

# **Geometry Overview**

## **Unit 1: Coordinates and Transformations**

Investigation 1: The Pythagorean Theorem and the Distance Formula

Investigation 2: Vectors and Translations

Investigation 3: Angles and Rotations

Investigation 4: Reflections

Investigation 5: Composition of Transformations

Investigation 6: Symmetry

Investigation 7: Isometries

## **Unit 2: Congruence, Constructions, and Proofs**

Investigation 1: The definition of congruence

Investigation 2: The first theorems about congruent triangles, SAS and ASA

Investigation 3: Isosceles triangles are introduced

Investigation 4: Isosceles triangles are used in the proof of the SSS Congruence Theorem

Investigation 5: Relationships among angles formed by intersecting lines and two parallel lines cut by a transversal are discussed

## **Unit 3: Polygons**

Investigation 1: Transformations to prove that the sum of the interior angles of a triangle is  $180^\circ$

Investigation 2: From the Triangle Sum Theorem it follows that an exterior angle of a triangle is greater than either non-adjacent interior angle. This is the first of several theorems about inequalities in triangles featured in, culminating in the Triangle Inequality

Investigation 3: the property of exterior angles in triangles is used to prove the converse of the Parallel Lines Corresponding Angles Theorem

Investigation 4: Regular polygons are studied

Investigations 5 and 6: The properties of special quadrilaterals are studied

Investigation 7: Introduction to tessellations

## **Unit 4: Similarity and Trigonometry**

Investigation 1: Dilations

Investigation 2: Similar Figures

Investigation 3: Proving Similar Triangles

Investigation 4: Parallel Lines in Triangles

Investigation 5: Similarity in Right Triangles

Investigation 6: Right Triangle Trigonometry

Investigation 7: Special Right Triangles

## **Unit 5 Circles and Other Conics**

Investigation 1: The circle is defined as the locus of points that are at a given distance to a given point.

Investigation 2: The concept of locus is applied to the perpendicular bisector of a line segment

Investigation 3: Examines central angles and arcs.

Investigation 4: We see an informal proof of the fact that a tangent to a circle is perpendicular to a radius drawn to the point of tangency.

Investigation 5: Leads to the construction of the center of the inscribed circle in a triangle

Investigation 6: We show that an inscribed angle in a circle is equal in measure to  $\frac{1}{2}$  the measure of its intercepted arc

Investigation 7: Introduces the locus definition of parabola and uses it to find the equation of a parabola with focus at  $(0, p)$  and directrix  $y = -p$ .

Investigation 8: Extends the study of conic sections to ellipses and hyperbolas

## **Unit 6: Three-Dimensional Geometry**

Investigation 1- Polygons and Polyhedra

Investigation 2 – Nets and Surface Area

Investigations 3 – Volume

Investigation 4 - Cross Sections and Solids of Rotation

Investigation 5 – Spheres

Investigation 6 – Geometry on the Sphere

Investigation 7 Size and Shape in the Real World

### **Unit 7: Probability**

Investigation 1 Sample Spaces

Investigation 2 Theoretical and Experimental Probability

Investigation 3 Independent Events and the Multiplication

Investigation 4 Conditional Probability

Investigation 5 Interpreting Two-Way Frequency Tables

Investigation 6 Using Probability to Make Decisions

### **Unit 8: Extensions and Projects**

Investigation 1: Frieze Patterns (builds on Unit 1)

Investigation 2: *Flatland* and the Fourth Dimension (builds on Unit 6)

Investigation 3: Further Investigation of Tessellations (builds on Unit 3)

Investigation 4: The History of Pi (builds on Unit 5)

Investigation 5: Fractals (builds on Unit 4)

Investigation 6: The Golden Ratio (builds on Unit 4)

Investigation 7: Semi-regular and Stellated Polyhedra (builds on Unit 6)