Geometry in Transition Year

IMTA Branch Meeting 14/9/21

Geometry

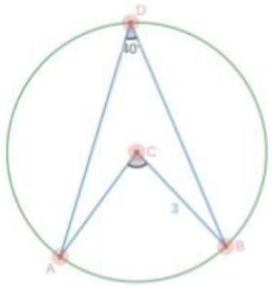
- Geometry Problem Solving
- Constructions
- Geometry Art

Geometry Problem Solving

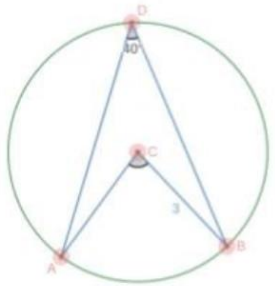
- SSDD (Same Surface Different Depth) - https://ssddproblems.com/
- Nrich https://nrich.maths.org/9341
- Catriona Shearer https://twitter.com/Cshearer41

SSDD (Same Surface Different Depth)

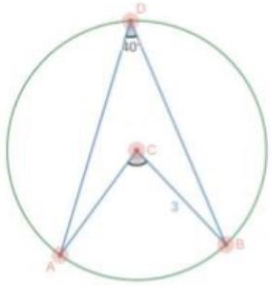
- https://ssddproblems.com/



How long is arc AB?

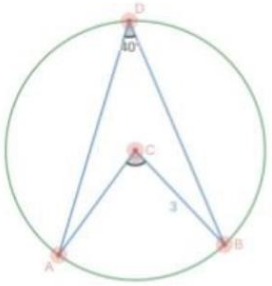


What's the area of sector ACB?



DA = DB

How many degrees is arc DB?



Does this diagram give enough info to prove triangles DAC and DBC are congruent?

Nrich

https://nrich.maths.org/9341

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NRICH | Events | Donate

Angles, Polygons and Geometrical Proof Short Problems

This is part of our collection of Short Problems.

You may also be interested in our longer problems on Angles, Polygons and Geometrical Proof Age 11-14 and Age 14-16.

Printable worksheets containing selections of these problems are available here:

Stage 3 â˜…	Sheet 1 Sheet 2 Sheet 3 Sheet 4	Solutions Solutions Solutions Solutions
Stage 3 â˜…â˜…	Sheet 1 Sheet 2 Sheet 3	Solutions Solutions Solutions
Stage 4 â˜…â˜…	Sheet 1 Sheet 2	Solutions Solutions
Stage 4 â˜…â˜…â˜…	Sheet 1	Solutions

NRICH Short Problems

Angles, Polygons and Geometrical Proof

Stage 3 ★
Mixed Selection 1 – Solutions

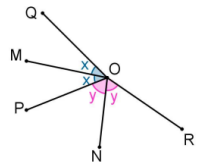
1. Right-angled request
Four right-angled triangles can be drawn in each of the squares, plus four formed from two adjacent sides of the rectangle - that makes 12.

Then there are two right-angled triangles formed by joining the points UQS and PTR.

This makes a total of 14 triangles.

2. Angular reflection
As OQ is the reflection of OP in OM,
$\angle QOM = \angle POM$.
Similarly, $\angle RON = \angle PON$.
Hence, reflex $\angle QOR \quad 2 \times \angle MON = 260°$.

Therefore, $\angle QOR = 360° - 260° = 100°$.

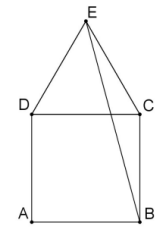


3. Homely angles
Since $ABCD$ is a square, $\angle BCD = 90°$, and since CDE is an equilateral triangle, $\angle DCE = 60°$.

Thus $\angle BCE = \angle BCD + \angle DCE = 90° + 60° = 150°$.

Because CDE is an equilateral triangle, $EC = DC$ and also, because $ABCD$ is a square, $DC = CB$.
Hence, $EC = CB$ and ECB is an isosceles triangle.

