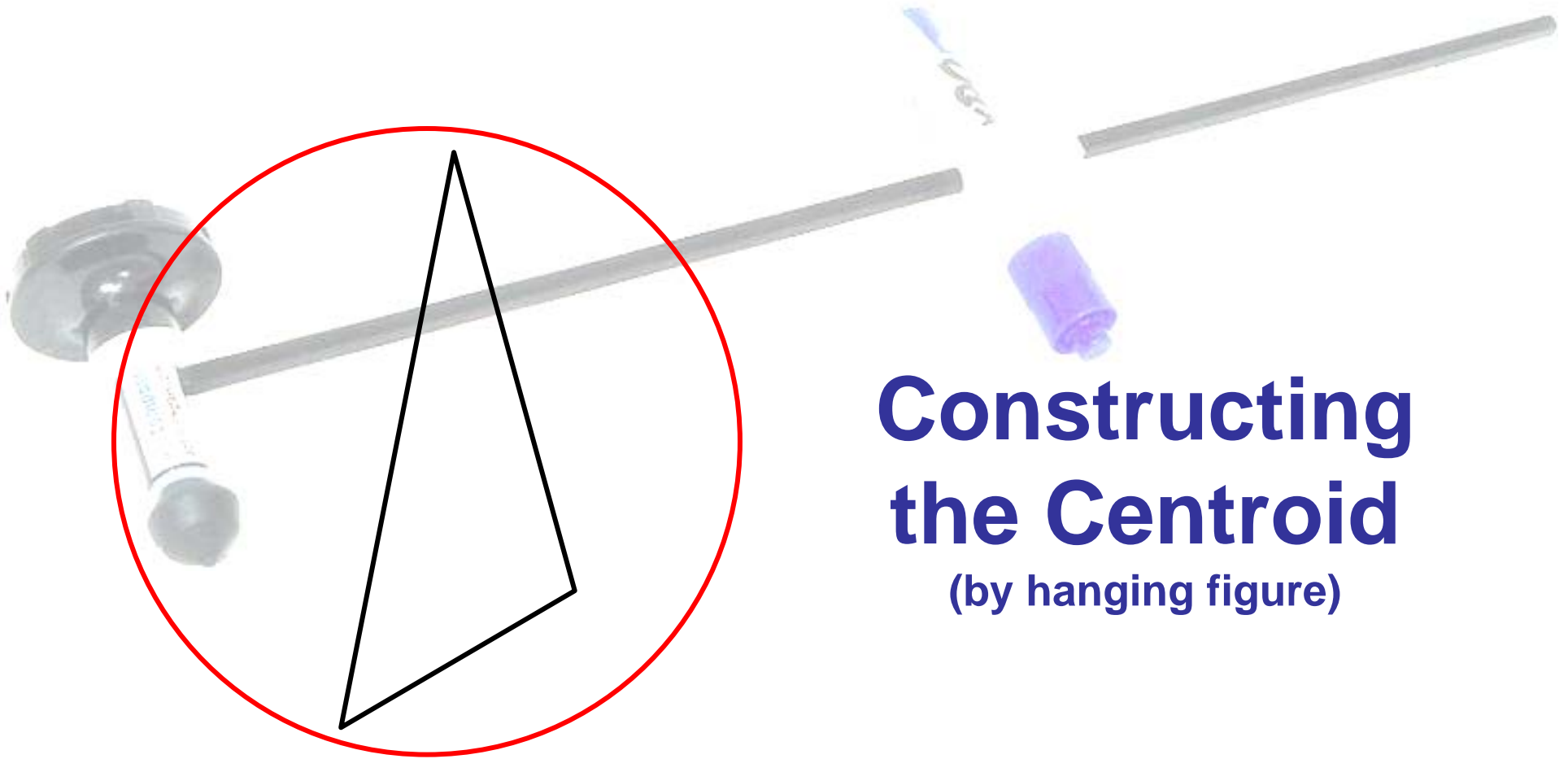
Use compass and straightedge to construct the centroid of the triangle below.

Because the centroid of a triangle coincides with its center of gravity, the triangle should balance at this point when placed on the **A+** pedestal.



Use compass and straightedge to construct the centroid of each triangle below. Verify the centroid by balancing on the **A+** pedestal



