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| **GEOMETRY TOOKLIT** | | | | | | | | |
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| **Unit 1: Constructions** | | | | | | | | |
| 1. **Perpendicular Bisector (find a midpoint!)**   *A perpendicular bisector is a locus of points equidistant from the endpoints of the line. We will find TWO of these points and connect them.*  **1)**  **2)**  **4)**  **3)** | | | | 1. **Angle Bisector**   *We’ll “arc” the angle and bisect the arc (just like we bisected a line, except we only need one intersection point this time)*  **1)**  **2)**  **4)**  **3)** | | | | |
| 1. **Perpendicular Line through Point R**   *We’ll use our compass to find 2 points on our line which are equidistant from R. Then we can use those as endpoints and construct a perpendicular bisector.*  **1)**  **2)**  **4)**  **3)** | | | | 1. **Parallel Line through Point R**   *Congruent corresponding angles mean parallel lines! So we’ll draw a transversal through R and copy at R the angle between the transversal and the original line.*  **1)**  **4)**  **5)**  **2)**  **3)** | | | | |
| 1. **Equilateral Triangle**   **4)**  **1)**  **2)**  **3)**  *Equilateral triangles have three congruent sides. So we can keep our compass the desired side length and use it to draw all three sides.* | | | | | | | | |
| **Unit 2: Transformations** | | | | | | | | |
| **Transformations:** *In composite transformation, do the transformation on the right first.* | | | | | | *For example:*   |  |  | | --- | --- | |  | | | Do me second! | Do me first! | | | | |
| **Reflection:**  A **reflection** is flipping an object across a line without changing its size or shape. | | | | | | **Rotation:**  A **rotation** is rotating an object about a fixed point without changing its size or shape.  \*Rotations are COUNTERCLOCKWISE by convention | | | |
| **Translation:**  A **translation** is moving an object in space without changing its size, shape or orientation. | | | | | | **Dilation:**  A **dilation** is expanding or contracting an object without changing its shape or orientation. | | | |
| **Unit 3: Slope, Distance, and Midpoint** | | | | | | | | | |
| Slope formula |  | | | | Equation of a line | | |  |
| Distance formula  *\*can be used to find length!* |  | | | | Point-Slope Formula | | |  |
|  |  | | | | Parallel Slope | | |  |
| Midpoint formula |  | | | | Perpendicular Slope | | |  |

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| **How-To: Find the equation of a line with the point-slope formula** | | | | | |
| **Case (A) -**Given a point and a line to compare | | | **Ex:** Find an equation of a line passing through the point (6,5) and perpendicular to the line whose equation is 2y+3x=6. | | |
| **Step 1:** Find the slope of given line | **Step 2:** Determine slope of your new line | | **Step 3:** Identify a point on your new line | **Step 4:** Substitute into point-slope |
| **Case (B)**-Find the perpendicular bisector | | | **Ex:** Write an equation of a line that is the perpendicular bisector of the line segment with the end points (2,-1) and (3,5). | | |
| **Step 1:** Find the slope of given line | | | **Step 2:** Determine slope of your new line | |
| **Step 3:** Identify a point on your new line (midpoint!) | | | **Step 4:** Substitute into point-slope | |

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| **Unit 4: Parallelograms and Quadrilaterals** |

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| ***\*\*\*Annotate all the pictures below with the following properties!\*\*\**** | | |
| **1. Parallelogram**   * Opposite sides are ∥ * Opposite sides are * Opposite angles are * Consecutive angles are supplementary * Diagonals bisect each other | **2. Rectangle**   * ALL THE CHARACTERISTICS OF THE PARALLELOGRAM **AND**: * All right angles * Diagonals are |  |
| **3. Square**  ALL THE CHARACTERISTICS OF BOTH THE RECTANGLE **AND** THE RHOMBUS |
| **2. Rhombus**   * ALL THE CHARACTERISTICS OF THE PARALLELOGRAM **AND**: * All 4 sides. * Diagonals are ⊥ * Diagonals bisect opposite angles |
| **1. Kite**   * Diagonals are ⊥ * 2 pairs of consecutive sides * 1 pair of opposite angles * Other pair of angles bisected by diagonal * One diagonal bisected by the other. |
| **1. Trapezoids**   * One set of opposite sides ∥ * Consecutive upper and lower angles supplementary | **2. Isosceles trapezoid**   * ALL THE CHARACTERISTICS OF THE TRAPEZOID **AND:** * 2 legs * 2 upper angles * 2 lower angles |