So $\angle CEB = \angle CBE = \frac{1}{2}(180 - 150)° = 15°$, and hence $\angle BED = \angle CED - \angle CEB = 60° - 15° = 45°$.



Catriona Shearer

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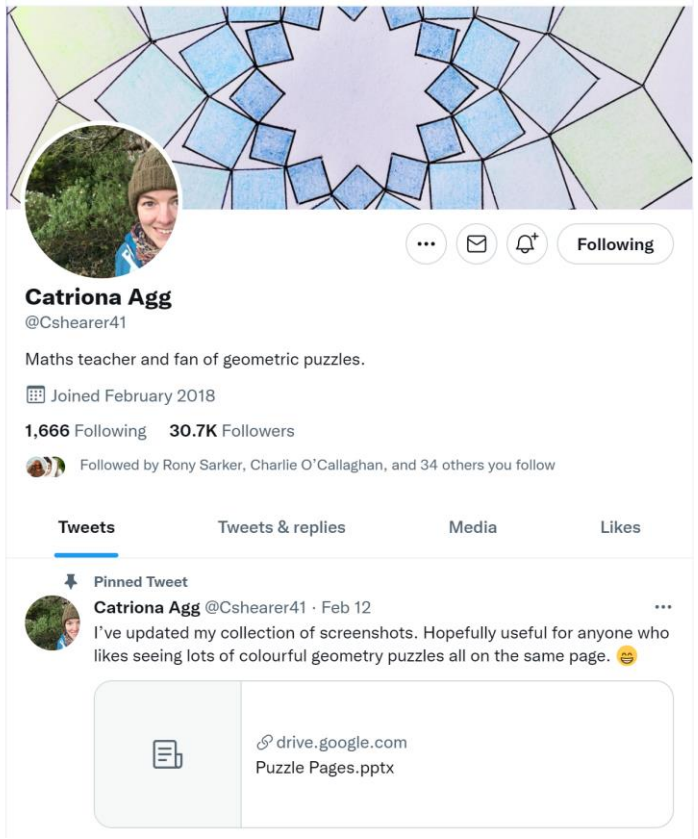
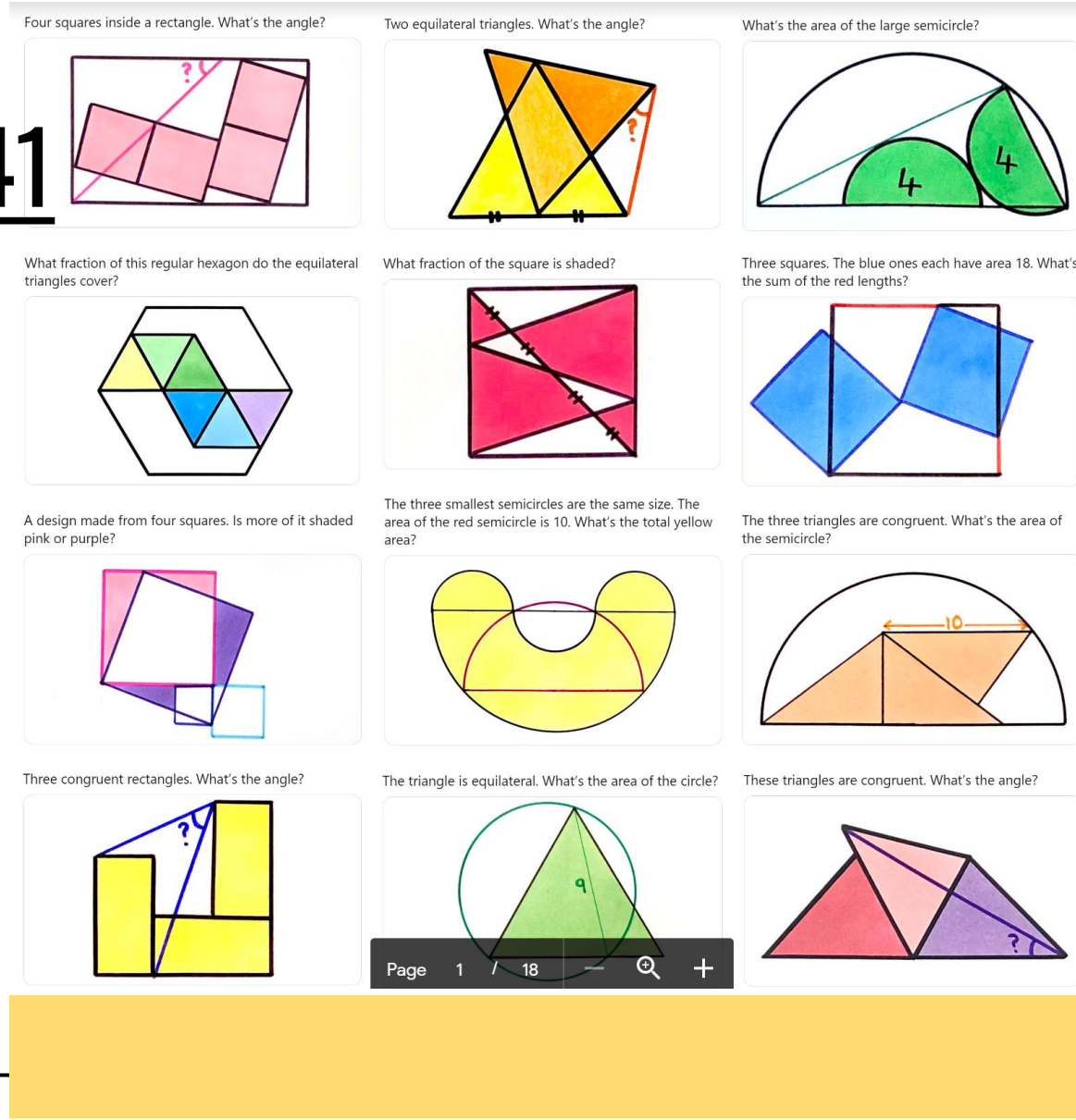
