

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



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Find the rate of change:

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

**16**

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

**6**

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

**8**

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

**-12**

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

**158**

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

 **$12\pi$** 

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

**73**

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

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

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

 **$-5 < x < 3$** 

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

 **$\frac{1}{3} < x < 2$** 

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

 **$x < -6$  or  $x > 2$** 

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

 **$x < 0$  or  $x > \frac{3}{4}$** 

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

 **$x < 2$  or  $x > 5$** 

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

 **$-\frac{1}{2} < x < 0$** **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. **$0 < x < \frac{4}{3}$** 