

## Pipes and Cistern

1. Bucket P has thrice the capacity as bucket Q. It takes 80 turns for bucket P to fill the empty drum. How many turns it will take for both the buckets P and Q, having each turn together to fill the empty drum?

- A. 30
- B. 45
- C. 60
- D. 80

### Answer & Explanation

Answer :  
60

### Explanation :

Let capacity of Q =1 liter. Then, capacity of P =3 liter. Given that it takes 80 turns for bucket P to fill the empty drum. => capacity of the drum = $80 \times 3 = 240$  liter. Number of turns required if both P and Q are used having each turn together= $240 \div 3 + 1 = 60$

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2. Two pipes can fill a tank in 4 hours and 12 hours.If two pipes are operate simultaneously, in how much time will the tank be filled?

- A. 3 hrs 10 min
- B. 13 hrs
- C. 3 hrs
- D. None of these

### Answer & Explanation

Answer :  
3 hrs

### Explanation :

$(A+B) = 1/4 + 1/12 = (3+1)/12 = 4/12 = 1/3$  3 hours to filled the tank.

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3. A tap can fill a tank in 6 hrs. After half the tank is filled 3 more similar taps are opened. What is the total time taken to fill the tank completely?

- A. 3 hrs
- B. 3 hrs 30 mins
- C. 3 hrs 45 min
- D. 4 hrs

### Answer & Explanation

Answer :

3 hrs 45 min

Explanation :

Time taken to fill the half time =  $6/2 = 3$  hrs (1/2 part is filled) Remaining time = 1/2 Time taken to fill the remaining part =  $(1/(4*1/6))*(1/2) = (3*1)/(2*2) = 3/4$  hrs = 45 mins Total time 3 hrs + 45 mins = 3 hrs 45 minutes

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4. 10 buckets of water fill a tank when the capacity of each tank is 11.5 liters. How many buckets will be needed to fill the same tank, if the capacity of each bucket is 5 liters?

- A. 21
- B. 32
- C. 23
- D. 22

Answer & Explanation

Answer :

23

Explanation :

Capacity of the tank =  $10 * 11.5 = 115$  capacity of bucket = 5 liters Number of bucket needed =  $115/5 = 23$ .

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5. A booster pump can be used for filling as well as for emptying a tank. The capacity of the tank is 2400 m<sup>3</sup>. The emptying of the tank is 10 m<sup>3</sup> per minute higher than its filling capacity and the pump needs 8 minutes lesser to empty the tank than it needs to fill it. What is the filling capacity of the pump?

- A. 20 m<sup>3</sup> / min.
- B. 40 m<sup>3</sup> / min.
- C. 50 m<sup>3</sup> / min.
- D. 60 m<sup>3</sup> / min.

Answer & Explanation

Answer :

50 m<sup>3</sup> / min.

Explanation :

Let the filling capacity of the pump =  $x$  m<sup>3</sup>/min. Then the emptying capacity of the pump =  $(x+10)$  m<sup>3</sup>/min. Time required for filling the tank =  $2400/x$  minutes. Time required for emptying the tank =  $2400/(x+10)$  minutes. Pump needs 8 minutes lesser to empty the tank than it needs to fill it.

$\Rightarrow 2400/x - 2400/(x+10) = 8 \Rightarrow 300x - 300x + 10 = 1 \Rightarrow 300(x+10) - 300x = x(x+10) \Rightarrow 3000 = x^2 + 10x \Rightarrow x^2 + 10x - 3000 = 0 \Rightarrow (x+60)(x-50) = 0 \Rightarrow x = 50$  or  $-60$  Since  $x$  can not be negative,  $x = 50$  i.e., filling capacity of the pump = 50 m<sup>3</sup>/min.

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6. A tank is filled in 5 hours by three pipes A,B and C. The pipe C is twice as fast as B and B is twice as fast as A. How much time will pipe A alone take to fill the tank ?

- A. 20 hrs
- B. 25 hrs
- C. 35 hrs
- D. None of these

**Answer & Explanation**

**Answer :**

35 hrs

**Explanation :**

Suppose pipe A alone takes x hrs to fill the tank then Pipes B and C will take  $x/2$  and  $x/4$  hrs respectively to fill the tank  $1/x + 2/x + 4/x = 1/5 = 7/x = 1/5 = 35$  hrs

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7. Two pipes A and B can fill a tank in 36 hours and 45 hours respectively.If both the pipes are opened simultaneously, how much time will be taken to fill the tank?

