

Question #61936, Physics / Mechanics | Relativity

Water from a leaking tap begins to fall into an empty tank 0.5m wide by 2m long and 4m high. If the drops weigh 0.05g, after how many seconds will pressure be at the bottom of the tank be 200Pa?

Solution

The water pressure is determined:

$$p = \frac{mgn}{A} = \frac{mgn}{ab};$$

$$n = \frac{abp}{mg} \tag{1}$$

The number of drops:

$$n = ft \tag{2}$$

where f – is the frequency of drops. Since f is not given, assuming it to be 1 drop per second.

Solving (2) for t and substituting n value from (1):

$$t = \frac{n}{f} = \frac{abp}{mg};$$

$$t = \frac{0.5 \times 2 \times 200}{0.05 \times 10^{-3} \times 9.8 \times 1} = 408,163 \text{ s}$$

Answer: after 408,163 s.