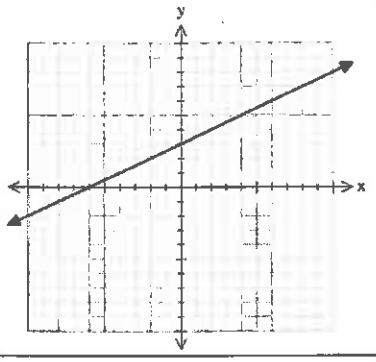
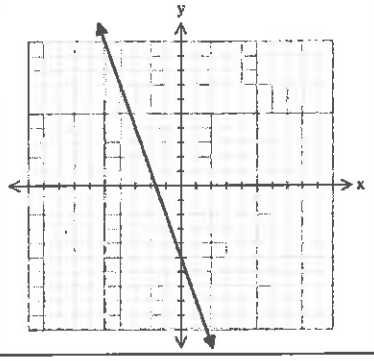
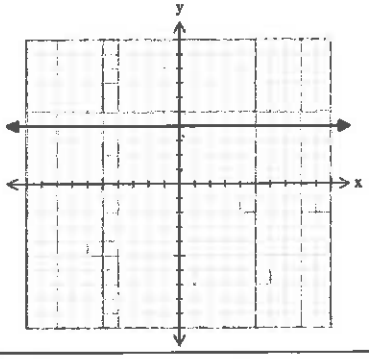
Linear Function: A linear function is a polynomial function of degree 1 which means that the biggest exponent in the equation is 1 and the graph of a linear function makes a straight line, which is either increasing, decreasing, or staying constant (a horizontal line).

Graph 1	Graph 2	Graph 3
		
Increasing Linear Function $y = 0.5x + 3$ one x-intercept one y-intercept End Behaviour: Q3 to Q1	Decreasing Linear Function $y = -3x - 5$ one x-intercept one y-intercept End Behaviour: Q2 to Q4	Constant Linear Function $y = 4$ NO x-intercept one y-intercept End Behaviour: Q2 to Q1

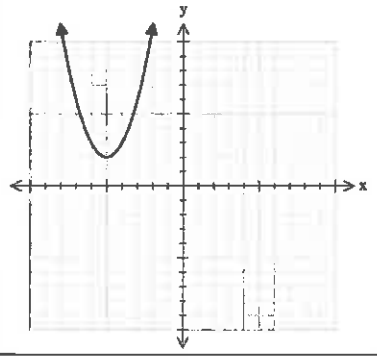
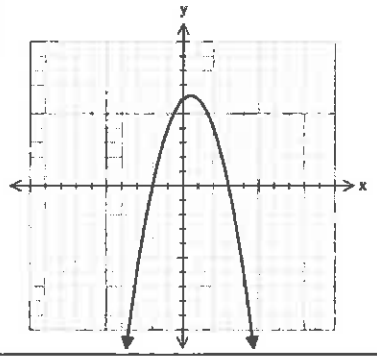
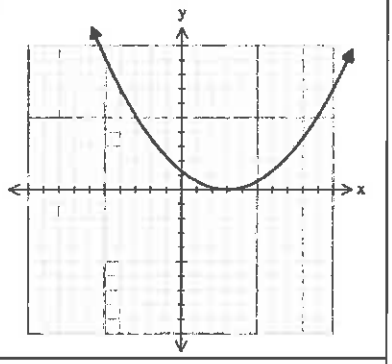
Domain: is a list of all the possible x-values of a function. Inspect the side to side growth of a graph to determine its domain.

Range: is a list of all the possible y-values of a function. Inspect the up and down growth of a graph to determine its range.

There is more than one way to state the domain and range of a function. Your teacher will explain this in more detail. Fill in the table below.