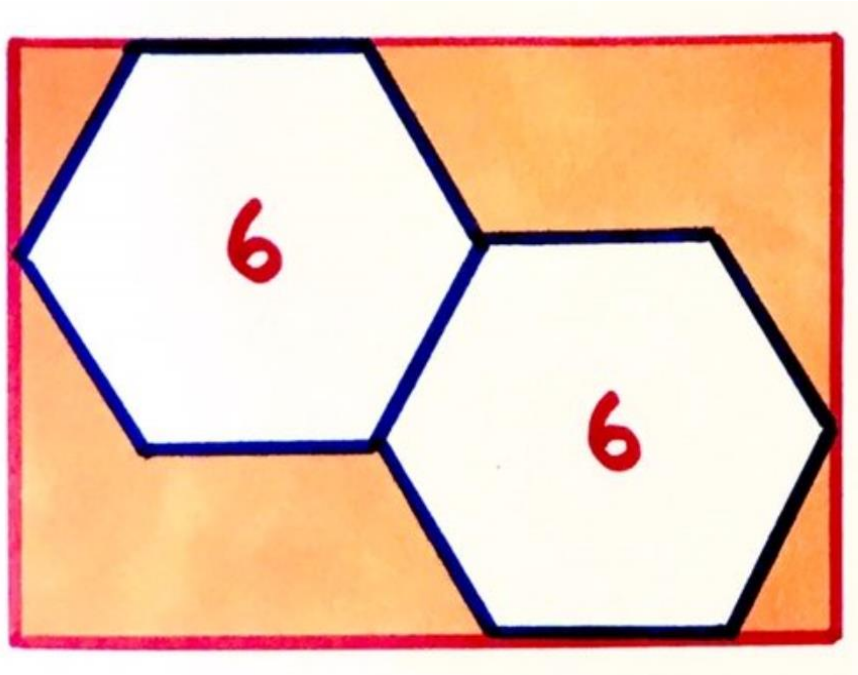
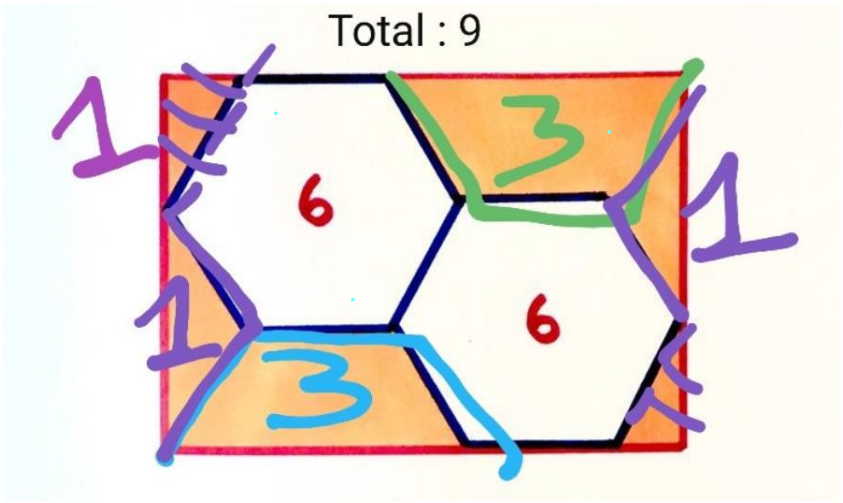
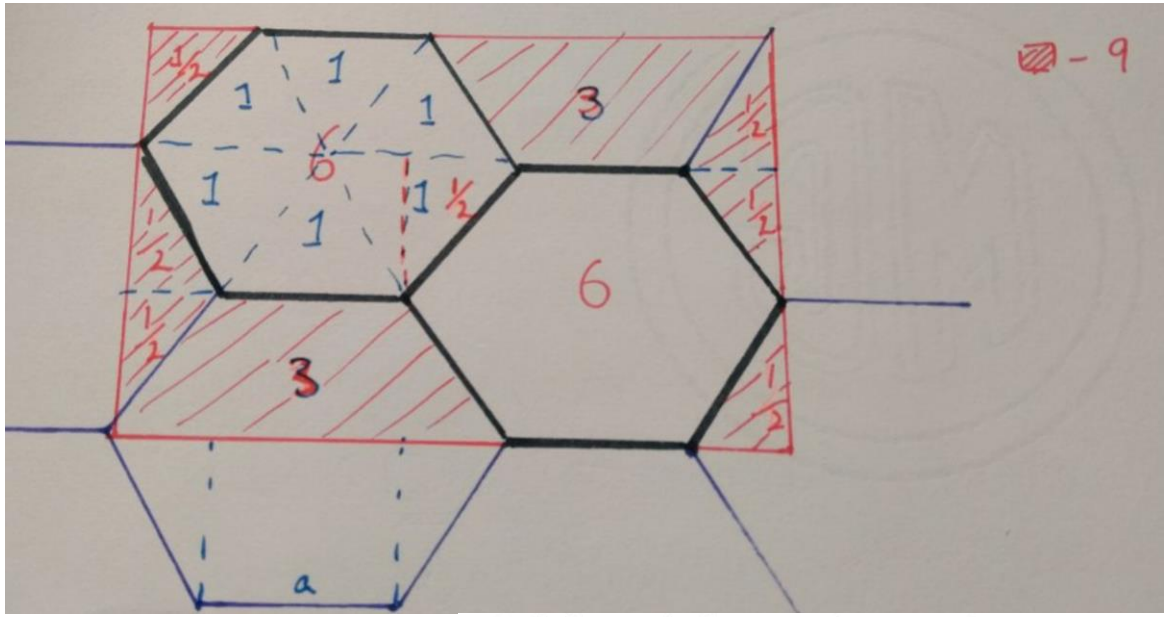


