**Harold’s Rules of Circle Geometry**

**Cheat Sheet**

21 May 2023

**Terminology**

|  |  |
| --- | --- |
| **Category** | **Examples** |
| **Arcs** | circular sector - Wiktionary |
| **Angles & Sectors** | geometry - How to find x and y coordinates on a flipped circle using  javascript methods - Stack Overflow Circles - CBSE Tuts |
| **Lines & Chords** |  |
| **Tangents** | 9-5 Tangents - Geometry Mr Lee |

**Arcs and Angles in a Circle**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Rule / Formula** | **Diagram** |
| **Central Angle**  (Angle at Center) | Equal to arc |  |
| **Inscribed Angle**  (Angle in Same Segment) | Half the arc |  |
| **Inscribed Quadrilateral**  (Opposite Angles of Cyclic Quadrilateral) | The opposite angles of cyclic quadrilaterals are supplementary (180°). |  |
| **Radius Ʇ Tangent** | The angle between the radius and a tangent is 90°. |  |
| **Two Chords**  **(Internal Angle)** | Half the sum |  |
| **Two Secants**  **(External Angle)** | Half the difference |  |
| **Secant & Tangent**  **(External Angle)** |  |  |
| **Two Tangents**  **(External Angle)** |  |  |
| **Angle at Center** | The angle at the center is twice the angle standing on the same chord/arc. |  |
| **Angles Inscribed in a Semi-Circle** | Right Angles  (90°)  Angles on a semi-circle are 90°. |  |
| **Angles Inscribed in a Circle** | Angles from two points on a circle are equal. | Proving theorems about angles without angles |
| **Same Segment Theorem**  (Two Inscribed Angles) | Angles on the same arc are equal. |  |
| **Alternate Segment Theorem** | The angle between a chord and a tangent is equal to the angle in the alternate segment. |  |
| **Tangent and Intersected Chord Theorem** | If a tangent and a chord intersect at a point on a circle, then the measure of each angle formed is one-half the measure of its intercepted arc. |  |
| **Supplimentary Angles** |  |  |
| **Interior Angles** | Sum of interior angles of a circle is always 360°. |  |

**Chords and Secants in a Circle**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Rule / Formula** | **Diagram** |
| **Perpendicular Bisector of Chord Passes Through Center** | The line from the center of a circle to the center of a chord is perpendicular to the chord.  A perpendicular line from the chord to the center bisects the chord. |  |
| **Equal Chords Equidistant from Center** | Equal chords are equal distance from the center.  Chords that are equal distance from the center are equal. |  |
| **Equal Arcs, Equal Chords** | Equal arc/chord subtend equal angles at the center.  Equal angles stand on an equal arc/chord. |  |
| **Tangents from External Point** | Tangent segments drawn from an external point are equal. | Circle Theorem: Tangents from the Same Point Are the Same Length (Key Stage  3) |
| **Intersecting Chords Theorem** |  |  |
| **Intersecting Secants Theorem** |  |  |
| **Intersecting Secant-Tangent Theorem** |  |  |

**Area and Perimeter**

|  |  |  |
| --- | --- | --- |
| **Configuration** | **Rule / Formula** | **Diagram** |
| **Radius** | The distance from the center or origin to a point on the circle. |  |
| **Diameter** |  |
| **Circumference** |  |
| **Area of Circle** |  |  |
| **Area of a Sector** |  |  |
| **Surface Area of Sphere** |  | Solid Geometry on SAT Math: The Complete Guide |

|  |  |  |
| --- | --- | --- |
| **Volume of Sphere** |  |  |

**Sources**:

Kevin’s Online Maths, Rules of Circle Geometry

<http://kelvinsonlinemaths.blogspot.com/2011/03/rules-of-circle-geometry.html>

Geometry R, Unit 13 – Circles, Mr. Rosss @ Grady High

<https://mrrossatgradyhigh.files.wordpress.com/2022/08/unit-13-notes-circles_2018.pdf>

Pinterest, Tangent & Secant Lines, Sandy Lakey

<https://www.pinterest.com.mx/pin/817403401103649163/>

Online Math Learning.com, Angles and Intercepted Arcs

<https://www.onlinemathlearning.com/arc-angles.html>

ck-12, 9.7 Segments of Secants and Tangents

<https://www.ck12.org/book/ck-12-foundation-and-leadership-public-schools-college-access-reader%3a-geometry/section/9.7/>

ck-12, Angles Outside a Circle

<https://www.ck12.org/c/geometry/angles-outside-a-circle/lesson/Angles-Outside-a-Circle-BSC-GEOM/>