

+2 Rhino Bonus due  $\pi$  Day at the start of class. Watch [this video](#) about the coffee makers and then answer these questions.

(5/12) 1. Give rough estimates of the following. Provide a measurement of unit in the blank. **Show your calculations for credit.**

$$\frac{dV}{dt} \approx \boxed{\phantom{000}} \text{ _____}$$

(to 1 decimal place)

For tall cup on the left from  $0 \leq t \leq 10$ ,  $\frac{dh}{dt} \approx \boxed{\phantom{000}} \text{ _____}$

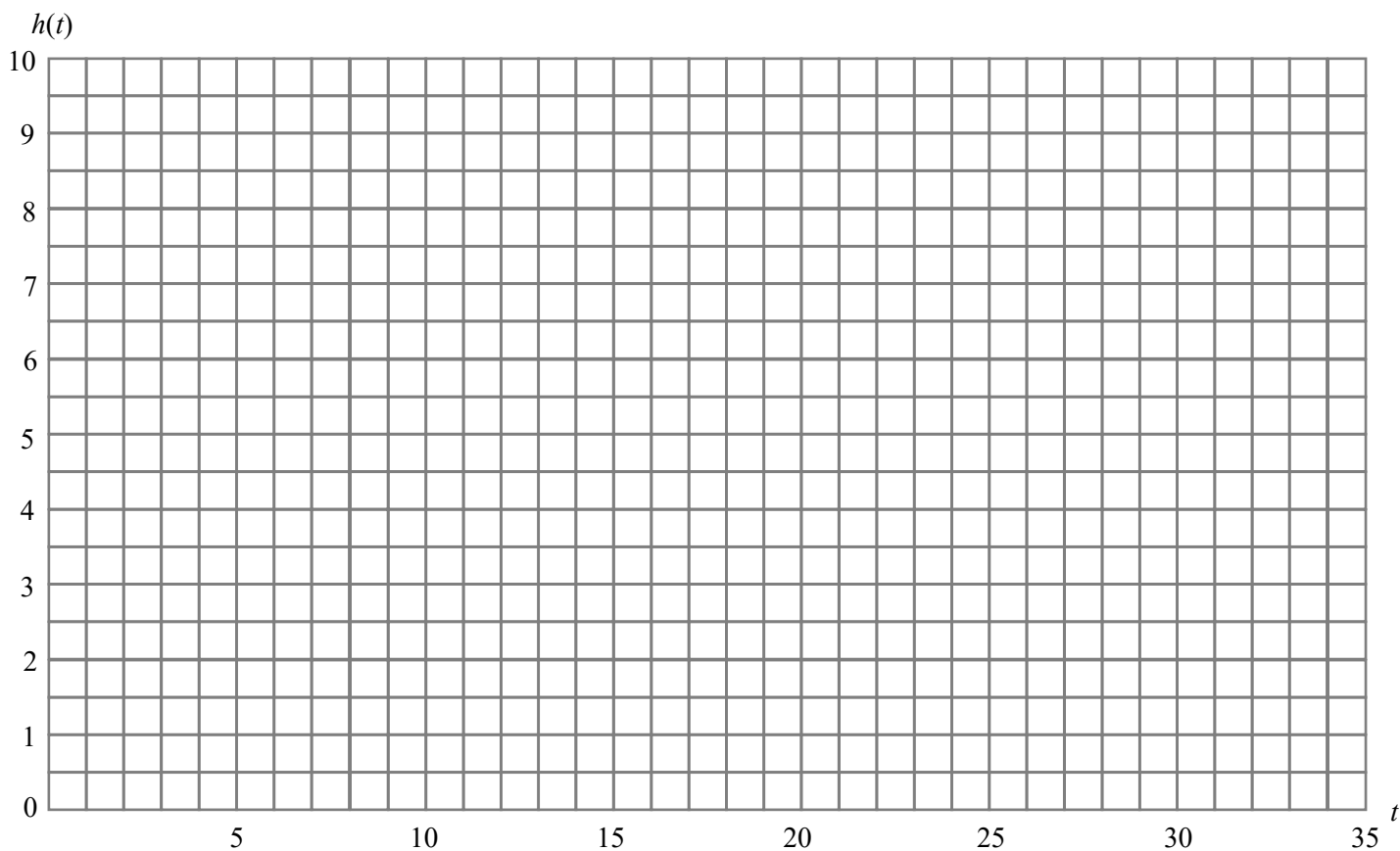
(to 2 decimal places)

For the short classic coffee cup on the right from  $0 \leq t \leq 35$ ,  $\frac{dh}{dt} \approx \boxed{\phantom{000}} \text{ _____}$

(to 2 decimal places)

Use back if necessary.

(1/4) 2. On the same set of axes, sketch rough graphs of the height of coffee in the tall cup on the left for  $0 \leq t \leq 18$  and the height of coffee in the short classic coffee cup on the right for  $0 \leq t \leq 35$ , where  $h$  is in cm and  $t$  is in seconds.



(1/3) 3. The function  $h(t)$  is **concave down** for values of  $t$  where  $\frac{dh}{dt}$  decreases. In this case,  $h$  increases more and more slowly.

The function  $h(t)$  is **concave up** for values of  $t$  where  $\frac{dh}{dt}$  increases. In this case,  $h$  increases faster and faster.

The function  $h(t)$  is has **no concavity** for values of  $t$  where  $\frac{dh}{dt}$  is constant.

For the tall cup on the left from  $0 \leq t \leq 18$ , report the values of  $t$  for which

$h(t)$  is concave down: \_\_\_\_\_

$h(t)$  is concave up: \_\_\_\_\_

$h(t)$  has no concavity: \_\_\_\_\_