Preliminaries and Objectives

Preliminaries
- Parabolas
  - Standard Form
  - General Form
- Factor-Root Theorem
- Factoring

Objectives
- Graphing a parabola from root form
- Finding the axis of symmetry and vertex of a parabola in root form
Example 1

\[ y = x^2 - 2x - 15 \]

\[ y = (x + 3)(x - 5) \]
\[ y = a(x - r)(x - s) \]

\( r \) and \( s \) are roots of the parabola

roots = \( x \)-intercepts = zeroes

Axis of symmetry at \( x = \frac{r + s}{2} \)
Example 2

Graph \( y = 3x^2 + 24x + 36 \)

\[ y = 3(x^2 + 8x + 12) \]

\[ y = 3(x + 2)(x + 6) \]

Axis of symmetry at \( x = -4 \)

Vertex = \((-4, -12)\)
Example 3

Graph \( y = -2x^2 + x + 3 \)

\[
y = -(2x^2 - x - 3)
\]

\[
y = -(2x - 3)(x + 1)
\]

Roots occur where
\( 2x - 3 = 0 \) and \( x + 1 = 0 \)

Roots at \( x = \frac{3}{2} \) and \( x = -1 \)
Example 4

Find the vertex of the parabola $y = -4(x - 7)(x + 3)$

Roots at $x = 7$ and $x = -3$

$$h = \frac{7 - 3}{2} = 2$$

$$k = -4(-5)(5) = 100$$

Vertex at $(2, 100)$
Recap

**Root Form of a Parabola**

If \( y = a(x - r)(x - s) \), then \( r \) and \( s \) are the roots (\( x \)-intercepts) of the parabola.

The axis of symmetry will be at

\[
x = \frac{r + s}{2}
\]