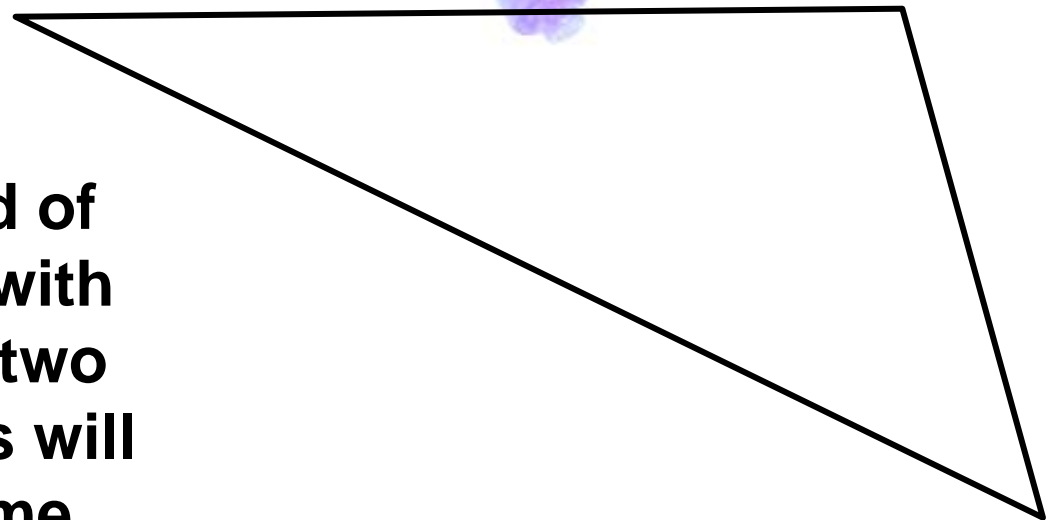


Constructing the Centroid

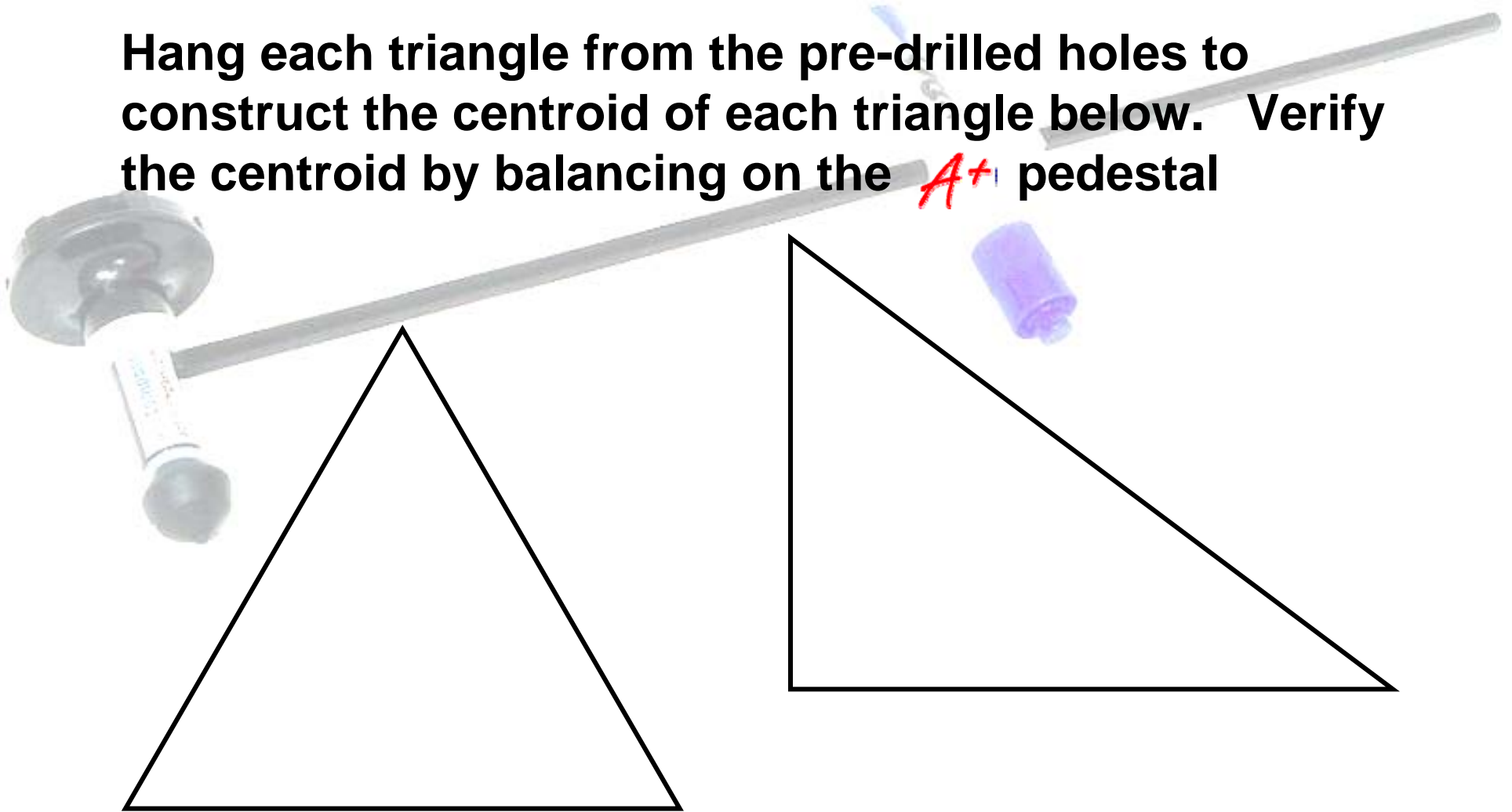
(by hanging figure)

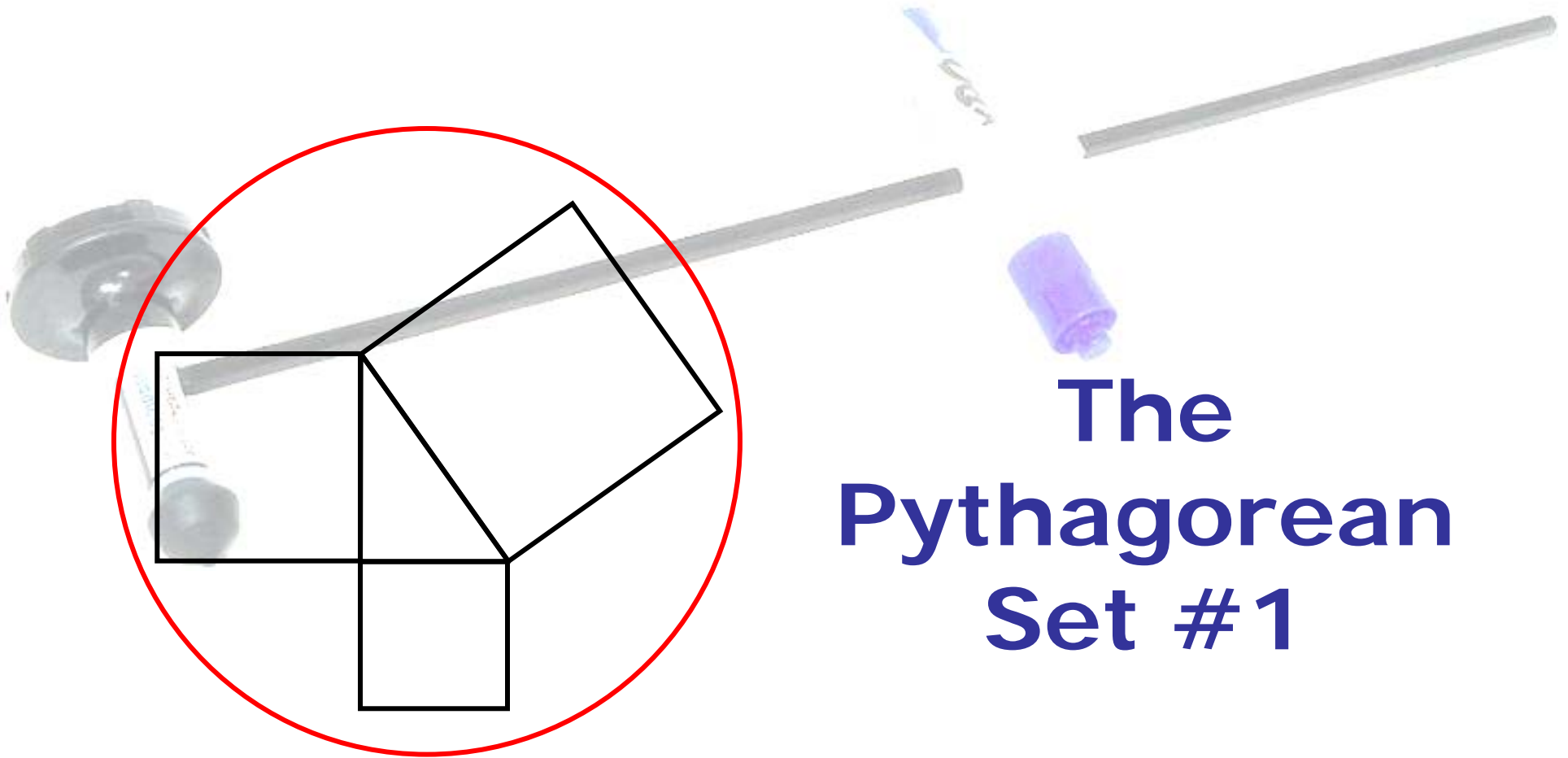
Hang each triangle from the pre-drilled holes and mark the vertical lines on the triangle to construct the centroid of the triangle below.

