

# **Geometry in Construction**

## **Table of Contents/Outline**

### **Quarter 1**

#### **Unit 1: Construction Planning**

1. Construction: Architectural Appreciation and History
2. Team Building and Cooperative Group Training
3. Area of rectangles, parallelograms, triangles, trapezoids, circles, and polygons
4. Perimeter/circumference/arc lengths
5. Area of sectors
6. Polygon classifications: quadrilaterals, pentagons, hexagons, octagons, decagons
7. Construction: Sketching of 2D and 3D
8. Surface Area of prisms, pyramids, cylinders, cones, and spheres
9. Construction: Drafting Using 2D, 3D, One Point, and 2 Point Perspective
10. Similar figures: Definition, finding missing lengths
11. Similar triangles: AA, finding missing lengths
12. Construction: Blueprint Reading
13. Similarity ratio/dilation/scale factor: Using to determine if figures are similar
14. Area ratios of similar figures
15. Transformations: Translation, Rotation, Reflection, Dilation
16. ALGEBRA REVIEW: 1-3 step equation solving

#### **Quarter 1 Project “Design a Logo”**

#### **Unit 2: Introduction to the Shop and this Year’s Home**

1. Calculating slope/pitch
  2. Slopes of parallel and perpendicular lines
  3. Construction: Step building; beginning safety training
  4. Construction: Hand Drafting, Plot Plans, or Balsa Wood Scale Modeling
  5. Pythagorean Theorem and its inverse
  6. Finding distance
  7. Exactness: Radicals (simplifying, addition, subtraction, and multiplication)
  8. Special right triangles: 30-60-90 and 45-45-90
  9. Triangle sum
  10. Triangle classifications by sides and by angles
  11. Isosceles and equilateral triangle properties
  12. Supplementary, complementary, and vertical angles
  13. Volume of prisms, pyramids, cylinders, cones, and spheres
  14. ALGEBRA REVIEW: Slope & graphing lines using  $y=mx+b$
-

## Quarter 2

### **Unit 3: Framing the Walls**

1. Tolerances & graphing inequalities on a number line
2. Construction: Framing vocabulary
3. Inverse trigonometry functions
4. Right triangle trigonometry (sine, cosine, tangent)
5. Law of Sines, Law of Cosines, Sine formula for triangle area
6. Kitchen Work Triangle & Triangle inequalities: sum of 2 short sides > long side;
7. ALGEBRA REVIEW: 1-3 step inequality solving

### **Quarter 2 Project “Calculating Material Needs”**

### **Unit 4: Laying out of the Foundation (Floor)**

1. Parallel lines and their angles: Corresponding, Alt. interior & exterior, Same side interior & exterior
2. If, Then statements and Counter examples
3. Quadrilateral properties
4. Midsegment properties of triangles and trapezoids
5. Interior & exterior angle sum of polygons
6. Inductive and deductive reasoning
7. Similar volume ratios
8. Geometric constructions
9. ALGEBRA REVIEW: Distributive property & binomial multiplication

## Quarter 3

### **Unit 5: The Business of Construction**

1. Data collection and graphing on a coordinate plane
2. Line of best fit
3. Graphing linear equations in the form of  $y = mx + b$  (continued from Unit 2)
4. Solving linear equations for  $y$
5. Writing linear equations given 2 points or a point and the slope
6. Interpreting graphs and making predictions
7. Midpoint calculation
8. Equations of parallel and perpendicular lines
9. Graphing linear inequalities
10. Writing linear inequalities
11. Mean, median, and mode
12. Counting principle
13. Simple probabilities of compound events
14. Odds
15. Conditional Probability
16. Permutations, Combinations

### **Quarter 3 Project “Design the Home of 2030”**

### **Unit 6: Decision Making with Green Technology**

1. Solving systems of linear equations by graphing
2. Solving systems of linear equations by substitution
3. Solving systems of linear equations by add/multiplication
4. Writing systems of equations
5. Graphing systems of linear inequalities
6. If, then statements and their converses
7. Construction’s Critical Path & Flowcharting: An Intro. To Logical Thinking
8. Flowchart proofs

## Quarter 4

### **Unit 7: Surveying**

1. Congruent triangles: Definition
2. Surveying & Triangle congruencies: SSS, SAS, ASA, AAS, HL
3. Arc Lengths
4. Sector Areas
5. Central & inscribed angles properties
6. Chords, secants, & properties
7. Tangents & properties
8. Paragraph/2 column proofs
9. Equation of a circle
10. ALGEBRA REVIEW: Simplifying algebraic expressions

### **Quarter 4 Project “Design a Fountain” or Service Learning**

### **Unit 8: Design the Archway for the House**

1. Graphing parabolas: max/min; x intercepts
2. Zero product property
3. Greatest common factor
4. Trinomial factoring
5. Quadratic formula
6. Writing quadratic equations in the form of  $y = a(x-b)(x-c)$
7. Solving quadratic equations
8. Focus and directrix of a parabola
9. Designing archways

[www.geometryinconstruction.org](http://www.geometryinconstruction.org)