#### Mathematical Methods 3,4 Summary sheets

Distance between two points

$$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Mid-point = 
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Parallel lines, my - my

Perpendicular lines.

$$m_1 m_2 = -1$$
 or  $m_2 = -\frac{1}{m_1}$ 

#### Graphs of polynomial functions in factorised form:

Quadratics e.g. y = (x+1)(x-3)





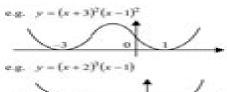


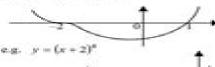
Cubics e.g. y = 3(x+1)(x-1)(x-2)



e.g. 
$$y = (x+1)^2(x-1)$$

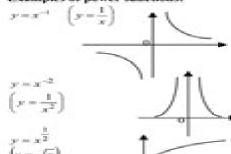






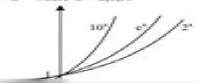


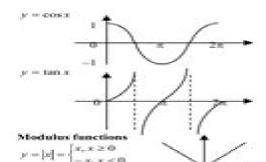
#### Examples of power functions:



#### Exponential functions:

$$y = a^x$$
 where  $a = 2, e, 10$ 





# Transformations of y = f(y)

 Vertical dilation (dilation away from the x-axis, dilation parallel to the y-axis) by factor k. y = kf(x)

(2) Herizontal dilation (dilation away from the y-axis, dilation parallel to the x-axis) by

factor 
$$\frac{1}{n}$$
.  $y = f(nx)$ 

(3) Reflection in the x-axis. y = -f(x)

(4) Reflection in the y-axis. y = f(-x)

(5) Vertical translation (translation parallel to the y-axis) by c units.

$$y = f(x) \pm c_x + up_x - down.$$

(6) Horizontal translation (translation parallel to the x-axis) by b units.

$$y = f(x \pm b)$$
, + left, - right.

 Always carry out translations last in sketching graphs.

Example 1 Sketch y = -[2(x-1)] + 2



Example 2 Sketch  $y = 2\sqrt{1-x}$ .

Rewrite as 
$$y = 2\sqrt{-(x-1)}$$
.

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**Rachel Sandford** 



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