



Name: \_\_\_\_\_



Find the rate of change:

a)  $v = 3t^2 + 4t$  when  $t = 2$

e)  $v = 10x - x^2$  when  $x = 2$

b)  $S = 8t - 1$  when  $t = 8$

f)  $a = 64t^{-1} - 8t$  when  $t = 4$

c)  $z = 6a^3 - 4a$  when  $a = 3$

g)  $A = 3\pi r^2$  when  $r = 2$  (in terms of  $\pi$ )

d)  $A = r^3 - 2r - 4$  when  $r = 5$

h)  $s = \frac{2}{3}t^3 + 27t^{-1} + 2t$  when  $t = 3$

Find the values of  $x$  for which  $y$  is:

a) Decreasing:  $y = \frac{1}{3}x^3 + x^2 - 15x$

d) Decreasing:  $y = x^3 - \frac{7}{2}x^2 + 2x + 1$

b) Increasing:  $y = 2x^3 + 12x^2 - 72x - 5$

e) Increasing:  $y = 4x^3 - \frac{9}{2}x^2 + 24$

c) Increasing:  $y = x^3 - \frac{21}{2}x^2 + 30x + 4$

f) Decreasing:  $y = 2x^3 + \frac{3}{2}x^2 - 5$

## Exam question:

C is the curve with equation  $y = 2x^3 - 4x^2 - 14$ Work out the range of values for  $x$  for which C has a negative gradient.