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| **Unit 5: Circles** |

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| **Outside angle:** | | **Inscribed angle:** | |
| **Inside angle:** | | **Central angle:** | |
| **Chord Length:** | **Secant-Secant:** | | **Secant-Tangent:** |

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| **Equation of a circle** | | | | | | | |
| **Unit 6: Area and Volume** | | | | | | | |
| Rectangle |  | Triangle |  | Square |  | Circle |  |
|  | | | | | | | |
| PRISMS  Lateral faces are RECTANGLES | | | | PYRAMIDS/CONES  Lateral faces are TRIANGLES  No general formula for lateral area | | | |
| Volume of  a Prism | | where *B* is the area of the Base | | Volume of  a Pyramid/Cone | | where *B* is the area of the Base | |
| Volume of a sphere |  | Surface area of a sphere |  | Lateral Area of a cylinder |  | Lateral Area of a cone | where is slant height |
| **Unit 7: Loci** | | | | | | | |

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| **5 Theorems  of Locus** | | | |
| Locus Theorem 1:  The locus of points at **a fixed distance**, *d,*  **from** **one point** P is a **CIRCLE**  http://www.regentsprep.org/regents/math/geometry/gl1/PicTh1.gif | | http://www.regentsprep.org/regents/math/geometry/gl1/PicTh2.gifLocus Theorem 2:  The locus of points at **a fixed distance**, d**, from a line** l, is a pair of **PARALLEL LINES**. | |
| Locus Theorem 3:  The locus of points **equidistant from two points** P and Q is a **LINE IN THE MIDDLE** of the two points  http://www.regentsprep.org/regents/math/geometry/gl1/PicTh3.gif | Locus Theorem 4:  The locus of points **equidistant from two parallel lines** l1 and l2 is a **PARALLEL LINE BETWEEN** both of the lines.  http://www.regentsprep.org/regents/math/geometry/gl1/PicTh4.gif | | Locus Theorem 5:  The locus of points **equidistant from two intersecting lines** is when you draw an **“X”**  http://www.regentsprep.org/regents/math/geometry/gl1/PicTh5.gif |

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| **Unit 8: Triangles** | |
| **Types of Triangles:** | |
| **Equilateral:** All sides and all angles  **Isosceles:** Two sides and two angles  **Scalene:** NO sides or angles | **Right:** Contains 1 right angle  **Obtuse**: Contains 1 angle greater than  **Acute:** Contains NO angles greater than |
| **Vocabulary:**  Midsegment  Vertex | |
| **Vertex:** The corner of the triangle  **Median:** A line that extends from a vertex to the midpoint on the opposite side  **Altitude:** A line that extends from a vertex which is perpendicular to the opposite side    **Midsegment:** A line that connects two midpoints  **Centroid:** The point at which all 3 medians intersect | Centroid  Median |
| **Exterior Angle Theorem:** | **Triangle Inequality Theorem:**  The sum of two sides of a triangle MUST be GREATER than the third side |
| **Isosceles Triangle Theorem:**  If two sides are congruent in a triangle then the opposite angles are congruent.  If two angles are congruent in a triangle then the opposite sides are congruent | **Side Splitter Theorem:**  If a [line is parallel](http://www.mathwarehouse.com/algebra/linear_equation/parallel-perpendicular-lines.php)to a side of a [triangle](http://www.mathwarehouse.com/geometry/triangles/) and intersect the other two sides, then this line divides those two sides proportionally.  =  = |
| **Angle Side Relationship:**  LARGEST side is OPPOSITE the LARGEST angle  LARGEST angle is OPPOSITE the LARGEST side  SMALLEST side is OPPOSITE the SMALLEST angle  SMALLES angle is OPPOSITE the SMALLEST side |  |
| **Unit 9: Proofs/Logic** | |

