# Unit 1: Segments, length and area

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 9/8 | 1.1 Segment length, vocabulary | Length, number lines; points, segments; measuring centimeters, inches, feet | Absolute value |
| 9/9 | 1.2 Segment addition | Postulate, collinear; algebraic conventions, prior knowledge | Algebra with fractional coefficients |
| 9/12 | 1.3 Geometric objects | Lines, rays, planes, coplanar | Efficient solutions to algebra equations |
| 9/13 | 1.4 Midpoint and bisector | Congruence, hash marks; solve equations with variables on both sides | Trisection |
| 9/15 | 1.5 Equilateral $\triangle$, isosceles $\triangle$, perimeter | Special triangles and quadrilaterals; calculate perimeter | Find endpoint given midpoint |
| 9/16 | 1.6 Review | Roundtable of peers: Terms, perimeter, modeling, algebra solving | |
| 9/19 | 1.7 Unit conversion | Inches $\rightleftarrows$ feet, inches $\rightleftarrows$ centimeters, formula sheet use | |
| 9/19 | 1.7 Exit Note Quiz: Length and perimeter | Use algebra to solve simple distance problems, vocabulary and notation | Absolute value, solve for endpoint, algebra |
| 9/20 | 1.8 Area | Rectangle, triangle, parallelogram area; units, solving for missing dimension | Scientific notation |
| 9/22 | 1.9 Rounding, circles | Area of a circle, circumference, $\pi$, decimals, compound figures | Sig figs |
| 9/23 | 1.10 Precision | Percent error formula | Confidence intervals |
| 9/28 | 1.11 Review | Roundtable peers: Length, area and perimeter, % error, solving algebra | |
| 9/30 | 1.12 Test: Length and area | Using algebra to solve, conventions, precision and rounding | Confidence intervals, absolute value, scientific notation |

12 Instructional days (1-12 / 159)

Application contexts:

- Classroom diagram, desk layout and dimensions (proctoring instructions reference)
- Maps: NYC streets, US states, historic treks (Lewis and Clark, Sherman, Ponz de Leon)
- Ordinal number lines: Supreme Court justices
- Curved number lines: clocks, parlimentary diagrams

# Unit 2: Angles

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 10/3 | 2.1 Angle measures | Terminology, notation, 90°, 180°, 360°, measuring with protractor | Algebra with absolute values review |
| 10/4 | 2.2 Angle addition, pairs | Adjacent, linear, complementary, supplementary | Clock problems |
| 10/7 | 2.3 Vertical angles | Opposite angles | Proof vertical $\angle$s $\cong$ |
| 10/11 | 2.4 Angle bisector | Congruence, hash marks; solving equations | Bearings |
| 10/12 | 2.5 Equilateral and isosceles $\triangle$s | Special triangles, isosceles base theorem | Radian units |
| 10/13 | 2.6 Review | Roundtable: Terms, protractor use, algebraic modeling, triangle situations | |
| 10/14 | 2.7 Test: Angles | Using algebra to solve, conventions, precision and rounding | Bearings, radians |

7 Instructional days (13-19 / 159)

# Unit 3: Transversals

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 10/17 | 3.1 Parallel lines | Identifying transversal angles, parallel and perpendicular definitions | Ratios |
| 10/18 | 3.2 Finding angle measures | Modeling with algebra, solve | Ratio partition |
| 10/20 | 3.3 Triangle sum | Derivation, auxilary lines, aper folding model | Non-Euclidean geometries |
| 10/21 | 3.4 Parallelograms | Definitions, opposite sides $\cong$ | Deltamath ramp-up |
| 10/24 | 3.5 External angles | $\triangle$ external angles | |
| 10/25 | 3.6 Transversal situations | Multiple steps: angle pairs, isosceles $\triangle$s | Polygon internal angles |
| 10/27 | 3.8 Review | Roundtable: Transversal naming conventions, solving for angles, parallelograms, situations | |
| 10/28 | 3.9 Test: Transversals | Parallel line situations, implications for polygons | |

9 Instructional days (20-28 / 159)

### Algebra review and prior learning assessment, tools

# Unit 4: Volume and polyhedra

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 10/31 | 4.1 Nets of prisms | Definitions, folding | |
| 11/1 | 4.2 Surface area | Rectangular prisms | Wooden cube models |
| 11/3 | 4.3 Volume | Prisms, cubes, units | |
| 11/4 | 4.4 Solve for a side | Algebra application, rectangular prisms, solve for area of base | |
| 11/7 | 4.5 Exponent review | Squaring, cubic, radicals | Exponent rules |
| 11/10 | 4.6 Spheres, cones, pyramids | Volume formulas, solve for parameter | Simplifying radicals |
| 11/14 | 4.7 2-D Density | Population density, cost calculations | |
| 11/15 | 4.8 Weight | Density calculations of a volume, multi-step problems | |
| 11/17 | 4.9 Review | Roundtable: | |
| 11/18 | 4.10 Test: Volume and polyhedra | | |

