

# **DIG INTO EQUATIONS: A POLYGON PUZZLE**

Presented by MathLinks Authors  
Mark Goldstein and Shelley Kriegler

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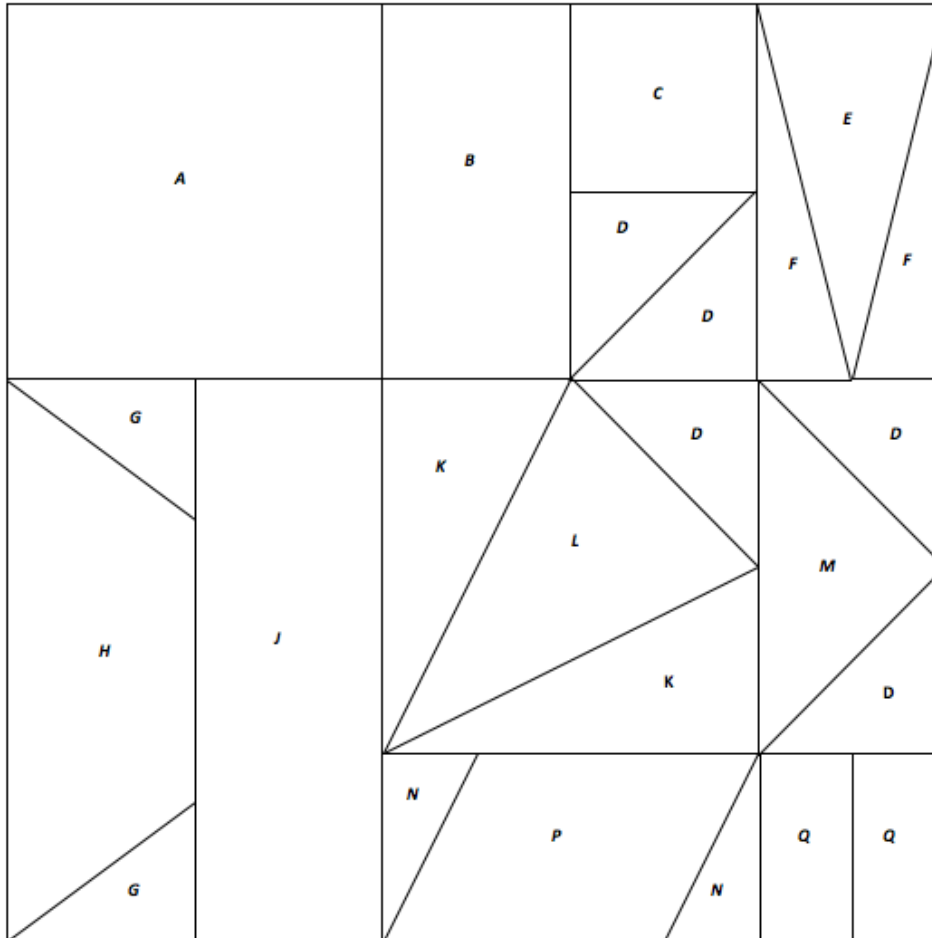
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In this session, we will explore a context that helps students:

- Write algebraic equations
- Evaluate algebraic expressions using substitution

# Our polygon puzzle

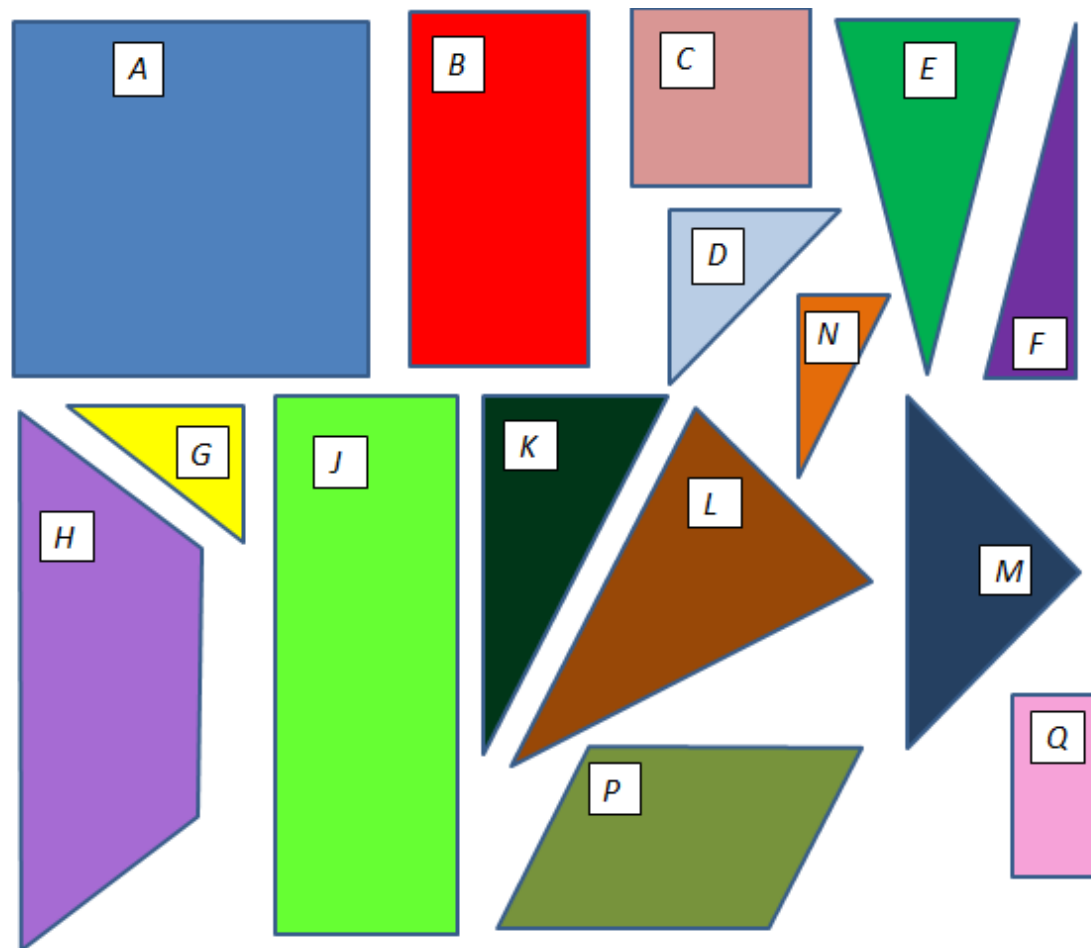


**A** is a label . It refers to an object – a piece of the puzzle.

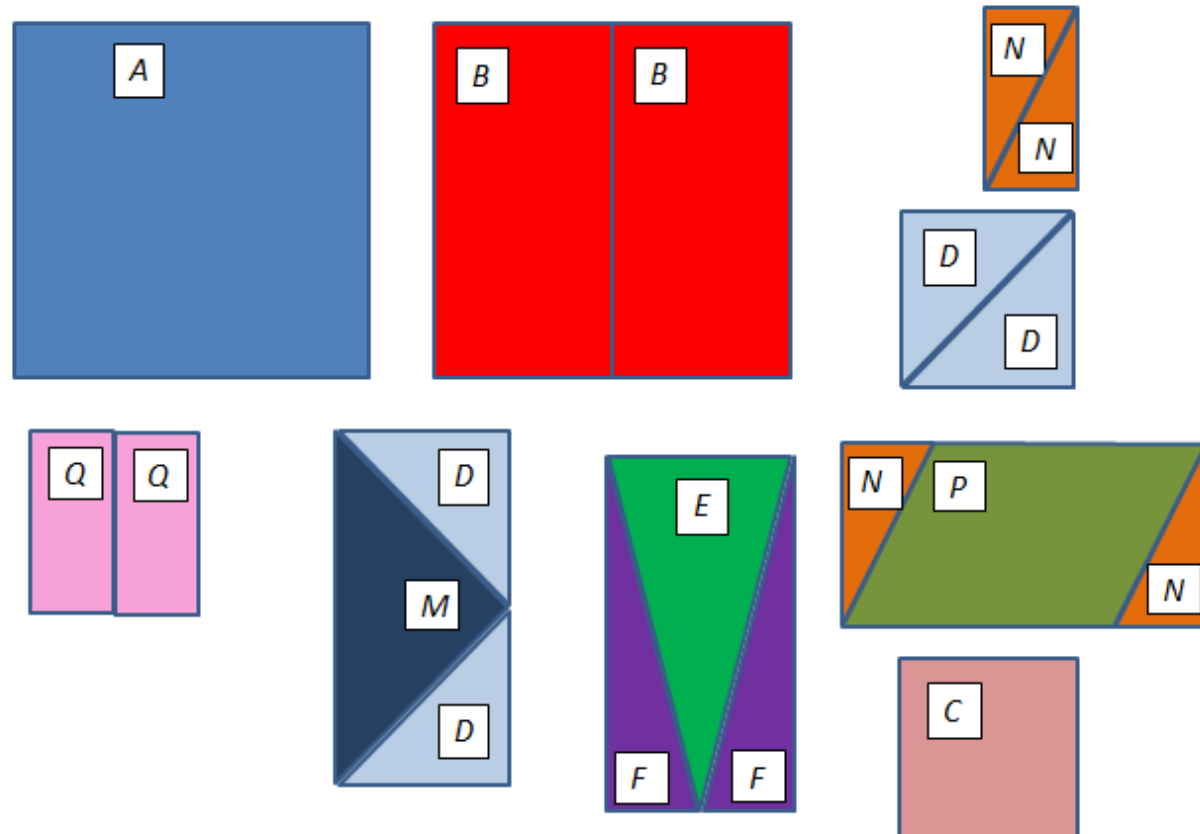
Let **A** = the area of shape A.  
This is a variable.

