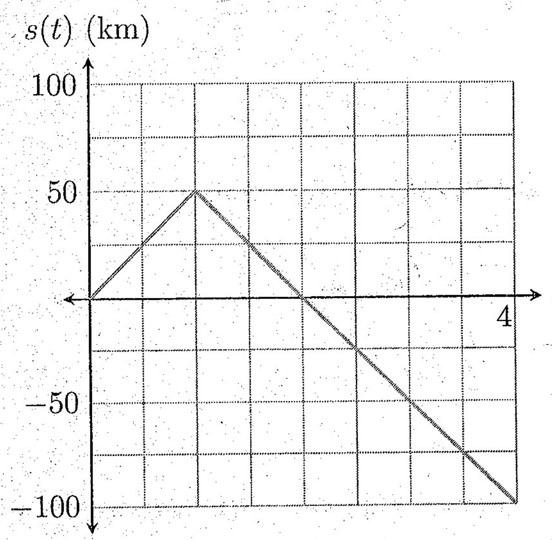
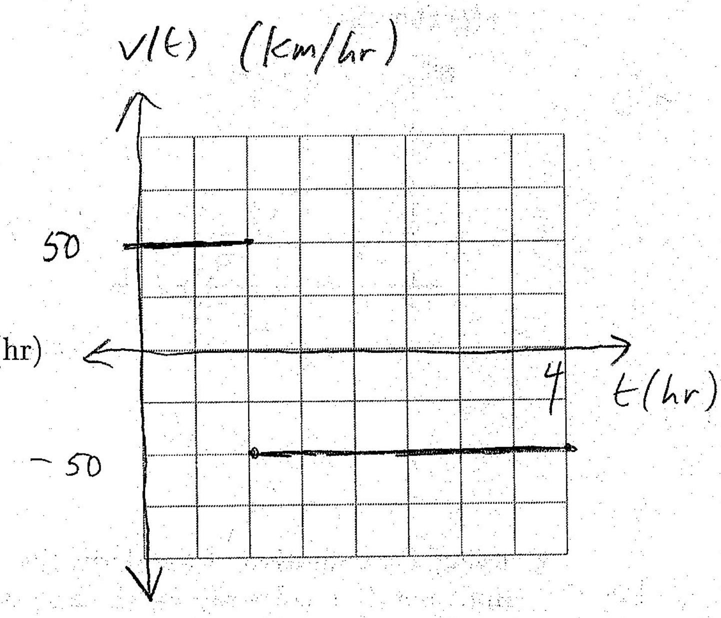
+8

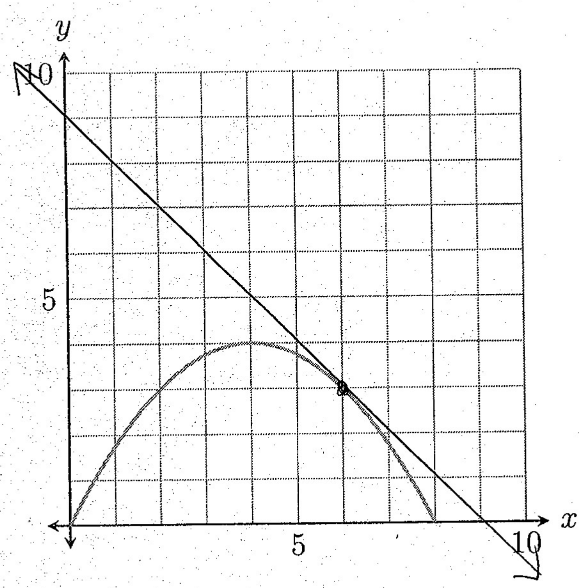
1. You are given a displacement graph below. Draw the corresponding velocity graph on the blank grid. Label axes carefully!





+8

2. Consider the function $f(x) = 2x - \frac{1}{4}x^2$, with derivative $f'(x) = 2 - \frac{1}{2}x$. Find the equation of the tangent line at $x = 6$. The graph is for reference only, you must use calculus to find the equation of the line. Sketch your line to check your work.



$m = f'(6)$

$= 2 - \frac{1}{2}(6) = -1.$

point: $f(6) = 2 \cdot 6 - \frac{1}{4} \cdot 6^2$

$= 12 - 9$

$= 3$

$(6, 3)$

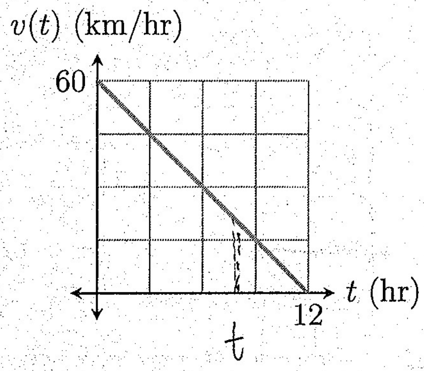
$y = -x + b$

$3 = -6 + b \rightarrow y = -x + 9$

$b = 9$

+8

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



$M = \frac{-60}{12} = -5$

$v(t) = 60 - 5t$

Trapezoid formula:

$s(t) = \frac{1}{2}h(b_1 + b_2) = \frac{1}{2} \cdot t(60 + 60 - 5t)$

$= \frac{1}{2}t(120 - 5t) = 60t - \frac{5}{2}t^2$

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

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

$\frac{f(x+h) - f(x)}{h} = \frac{x + h - 2(x+h)^2 - (x - 2x^2)}{h}$

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

$= \frac{h - 4xh - 2h^2}{h} = \frac{h(1 - 4x - 2h)}{h}$

$= 1 - 4x - 2h$

$\lim_{h \to 0} (1 - 4x - 2h) = 1 - 4x$