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MATH

DOUBT SESSION PART-2

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1. A boat covers a certain distance downstream in 3 hour and it covers the same distance upstream in 5 hours . If the speed of the boat ~~in~~ is 8 km/hr in still water. Find the speed of the stream .

Sol) Given

Let the distance be D km

Downstream

$T = 3\,hr$

Distance = D km

$S_D = \frac{D}{3}$ km/hr

Upstream

Distance = D km

Time = 5 hr

$S_U = \frac{D}{5}$ km/hr

$S_B = 8$ km/hr

$\frac{S_D + S_U}{2} = 8$

Downstream

$S_D = S_B + S_S \rightarrow (1)$

Upstream

$S_U = S_B - S_S \rightarrow (2)$

$S_B = \frac{S_D + S_U}{2}$

$S_S = \frac{S_D - S_U}{2}$

$$S_D + S_U = 16$$

$$\frac{D}{3} + \frac{D}{5} = 16$$

$$\frac{5D + 3D}{15} = 16$$

$$8D = 16 \times 15$$

$$D = \frac{\overset{2}{\cancel{16}} \times 15}{\cancel{8}}$$

$$\underline{\underline{D = 30 \text{ km}}}$$

$$\therefore S_D = \frac{D}{3} = \frac{30}{3} = 10 \text{ km/hr}$$

$$\therefore S_U = \frac{D}{5} = \frac{30}{5} = 6 \text{ km/hr}$$

Now

$$S_S = \frac{S_D - S_U}{2}$$

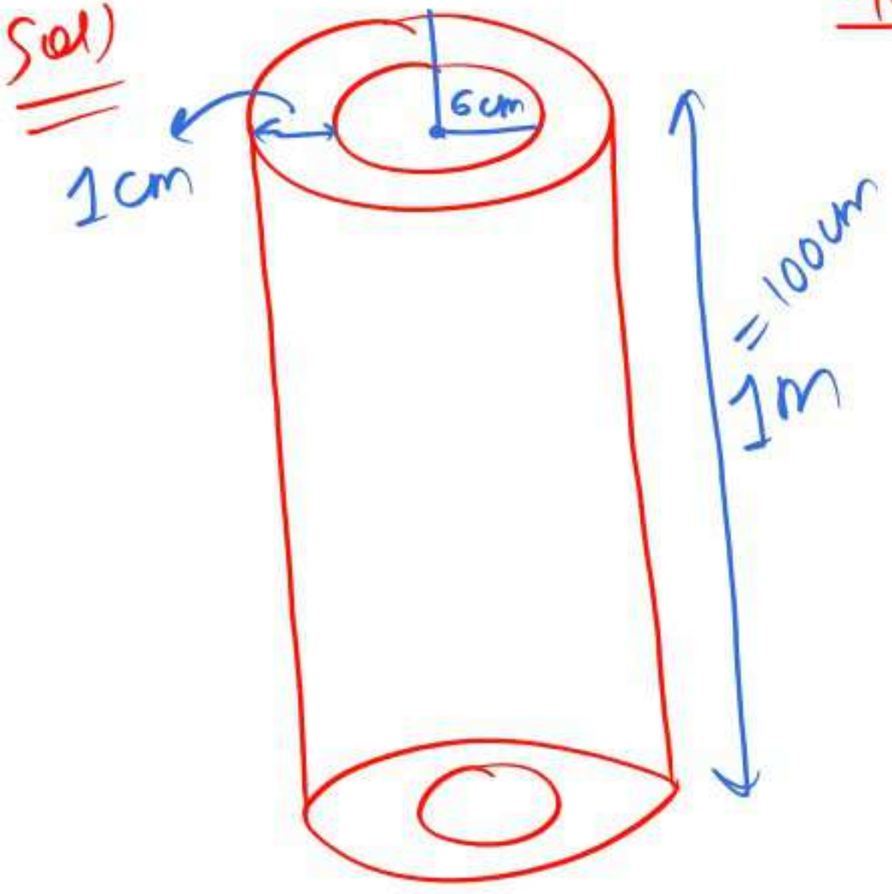
$$S_S = \frac{10 - 6}{2}$$

$$= \frac{4}{2}$$

$$= 2 \text{ km/hr}$$

2. The thickness of a metallic tube is 1 cm and the inner diameter of the tube in 12 cm, find the weight of 1 m long tube, if the density of the metal is $7.8 gm/cm^3$

Sol)



