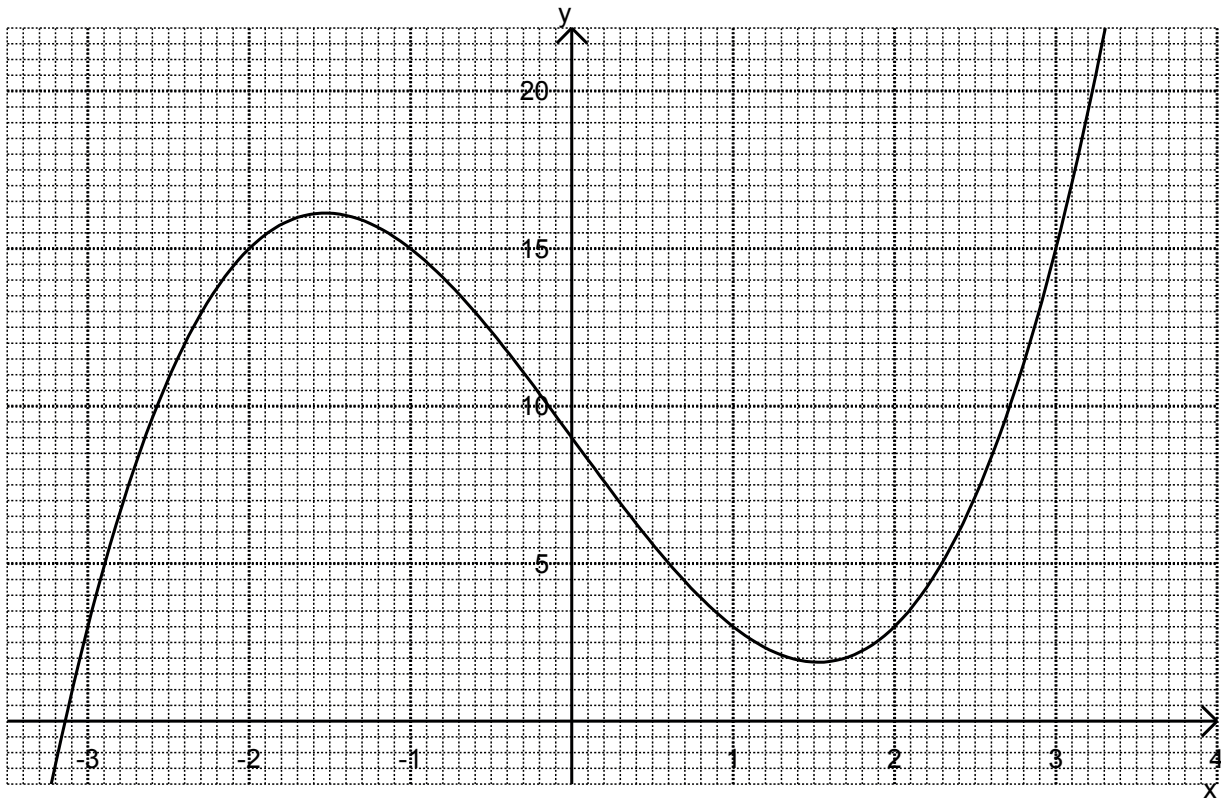


## Solving equations using graphs

Part of the graph of  $y = x^3 - 7x + 9$  is shown below.



- (a) The graph of  $y = x^3 - 7x + 9$  and the line with equation  $y = k$ , where  $k$  is an integer, have 3 points of intersection. Find the greatest and least possible values of the integer  $k$ .
- (b) By drawing a suitable straight line on the grid, find estimates of the solutions of the equation  $x^3 - 7x + 9 = 12$ . Give your answers correct to 1 decimal place.
- (c) State the number of solutions of each of the following equations:  
 (i)  $x^3 - 7x + 9 = 8$       (ii)  $x^3 - 7x + 9 = 20$       (iii)  $x^3 - 7x + 9 = 1$
- (d) By drawing a suitable straight line on the grid, find estimates of the solutions of each of the following equations. Give your answers correct to 1 decimal place.  
 (i)  $x^3 - 7x + 4 = 0$       (ii)  $x^3 - 9x + 1 = 0$       (iii)  $x^3 - 6x - 2 = 0$
- (e) Find the equation of the straight line you would need to draw on the graph above in order to solve each of the following equations (don't actually draw the line):  
 (i)  $x^3 - 4x + 2 = 0$       (ii)  $x^3 - 10x + 13 = 0$       (iii)  $x^3 - 5x - 3 = 0$   
 (iv)  $x^3 - 11x = 0$       (v)  $2x^3 - 12x + 8 = 0$       (vi)  $2x^3 + 4x + 7 = 0$