# Let's dig in:

Build  
polygons  
with equal  
areas.



# A few assembled rectangles.



Write equations to represent polygons with equal areas.

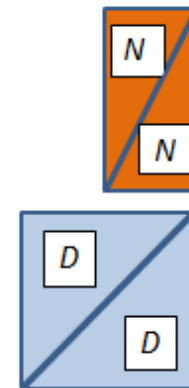
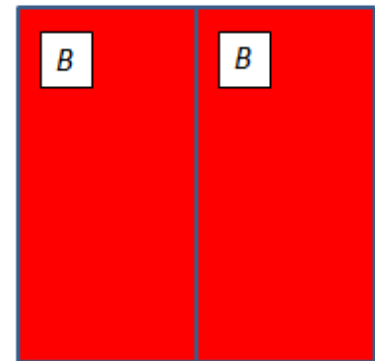
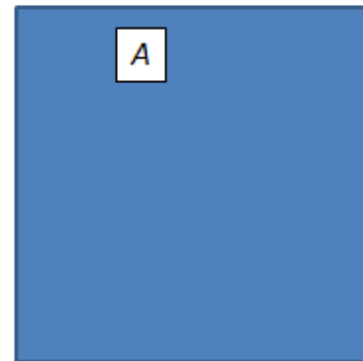
$$A = 2B$$

$$A = B + B$$

$$B = \frac{1}{2} A$$

$$2D = 4N$$

$$4D = B$$

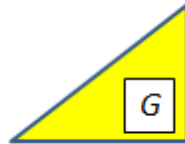


$$\frac{1}{2} A = 4D$$

$$A + 2D = 2B + 4N$$

Given:  $H = 36$  sq units

Find  $G$ :

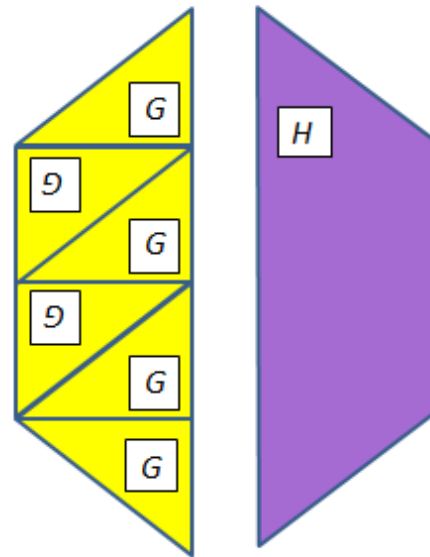


$$H = 6G$$

$$36 = 6G$$

$$6 = G$$

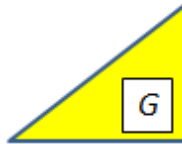
$$G = 6 \text{ sq units}$$



Given:  $H = 36$  sq units

Find  $\frac{1}{3}J$ :