Given

Inner radius (r) = 6 cm

Outer radius (R) = 6+1 = 7 cm

Volume of metal = Outer Volume − Inner Volume

$$= \pi R^2 h - \pi r^2 h$$

$$= \pi h [R^2 - r^2]$$

$$= \pi h (R-r)(R+r)$$

$$= \frac{22}{7} \times 100 (7-6)(7+6)$$

$$= \frac{22}{7} \times 100 \times 1 \times 13 \ cm^3$$

By using unitary method

$$1 \ cm^3 = 7.8 g$$

$$\frac{22}{7} \times 100 \times 13 \ cm^3 = More$$

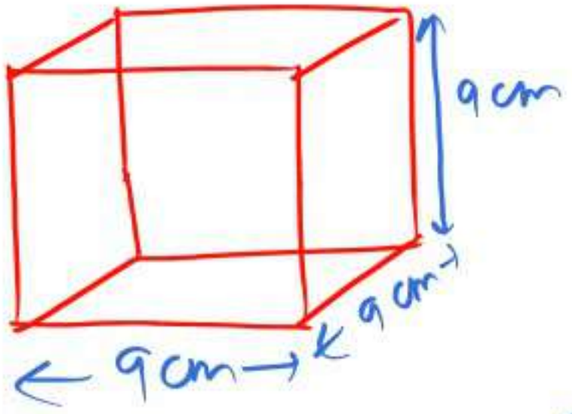
$$\boxed{\frac{More}{less} \times Individual\ value}$$

$$\frac{22}{7} \times 100 \times 13 \times 7.8 \ gm$$

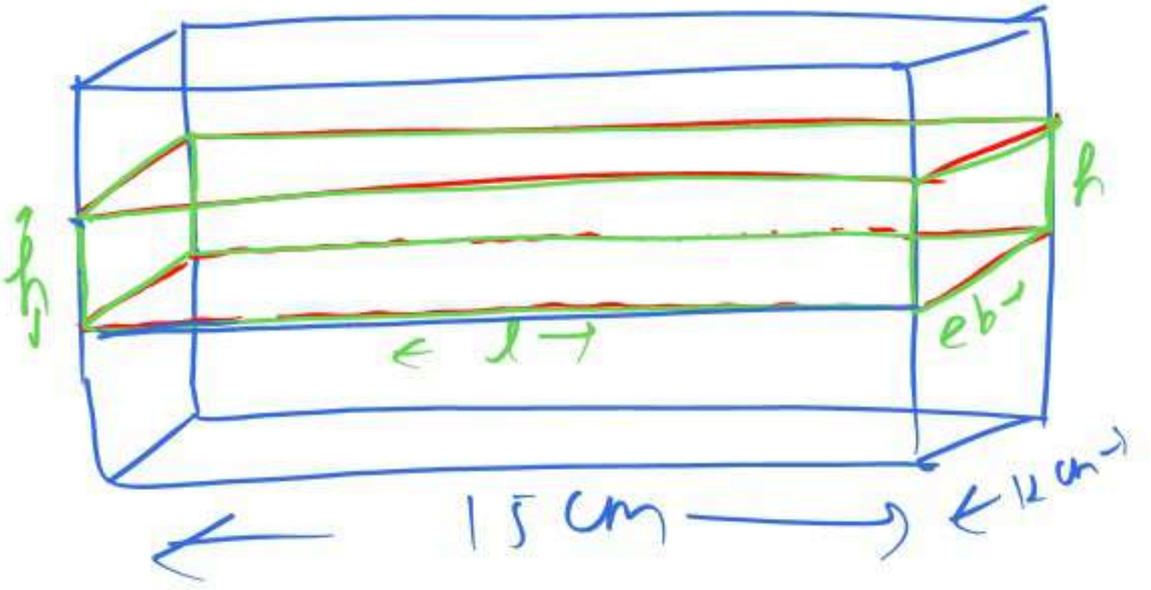
$$\frac{22 \times 10 \times 13 \times 78}{7} = \frac{223080}{7} gm$$

3. A cube with edge of 9 cm is immersed completely in a rectangular vessel containing water. If the dimensions of the base of the rectangular vessel are 15 cm and 12 cm . Find the rise in the water level of the vessel.

Sol)



Volume of cube $= a^3 = 729\,cm^3$



The volume of a cube of cube

= Volume of a cuboid formed due to rise in level

$$9 \times 9 \times 9 = l \times b \times \underline{\underline{h}}$$

$$9 \times 9 \times 9 = 15 \times 12 \times h$$

$$h = \frac{\overset{3}{\cancel{9}} \times \overset{3}{\cancel{9}} \times 9}{\underset{5}{\cancel{15}} \times \underset{4}{\cancel{12}}} = \frac{81 \times 5}{20 \times 5} = \frac{405}{100} \Rightarrow \underline{\underline{4.05 \text{ cm}}}$$

4. Kelly borrowed from Richie a certain sum of money for 2 years at simple interest. Kelly lent this sum to Rexy at the same rate for 2 years at compound interest. At the end of 2 years Kelly received Rs. 110 as compound interest but paid Rs. 100 as simple interest .Find the sum of money and the rate of interest.

