Strand 2 Chapter 4 Coordinate Geometry The Circle

1. I can find the Equation of a circle with **centre at (0,0) with radius r** is

   $\mathbf{x^2 + y^2 = r^2}$

   Example 1 Page 111

2. I know that given the centre and the equation of the tangent to the circle, then I can find the radius by getting the length of the perpendicular from the centre of the circle to the tangent using formulae.
   Example 2 Page 112

3. I know how to find the radius of a circle given the equation of the circle like $4x^2 + 4y^2 = 9$ by dividing all terms by 4 to ensure that the equation is in the form $x^2 + y^2 = 9/4$

4. I know that a line is a tangent to a circle if the perpendicular distance from the centre of the circle to the line is equal to the radius length.
   Ex 4.1 Q2 – Q10 Page 112

5. I know that **the equation of the circle with centre (h,k) and radius r is given by**

   $\mathbf{(x - h)^2 + (y - k)^2 = r^2}$

   And I can solve problems associated with this equation.

   Example 1 and Example 2 Page 114

6. I am familiar with the general equation of the circle and its application

   $\mathbf{x^2 + y^2 + 2gx + 2fy + c = 0}$

   where centre = (-g, -f)

   and radius = $\sqrt{g^2 + f^2 - c}$ provided $g^2 + f^2 - c > 0$

   Remember to make sure that the coefficients of x^2 and y^2 are 1 before using this equation.

Example 3 Page 115

7. I know that if the coordinates of a point satisfy the equation of a circle, then that point is on the circle.
   Example 4 Page 115
   Ex 4.2 Q2 – Q18 Even Page 116

8. I know that to find the equation of a circle I need the centre and the radius of the circle.
9. I know that I can use the following properties to help me find these:

   1. The perpendicular from the centre of a circle to a chord bisects the chord.
   2. The perpendicular bisector of a chord contains the centre. (very useful when we require the equation of a circle containing 3 given points)
      See Example 1 Page 119 and Example 2 (alternative method) Page 120
   3. The perpendicular to a tangent at the point of contact passes through the centre of the circle.
      See Example 3 Page 120 which looks to find the equation of a circle when given the equation of a tangent, the point of contact and one other point.

      See Example 4 Page 121 Equation of a circle through two given points with its centre on a given line

10. I know how to show that a given line is a tangent to a given circle.
    Example 5 Page 123
    Ex 4.3 Q2 – Q20 Page 123

11. I know how to find the equation of the tangent to a circle at the point P on the circle by finding the slope of the radius, finding the reciprocal of this and changing its sign before using this and the point of contact in the equation of the line formula.
    Example 1 Page 126
12. I recall that any line

    Parallel to $ax + by + c = 0$ has equation $ax + by + k = 0$
    Perpendicular to $ax + by + c = 0$ has equation $bx - ay + k = 0$

    And can find the equations of the lines parallel to a given circle.

    Example 2 Page 126

13. I recall how to find the perpendicular distance from a given point to a line using formulae.
14. I can solve problems with tangents to a circle from a point.
    Example 3 Page 128

15. I can find the length of a tangent to a circle from a given point.
    Example 4 Page 128
    Ex 4.4 Q2 – Q22 Even Page 129

16. I can use simultaneous equations to find the point(s) of intersection of a line and a circle.
    Example 1 and Example 2 Page 132
17. I can find where a circle intersects the x or y axes
    Example 3 page 133

18. I can find the equation of the line that is the **common chord** (when the 2 circles intersect) or the **common tangent** (when the circles touch internally or externally) to 2 circles by subtracting the equation of one circle from another.

    I can go on to find the points of intersection of the two circles by finding the points of intersection of the found chord and any one of the circles.

    Example 4 Page 133
    Ex 4.5 Q2 – Q14 Page 134
19. I know that 2 circles touch if they meet at one point only and that d, the distance between the two centres is

    $d = r_1 + r_2$ for externally touching circles
    $d = r_1 - r_2$ for internally touching circles
    Example 1 Page 135
20. I recall that the perpendicular from the centre of a circle to a chord bisects the chord.
    Example 2 Page 136
    Ex 4.6 Q2 – Q12 Page 136

21. I know that if a circle touches the x-axis or y-axis, then the radius of the circle is equal to one of the coordinates of its centre.
    Example 1 Page 138

Ex 4.7 Q1 to Q7 Page 139