	Graph 1		Graph 2		Graph 3	
	Interval Notation	Set Notation	Interval Notation	Set Notation	Interval Notation	Set Notation
Domain	$(-\infty, \infty)$	$\{x \mid x \in R\}$	$(-\infty, \infty)$	$\{x \mid x \in R\}$	$(-\infty, \infty)$	$\{x \mid x \in R\}$
Range	$(-\infty, \infty)$	$\{y \mid y \in R\}$	$(-\infty, \infty)$	$\{y \mid y \in R\}$	$y = 4$	$\{y \mid y = 4\}$

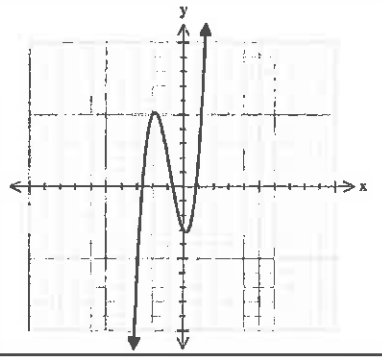
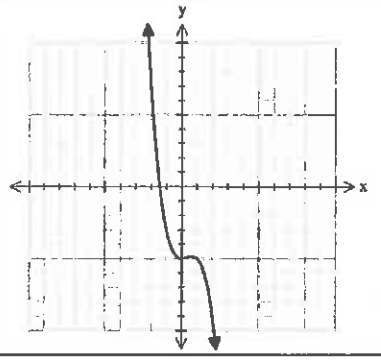
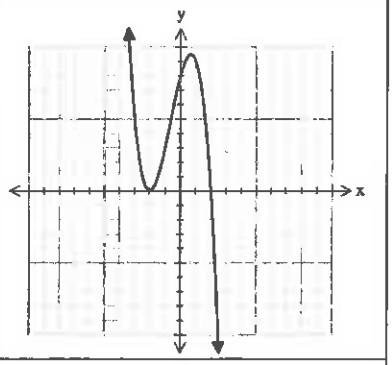
Quadratic Function: A quadratic function is a polynomial function of degree 2 which means that the biggest exponent in the equation is 2. The graph of a quadratic function makes a parabolic shape, opening either up or down.

Graph 1	Graph 2	Graph 3
		
Parabola Opening Upward $y = x^2 + 10x + 27$ no x-intercepts End Behaviour: Q2 to Q1	Parabola Opening Downward $y = -x^2 + x + 6$ two x-intercepts End Behaviour: Q3 to Q4	Parabola Opening Upward $y = \frac{1}{7}x^2 - \frac{6}{7}x + \frac{9}{7}$ one x-intercept End Behaviour: Q2 to Q1

Fill in the table below.

	Graph 1		Graph 2		Graph 3	
	Interval Notation	Set Notation	Interval Notation	Set Notation	Interval Notation	Set Notation
Domain	$(-\infty, \infty)$	$\{x/x \in R\}$	$(-\infty, \infty)$	$\{x/x \in R\}$	$(-\infty, \infty)$	$\{x/x \in R\}$
Range	$[2, \infty)$	$\{y/y \geq 2, y \in R\}$	$(-\infty, 6.2)$	$\{y/y \leq 6.2, y \in R\}$	$[0, \infty)$	$\{y/y \geq 0, y \in R\}$

Cubic Function: A cubic function is a polynomial function of degree 3 which means that the biggest exponent in the equation is 3. The graph of a cubic function often makes an s-shaped curve and may change direction up to two times. The cubic function may be increasing or decreasing.

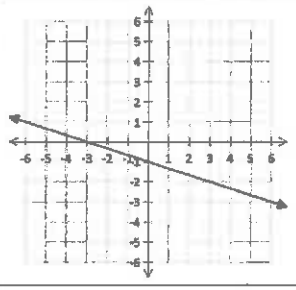
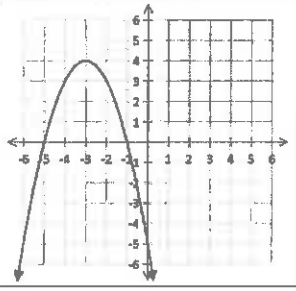
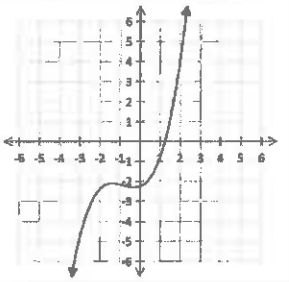
Graph 1	Graph 2	Graph 3
		
Increasing Cubic Function $y = 2x^3 + 5x^2 - 2x - 3$ three x-intercepts End Behaviour: Q3 to Q1	Decreasing Cubic Function $y = -x^3 + x^2 - 5$ one x-intercept End Behaviour: Q2 to Q4	Decreasing Cubic Function $y = -x^3 - 2x^2 + 4x + 8$ two x-intercepts End Behaviour: Q2 to Q4

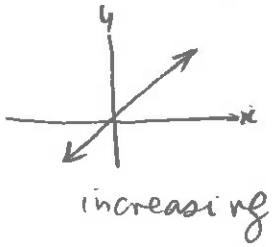
Fill in the table below.

