



## Function Root Behaviour (Polynomials) - Behaviour to Roots and Multiplicity

**1** at  $x = -2$ : crosses the x-axis and flattens  
at  $x = 1$ : touches the x-axis without crossing and flattens

What roots and multiplicities would create this x-intercept behaviour?

A	B	C	D	E
$x = -2$ (multiplicity 3) $x = 1$ (multiplicity 4)	$x = -1$ (multiplicity 4) $x = 2$ (multiplicity 3)	$x = -2$ (multiplicity 4) $x = 1$ (multiplicity 4)	$x = -2$ (multiplicity 4) $x = 1$ (multiplicity 3)	$x = 3$ (multiplicity 1) $x = 4$ (multiplicity 1)

**2** at  $x = -1$ : crosses the x-axis  
at  $x = 1$ : touches the x-axis without crossing and flattens

What roots and multiplicities would create this x-intercept behaviour?

A	B	C	D	E
$x = -1$ (multiplicity 1) $x = 2$ (multiplicity 4)	$x = -1$ (multiplicity 1) $x = 1$ (multiplicity 4)	$x = -1$ (multiplicity 4) $x = 1$ (multiplicity 1)	$x = 1$ (multiplicity 1) $x = 4$ (multiplicity 1)	$x = -1$ (multiplicity 2) $x = 1$ (multiplicity 4)

**3** at  $x = -3$ : crosses the x-axis and flattens  
at  $x = 2$ : touches the x-axis without crossing and flattens

What roots and multiplicities would create this x-intercept behaviour?

A	B	C	D	E
$x = -3$ (multiplicity 4) $x = 2$ (multiplicity 3)	$x = -2$ (multiplicity 4) $x = 3$ (multiplicity 3)	$x = 3$ (multiplicity 1) $x = 4$ (multiplicity 2)	$x = -3$ (multiplicity 3) $x = 2$ (multiplicity 3)	$x = -3$ (multiplicity 3) $x = 2$ (multiplicity 4)

**4** What roots and multiplicities would create this x-intercept behaviour?

at  $x = -3$ : crosses the x-axis  
at  $x = -2$ : crosses the x-axis

A	B
$x = 2$ (multiplicity 1) $x = 3$ (multiplicity 1)	$x = -3$ (multiplicity 1) $x = 2$ (multiplicity 1)
$x = -3$ (multiplicity 1) $x = -2$ (multiplicity 1)	$x = -2$ (multiplicity 1) $x = 3$ (multiplicity 1)
$x = -3$ (multiplicity 1) $x = -1$ (multiplicity 2)	

**5** What roots and multiplicities would create this x-intercept behaviour?

at  $x = -2$ : crosses the x-axis  
at  $x = -1$ : crosses the x-axis

A	B
$x = -2$ (multiplicity 1) $x = -1$ (multiplicity 1)	$x = 1$ (multiplicity 1) $x = 2$ (multiplicity 1)
$x = -2$ (multiplicity 1) $x = 1$ (multiplicity 1)	$x = -1$ (multiplicity 1) $x = 2$ (multiplicity 1)
$x = -3$ (multiplicity 1) $x = -2$ (multiplicity 1)	

**6** What roots and multiplicities would create this x-intercept behaviour?

at  $x = 1$ : crosses the x-axis  
at  $x = 2$ : crosses the x-axis

A	B
$x = -2$ (multiplicity 1) $x = 1$ (multiplicity 1)	$x = 1$ (multiplicity 1) $x = 2$ (multiplicity 1)
$x = -1$ (multiplicity 1) $x = 2$ (multiplicity 1)	$x = 1$ (multiplicity 1) $x = 3$ (multiplicity 1)
$x = -2$ (multiplicity 1) $x = -1$ (multiplicity 1)	

**7** What roots and multiplicities would create this x-intercept behaviour?

at  $x = 1$ : crosses the x-axis and flattens  
at  $x = 3$ : touches the x-axis without crossing

A	B
$x = 2$ (multiplicity 3) $x = 3$ (multiplicity 1)	$x = -3$ (multiplicity 2) $x = -1$ (multiplicity 3)
$x = 1$ (multiplicity 2) $x = 3$ (multiplicity 3)	$x = 1$ (multiplicity 3) $x = 3$ (multiplicity 2)
$x = 1$ (multiplicity 4) $x = 3$ (multiplicity 2)	

**8** at  $x = -1$ : touches the x-axis without crossing  
at  $x = 1$ : touches the x-axis without crossing and flattens

What roots and multiplicities would create this x-intercept behaviour?

A	B	C	D	E
$x = -1$ (multiplicity 4) $x = 1$ (multiplicity 2)	$x = -1$ (multiplicity 2) $x = 1$ (multiplicity 4)	$x = -1$ (multiplicity 3) $x = 1$ (multiplicity 4)	$x = 2$ (multiplicity 1) $x = 4$ (multiplicity 1)	$x = -1$ (multiplicity 2) $x = 2$ (multiplicity 4)