Because the centroid of a triangle coincides with its center of gravity, two or more vertical lines will pass through the same point.



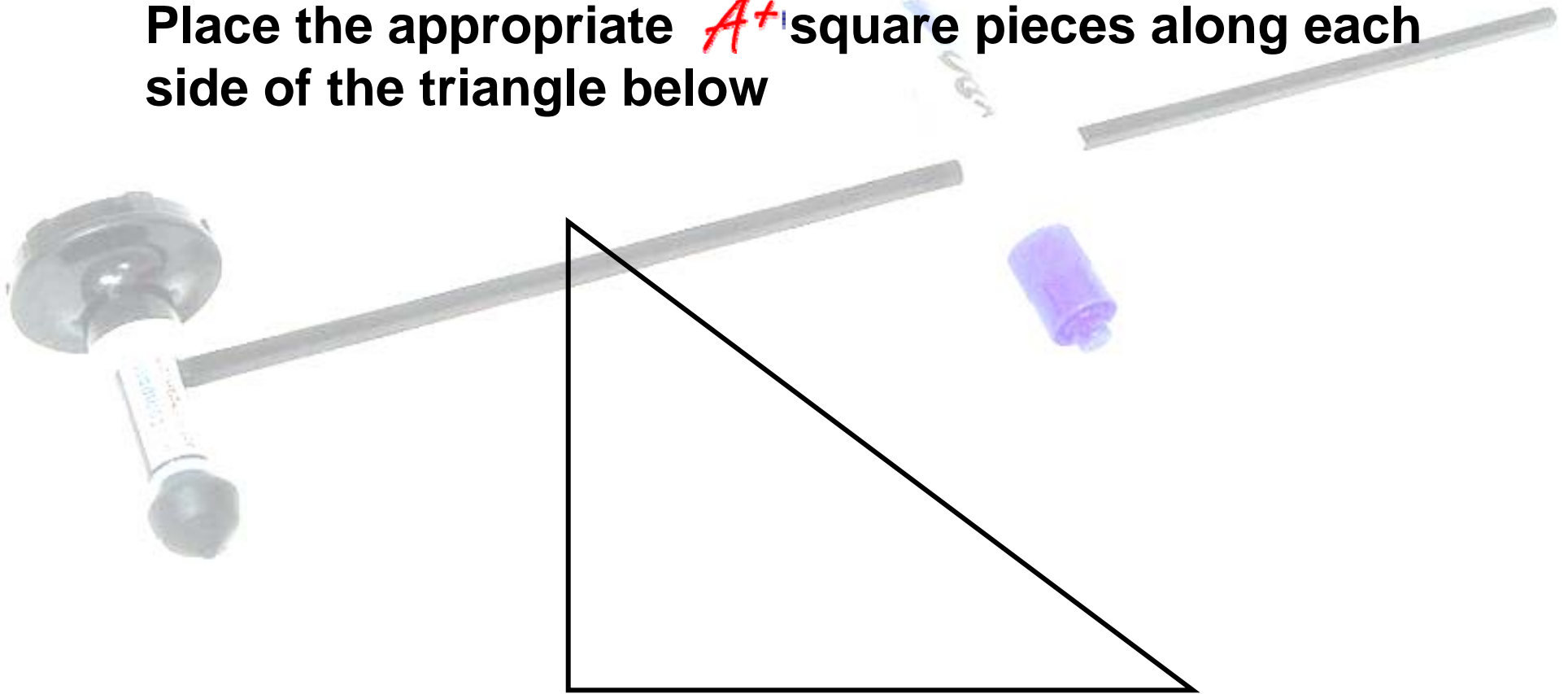
Hang each triangle from the pre-drilled holes to construct the centroid of each triangle below. Verify the centroid by balancing on the *A+* pedestal





