# Knowledge Rich Curriculum Plan

Year 12 Maths

Unit 6 – Circles

| Maths Year 12 | Unit: Circles | | | |
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| **Lesson/Learning Sequence** | **Intended Knowledge:** *Students will know that…* | **Tiered Vocabulary** | **Prior Knowledge:** *In order to know this students, need to already know that…* | **Assessment** |
| **Lesson 27: Midpoints** Lesson Objective: To learn how to find the midpoint of a line segment. | • Students will know that finding the average of the x- and y-coordinates of its endpoints will find the midpoint of the line segment. • Students will know that the midpoint of a diameter is the centre of the circle. • Students will know how to find a point using another point and the midpoint. | | • *Students need to know how to find the average of two values.* • *Students need to know that the diameter of a circle is a straight line which touches the circumference twice and goes through the centre of the circle.* | |
| **Lesson 28: Perpendicular bisectors** Lesson Objective: To learn how to find the perpendicular bisector of a line segment. | • Students will know that the perpendicular bisector of a line segment is the straight line that is perpendicular to the line segment and passes through the midpoint of the line segment. • Students will know that the perpendicular bisector of a line segment will cut the line segment into two lines of equal length. • Students will know how to find the equation of the perpendicular bisector of a line segment. | | • *Students need to know that bisector means cut into two equal parts.* • *Students need to know how to find the midpint of a line segement.* • *Students need to know how to rearrange formulae.* • *Students need to know how to substitute into equations.* • *Students need to know how to find the gradient of a line.* • *Students need to know to find the perpendicular gradient.* • *Students need to know how to find the equation of a perpendicular line.* | |
| **Lesson 29: Equation of a circle** Lesson Objective: To learn how to find the equation of a circle. | • Students will know that a circle is a set of points that are equidistant from a fixed point. • Students will know how to use Pythagoras' theorem to derive the equation of circle on a coordinate grid, using a point on the circumference and the centre of the circle. • Students will know the general equation of a circle. • Students will know how to substitute the centre of the circle and radius into the general equation of a circle to produce a particular equation of a circle. • Students will know how to find the centre and radius of a circle using the equation of the circle. • Students will know how to show that a circle passes through a point using substitution. • Students will know how to find the radius of a circle using two points on the circumference or the diameter. • Students will know the alternate form for the equation of a circle. | | • *Students need to know how to use Pythagoras' theorem to find the length of a line segment.* • *Students need to know how to rearrange formulae.* • *Students need to know how to substitute into equations.* • *Students need to know how to find the midpoint of a line segment.* • *Students need to know that the length of the radius is half the length of the diameter.* • *Students need to know the general equation of a circle with centre at the origin.* | |

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| **Lesson/Learning Sequence** | **Intended Knowledge:** *Students will know that…* | **Tiered Vocabulary** | **Prior Knowledge:** *In order to know this students, need to already know that…* | **Assessment** |
| | • Students will know to use completing the square to manipulate the alternate form of the equation of a circle to find the centre and radius of the circle. | | | |
| **Lesson 30: Intersections of straight lines and circles** Lesson Objective: To learn how to find the points of intersection of straight lines and circles. | • Students will know that a straight line can cross a circle once by just touching the circle or twice. <br>• Students will know how to find the coordinates of the points where a straight line intersects a circle. <br>• Students will know how to use the discriminant to show tha a line will intersect a circle twice. <br>• Students will know how to use the discriminant to show that a straight line will touch the edge of the circle and recognise the line as a tangent to the circle. <br>• Students will know how to use the discriminant to show that a straight line does not intersect with a circle. | | • *Students need to know how to solve quadratic simultaneous equations.* <br>• *Students need to know how to expand brackets.* <br>• *Students need to know how to substitute into equations.* <br>• *Students need to know how to rearrange formulae.* <br>• *Students need to know how to calculate the discriminant.* <br>• *Students need to know how to interpret the result of the discriminant.* <br>• *Students need to know that a tangent to a circle touches the circle in one place.* <br>• *Students need to know how to factorise quadratic expressions.* <br>• *Students need to know how to solve quadratic equations.* | |
| **Lesson 31: Use of tangent and chord properties** Lesson Objective: To learn how to use tangent and chord properties to solve problems in circles. | • Students will know that a tangent is perpendicular to the radius of the circle at the point of intersection. <br>• Students will know that the perpendicular bisector of a chord will go through the centre of a circle. <br>• Students will know how to find the equation of a tangent of a circle knowing the equation of the circle and the point on the tangent. <br>• Students will know how to find the equations of a tangent of a circle knowing the equation of the circle and the gradient of the tangent. <br>• Students will know how to find the equation of the diameter of the circle by knowing the two points where the chord touches the circumference and finding the midpoint. | | • *Students need to know how to find the midpoint of a line segment.* <br>• *Students need to know how to find the gradient of a straight line.* <br>• *Students need to know how to find the gradient of a perpendicular line.* <br>• *Students need to know how to how to find the equation of a straight line.* <br>• *Students need to know how to find the equation of a perpendicular line.* | |

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| **Lesson 32: Circles and triangles**<br>Lesson Objective: To learn how to use circumcircles. | • Students will know that a circumcircle is a unique circle that's circumference goes through the three vertices of a triangle.<br>• Students will know that the centre of the circumcircle is called the circumcentre of the triangle.<br>• Students will know that the circumcentre is the point where the perpendicular bisectors of each side of the triangle intersect.<br>• Students will know that for right-angled triangles, the hypotenuse of the triangle is a diameter of the circumcircle.<br>• Students will know that the angle in a semicircle is always 90 degrees.<br>• Students will know how to find the equations of the perpendicular bisectors of two different chords when given any three points on the circumference, to find the centre of the circle.<br>• Students will know how to find the coordinates of the point of intersection of the perpendicular bisectors of two different chords, when given any three points on the circumference. | | • *Students need to know how to find the equation of a straight line.*<br>• *Students need to know how to find the equation of a perpendicular line.*<br>• *Students need to know how to find the perpendicular bisector of a chord.*<br>• *Students need to know how to find the equation of a circle using the radius and the centre of the circle.*<br>• *Students need to know how to find the midpoint of a line segment.*<br>• *Students need to know how to use Pythagoras' theorem.*<br>• *Students need to know how to find the equation of a perpendicular bisector.* | |