Recall  $G = 6$



$$J = H + 2G$$

$$J = 36 + 2(6)$$

$$J = 48$$

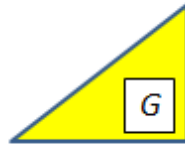


$$\frac{1}{3}J = 16$$



Given:  $H = 18$  sq units

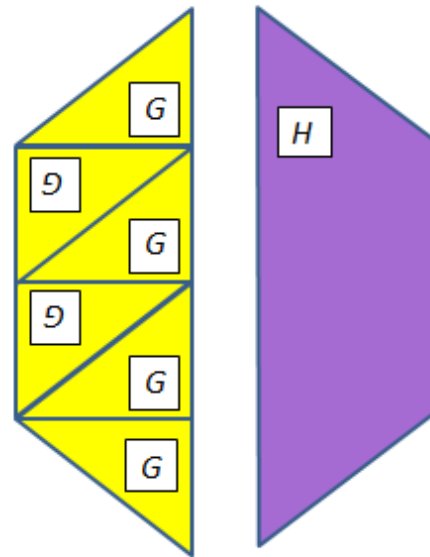
Find  $G$ :



$$H = 6G$$

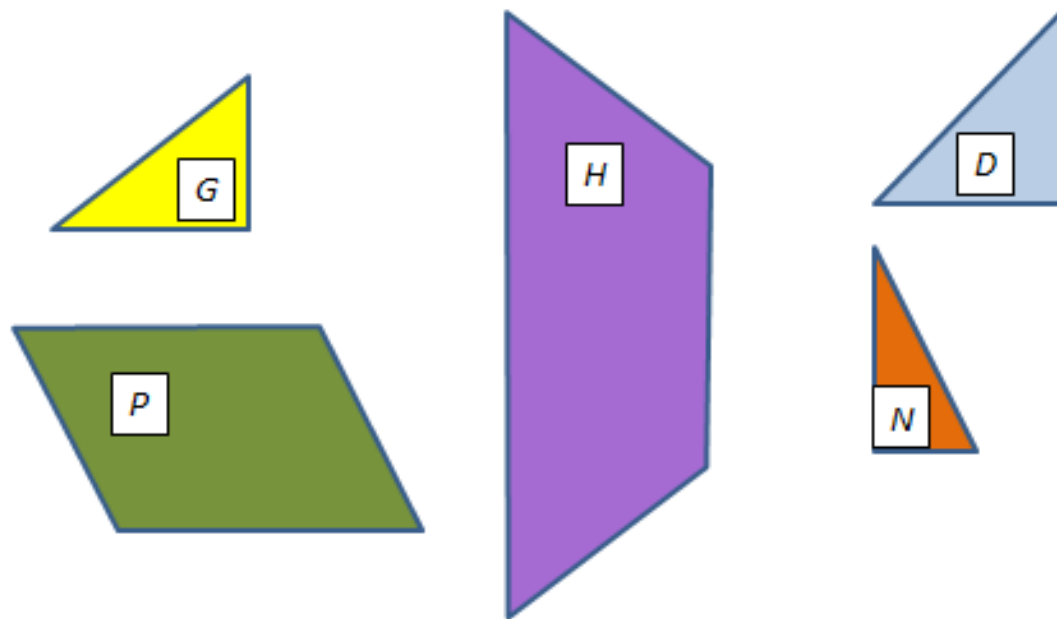
$$18 = 6G$$

$$3 = G$$



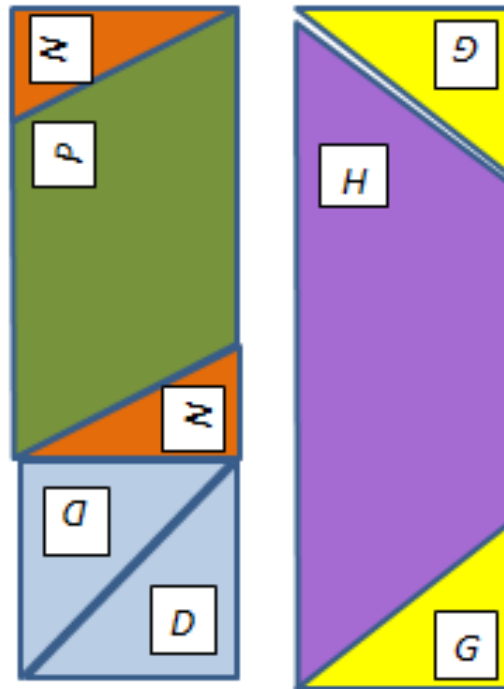
# Justification:

Does  $2G + H = P + 2(N+D)$ ? Explain.



