

**Answer on Question #48444 – Math –Algebra**

A pump can fill a milk tank in 2 hours. Because of leakage problem, it took 20 minutes more to fill the tank. The plant supervisor wants to find that how much time would the leak take to empty a full tank.

**Solution:**

$v$  – speed of filling;

$u$  – speed of draining;

$V$  – volume of the tank;

$t_1 = 2$  hours – time to fill tank in normal situation;

$t_2 = \frac{1}{3}h + 2h = \frac{7}{3}$  hour – time to fill tank in leakage situation;

$t_3$  – time to empty the full tank;

Time to fill tank in normal situation:

$$t_1 = \frac{V}{v}$$
$$\frac{1}{t_1} = \frac{v}{V} \quad (1)$$

Time to fill tank in leakage situation:

$$t_2 = \frac{V}{v-u}$$
$$\frac{1}{t_2} = \frac{v-u}{V}$$
$$\frac{1}{t_2} = \frac{v}{V} - \frac{u}{V} \quad (2)$$

Time to empty full tank:

$$t_3 = \frac{V}{u}$$
$$\frac{1}{t_3} = \frac{u}{V} \quad (3)$$

Plug (3) and (1) in (2):

$$\frac{1}{t_2} = \frac{1}{t_1} - \frac{1}{t_3}$$
$$\frac{1}{\frac{7}{3}} = \frac{1}{2} - \frac{1}{t_3}$$
$$\frac{1}{t_3} = \frac{1}{2} - \frac{3}{7}$$
$$\frac{1}{t_3} = \frac{7-6}{14}$$
$$t_3 = \frac{t_1 t_2}{t_2 - t_1} = \frac{2h \cdot \frac{7}{3}h}{\frac{7}{3}h - 2h} = 14 \text{ hours}$$

**Answer:** 14 hours