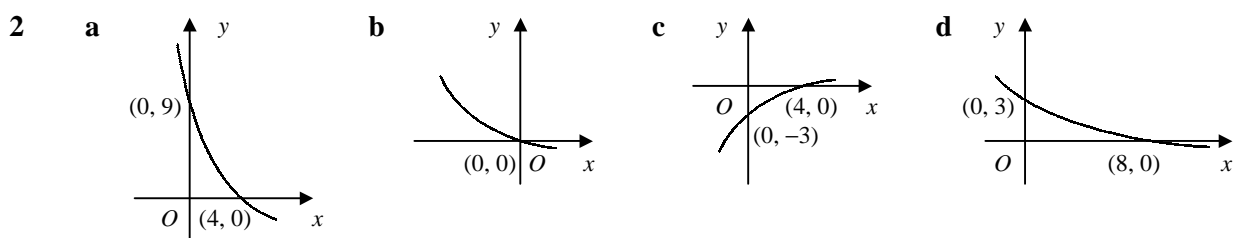
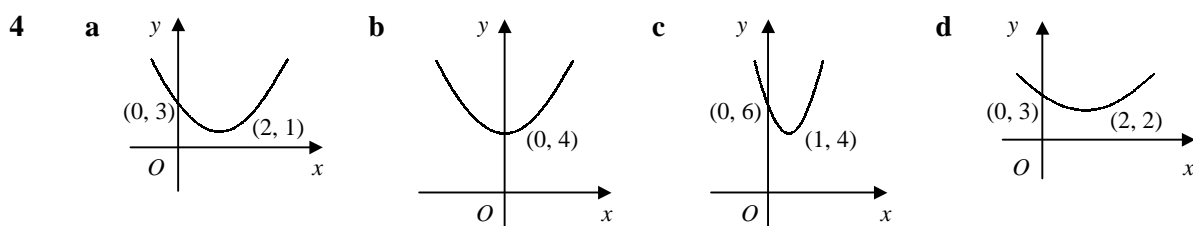


- 1 a translated 1 unit in positive  $x$ -direction  
 b translated 3 units in negative  $y$ -direction  
 c stretched by a factor of 2 in  $y$ -direction  
 d stretched by a factor of  $\frac{1}{4}$  in  $x$ -direction  
 e reflected in the  $x$ -axis  
 f stretched by a factor of  $\frac{1}{5}$  in  $y$ -direction  
 g reflected in the  $y$ -axis  
 h stretched by a factor of  $\frac{3}{2}$  in  $x$ -direction



- 3 a  $y = 2x + 5 + 1 \Rightarrow y = 2x + 6$   
 b  $y = 3(1 - 4x) \Rightarrow y = 3 - 12x$   
 c  $y = 3(x + 4) + 1 \Rightarrow y = 3x + 13$   
 d  $y = -(4x - 7) \Rightarrow y = 7 - 4x$

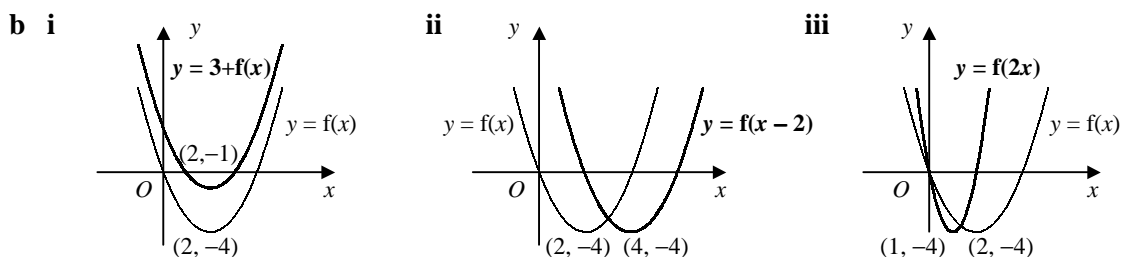


- 5 a stretch by a factor of 4 in  $y$ -direction  
 b translation by 2 units in positive  $x$ -direction  
 c reflection in the  $x$ -axis  
 d translation by 5 units in positive  $y$ -direction

