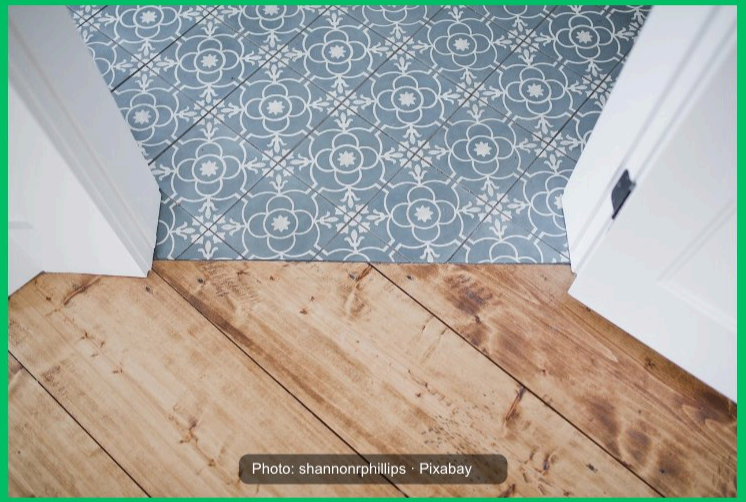
Angles in Polygons

From 180° to any shape in 60 minutes



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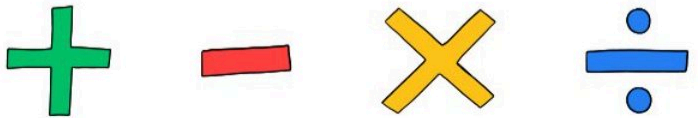
Today we will...

WE ARE LEARNING TO

- Derive triangle sum and polygon rule (n-2) x 180°
- Use sums to find angles in regular polygons

SUCCESS LOOKS LIKE

- ✓ I can explain why sum is (n-2) x 180°
- ✓ I can find missing interior and exterior angles

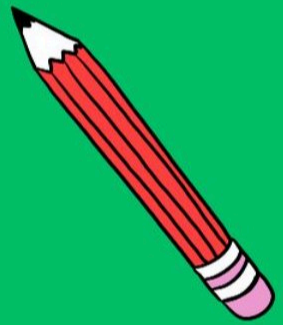


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$a^2+b^2=c^2$

How we get the rule

1. Show triangle angles make 180°
2. Split polygon from one corner into triangles
3. Count triangles: sides minus two
4. Multiply: total = triangles x 180°



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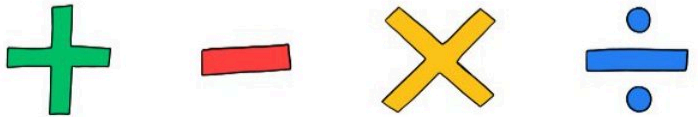
Regular or irregular?

Regular

- All sides and all angles equal
- Total ÷ sides gives one angle
- Regular hexagon: 720° ÷ 6 = 120°

Irregular

- Sides and angles not all equal
- Add known angles, subtract from total
- Any pentagon totals 540°

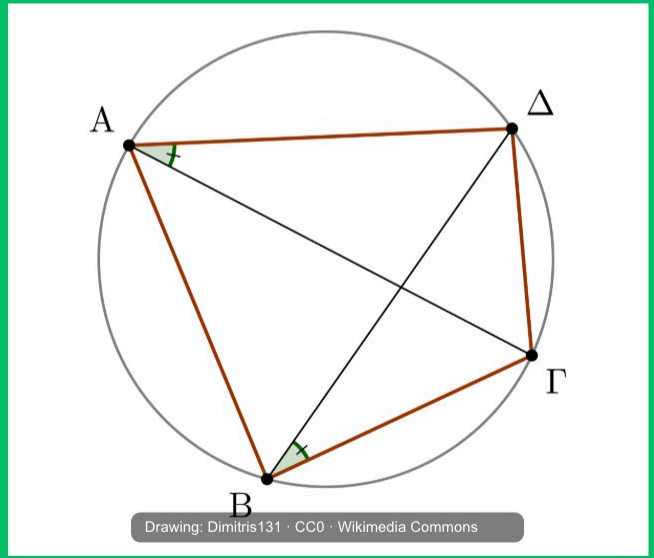


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$a^2+b^2=c^2$

Think, pair, share

A quadrilateral is two triangles joined together. So why must its angles add to 360°?