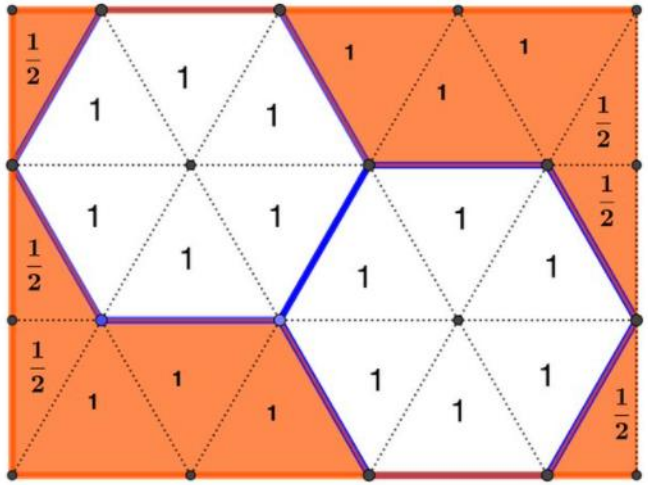


The two regular hexagons have an area of 6. What's the total shaded area?









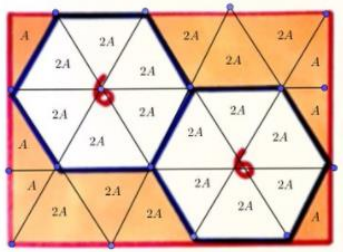
Area of the orange shaded regions =

$$6 + 6 \cdot \frac{1}{2} =$$

$$6 + 3 =$$

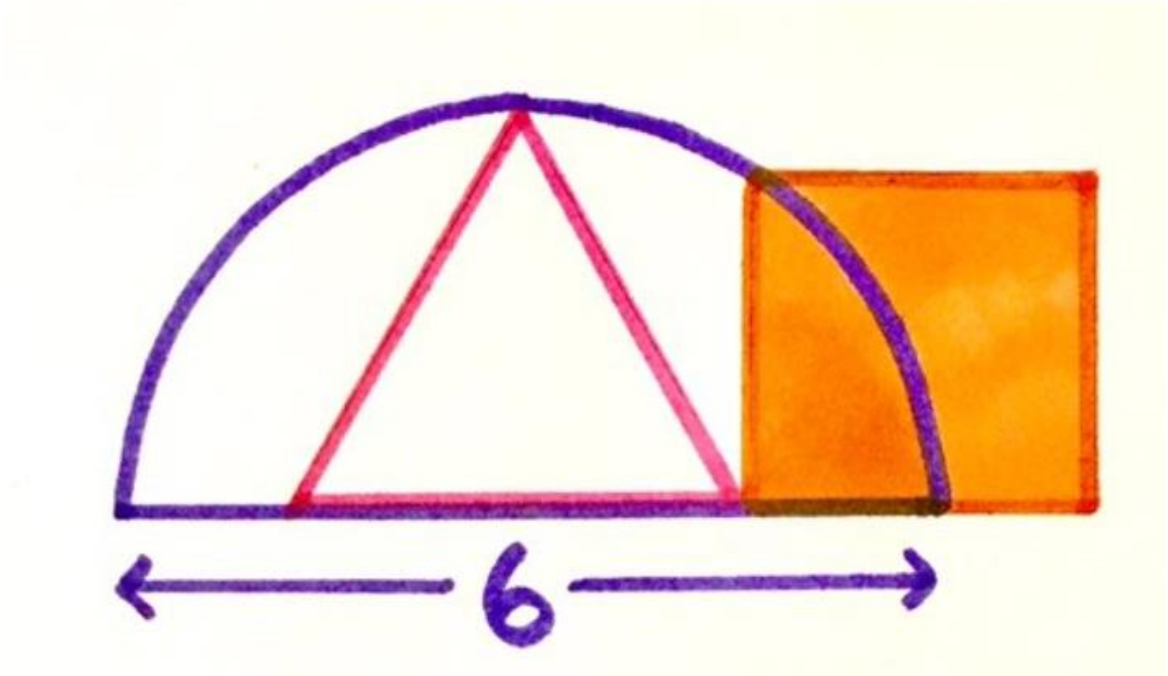
$$9$$

Both the regular hexagons have area 6.
What's the total shaded area?