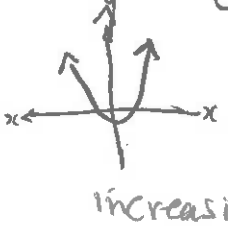
	Graph 1		Graph 2		Graph 3	
	Interval Notation	Set Notation	Interval Notation	Set Notation	Interval Notation	Set Notation
Domain	$(-\infty, \infty)$	$\{x \mid x \in R\}$	$(-\infty, \infty)$	$\{x \mid x \in R\}$	$(-\infty, \infty)$	$\{x \mid x \in R\}$
Range	$(-\infty, \infty)$	$\{y \mid y \in R\}$	$(-\infty, \infty)$	$\{y \mid y \in R\}$	$(-\infty, \infty)$	$\{y \mid y \in R\}$

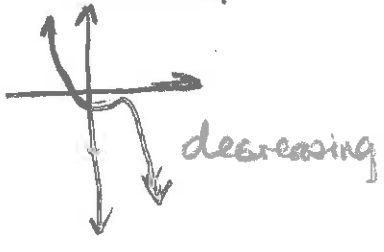
Example 1

Complete the following table:

	Linear	Quadratic	Cubic
Sample Graphs			
Degree	1	2	3
Number of turning points	none	one	two
Value of y –intercept	-1	-5	app. 2.3
Value of x –intercept(s)	-3	-5 and -1	app. 1.2
Maximum/ Minimum Value	none	max. $=4$ minimum $-\infty$	none
End Behaviour	Q II to Q IV	Q III to Q IV	Q III to Q I
Domain	$\{x \mid x \in R\}$	$\{x \mid x \in R\}$	$\{x \mid x \in R\}$
Range	$\{y \mid y \in R\}$	$\{y \mid y \leq 4, y \in R\}$	$\{y \mid y \in R\}$
Increasing/ Decreasing	decreasing	decreasing	increasing

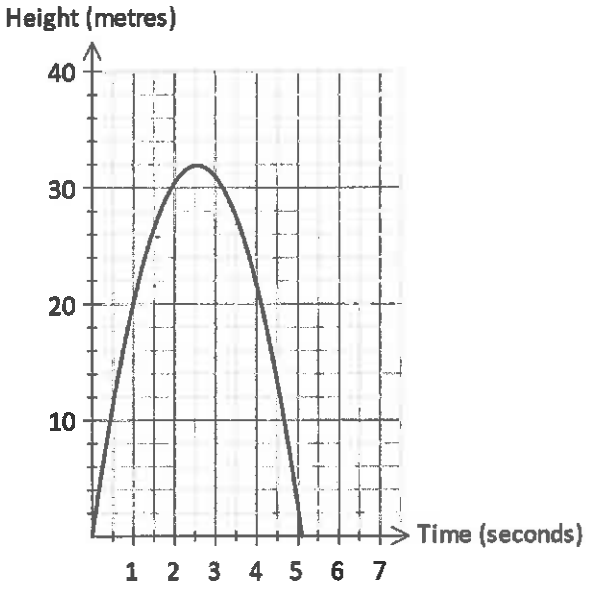






Example 2

The following graph shoes the relationship between the height of a ball, in metres, after being thrown in the air and time, in seconds.



a) What type of polynomial function is represented by the graph?

Quadratic

b) Use the graph to determine how long it takes the ball to reach a height of 20 metres for the first time.

1 second 'point

c) What is the maximum height of the ball?

32 metres

d) Approximately how long is the ball in the air?

app. 5.1 seconds

e) Estimate how high the ball is after 1.5 seconds.

app. 26 metres

f) How long is the ball above a height of 20 metres?

4.1 - 1 3.1 seconds

g) State the domain and range for the context of this problem.

Domain: $\{x / 0 \leq x \leq 5.1 / x \in R\}$

Range: $\{y / 0 \leq y \leq 32, y \in R\}$