Suppose that $s(t)$ is the output of a function s that describes the distance traveled by a moving object at time t.

Find an expression for the average speed of the object over the time interval $[a,b]$ where $b > a$.

① $s(a)$ = distance object has traveled at time $t = a$

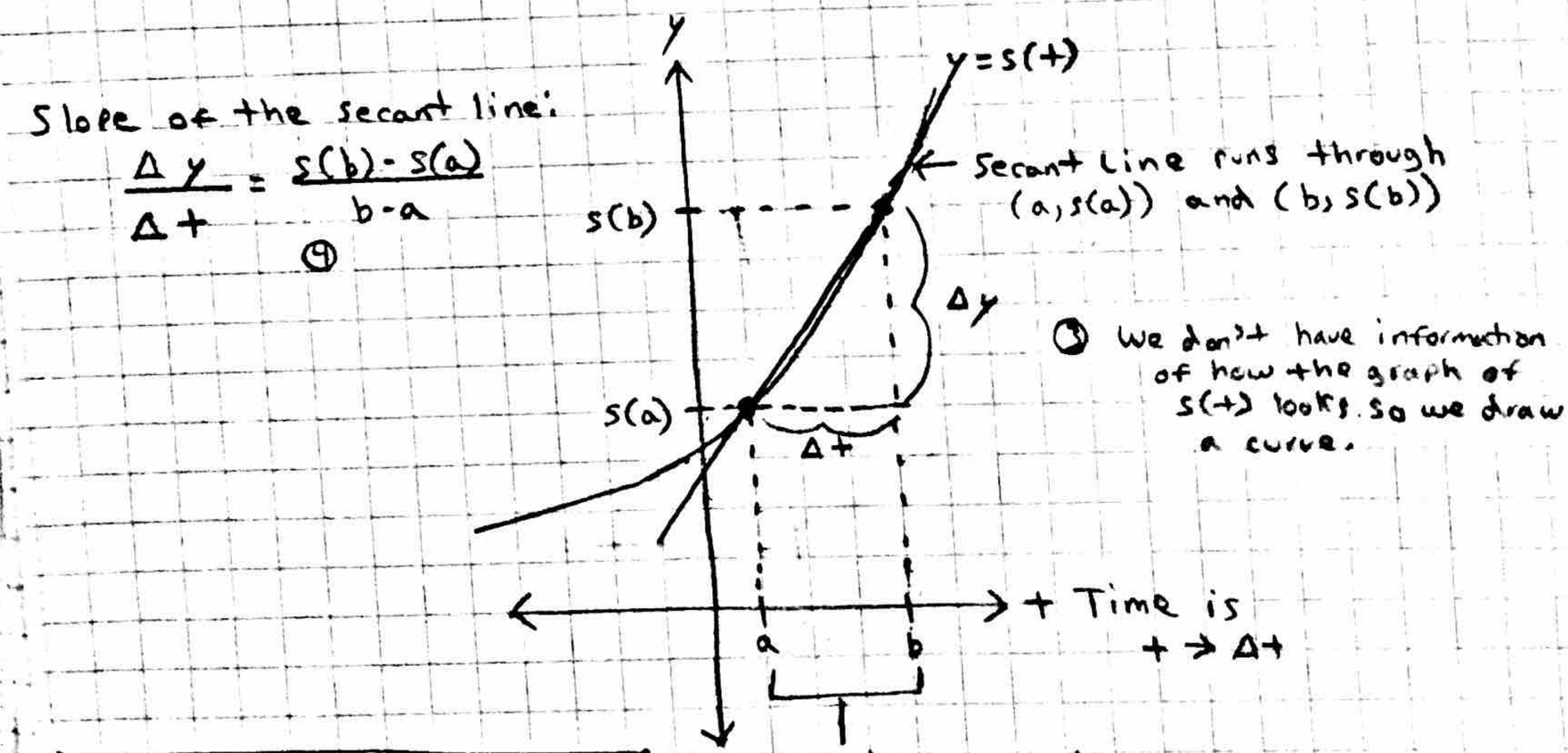
$s(b)$ = distance object has traveled at time $t = b$

② Average Speed

$$\frac{\text{Distance}}{\text{Time}} = \frac{s(b) - s(a)}{b - a}$$

← Distance
← Time

Distance is $y \to \Delta y$



Slope of the secant line:

$$\frac{\Delta y}{\Delta t} = \frac{s(b) - s(a)}{b - a}$$

⑨

Secant Line runs through $(a, s(a))$ and $(b, s(b))$

③ We don't have information of how the graph of $s(t)$ looks. So we draw a curve.

The average speed of the object over the time interval $[a,b]$ is the slope of that secant line.

Lifesaver

Suppose that $s(t)$ is the output of a function s that describes the distance traveled by a moving object at time t.
Find an expression for the average speed of the object over the time interval $[a, a+h]$ where $h > 0$.

