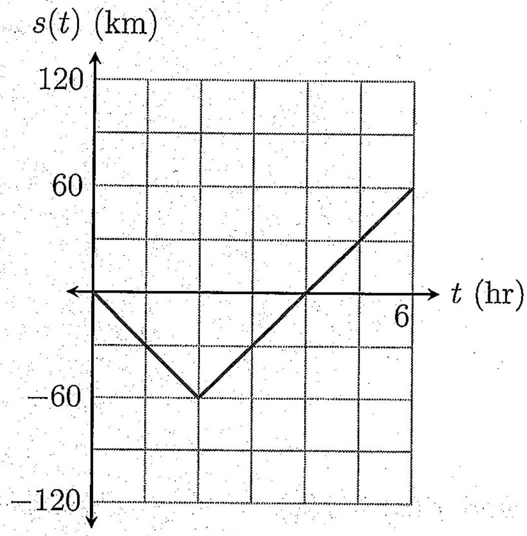
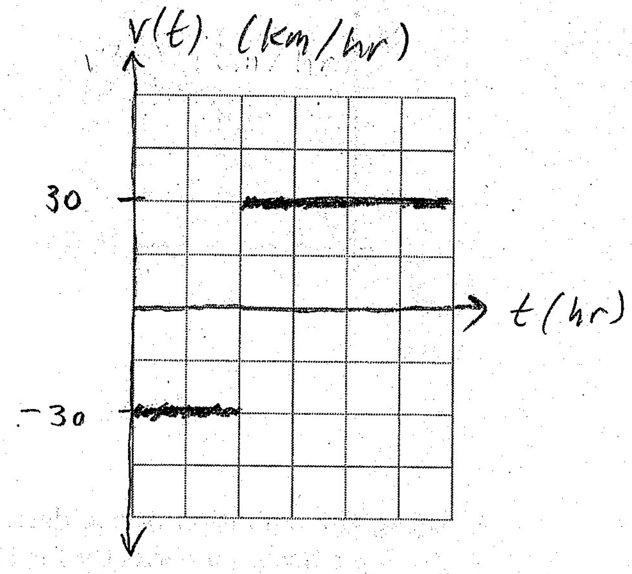
+6

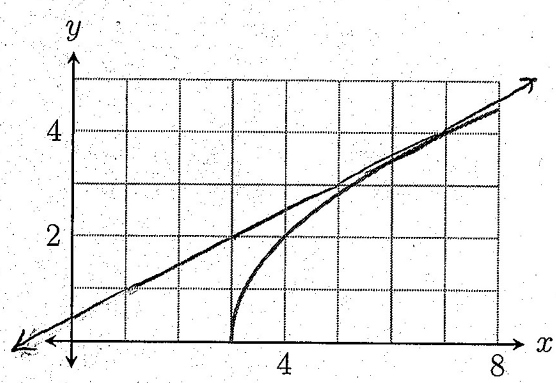
1. You are given a displacement graph below. Draw the corresponding velocity graph on the blank grid. Label axes carefully!





+6

2. Consider the function $f(x) = 2\sqrt{x-3}$, with derivative $f'(x) = \dfrac{1}{\sqrt{x-3}}$. Find the equation of the tangent line at $x = 7$. The graph is for reference only, you must use calculus to find the equation of the line. Sketch your line to check your work.



Point: $f(7) = 2\sqrt{7-3} = 4$ 12

$(7,4)$ +2

Slope: $f'(7) = \dfrac{1}{\sqrt{7-3}} = \dfrac{1}{2}$ +2

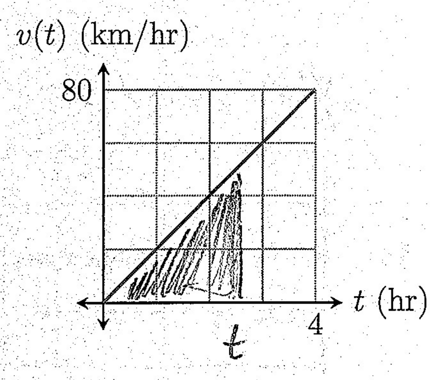
$y - 4 = \frac{1}{2}(x-7)$

$y - \frac{8}{2} = \frac{1}{2}x - \frac{7}{2}$

$y = \frac{1}{2}x + \frac{1}{2}$ +2

3. Below is a graph of a velocity curve. Find an equation for the displacement curve.

+5



$v(t) = \frac{80}{4} t = 20t$ (+2)

$s(t) = \frac{1}{2} bh$

$= \frac{1}{2} t \cdot 20t$

$= 10t^2$ (+3)

4. Using the definition of the derivative, find $f'(x)$ if $f(x) = -4x - x^2$. Make sure you use limit notation correctly for the last steps.

+10

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$= \lim_{h \to 0} \frac{-4(x+h) - (x+h)^2 - (-4x - x^2)}{h}$$ (+6)

$$= \lim_{h \to 0} \frac{-\cancel{4x} - 4h - (x^2 + 2xh + h^2) + \cancel{4x} + x^2}{h}$$

$$= \lim_{h \to 0} \frac{-4h - \cancel{x^2} - 2xh - h^2 + \cancel{x^2}}{h}$$

$$= \lim_{h \to 0} \frac{h(-4 - 2x - h)}{h}$$

$$= \lim_{h \to 0} (-4 - 2x - h)$$

$$= -4 - 2x$$