

**Free Example**

**of**

**Don't Solve**

**from**



### **Question**

In how much time will a tank be filled by 4 pipes of diameter 1 cm, 2 cms, 3 cms and 6 cms running into it simultaneously? Given that the largest pipe alone fills it in 36 minutes.

- a. 16 minutes
- b. 18 minutes
- c. 36 minutes
- d. 40 minutes
- e. 26 minutes

See Next page for **Usual Method**

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- e. 26 minutes

## **The Usual Method**

The largest pipe i.e. the one with diameter of 6 cms will fill  $\frac{1}{36}$  of the tank in 1 minute. Since the rate of flow of water is proportional to the area of cross section of the pipe or to the square of the diameter and not to the diameter itself, then:

$$\text{Time taken by pipe with 1 cm diameter} = 36 \times \frac{36}{1^2} \text{ minutes}$$

$$\text{Time taken by pipe with 2 cms diameter} = 36 \times \frac{36}{2^2} \text{ minutes}$$

$$\text{Time taken by pipe with 3 cms diameter} = 36 \times \frac{36}{3^2} \text{ minutes}$$

$\therefore$  Amount of tank filled by all pipes running together in one minute

$$= \frac{1}{36} \times \frac{1^2}{36} + \frac{1}{36} \times \frac{2^2}{36} + \frac{1}{36} \times \frac{3^2}{36} + \frac{1}{36} \times \frac{6^2}{36}$$

$$= \frac{1}{36^2} (1^2 + 2^2 + 3^2 + 6^2)$$

$$= \frac{1}{36^2} (50)$$

$$= \frac{50}{1296} \text{ or } \frac{100}{2592}$$

$$= \frac{1}{25.92} \text{ or it will take } 25.92 \approx 26 \text{ minutes to fill the tank.}$$

**(Ans: e)**

*Estimated Time to arrive at the answer = 150 seconds*

See Next page for **Smart Technique**

## **Question**

In how much time will a tank be filled by 4 pipes of diameter 1 cm, 2 cms, 3 cms and 6 cms running into it simultaneously? Given that the largest pipe alone fills it in 36 minutes.

- a. 16 minutes
- b. 18 minutes
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- d. 40 minutes
- e. 26 minutes

## **Using Technique**

If you notice from the options that the option 'd' of 40 minutes is not possible. If one pipe alone takes 36 minutes, then if other pipes are also running along with it, the time taken has to be less than 36 minutes. Using the same logic, even 36 minutes of option 'c' also can't be the answer.

Now, for simplicity sake, just ignore that the rate of flow of water is proportional to the square of diameter but take it as being directly proportional to the diameter itself. Adding up the diameters of the other pipes i.e.  $1 + 2 + 3 = 6$  cms. This 6 cms is equal to the 6 cms diameter of the pipe whose time for filling the tank is given. This means that now there are two pipes each of 6 cms filling the tank simultaneously. Hence, the time taken by the two together will be equal to half of 36 minutes (half of the time taken by one 6 cms pipe to fill the tank) i.e. 18 minutes.

But in reality, the rate is proportional to the square of diameter of pipes. Hence, the answer should not be 18 minutes, but higher than that.

(Since,  $6^2 = 36$  is  $> 1^2 + 2^2 + 3^2 = 14$ ).

From the remaining options, only option 'e' satisfies the condition. Hence, the answer is 26 minutes.

**(Ans: e)**

*Estimated Time to arrive at the answer = 15 seconds*

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