① Define $s(a)$ and $s(a+h)$

$s(a)$ = distance object has traveled at time $t = a$

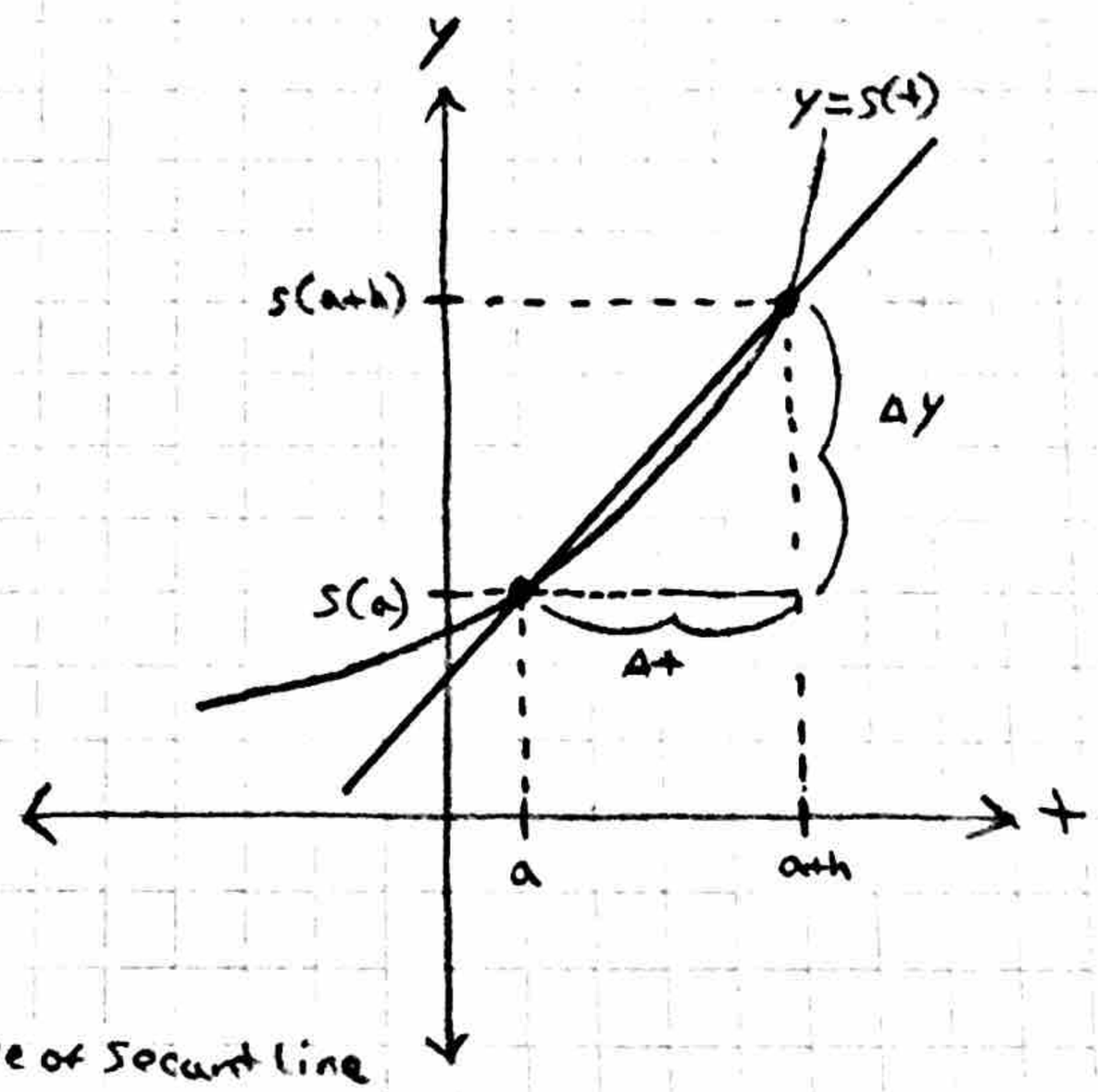
$s(a+h)$ = distance object has traveled at time $t = a+h$

② Get Average Speed

$$\frac{\text{Distance}}{\text{Time}} = \frac{s(a+h) - s(a)}{(a+h) - a} = \frac{s(a+h) - s(a)}{h}$$

$\text{Time} = h = (a+h) - a$

③ Graph → We don't have information of how the graph of $s(t)$ looks, so we draw a curve.



④ Get Slope of Secant line

Slope of Secant line:

$$\frac{\Delta y}{\Delta t} = \frac{s(a+h) - s(a)}{h}$$

The average speed of the object over the time interval $[a, a+h]$ is the slope of that secant line.