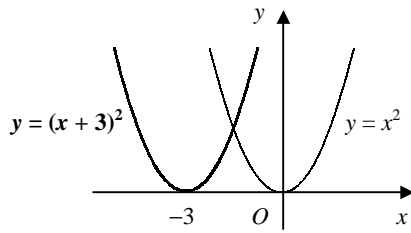
- 6 a  $y = 2(x^2 + 2)$   
 stretch by a factor of 2 in  $y$ -direction  
 b  $y = (x^2 + 2) - 7$   
 translation by 7 units in negative  $y$ -direction  
 c  $y = (\frac{1}{3}x)^2 + 2$   
 stretch by a factor of 3 in  $x$ -direction  
 d  $y = (x + 2)^2 + 2$   
 translation by 2 units in negative  $x$ -direction

- 7 a  $y = (x - 1)^2 + 2(x - 1) \Rightarrow y = x^2 - 1$   
 b  $y = (3x)^2 - 4(3x) + 5 \Rightarrow y = 9x^2 - 12x + 5$   
 c  $y = (-x)^2 + (-x) - 6 \Rightarrow y = x^2 - x - 6$   
 d  $y = 2(\frac{1}{2}x)^2 - 3(\frac{1}{2}x) \Rightarrow y = \frac{1}{2}x^2 - \frac{3}{2}x$

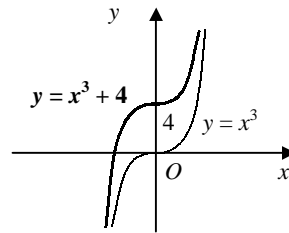
- 8 a  $f(x) = (x - 2)^2 - 4 \therefore$  turning point  $(2, -4)$



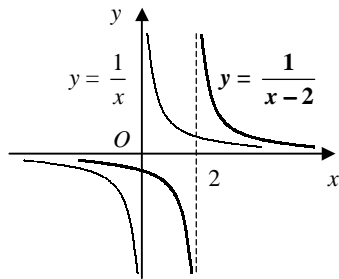
9 a



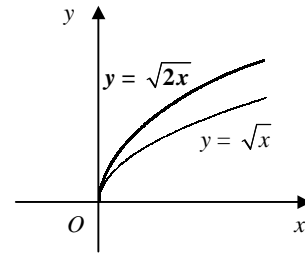
b



c

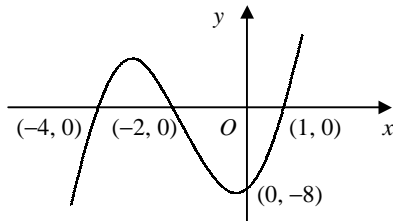


d

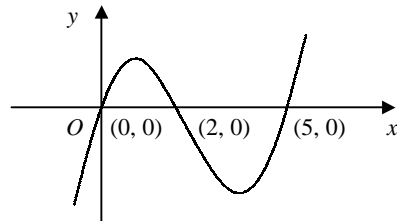


- 10 a let  $f(x) = \frac{1}{x} \therefore \frac{1}{3x} = \frac{1}{3}f(x)$  or  $f(3x)$   
 $\therefore$  stretch by a factor of  $\frac{1}{3}$  in  $y$ -direction  
 or stretch by a factor of  $\frac{1}{3}$  in  $x$ -direction
- b let  $g(x) = x^2 \therefore 4x^2 = 4g(x)$  or  $g(2x)$   
 $\therefore$  stretch by a factor of 4 in  $y$ -direction  
 or stretch by a factor of  $\frac{1}{2}$  in  $x$ -direction

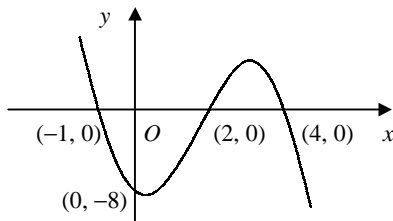
11 a



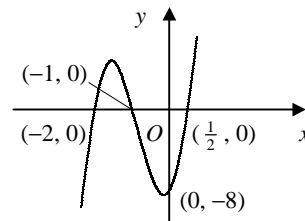
b



c

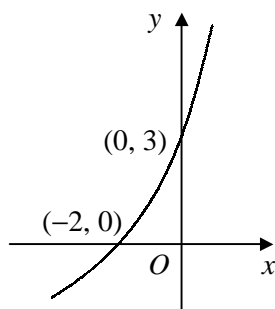


d



- 12 a  $(a, 3b)$                       b  $(a, b + 4)$                       c  $(a - 1, b)$                       d  $(3a, b)$

13 a



b

