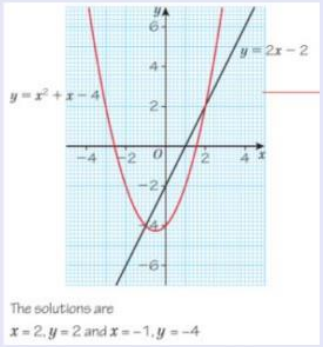
Quadratic Graphs

V180 V181 V276c VCubic

Solving Simultaneous Equations

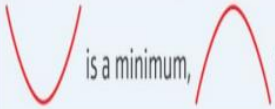


The solutions are
$x = 2, y = 2$ and $x = -1, y = -4$

The lowest or highest point of the parabola, where the graph turns, is called the **turning point**.

The turning point is either a minimum or maximum point.

The x-values where the graph intersects the x-axis are the solutions, or **roots**, of the equation $y = 0$.

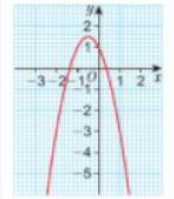


is a minimum, is a maximum

When a quadratic is written in completed square form $y = a(x + b)^2 + c$ the coordinate of the turning point is $(-b, c)$

To sketch a quadratic function

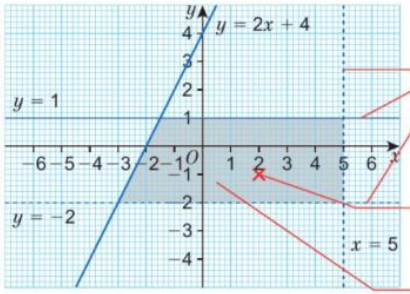
- Calculate the solutions to the equation '$y = 0$' (points of intersection with the x-axis).
- Calculate the point at which the graph crosses the y-axis.
- Find the coordinates of the turning point and whether it is a maximum or a minimum.



The quadratic equation $ax^2 + bx + c = 0$ is said to have no real roots if its graph does not cross the x-axis. If its graph just touches the x-axis, the equation has one repeated root.

Inequality Graphs

On a coordinate grid, shade the region that satisfies the inequalities
$x < 5, y \leqslant 2x + 4, y \leqslant 1$ and $y > -2$



Draw dotted lines $x = 5$ and $y = -2$
Draw solid lines $y = 2x + 4$, $y = 1$

Test a point. For (2, −1)
$y \leqslant 1$ and $y > -2$: the y-coordinate is −1
$x < 5$: the x-coordinate is 2
$2x + 4 = 8$: y-coordinate $\leqslant 8$

Shade the required region.

Cubic Graphs

A **cubic** function is one whose highest power of x is x^3.
It is written in the form $y = ax^3 + bx^2 + cx + d$

When $a > 0$ the function looks like

or

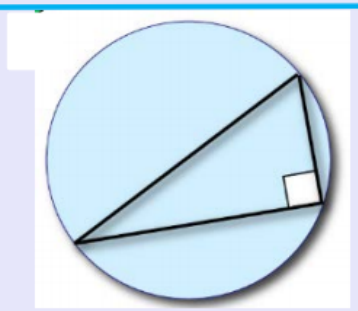
When $a < 0$ the function looks like

or

The graph intersects the y-axis at the point $y = d$
The graph's roots can be found by finding the values of x for which $y = 0$.

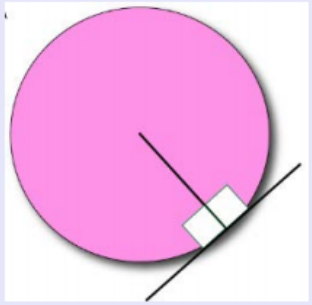
Unit 16 Higher Circle Theorems

V64 V65



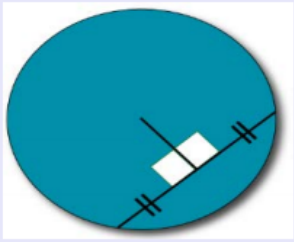
The angle in a semicircle is a right angle.

V65a



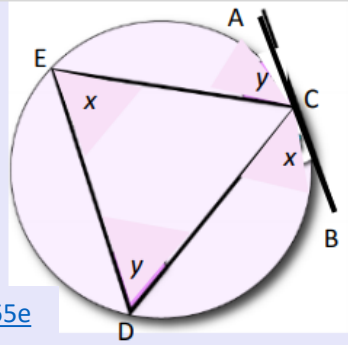
The angle between a **tangent** and **radius** is a right angle.

V65f



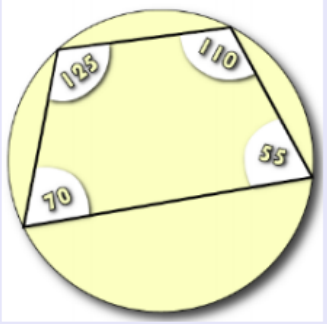
A **chord** is a straight line connecting two points on a circle.

The **perpendicular** from the centre of the circle to a chord **bisects** the chord and the line drawn from the centre of the circle to the **midpoint** of a chord is at right angles to the chord.



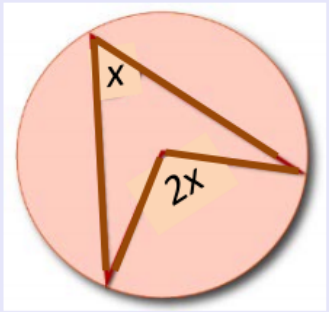
V65e

AB is a tangent to the circle. CD, DE and CE are **chords**. Angle ECA is the angle between the **tangent** and the chord in one segment. The other **segment** has angle CDE. This is the **alternate segment.** The angle between the chord and tangent is equal to the angle in the alternate segment.



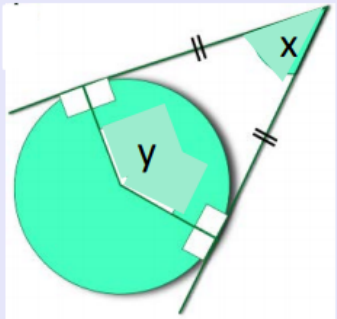
A cyclic quadrilateral with all four vertices on the circumference of the circle. Opposite angles add up to 180°.

V65d



The angle at the centre of a circle is twice the angle at the circumference when both are subtended by the same arc.

V65b



Tangents drawn from a point outside the circle are equal in length.

$x + y = 180$

Angles in the same segment and standing on the same chord are always equal.

V65c