The Pythagorean Set #1

Place the appropriate **A+** square pieces along each side of the triangle below



Using the *A+* plastic grid, determine the area of each square piece

A square with side \overline{AB}

=

A square with side \overline{AC}

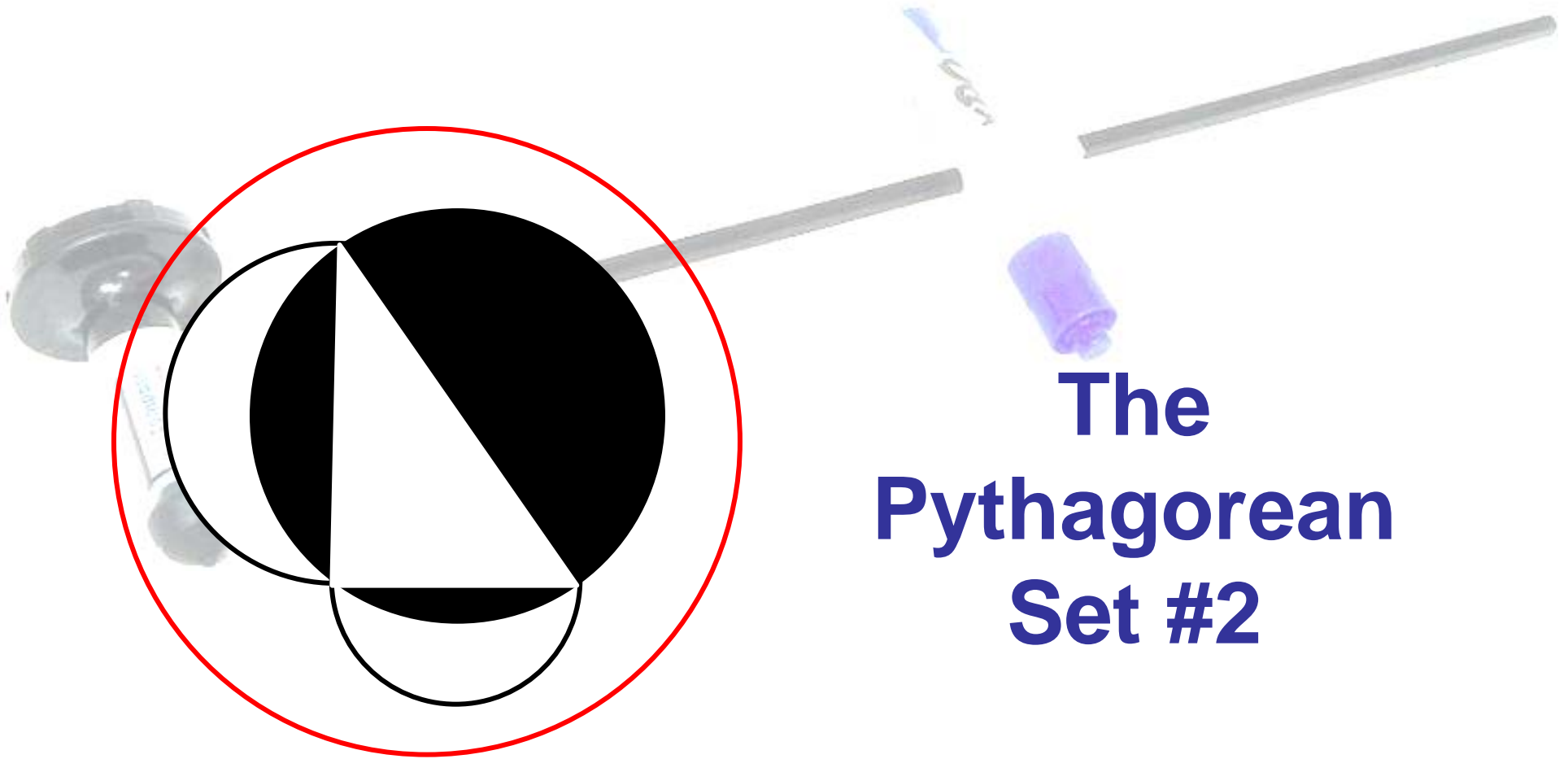
=

A square with side \overline{BC}

=

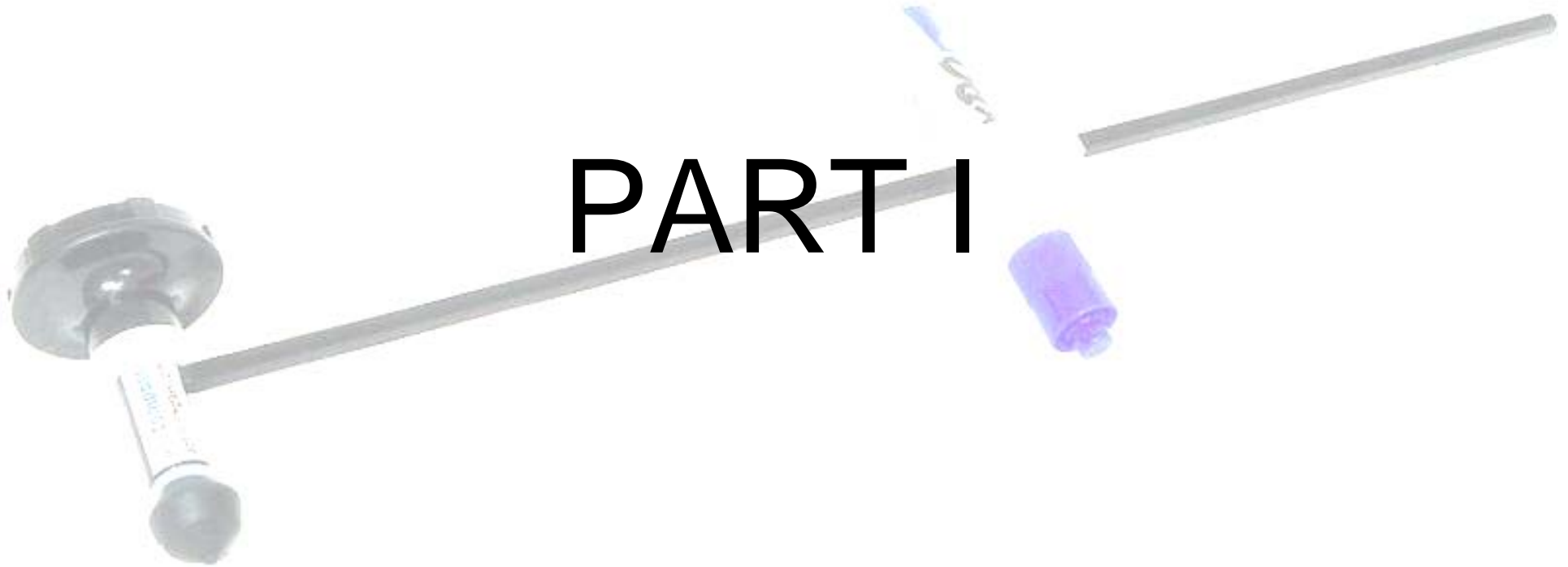
What relationships exist between these measures?

More specifically, what is the relationship between the sum of the areas of the squares on the legs and the area of the square on the hypotenuse?