# Justification:

Does  $2G + H = P + 2(N+D)$ ? Explain.





In this session, we used the polygon puzzle to:

- Write algebraic equations
- Evaluate algebraic expressions using substitution
- Justify mathematical statements

# Handout



## DIG INTO EQUATIONS: A POLYGON AREA PUZZLE

1. Build equations based upon the areas of the shapes. Record several in the table below.

Example:  $A = 2B$ .

2. How could you sort these equations into categories?

3. Given:  $H = 36$  square units;

$$G = \underline{\hspace{1cm}}; \quad \frac{1}{3}J = \underline{\hspace{1cm}}; \quad A + B = \underline{\hspace{1cm}}$$

4. Explain why  $2G + H = P + 2(N + D)$ .

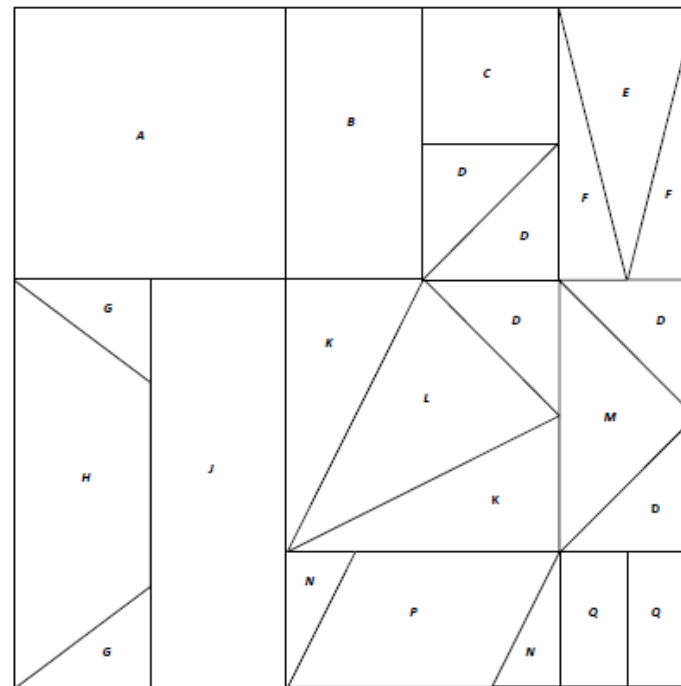
5. Find  $D$  if  $G = 3$ ,  $H = 18$ ,  $P = 12$ , and  $N = 2$ .

6. Finish the Equation column (the first two are done as examples)

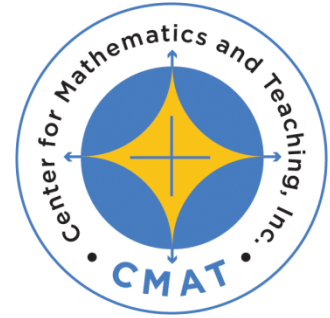
Given expression	Written in terms of this variable	Equation
$A$	$B$	$A = 2B$
$B$	$A$	$B = \frac{1}{2}A$
$B + C$	$D$	$B + C = \underline{\hspace{1cm}}$
$J$	$A$	
$2(B + C)$	$J$	

Adapted from MathLinks: Grade 7  
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## POLYGON PUZZLE PIECES



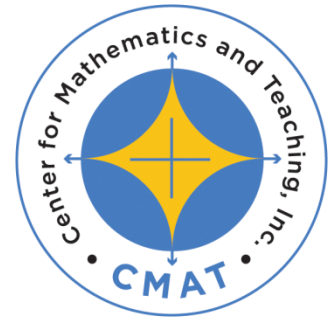
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# THANK YOU!

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