

# Math Circle Competition

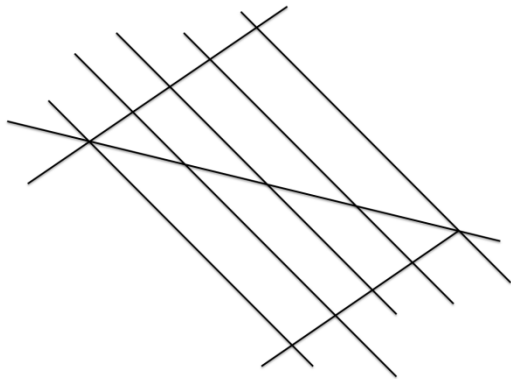
## Round 1

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This problem is worth 4 points for the team who has the best answer.

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Draw 8 lines on the plane so that the largest number of triangles are drawn. For example, if I draw my 8 lines such as below:



I notice that I have formed 8 triangles (try to find them!). See if you can arrange 8 lines in a way so that there are even more triangles. The team with the best solution gets the points!

## Math Circle Competition Round 1

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This problem is worth 4 points for the team who has the best answer.

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Express the number 100 using the digit 8 only. The goal is to use as few 8's as possible.

You can use the four arithmetic operations  $+$ ,  $-$ ,  $\times$ ,  $\div$  and exponentiation (raising to a power), and parentheses. The same operation can be used as many times as you wish, and you do not need to use all of them. Do not combine 8's into multi-digit numbers such as 88 or 888.

The team which writes an expression for 100 using the fewest number of 8's gets the points!