10 Instructional days (29-38 / 159)

# Unit 5: Pythagorean theorem

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 11/21 | 5.1 Geometric proof | Diagram for visual proof, history (list of proofs) | |
| 11/22 | 5.2 Algebraic form | $a^2 + b^2 = c^2$, triples | |
| 11/28 | 5.3 Coordinate plane | Distance formula, standard position | 3-D formula |
| 11/29 | 5.4 Solve for a leg | Square roots | Higher orders, simplify radicals |
| 12/1 | 5.5 Special triangles | Equilateral and isosceles right $\triangle$s | |
| 12/2 | 5.6 Additional proofs | Writing project | |
| 12/5 | 5.7 Review | Roundtable | |
| 12/6 | 5.8 Test | Triples, distance formula, solve for a leg, special triangles | |

8 Instructional days (39-46 / 159)

# Unit 6: Analytic geometry

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 12/8 | 6.1 Midpoint formula | Coordinate plane, midpoint as average | 3-D midpoint |
| 12/9 | 6.2 Linear equations | Slope-intercept form, graphing, gradient | |
| 12/12 | 6.3 Standard form | Algebraic conversion in both directions | Domain and range, open and closed endpoints, inequality and interval notation |
| 12/13 | 6.4 Slopes: $\parallel$, $\perp$ | Negative reciprocals, geometric interpretation as 90° rotation | Point-slope form |
| 12/15 | 6.5 $\tan\theta$ | Interpretation of slope | Radian use |
| 12/16 | 6.6 Linear functions | $f(x)$ notation, vertical and horizontal | |
| 1/3 | 6.7 Review | | |
| 1/4 | 6.8 Test | Graphing, rate of change, algebraic conversion, parallel and perpendicular slopes | Line through a point, point-slope |

8 Instructional days (47-54 / 159)

# Unit 7: Project

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 1/5 | 7.1 Pick a topic | | |
| 1/6 | 7.2 Outline, Intro | | |
| 1/7 | 7.3 Diagrams | | |
| 1/8 | 7.4 Text body | | |
| 1/9 | 7.5 Diagrams | | Mock Regents (YTD) |
| 1/12 | 7.6 Text body | Early finishers: compass, flower of life design | |
| 1/13 | 7.7 Peer review | | |
| 1/14 | 7.8 Revision | | |
| 1/15 | 7.9 Presentations | | |
| 1/16 | 7.10 Presentations | | |

10 Instructional days (55-64 / 159)

# Unit 8: Congruence transformations

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 1/3 | 8.1 Translation | Rigid motion, isometry, notation, construct equilateral $\triangle$ | Vectors |
| 1/4 | 8.2 Reflection | Orientation, invariance | Construct $\perp$ bisector |
| 1/5 | 8.3 Rotation | Center, direction, magnitude in degrees | Centered away from the origin |
| 1/6 | 8.4 Triangle correspondences | SSS | Proving congruence |
| 1/9 | 8.5 Triangle congruencies | ASA, SAS | Reflexive property |
| 1/10 | 8.6 "Onto" mappings | Rotational symmetry, regular polygons | |
| 1/11 | 8.7 Symmetry | Bilateral symmetry, compositions | Proof of isosceles base theorem |
| 1/12 | 8.8 Review | | |
| 1/13 | 8.9 Test | Translation, reflection, rotation, $\triangle$ congruencies | |

9 Instructional days (65-73 / 159)

# Unit 9: Dilation

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 1/17 | 9.1 Dilation | Triangle graphing, angle correspondence | |
| 1/18 | 9.2 Scale factor | | Dilations not centered at the origin |
| 1/19 | 9.3 Overlapping triangles | | |
| 1/20 | 9.4 Compositions | | |
| 1/23 | 9.5 Scale maps | | |
| 1/31 | 9.6 Project | Cuba and Taiwan comparision | |
| 2/1 | 9.7 Presentations | | |
| 2/2 | 9.8 Review | | |
| 2/3 | 9.9 Test | | |