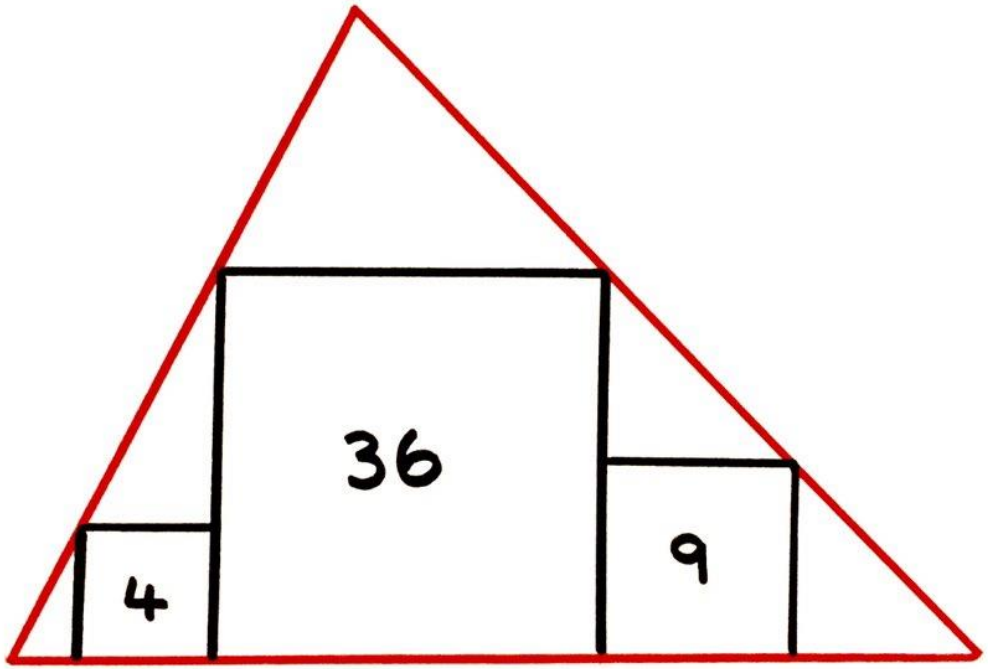


$$A = 0.5 \Rightarrow Ashaded = 18A = 9$$

The equilateral triangle sits in the centre of the semicircle. What's the area of the square?



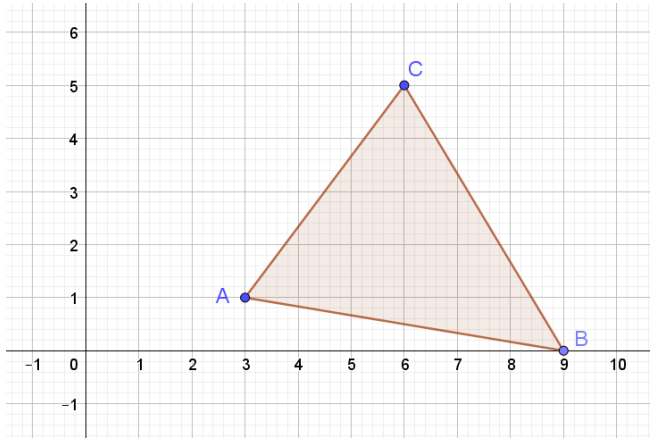
The areas of the three squares are given. What's the area of the red triangle?



