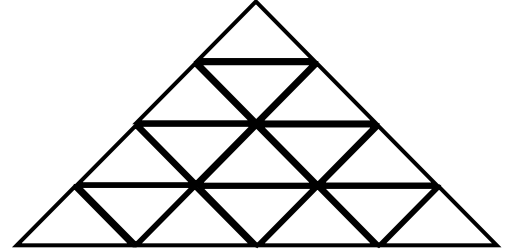


TEACHERS: RESOURCES AND DEMONSTRATIONS

Math in Art – Self-Guided Tour for Grades 7-8

1. The exterior of the National Gallery is clearly a mathematical treasure! One fascinating section is the isosceles triangle in the Great Hall, which is made up of tessellating stacked triangles. It looks something like this:



- a. Consider the number of triangles in each row. What numbers is the pattern based on?
 - b. How many triangles are there in this diagram? *You need to be careful when answering this question!*
2. Throughout the Gallery, you will see many works of art. Find one work that you like. The label beside the work will provide you with some information. On what date did the artist make this work? Using only the four digits of the year create a mathematical expression which, when solved, has your age as the answer. E.g. A 32 year old teacher who likes Tony Cragg's *A Place in My Heart* would write 1998 as the date for the creation of this work.

$$(1^9 + \sqrt{9}) * 8 = (1 + 3)(8) \text{ or } 32$$

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3. The phone number of the National Gallery can be written in a variety of ways.
- $(613) 990-1985 = 604885$
 - $613-990-1985 = -2362$
 - $613 \cdot 990 \cdot 1985 = 1\ 204\ 636\ 950$
 - $613/990-1985 = \text{approximately } -1984.381$
- a. Write your own phone number in the same way as above and evaluate it mathematically. Which one gives you the largest value? Is this the case all the time?
- b. Can you create a phone number and write it out according to the methods above in 3, so that you arrive at the largest answer and the smallest answer. Explain your thoughts in detail.
- c. Letters can represent the numbers in a phone number. Can you find a word or part of a word in your phone number or in the National Gallery's phone number: 613-990-1985?
4. Find works of art in the gallery that best express the terms below, in the mathematical sense. Describe briefly how each is illustrated. *A glossary for these words can be found at the end of this tour.*

Hypotenuse	
Opposite	
Parallel	

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Perpendicular	
Pattern	
Polyhedron	
Prism	
Symmetry	
Tessellation	
Transformation	

5. Find a work of art that depicts the human figure. Spend sometime looking for this work. You may be surprised at how many different forms a figure could take.
- Which form is the most life-like from a mathematical perspective?
 - How many ways could you determine this?

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6. Every number has mathematical characteristics. Find a work of art that includes in its label a number that is: (glossary description below)
 - a. Prime
 - b. Composite
 - c. A perfect square
 - d. A perfect cube

7. Some of the most popular galleries in the Canadian collection are those dedicated to the Group of Seven.
 - a. How many works of art are there in these rooms?
 - b. Write this number as a product of its prime factors, using exponential notation.
 - c. There are actually eleven artists associated with the Group of Seven. Write an expression that has seven 7s in it and that when calculated equals 11.

8. Make up one math question that relates to any of the pieces you have seen in the gallery.

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Glossary

Composite – a number with more than two factors (opposite of prime)

Cube – (as in perfect cube) – a number that can be expressed as the product of three identical whole number factors

Hypotenuse – the longest side on a right-angled triangle

Opposite – opposite angles are a pair of angles that are formed by the intersection of straight lines and do not share an angle arm – opposite numbers are two numbers that have the same numeral but have the opposite signs

Parallel – lines that are the same distance apart

Pattern – repeated design or recurring sequence

Perfect square – a number that can be expressed as the product of two identical number factors

Perpendicular - at right angles to the horizon, or two lines that intersect at right angles

Polyhedron – a solid (three-dimensional) shape with plane faces

Prime – a number that can only be divided evenly by itself and one

Prism – a solid three- dimensional shape with two identical parallel bases – all other sides are parallelograms

Symmetry – when one half of an object is the mirror image of the other half

Tessellation – a pattern of shapes that fit together without any overlaps or gaps

Transformation – a change in position or size, including reflections, translations, rotations, or enlargement

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Answer Sheet

1.

- a. 1, 3, 5, 7, ... This is clearly the sequence of odd numbers.
- b. There are $1+3+5+7 = 16$ small triangles (side length one).
There are 7 medium triangles (side length two).
There are 3 large triangles (side length three).
There is 1 extra large triangle (side length four).

So that is $16+7+3+1 = 27$ total.