Sol)

Riche $\xrightarrow{\text{Rate}=r\%}$ Kelly $\longrightarrow$ Rexy

Riche → SI = 100₹

Riche → Kelly: Rate = r%, T = 2 years, SI

Kelly → Rexy: Rate = r%, T = 2 years, CI

Kelly → CI = 110₹

1st Case Richie & Kelly

Principal = P

T = 2 years

Rate = r%

$$SI = \frac{P \times R \times T}{100}$$

$$100 = \frac{P \times R \times 2}{100}$$

50

$$\boxed{PR = 5000} \rightarrow (1)$$

Kelly & Rexy (CI)

Principal = P

Rate = r %

T = 2 years

$$A = P\left(1 + \frac{R}{100}\right)^n$$

$$A = P\left(1 + \frac{r}{100}\right)^2$$

$$A = P\left(\frac{100 + r}{100}\right)^2$$

$$A = \frac{P(100^2 + r^2 + 200r)}{100^2}$$

$$CI = A - P$$

$$110 = \frac{P(100^2 + r^2 + 200r)}{100^2} - P$$

$$110 = \frac{\cancel{100^2 P} + Prr + 200Pr - \cancel{100^2 P}}{100^2}$$

put value of PR = 5000

$$110 = \frac{Pr(r + 200)}{100^2}$$

$$110 \times 100^2 = 5000(r + 200)$$

$$\frac{110 \times \cancel{100}^{2} \times \cancel{100}}{\cancel{5000}} = r + 200$$

$$220 = r + 200$$

$$r = 20\%$$

Now

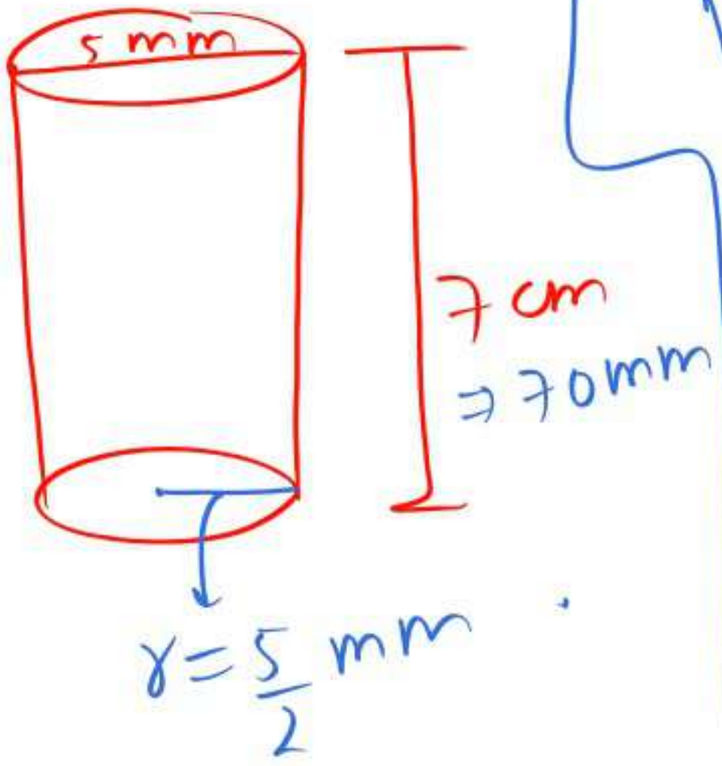
$$Pr = 5000$$

$$P = \frac{5000}{20}$$

$$\boxed{P = 250₹}$$

5.The barrel of a fountain pen cylindrical in shape is 7 cm long and 5 mm in diameter. A full barrel of ink in the pen is used up to write 330 words on an average. How many words would use up a bottle of ink containing one fifth of a liter ?

Sol



Volume of barrel $= \pi r^2 h$

1cm = 10mm

1 litre = $1000 cm^3$

$= \frac{22}{7} \times \frac{5}{2} \times \frac{5}{2} \times 70 \ mm^3$

By using unitary method

$\frac{22}{7} \times \frac{5}{2} \times \frac{5}{2} \times 10 \ mm^3 \longrightarrow 330$ words

$1/5$ liter $\longrightarrow$

$\frac{22}{7} \times \frac{5}{2} \times \frac{5}{2} \times 70 \ mm^3 =$ 330 words

$\frac{1}{5} \times 1000 \ \underline{cm} \times cm \times cm$

$\frac{1}{5} \times 1000 \times 10 \times 10 \times 10 \ mm^3 =$ More

$\frac{1}{5} \times 1000 \times 10mm \times 10mm \times 10mm$

$\boxed{\frac{\text{More}}{\text{less}} \times \text{Individual value}}$

$\frac{1}{\cancel{5}} \times \cancel{1000}^{200} \times \cancel{10}^{2} \times \cancel{10} \times \cancel{10} \times \cancel{7} \times 2 \times 2 \times \cancel{330 words}^{30}$

$\cancel{70} \times \cancel{5} \times \cancel{5} \times \cancel{22}$

$\cancel{10} \qquad \cancel{11}$

$\Rightarrow 200 \times 2 \times 4 \times 30 = 48000$ words

ALL THE BEST

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