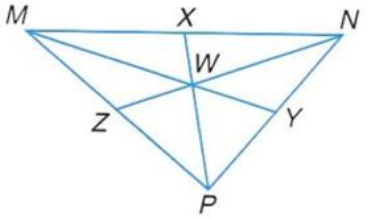
Constructions

- Centroid

Centroid



- Constructing perpendicular bisector of lines
- Finding equation of median lines
- Simultaneous equations to find centroid coordinates
- Distance between points
- Ratios
- Problem Solving



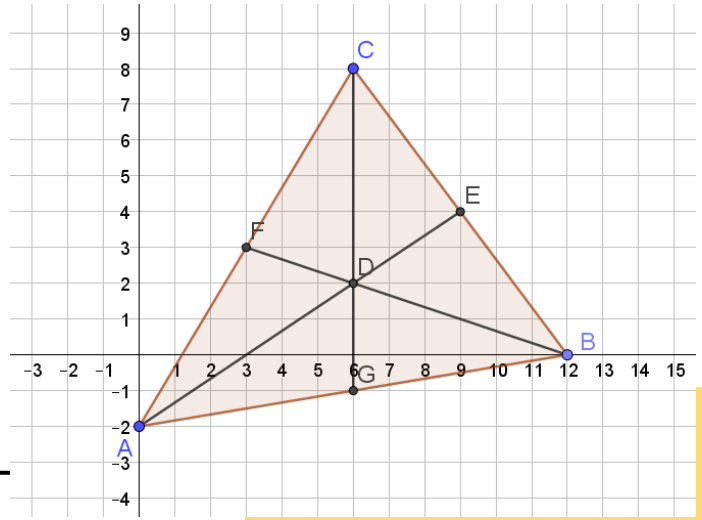
In $\triangle MNP$, MY, PX, and NZ are medians.

8. Find the measure of $\overline{WY}$ if $MW = 22$.
9. What is NW if $ZW = 10$?
10. If $PW = 13$, what is WX?

Find the coordinates of the point of intersection of the medians of the triangle formed by joining the points (-1,-2), (8,4) and (5,7)

The centroid of a triangle is (-1,-2) and coordinates of its two vertices are (4,6) and (-8,-12). Find the coordinates of the third vertex.

The coordinates of the vertex A of the triangle ABC are (2,5); if the centroid of the triangle is at (-2,1), find the coordinates of the mid-point of the side BC.



https://www.geogebra.org/m/nGg3tdeK

https://www.geogebra.org/m/nkprxcpb

Geometry Art

- https://arbitrarilyclose.com/home/
- https://www.whatdowedoallday.com/sierpinski-fractal-triangle/

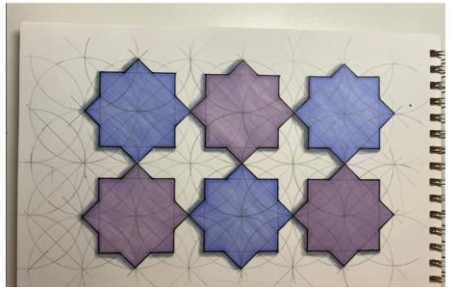
https://arbitrarilyclose.com/home/

#MathArtChallenge Day 11: 8-Pointed Star

March 26, 2020

2D, Angles, Circles, Geometric Construction, Islamic Geometry, Symmetry, Tessellations, Vertices/Intersections

3 Comments



#MathArtChallenge 84: Tangrams

July 10, 2020

2D, 3D, Angles, Geometry, Lines, Polygons, Proportions/Ratios, Symmetry, Tessellations

Leave a comment

The Challenge: Get yourself a square of paper (or something else?) and cut yourself a set of tangrams. Then create away!

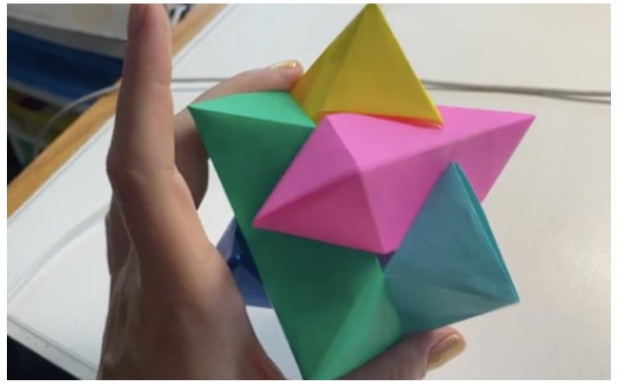
Materials Needed: Scissors, paper
Math concepts you could explore with this challenge: angles, geometry, lines, polygons, proportions/ratios, symmetry, tessellations