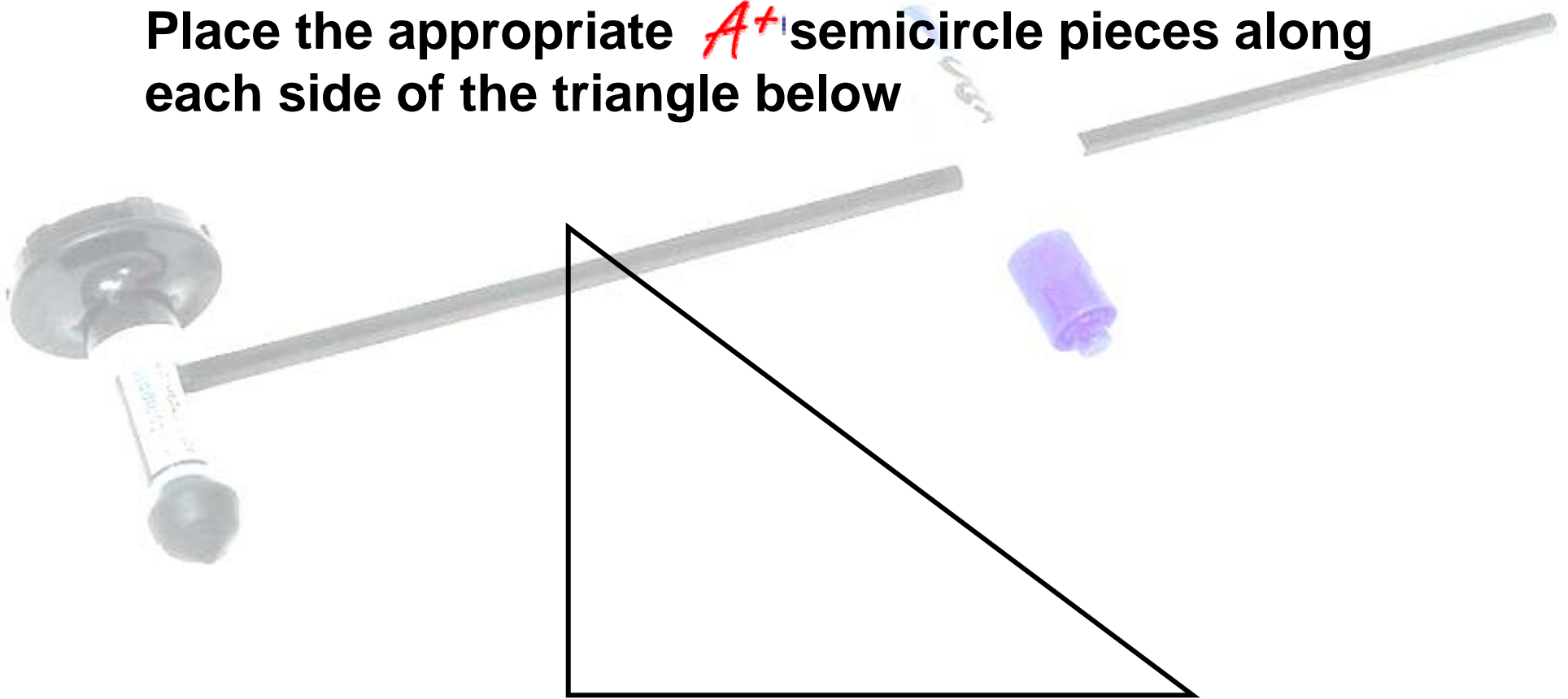


The Pythagorean Set #2

PART I



Place the appropriate **A+** semicircle pieces along each side of the triangle below



Using the A+ plastic grid to determine the diameter & radius of each semicircle piece, find the areas below.

$$\left(A_{\text{semicircle}} = \frac{1}{2} \pi r^2 \right)$$

$A_{\text{semicircle with diameter } \overline{AB}} =$ _____

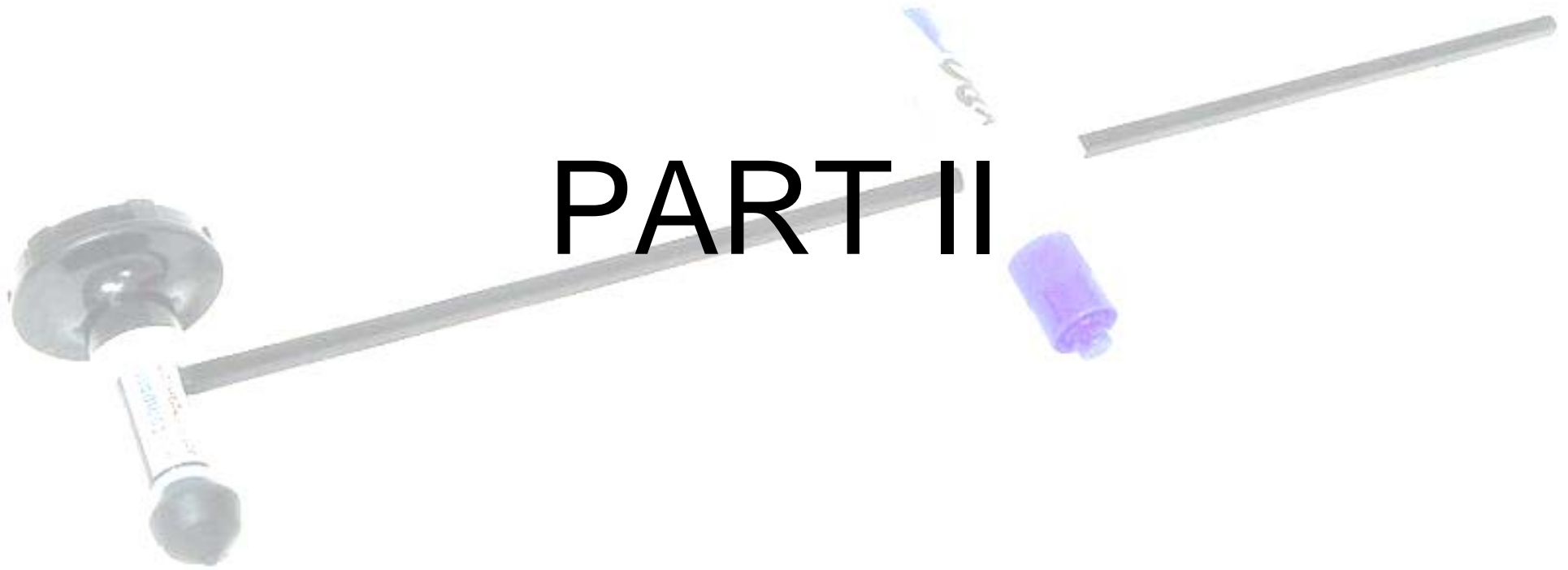
$A_{\text{semicircle with diameter } \overline{AC}} =$ _____

$A_{\text{semicircle with diameter } \overline{BC}} =$ _____

What relationships exist between these measures?

More specifically, what is the relationship between the sum of the areas of the semicircle on the legs and the area of the semicircle on the hypotenuse?

PART II



The previous activity shows that you can replace the squares on each side of the triangle with any similar figures (like the semicircles).