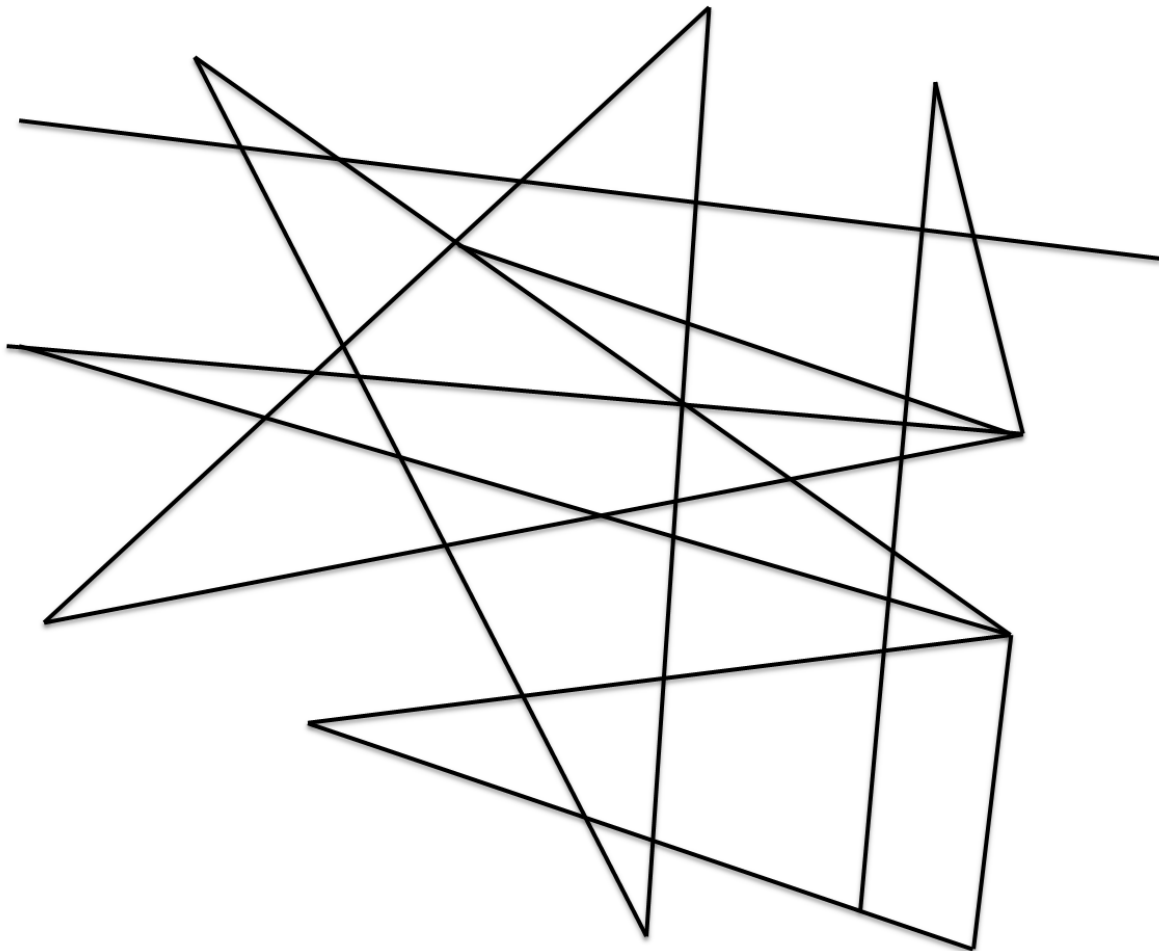
Math Circle Competition  
Round 2

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This problem is worth 4 points for the team who has the best answer.

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In the figure below, find as many triangles as you can. The team that finds the most triangles gets the points!



# Math Circle Competition

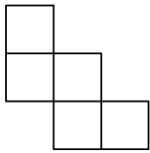
## Round 2

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This problem is worth 4 points for the team who has the best answer.

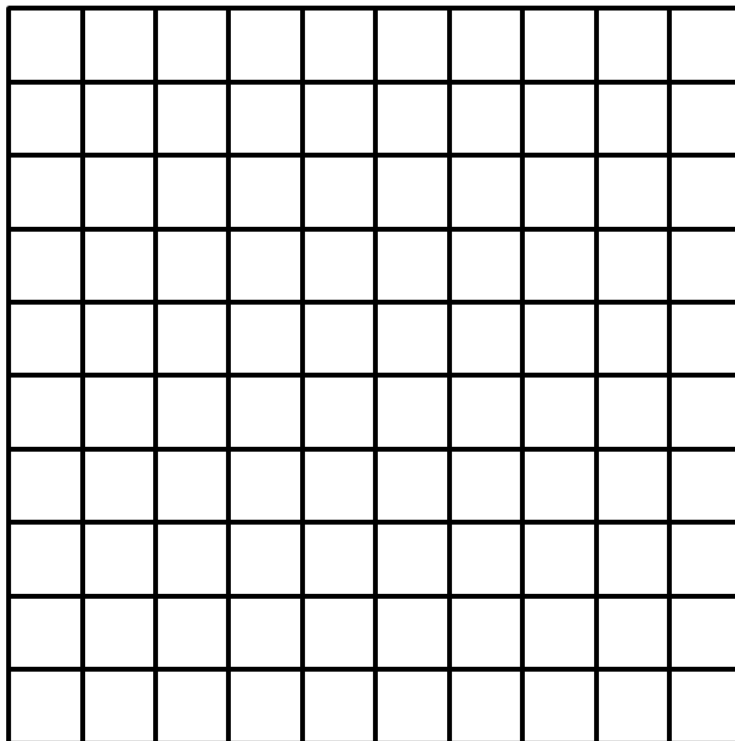
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What is the largest number of pieces which have the shape:



Can be placed in a 10 x 10 grid?

You may want to cut out some pieces from the next page and try to arrange them on the grid below. The team who can fit the largest number of pieces in the grid gets the points!





## Math Circle Competition Round 3

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This problem is worth 4 points for the team who has the best answer.

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Arrange the numbers 2, 0, 1, 3 along with the math operations (addition, subtraction, multiplication, exponentiation, division, etc.) to write as many consecutive natural numbers as you can.