#MathArtChallenge 87: Burr Puzzle Origami

July 15, 2020

3D, Angles, Geometry, Origami, Polygons, Polyhedra, Vertices/Intersections

Leave a comment

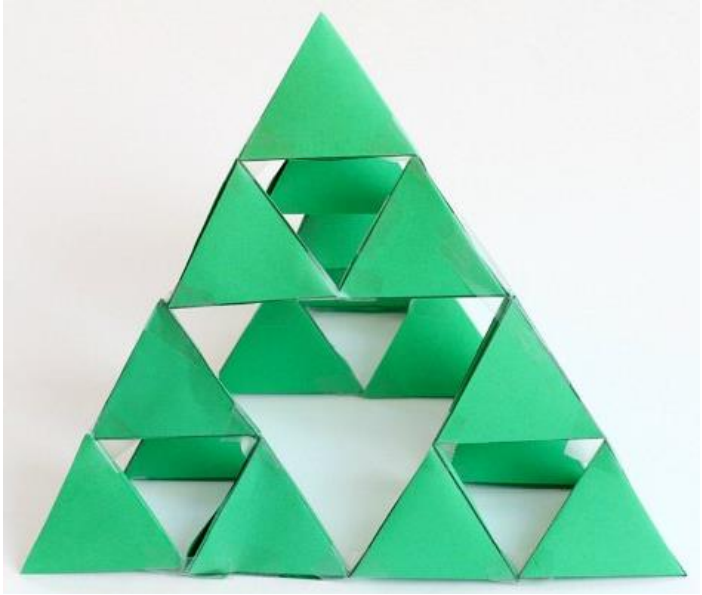


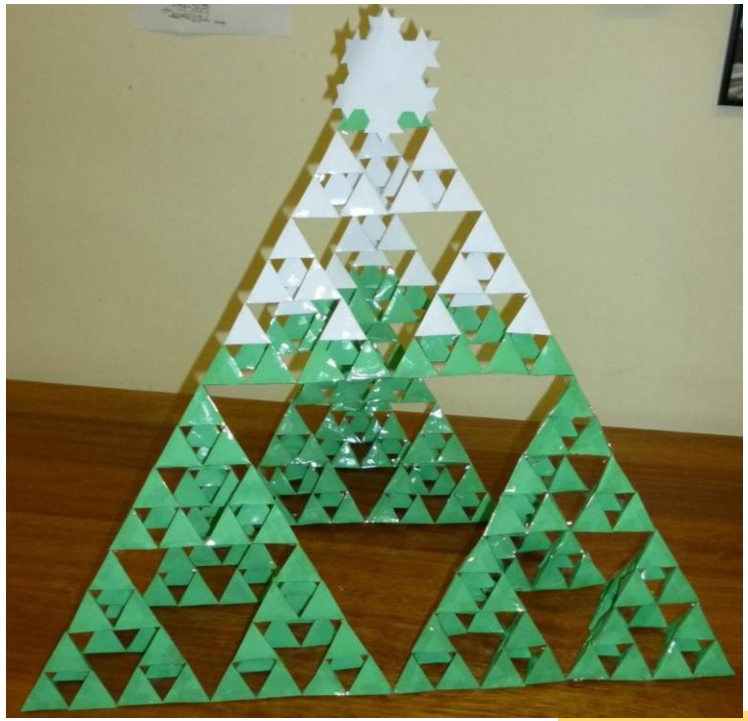
An origami stellated polyhedra made from origami

The Challenge: Fold yourself a 6 piece puzzle that comes together as a 3D star shape. You'll need 6 pieces of paper.

Materials Needed: 6 square pieces of paper.
Math concepts you could explore with this challenge: angles, geometry, origami, polygons, polyhedra, vertices.

https://www.whatdowedoallday.com/sierpinski-fractal-triangle/





Thank you!

Any Questions?

@cgsweeney