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| **Logic How-To** | | | | | | | |
| **Conditional Statements** | | If **a**, then **b.** | | **Negation:** *to deny* | | | |
| **Hypothesis** | | If **a.** | |
| **Conclusion** | | Then **b.** | |
| **Converse statements** | | If **b**, then **a.** | | **Counter-Example:** *an example to disprove a statement* | | | |
| **Inverse statements** | | If not **a**, then not **b.** | |
| **Contrapositive statements** | | If not **b**, then not **a.** | |
| **Most Common Proof Moves** | | | | | | | |
| **Statement:** CA≅CA  **Reason:** Reflexive Propertyhttp://o.quizlet.com/i/Srg4MeCIjWc2q8ihJx8LTA_m.jpg | **Statement**: AM≅MB  **Reason:** Definition of midpointhttp://mathworld.wolfram.com/images/eps-gif/Midpoint_1000.gif | | | | **Statement:** ∠ABD≅∠DBC  **Reason:** Definition of angle bisectorhttps://dr282zn36sxxg.cloudfront.net/datastreams/f-d%3Aad907e1f0d213d6d785e57a2625f7d76af8dee3f56f09d8608751648%2BIMAGE%2BIMAGE.1 | | **Statement:** ∠ADC≅∠CDB  **Reason:** Right angles are always congruenthttp://mathworld.wolfram.com/images/eps-gif/Perpendicular_1000.gif |
| **Statement:** ∠DPA≅∠CPB  **Reason:** Vertical angles are congruent  http://image.mathcaptain.com/cms/images/41/vertical-angles-theorem.PNG | **Statement:** ∠a≅∠b  **Reason:** Alternate interior angles are congruent  http://image.tutorvista.com/content/feed/u731/a1_2.gif | | | | **Statement:** ∠a≅∠α  **Reason:** corresponding angles are congruent  http://www.open.edu/openlearnworks/pluginfile.php/65471/mod_page/content/1/MU120_B_I133i.jpg | | **Statement:** ∠DCA, ∠DCB are right angles  **Reason:** Definition of perpendicular lines  https://lh6.googleusercontent.com/G_JfDzpDDNFVatxmlkY_zCHo8i_heU6JxbMMm_vw34Ktkr9-G_LU_6HU6t4qWfOtNOmvJDZG_nowEmEojWAxI3TBMJOIsCSHRhfUKMlEe202iRyWHmjGQQ2GRwjnhcVktm1h0i0FtkyNibNM |
| **Congruent Triangles** | | | | | | | |
| **SSS Congruence Postulate** https://lh4.googleusercontent.com/xKwjBcnvxcQNMJkrFJaF3X0YVgrIn1SZydakZvT_ZbzbeqdgMJ6rD_EqElNkEBXz8ODeTVxcisJBY_2dyyqt0P-hKMuBDZA2bwUkavT5axrXLXXJAR2Di2D-ZLs2AFD0Ld3yTFRoY_NkxcFg | | | **SAS Congruence Postulate** https://lh4.googleusercontent.com/RZwjQkupxOehpnjiKOC0rQzy-arU66JDqb7DjH38nkwN8RTnDXtpLHETc_BfI2t4mdF6N09d2kOu9IGVg6gIudWilGorVrZEvBm_DLpZaIhWYamP0ML9mXmrpfKQbrDuwBZTCI4-CXdcdQ1H | | | **ASA Congruence Postulate** https://lh5.googleusercontent.com/4_75u4mkMbEztK0yIxjDQjyYtLZAhknc1xz2aCXysAc6o0gCRjERkv93p6U-zaxVGjGEkXOh2QFLtNeST8ow3McXUAczP8PHoOmVitmzuaJ927XULf0u-iwRa4eY0Wk6xlTItyhdMiZyQq2u | |
| **AAS Congruence Postulate** https://lh5.googleusercontent.com/1nmW7XH1IdEL2dTW5KCCh2_6M8yY8cxpXfaCwFUX6gxlAt4_b_MiIVzCWgWPQhuFVWOpLS-FQb8P_6I5KasFUC_p_ZOPraKWnYBdB-MR-F73uQiPOYZ3QzLDjYOza-vdbp7XX7jJFrKADNUj | | | **HL Congruence** https://lh4.googleusercontent.com/jOpH4T0W3rV_nTpPZ0x_KCt-zqj50T89z6ZpW9afChOZ7bfTLSkzQRcP5Z_nM8Vt9jJNldv51No59ly41Pt21vwO5AGI62iw8JjNIUcYPLknjT6jaWqh643UruZCiwlIw1koPBt4RcYxlN4V | | | **CPCTC** – corresponding parts of congruent triangles are congruent | |
| **Similar Triangles** | | | | | | | |
| **AA Similarity Postulate**   http://hotmath.com/hotmath_help/topics/angle-angle-similarity/angle-angle-similarity-image003.gif | **SSS Similarity**  http://img.sparknotes.com/figures/7/72cb950b9322b483f89f93dac3e30381/similarsss.gif | | | | **SAS Similarity**  https://lh6.googleusercontent.com/5xo7QgB2RgoRgHze_8MLuXMwBlFv3DqiP25hHmec7QTBlsfiMSS6KCz3-mAmklvlB-F7_le0tVVdnL625y-vc3ez1Q1iMJmwU4ZZsBbT0VdZ2I5zaTtdVZ2wrkp3wN-ZXguocGPOEOIRsQ3i | | Corresponding sides of similar triangles are proportional |
| The product of the means is equal to the product of the extremes |