

Geometry Explorers: Properties of 2D and 3D Shapes

Learning objective: To identify, describe, and represent the properties of 2D shapes and 3D solids, including identifying parallel and perpendicular lines and calculating missing angles around a point.

Read each question carefully. Use your geometric knowledge to solve these problems. Max the monkey needs your help to finish his architectural blueprints!

Max the monkey is designing a new treehouse. He needs to make sure his shapes are perfect. Remember: a regular polygon has equal sides and angles, and angles around a point always total 360 degrees.

Word bank: parallel · perpendicular · vertices · faces · edges · reflex angle · equilateral · isosceles · scalene · polygon

1. Max has drawn a quadrilateral with two pairs of parallel sides and four right angles. Identify this shape and explain why a square is a specific type of this shape. (2 marks)

2. A triangular prism has 5 faces, 9 edges, and 6 vertices. If Max adds a decorative pyramid on top with 5 faces and 5 vertices, calculate the total number of edges the combined structure would have. (2 marks)

3. Two angles around a point meet. One angle measures 145 degrees. Calculate the size of the remaining angle and justify your answer using the rule for angles around a point. (2 marks)

4. Compare and contrast a regular pentagon and an irregular pentagon. What must be true for the regular pentagon that is not necessarily true for the irregular one? (2 marks)

5. Max uses a set square to draw two lines that intersect at exactly 90 degrees. What is the mathematical term for these lines, and how would you prove they are not parallel? (2 marks)

Draw: Draw a composite 2D shape that consists of a rectangle with a triangle attached to the top. Label one pair of parallel lines and one pair of perpendicular lines.

Extension challenge: What might happen to the stability of Max's treehouse if he replaced all the 90-degree corner joints with obtuse angles? Justify your answer by discussing how the distribution of weight would change.