For example:

$$0 = 0 \cdot 213$$

$$1 = 1 + 0 \cdot 23$$

See how high you can go without skipping any numbers...get creative!

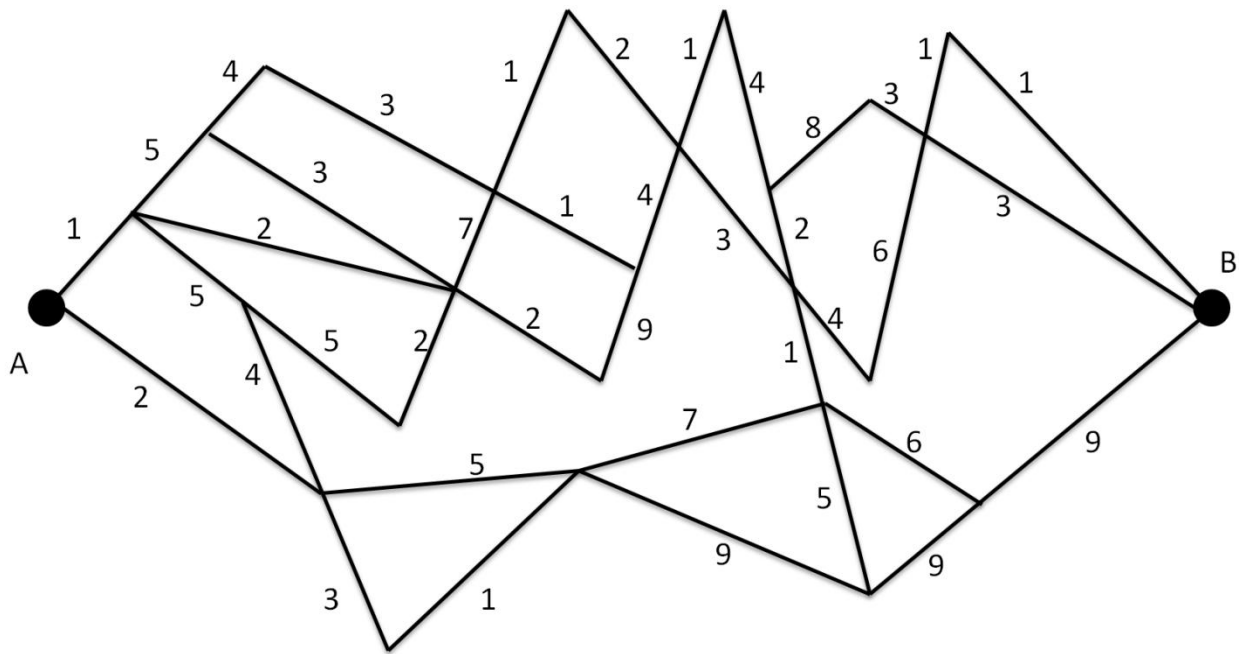
Math Circle Competition  
Round 4

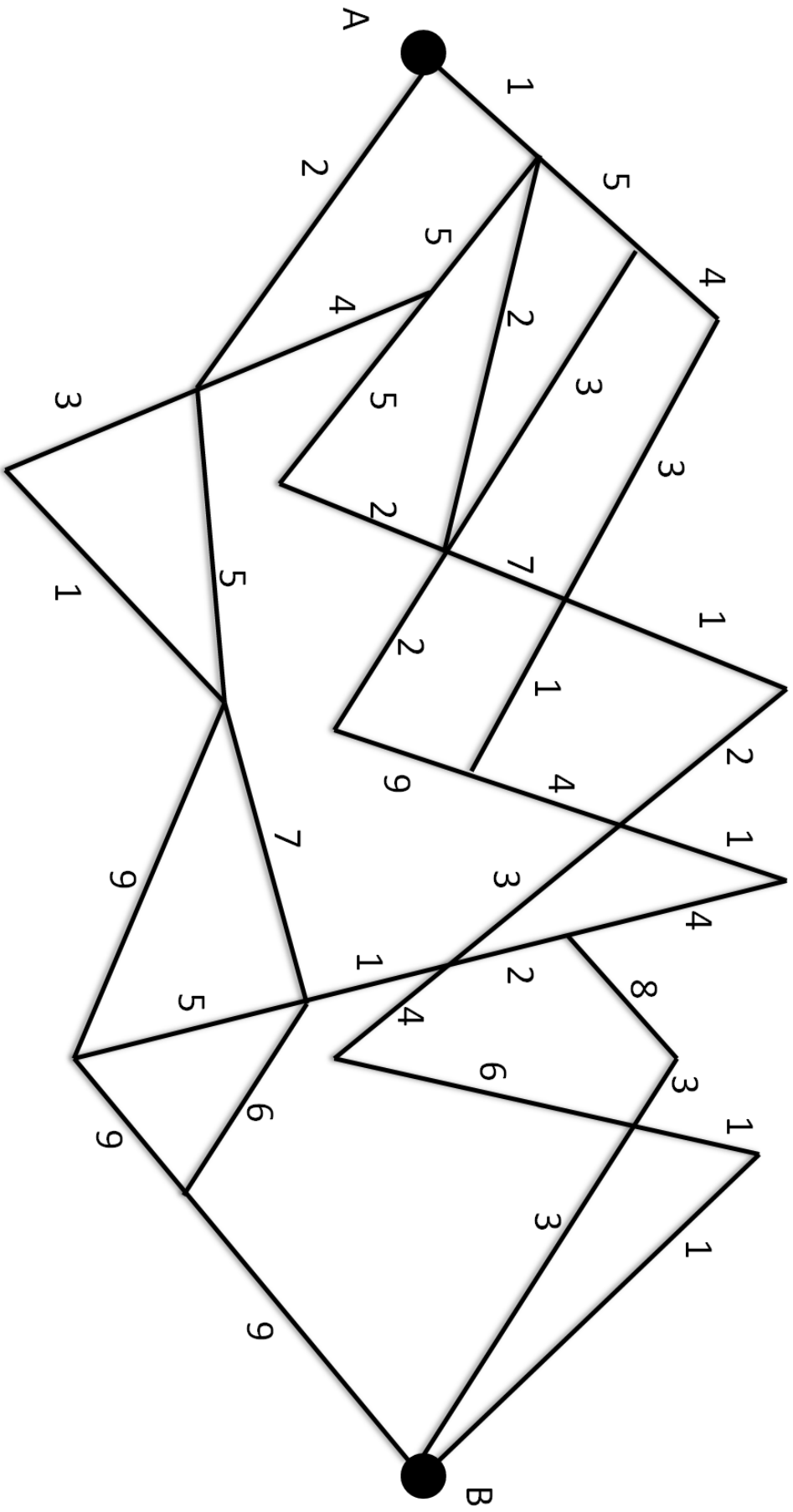
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This problem is worth 4 points for the team who has the best answer.

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The following diagram shows the possible routes to get from point A to point B, along with how long it takes to drive on each segment. Find the time for the shortest route from point A to point B.







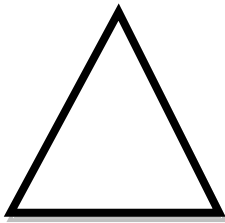
## Math Circle Competition Round 4

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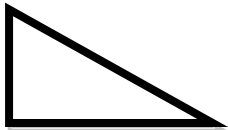
This problem is worth 4 points for the team who has the best answer.

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An acute triangle is a triangle which has all of its angles less than  $90^\circ$ . An example of an acute triangle is:



An example of a triangle which is not acute is:



Divide a square into the smallest number of acute triangles you can. If your team uses the least number of triangles, you get the points!