9 Instructional days (74-82 / 159)

# Unit 10: Similarity and proportion

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 2/6 | 10.1 Midline, median | | Centroid, median partition |
| 2/7 | 10.2 Similarity situations | | |
| 2/8 | 10.3 Overlapping $\triangle$ composition | Reflection and dilation, overlapping $\triangle$ | |
| 2/9 | 10.4 Area and volume scaling | | |
| 2/10 | 10.5 Algebraic modeling | | $\triangle$s in circles, angles |
| 2/13 | 10.6 Applications of scale | | Chord lengths |
| 2/14 | 10.7 Project | | Secant triangle angles |
| 2/15 | 10.8 Presentations | | Secant lengths |
| 2/16 | 10.9 Review | | |
| 2/17 | 10.10 Test | | |

10 Instructional days (83-92 / 159)

# Unit 11: Circle angles, sectors, arcs

| Date | Lesson title | Topics | Extension topics |
|---|---|---|---|
| 2/27 | 11.1 Arc length | Circumference, central angle, rotation, radius, diameter | Radians |
| 2/28 | 11.2 Sector area | Exact and decimal calculations | Circle equations |
| 3/1 | 11.3 Inscribed polygons | Regular polygon area | Segment area |
| 3/2 | 11.4 Inscribed angles | Chords, inscribed angle theorem | Completing the square |
| 3/3 | 11.5 Secants, tangents | Tangent $\perp$ radius, circumscribed | |
| 3/6 | 11.6 Pie charts | Data presentation | Incenter and circumcenter |
| 3/7 | 11.7 Project | | |
| 3/8 | 11.8 Presentations | Completing the square (calculator) | |
| 3/9 | 11.9 Review | | |
| 3/10 | 11.10 Test | | |

10 Instructional days (93-102 / 159)

# Unit 12: Trigonometry

| Date | Lesson title | Topics | |
|---|---|---|---|
| 3/13 | 12.1 Tangent | Slope, angle of rotation, graphing, Pythagorean triples | |
| 3/14 | 12.2 Tan inverse | | Radians |
| 3/15 | 12.3 Tangent applications | Angle of elevation, declination | 3-D situations |
| 3/16 | 12.4 Sine and cosine | SOHCAHTOA | |
| 3/17 | 12.5 Inverse functions | | |
| 3/20 | 12.6 Special triangles | | Complementary angle theorem |
| 3/21 | 12.7 Project | | |
| 3/22 | 12.8 Presentations | | |
| 3/23 | 12.9 Review | | |
| 3/24 | 12.10 Test | | |

10 Instructional days (103-112 / 159)

# Unit 13: Quadrilaterals

| Date | Lesson title | Topics | |
|---|---|---|---|
| 3/27 | 13.1 Parallelograms | Sides, angles properties | |
| 3/28 | 13.2 Diagonals | Congruent triangle implications, bisectors | |
| 3/29 | 13.3 Rectangles and squares | Congruent diagonals | |
| 3/30 | 13.4 Rhombus | Perpendicular diagonals, perimeter | |
| 3/31 | 13.5 Kites | Perimeter | |
| 4/3 | 13.6 Quadrilateral circle inscription | Angle properties | |
| 4/4 | 13.7 Review | | |
| 4/5 | 13.8 Test | | |

8 Instructional days (113-120 / 159)

# Unit 14: Function transformations

| Date | Lesson title | Topics | |
|---|---|---|---|
| 4/17 | 14.1 Translations | Graphing | |
| 4/28 | 14.5 Test | Linear, polynomial, reciprocal, exponential, periodic | |

9 Instructional days (113-120 / 159)

# Unit 15: IB Trigonometry

| Date | Lesson title | Topics | |
|---|---|---|---|
| 5/1 | 15.1 Sine $\triangle$ area formula | | |
| 5/2 | 15.2 Sine rule | | |
| 5/3 | 15.3 Cosine rule | | |
| 5/4 | 15.4 Review | Roundtable | |
| 5/5 | 15.5 Test | | |
| 5/8 | 15.6 IB Prior learning assessment | | |

[6] Instructional days (113-120 / 159)

# Project ideas

- Rate of change, Interpretations of slope
- Numberlines
  - Dates: 1492, 1776, 1969
  - Silk Road distance by latitude, Gibralter to Tokyo
  - Timelines of civilizations
  - Supreme Court justices
  - Curved clock face
  - Curved parlimentary party split

# Tech skills progression

1. Graph paper, graphing, scale drawing
2. Origami
3. 3-D paper or stick models (glue guns)
4. Geogebra drawing figures, angle measures
5. GraspableMath algebraic notation
6. Map reading, latitude and longitude, distance
7. Desmos analytic geometry, functions

# Curves unit exploration

1. Conics
2. Exponentials
3. Catenaries