Chp 3 Quadratic Equations

3A Expanding & Collecting like terms

Expanding

Method 1: FOIL $(3+t)(4-2t) = 12 \underbrace{-6t+4t}_{-2t} -2t^2 = 12-2t-2t^2$

Method 2: Table

	3	$+t$
4	12	$+4t$
$-2t$	$-6t$	$-2t^2$

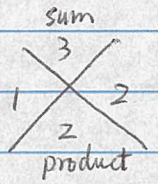
$12+4t-6t-2t^2$

$= 12-2t-2t^2$

3B Factorising Quadratics

$2x^2+4xz = 2x(x+2z)$

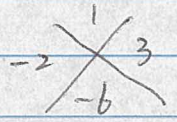
$x^2+3x+2 = (x+1)(x+2)$



Square Difference

$4x^2-9 = (2x)^2-3^2 = (2x+3)(2x-3)$

$2x^2+x-3 = (x-1)(2x+3)$

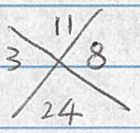


$x-\frac{2}{2}$ $x+\frac{3}{2}$

$x-1$ $2x+3$

3C Quadratic equations

eg.1 $x^2+11x+24=0$



$(x+3)(x+8)=0$

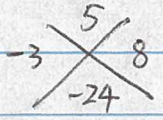
Null Factor Theorem

$\| \quad \|$

$0 \quad 0$

$x_1=-3 \quad x_2=-8$

eg.2 $2x^2+5x-12=0$



$x-\frac{3}{2}$ $x+\frac{8}{2}$

$2x-3$ $x+4$

$(2x-3)(x+4)=0$

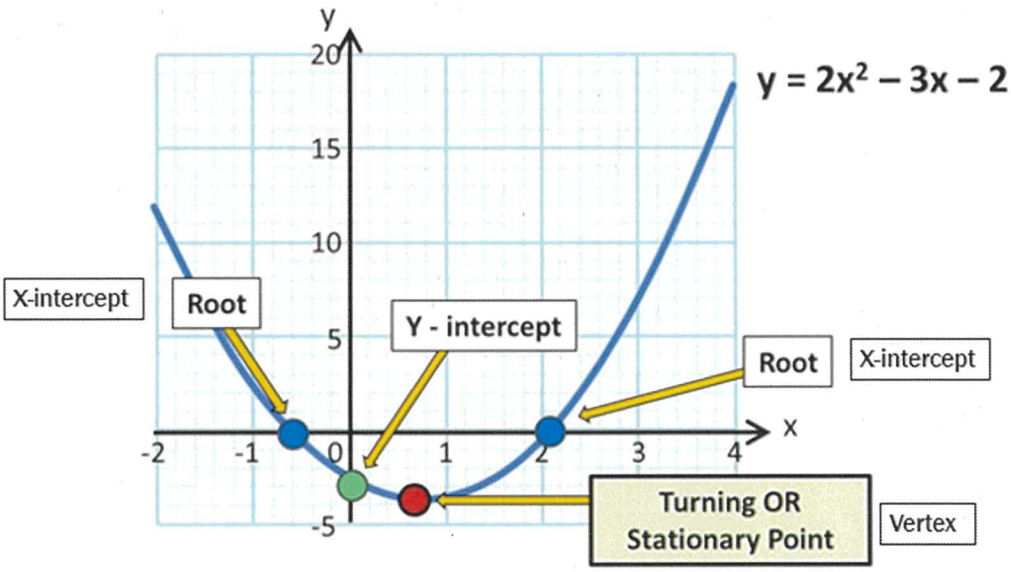
Null Factor Theorem

$\| \quad \|$

$0 \quad 0$

$x_1=\frac{3}{2} \quad x_2=-4$

KEY WORDS



Intercept Form

$y = d(x - a)(x - b)$

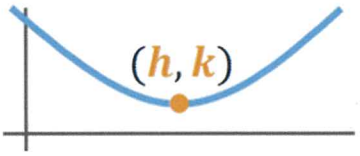
1. See if positive or negative
2. Draw in x intercepts (which are a and b)
3. Find y intercept (make x = 0)

Turning Point Form

$y = a(x - h)^2 + k$

Symmetry line: x=h

1. See if positive or negative
2. Draw in turning point (h, k)
3. Find intercepts (make x = 0 and then y = 0)



General Form

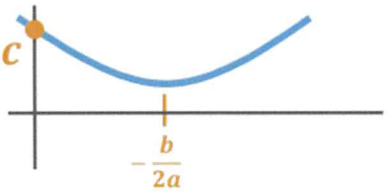
$y = ax^2 + bx + c$

Symmetry line: $x = -\frac{b}{2a}$

$x \text{ intercepts} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

discriminant: $\Delta = b^2 - 4ac$

1. See if positive or negative
2. Draw in y-intercept
3. Find x-intercepts if there are any
4. Find turning point

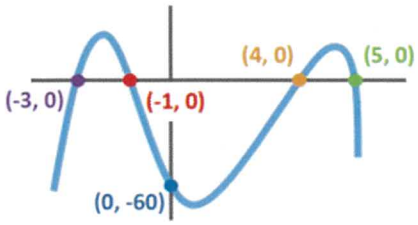


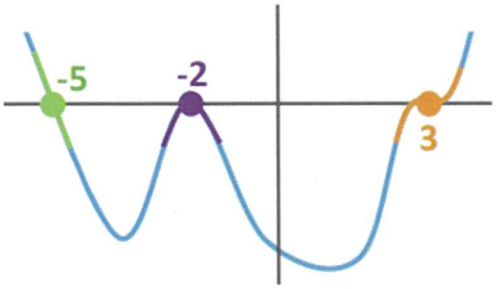
SKETCHING IN INTERCEPT FORM

$y = (x + 3)(x + 1)(4 - x)(x - 5)$

$y = (x + 5)(x + 2)^2(x - 3)^3$

1. Find x-intercepts
   by making each bracket = 0
2. Find if it is positive or negative
3. Draw in x-intercepts
4. Find y-intercept





3D Graphing Quadratics by turning point Form

Parent Graph	Transformation Graph
$y=x^2$	$y=a(x-h)^2+k$
$a=1$	$a>1$ shrink inside, $0<a<1$ stretch out, $a<0$ flip along X
Vertex $(0,0)$	Vertex (h,k)
Symmetry Line $x=0$	Symmetry Line $x=h$
x-intercept $(0,0)$	x-intercept : $y=0$
y-intercept $(0,0)$	y-intercept : $x=0$

3F Graphing quadratics in polynomial form (intercept form)

eg.1 sketch $y=x^2-4x$

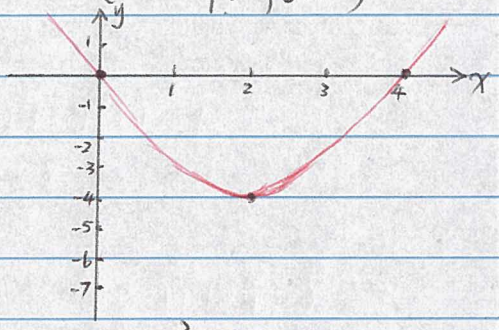
$x\cdot x-4\cdot x$

① $y=x(x-4)=(x-0)(x-4)$

Roots (x-intercept) $x_1=0$ $x_2=4$

② Symmetric Line $x=\frac{0+4}{2}=2$

③ Turning Point : $(2,-4)$



$y=2^2-4\times2=4-8=-4$

3H The General Quadratic Form $y=ax^2+bx+c$

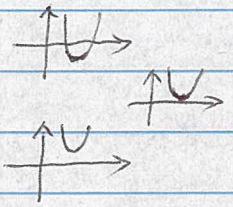
3I The discriminant Δ

Discriminant $=\Delta=b^2-4ac$

$\Delta>0$ Graph has two roots

$\Delta=0$ Graph has one root

$\Delta<0$ Graph has no root



Solutions $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{-b\pm\sqrt{\Delta}}{2a}$