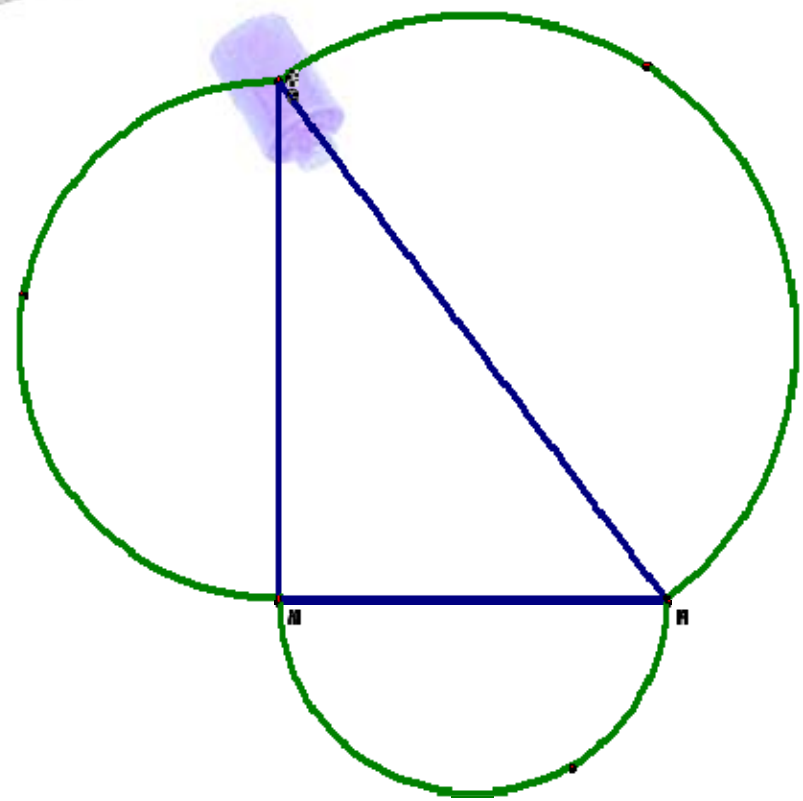
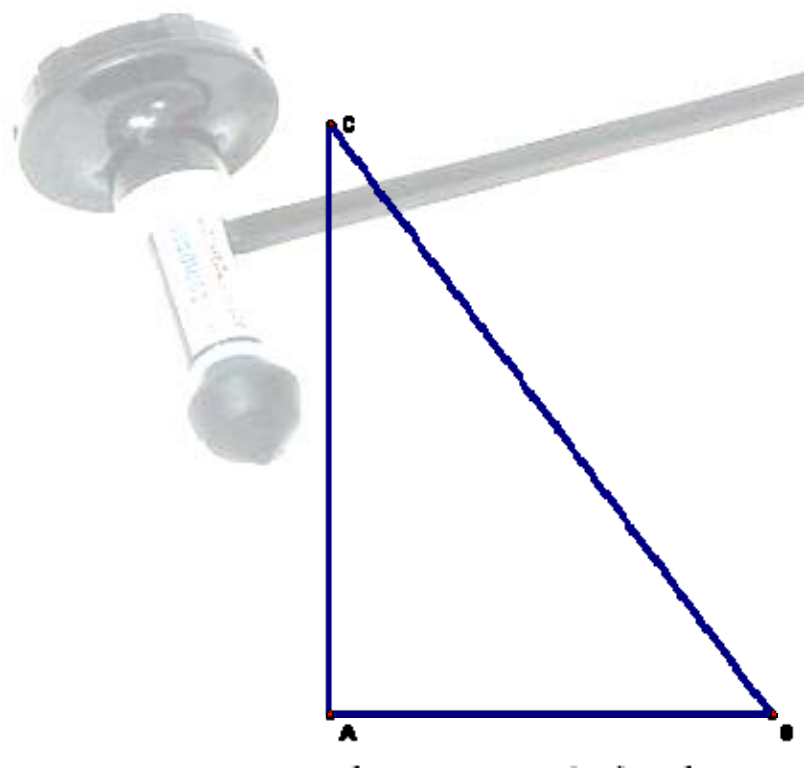
This idea can be extended to demonstrate that the lunes formed on the legs of a right triangle have an area equal to the triangle itself.

Superimpose the large circle over the semicircle on the hypotenuse to view the lunes formed.

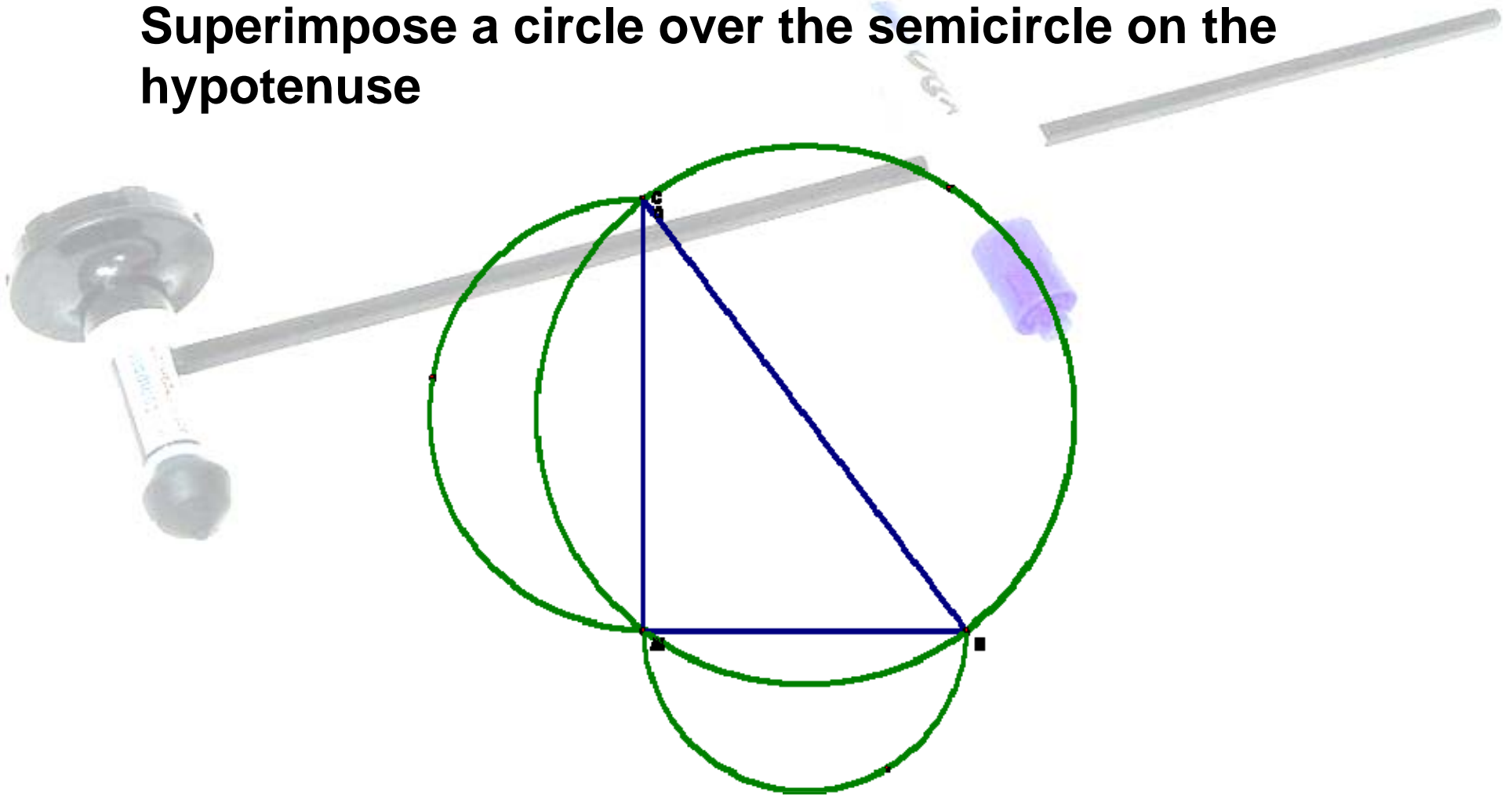
Confirm this relationship in The Geometer's Sketchpad®.