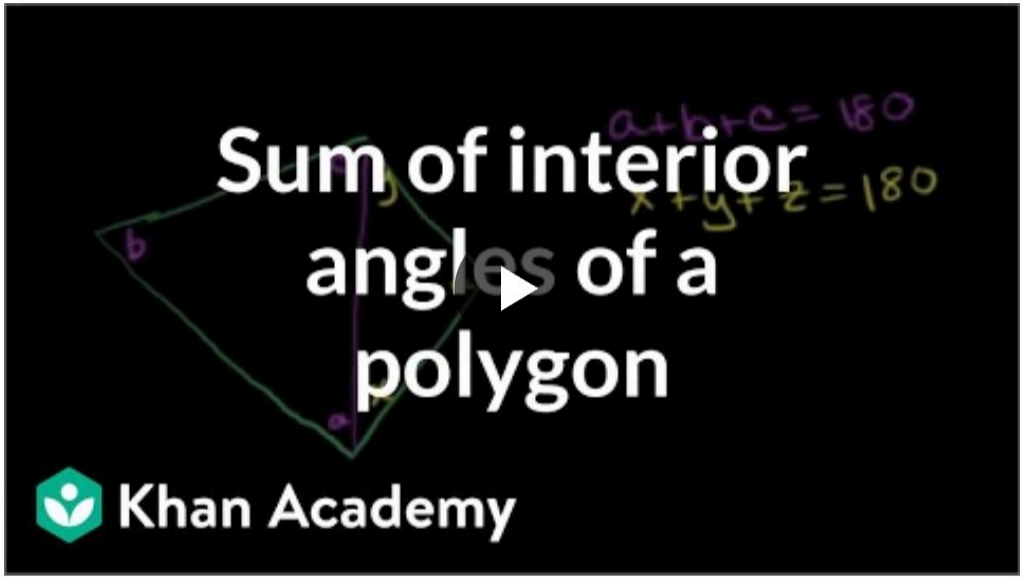


Drawing: Dimitris131 · CC0 · Wikimedia Commons



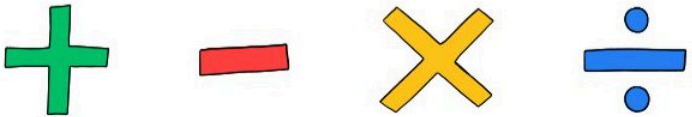
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Splitting shapes into triangles



▶ 0:00 – 5:00

- Spot how each new side adds one triangle
- Listen for why we always subtract two

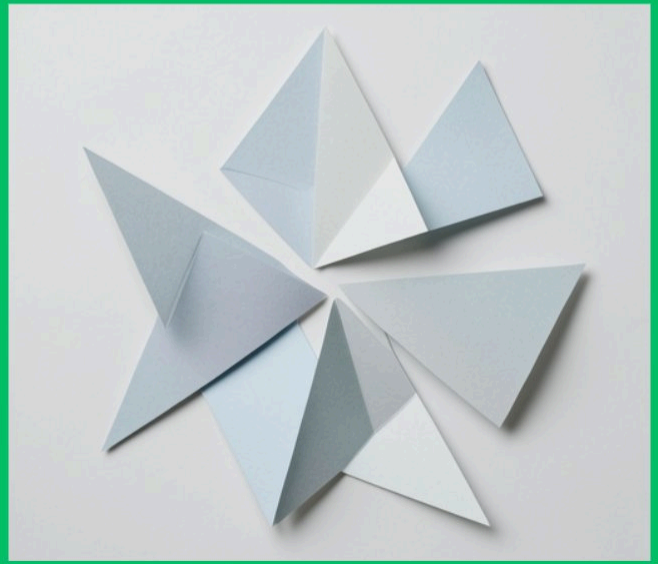


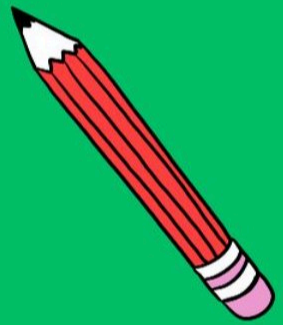
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$a^2+b^2=c^2$

