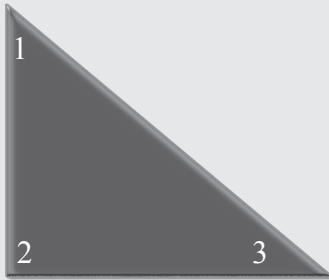


## Newsletter #10 Grades 7-8

### Why do the angles of a triangle always add up to 180°?

There is a great visual way of demonstrating how the angles add up to 180°.

Using paper, cut out a triangle of any size.



Rip off the three corners of the triangle. Make sure the corners are big enough to use.



Piece all of the corner sections together so that the numbered points meet.



These pieces will always give a straight line, which is 180°.

Try doing this ripping and matching with other 2-D shapes.

All other regular 2-D shapes (polygons) follow their own rules for total angle size. A quadrilateral will always have pieces totalling 360°. A pentagon will always have pieces totalling 540°. The pattern continues for all other polygons. Experiments can be tried to find results for other shapes.



### Original Number

Think of a number  
Add 17  
Double  
Subtract 4  
Double  
Add 20  
Divide by 4  
Subtract 20

The result is the original number.  
How it Works

$$\begin{aligned} & (2(2(n + 17) - 4) + 20) \div 4 - 20 \\ &= (2(2n + 34 - 4) + 20) \div 4 - 20 \\ &= (2(2n + 30) + 20) \div 4 - 20 \\ &= ((4n + 60) + 20) \div 4 - 20 \\ &= (4n + 80) \div 4 - 20 \\ &= n + 20 - 20 \\ &= n \end{aligned}$$

## Newsletter #11 Grades 7-8

### Why is the area of a triangle $(B \times H) \div 2$ , when triangles are all different shapes?

To show where the formula for a triangle comes from, start with a rectangle.

To find the area of a rectangle, it is necessary to multiply the base times the height.



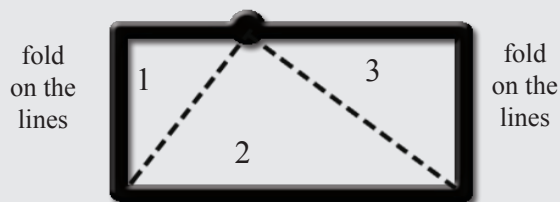
$$A = \text{base} \times \text{height}$$

$$A = 4 \text{ cm} \times 2 \text{ cm} \text{ (0.79 in.} \times \text{1.57 in.)}$$

$$A = 8 \text{ cm}^2 \text{ (1.24 square inch)}$$

After the area of this rectangle is found, the rectangle can be cut out.

Using the rectangle cutout, place a dot anywhere along the top. Using a ruler, make a line from the dot to each of the bottom corners.



Cut along the lines so that there are three sections.



The two outside parts will fit perfectly onto the middle part. This is why the formula for a rectangle is divided by two to get the formula for the area of a triangle.

Trying this a few more times, using different spots to place the dot, shows that it will always work!

### The Magic Three

Choose a number

Add 5

Double

Subtract 4

Divide by 2

Subtract the number you started with.

The answer is 3

How it Works

$n$

$n + 5$

$$2(n + 5) = 2n + 10$$

$$2n + 10 - 4 = 2n + 6$$

$$\frac{2n + 6}{2} \times n + 3$$

$$n + 3 - n = 3$$

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## Newsletter #12 Grades 7-8

### Why can't you divide by zero?

You can add zero, subtract zero and multiply by zero. Why can't you divide by zero?

It's easiest to discuss real objects to show why dividing by zero is impossible.

Let's say a company had 100 cars to ship. The trucks they had booked did not arrive. If they tried to divide the 100 cars among the trucks, they would have had:

$$100 \div 0$$

Trying to divide the cars among the zero trucks would not make the cars suddenly disappear! That means we can't say that  $100 \div 0 = 0$ .

Since there is no way to divide the 100 cars, the question is impossible.

Another way to look at this question is to remember that division is the inverse (opposite) operation of multiplication. A basic example of this is if  $2 \times 3 = 6$ , then  $6 \div 3 = 2$ .

Now, let's say that someone suggests that division by zero is possible.

$$6 \div 0 = \text{any number}$$

Is only true if:

$$0 \times \text{any number} = 6$$

Since we know that zero x any number equals zero, we know the answer cannot be six. So, we can again say that dividing by zero is impossible.

### Guess my favorite number

Think of a number between one and ten. Multiply your number by three and add seven. Tell me your final answer and I will tell you your favorite number!

How it Works

The equation for this is  $3n + 7 = A$ , where  $n$  is the favorite number and  $A$  is the final answer. To solve the puzzle, reverse the steps.

For example:

Subtract 7 ( $A - 7$ ) and then divide by 3

$$n = 5$$

$$5 \times 3 = 15$$

$$15 + 7 = 22$$

Solve:

$$22 - 7 = 15$$

$$15 \div 3 = 5$$

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## Newsletter #13 Grades 7-8

### Secret Squares

**Card One**

1	3	5	7
9	11	13	15
17	19	21	23
25	27	29	31

**Card Two**

2	3	6	7
10	11	14	15
18	19	22	23
26	27	30	31

**Card Three**

4	5	6	7
12	13	14	15
20	21	22	23
28	29	30	31

**Card Four**

8	9	10	11
12	13	14	15
24	25	26	27
28	29	30	31

**Card Five**

16	17	18	19
20	21	22	23
24	25	26	27
28	29	30	31

Have a partner pick a number that appears on one or more of the cards. Without telling you the number, ask your partner to point to the cards that have the number on them. You will be able to tell your partner what the secret number is.

Example:

Your partner chooses the number 25. The partner says that the number is on Card One, Card Four and Card Five.

How to Find the Number:

Add the upper left hand number from all of the cards that your partner points out. Since the partner said that the selected number was on Card One, Card Four and Card Five, you would add  $1 + 8 + 16 = 25$ .

The partner's number is 25.