**Construct a 3-4-5
right triangle**

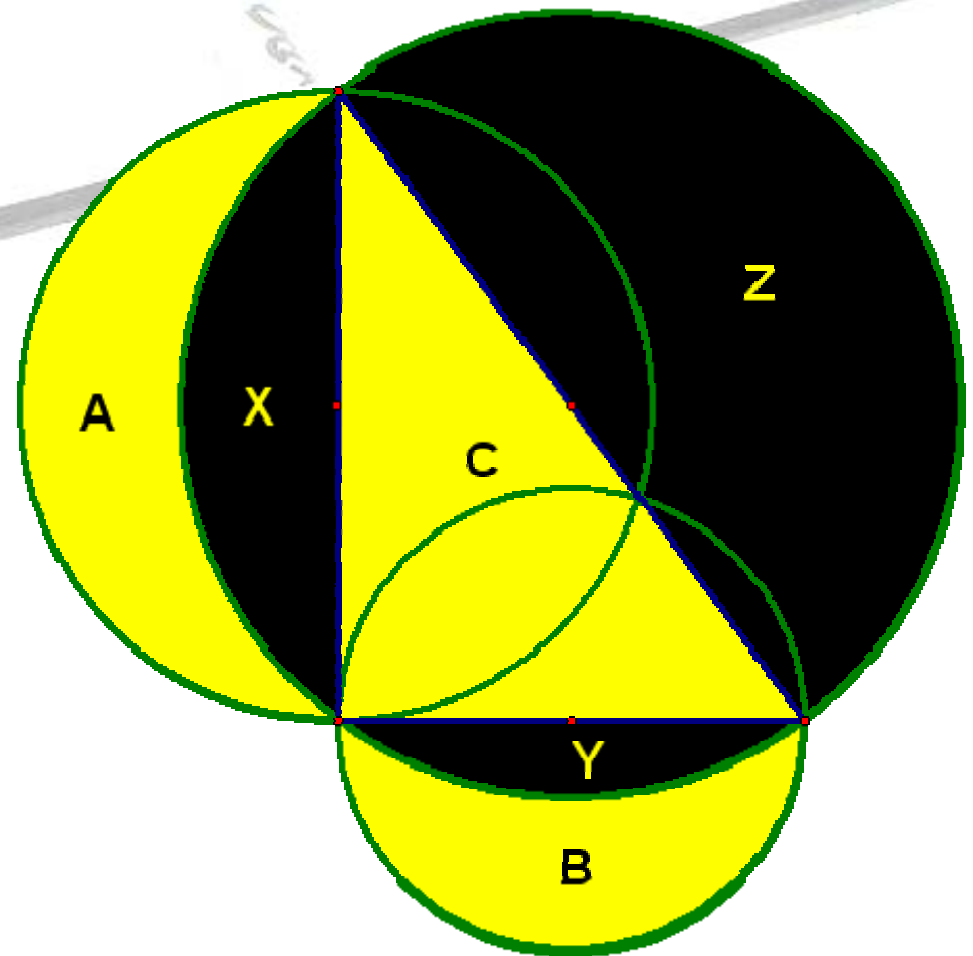
**Place semicircles on
each side of the
triangle**



Superimpose a circle over the semicircle on the hypotenuse



Find the area of the lunes (A and B) formed on each leg of the right triangle and compare to the area of the right triangle itself (C)



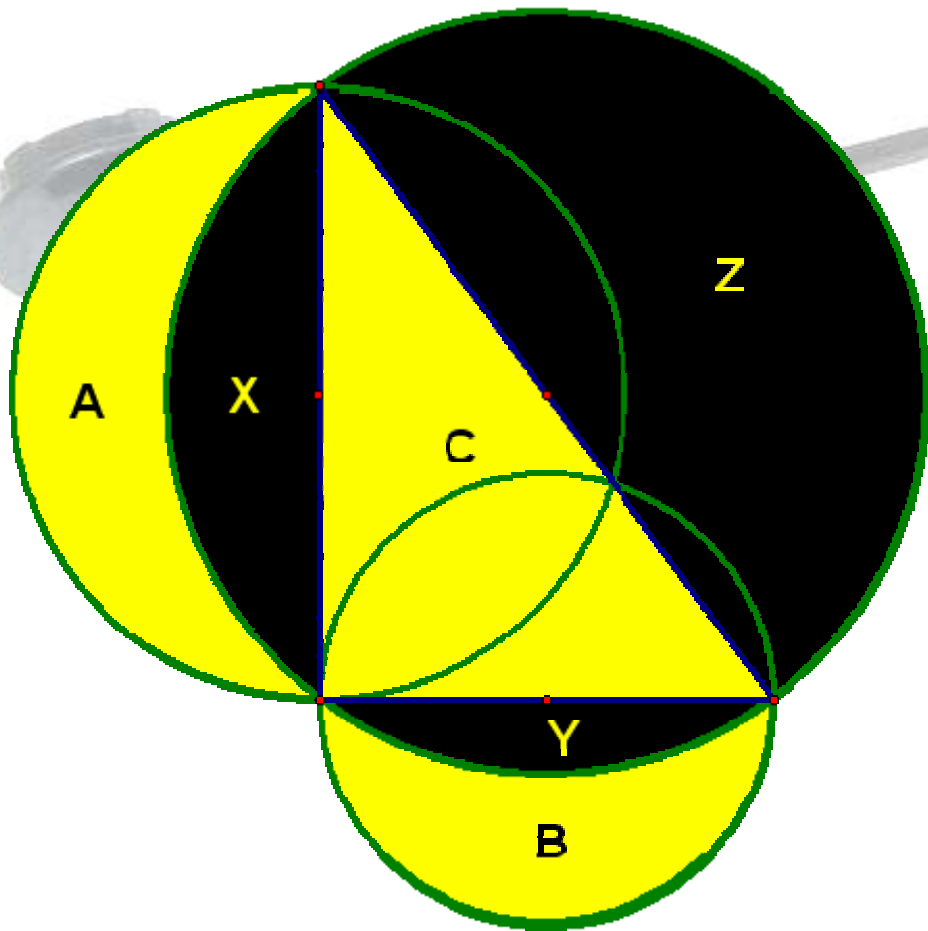
Area of lune A:

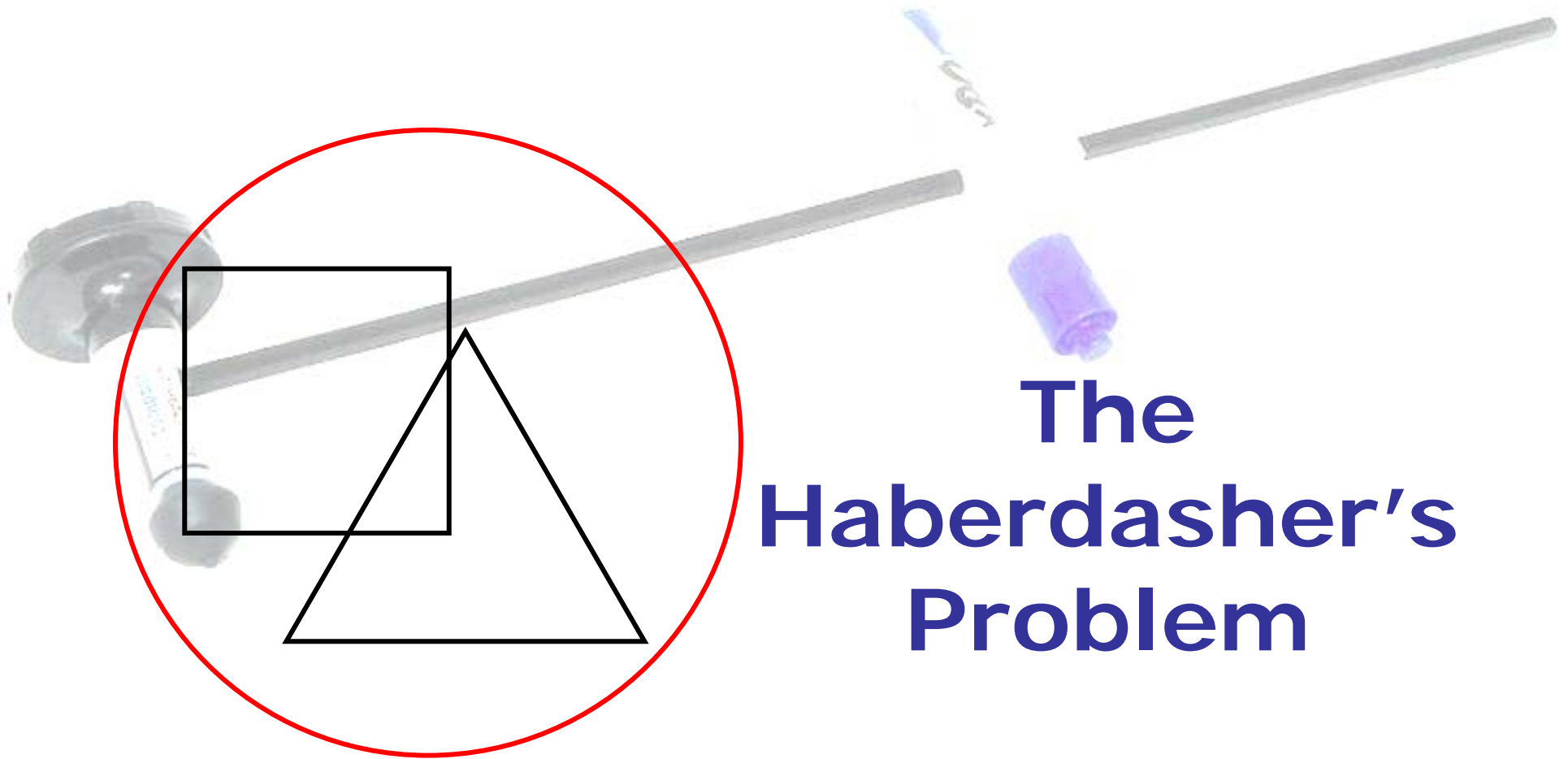
Area of lune B:

Area of right triangle C:

Area of lune A + Area of lune B: _____

Confirm this with a proof:





The Haberdasher's Problem

In PART I of this activity, you will use the 4 Haberdasher plastic pieces provided.

For the first part of this activity, you will arrange these pieces into an equilateral triangle. This is the beginning arrangement for the Haberdasher's Problem.

In the second part of this activity, you will arrange these pieces into a square. This is referred to as the Haberdasher's Problem – converting an equilateral triangle into a square.

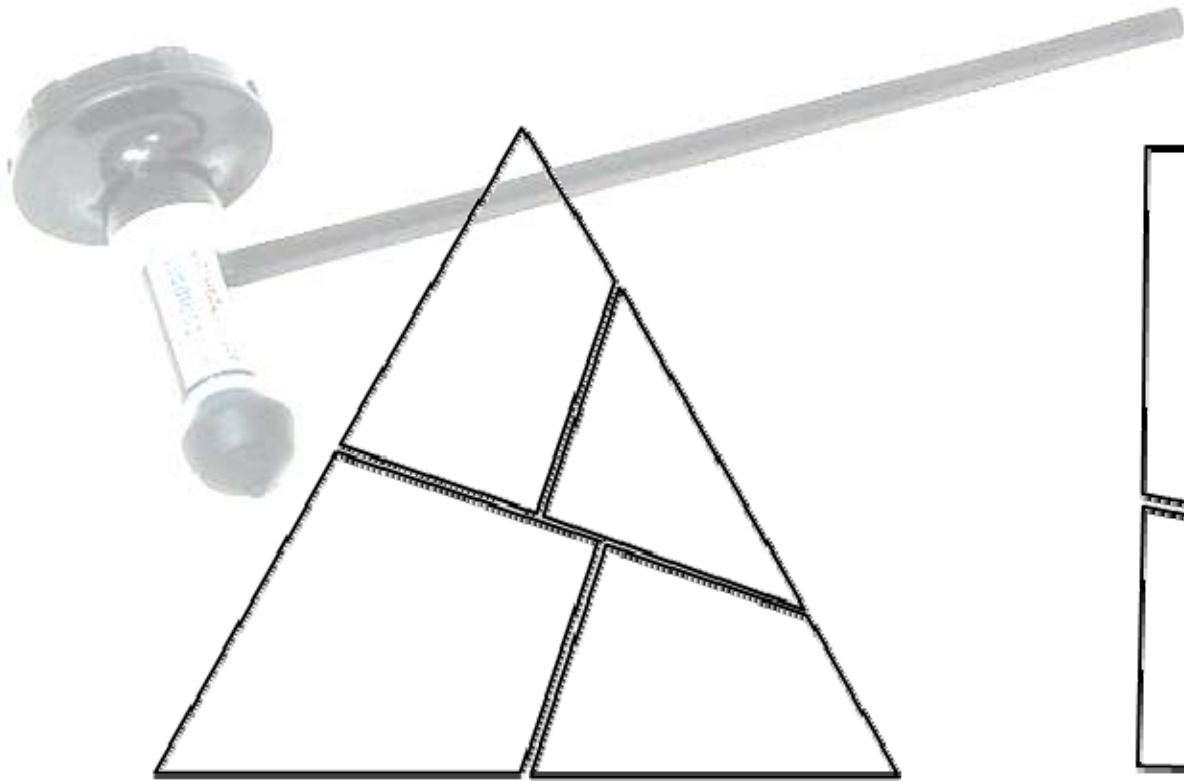
SPOILER ALERT:

The solution guide to each of these problems is printed on the next slide.



SOLUTION TO ARRANGING PIECES

INTO AN EQUILATERAL TRIANGLE:



INTO A SQUARE:

