

### 9.4 Cubic Functions

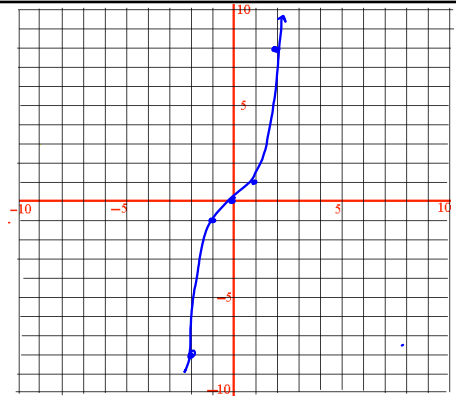
Graph of base

Graph when double, triple roots

Graph when 3 distinct roots

$$y = x^3$$

x	y
-2	-8
-1	-1
0	0
1	1
2	8



distinct Roots

at least 1  
up to 3

when 1 (triple root)  $y = x^3$   $y = (x+2)^3$

when 2 (double root w/ a single)  
 $y = x^2(x+1)$   $y = (x-1)(x+2)^2$

when 3 (3 single roots)  
 $y = x(x+5)(x-2)$   $y = (x-2)(x+8)(x-3)$

Roots  
where  
graph  
crosses  
the x-axis

$$\sqrt[3]{0} = \sqrt[3]{(x-3)^3}$$

$$0 = x - 3$$

$$3 = x$$

Triple root at 3

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

Triple at -5

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

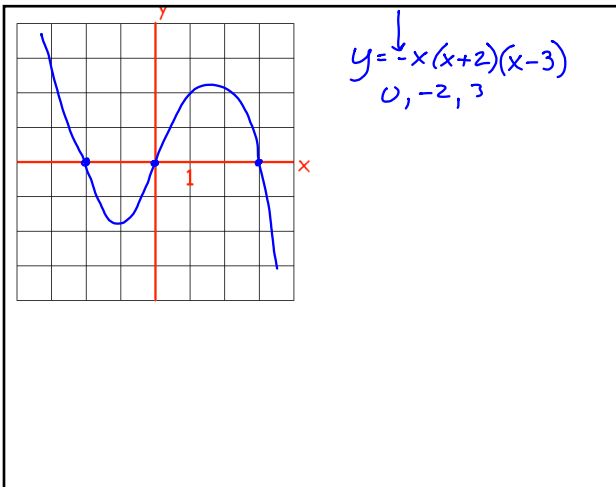
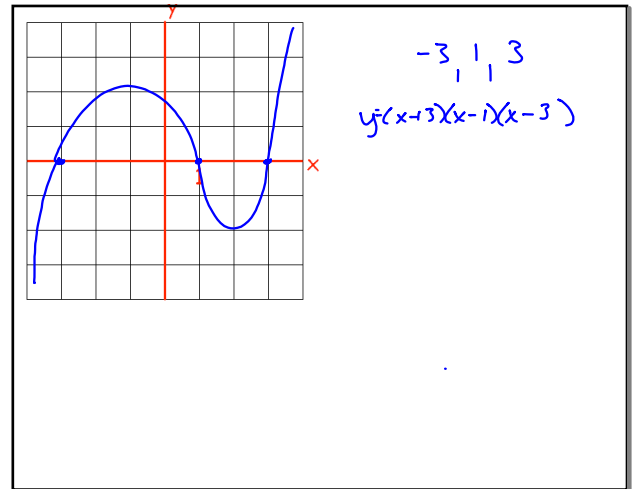
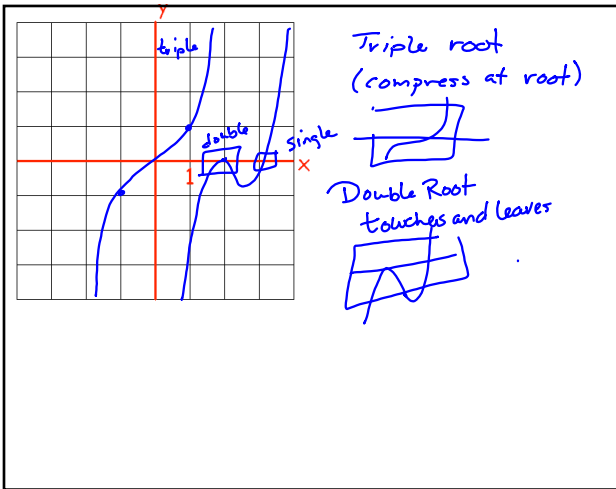
$$0 = (x+2)^2(x-1)$$

$(x+2)^2 = 0$  or  $x-1 = 0$   
 $x = -2$   $x = 1$   
dbl root at -2 single at 1

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

$$x = -3, 1, 5$$

single roots at -3, 1, 5



Linear  $y = mx + b$   
 quadratic  $y = a(x-h)^2 + k$   
 cubic  $y = x^3$   
 Rational  $y = \frac{x^2+2}{x-4}$

know what roots are  
 (Always 3)  
 3 distinct  
 2 distinct (1 dbl)  
 1 distinct (1 trpl)