One rule for every polygon

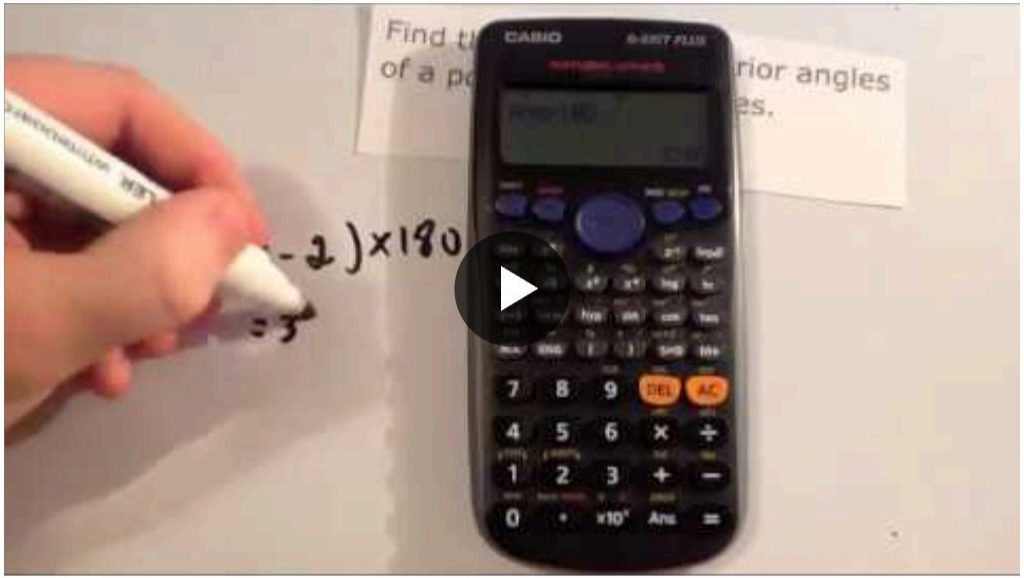
- Sum = (n - 2) x 180°, where n is sides
- Pentagon: (5 - 2) x 180° = 540°
- Hexagon: (6 - 2) x 180° = 720°
- Nonagon: (9 - 2) x 180° = 1260°





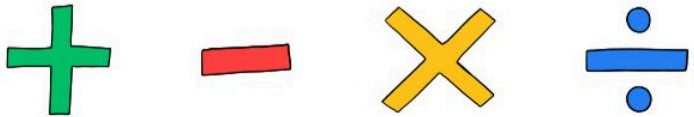
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Cracking regular polygons



▶ 0:00 – 5:00

- Watch interior + exterior = 180° on a line
- Listen for exterior = 360° ÷ sides



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$a^2+b^2=c^2$

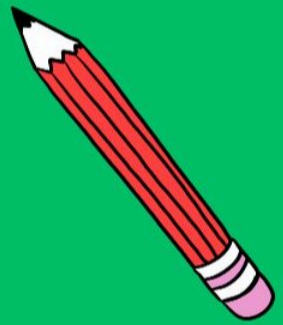
Your task

Work out the missing angles for these polygons. Show each step.

1. Pentagon has 106°, 135°, 115°, 90°, find last angle
2. Regular octagon: find one exterior and one interior angle
3. Regular polygon with exterior 24°: how many sides?

12 min

In pairs

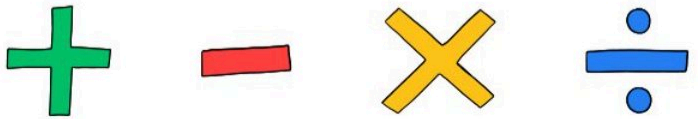


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Link it together

Polygon angles

- Triangle = 180°
- Total = (n-2) x 180°
- Exteriors = 360°
- Split into n-2 triangles
- Interior + exterior = 180°
- Regular ÷ n



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$a^2+b^2=c^2$

What could this be?

This floor uses one repeating regular shape with no gaps. Which shape, and what is each corner?





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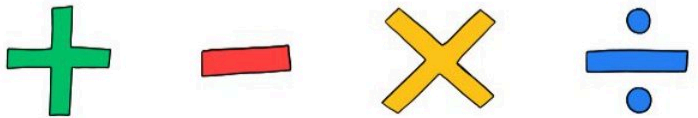
True or false?

Sum of interior angles of a hexagon is 720°

Each interior angle of a regular pentagon is 108°

Exterior angles of any polygon add to 180°

Regular polygon with interior 156° has 15 sides



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