- A. 20 hrs
- B. 10 hrs
- C. 16 hrs
- D. 12 hrs

**Answer & Explanation**

**Answer :**

20 hrs

**Explanation :**

Part filled by A in 1 hour =  $1/36$ ; part filled by B in 1 hour =  $1/45$ . part filled by (A+B) in 1 hour =  $(1/36 + 1/45) = 9/180 = 1/20$ . Hence, both the pipes together will fill the tank in 20 hours.

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8. An electric pump can fill a tank in 3 hours.Because of a leak in the tank, it took  $3\frac{1}{2}$  hours to fill the tank. If the tank is full, how much time will the leak take to empty it?

- A. 20 hrs
- B. 21 hrs
- C. 10 hours
- D. 30 hrs

**Answer & Explanation**

**Answer :**

21 hrs

**Explanation :**

Work done by the leak in 1 hour =  $(1/3 - 1/(7/2)) = (1/3 - 2/7) = 1/21$  Therefore the leak will empty the tank in 21 hours.

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9. Pipe A can fill a tank in 5 hrs, Pipe B in 10 hrs and Pipe C in 30 hrs. If all the pipes are open in how many hours will the tank be filled?

- A. 2 hrs
- B. 2.5 hrs
- C. 3 hrs
- D. 3.5 hrs

**Answer & Explanation**

**Answer :**

3 hrs

**Explanation :**

Part filled by ( A+B+C) in 1 hr =  $(1/5 + 1/10 + 1/30) = 1/3$  therefore all the 3 pipes together will fill the tank in 3 hrs

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10. One pipe can fill a tank 6 times as fast as another pipe. If together the two pipes can fill the tank in 22 minutes, then the slower pipe alone will be able to fill the tank in:

- A. 164 min
- B. 154 min
- C. 134 min
- D. 144 min

**Answer & Explanation**

**Answer :**

154 min

**Explanation :**

Let faster pipe alone can fill the tank in x minutes. Then, slower pipe alone can fill the tank in 6x minutes.  $x \times 6x + 6x = 22 \times 6x = 22x = 22 \times 7 = 154$  Time required for the slower pipe to fill the tank =  $6x = 154$  minute.

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11. Two pipes x and y can fill a tank in 24 and 30 minutes respectively. Both the pipes are opened for 6 minutes, after which pipe x is turned off. How much more time will pipe y take to fill the tank ?

- A. 16.5 minutes

- B. 22.5 minutes
- C. 24 minutes
- D. Cannot be determined

**Answer & Explanation**

**Answer :**

16.5 minutes

**Explanation :**

When pipe x is turned off (after 6 minutes) Work done by x and y in 6 minutes =  $[(1/24) + (1/30)] 6 = 9/20$  Remaining work =  $1 - (9/20) = 11/20$  which would be done by pipe y alone. 1 work is done by pipe y (alone) in 30 minutes  $11/20$  work is done by pipe y (alone) in  $30 \times (11/20) = 33/2$  minutes = 16.5 minutes

12. A pipe can fill a tank in 5 hours, but due to a leakage it took 7 hours to fill the tank. If the tank is full, in what time will tank become empty due to leakage?

- A. 15.30 hrs
- B. 17.50 hrs
- C. 16 hrs
- D. 12.30 hrs

**Answer & Explanation**

**Answer :**

17.50 hrs

**Explanation :**

$1/5 - 1/7 = 7 - 5/35 = 2/35 = 1/17.5 = 17.50$  hours

13. A large tanker can be filled by 2 pipes A & B in 60 minutes and 40 minutes respectively. How many minutes will it take to fill the tanker from empty state. If B is used for half the time and A & B fill it together for the half ?

- A. 15 minutes
- B. 20 minutes
- C. 27.5 minutes
- D. 30 minutes

**Answer & Explanation**

**Answer :**

30 minutes

**Explanation :**

Part filled by (A+B) in 1 minute =  $(1/60 + 1/40) = 1/24$  suppose the tank is filled in x minutes Then  $x/2 (1/24 + 1/40) = 1 = x/2 * 1/15 = 1 = x = 30$  minutes

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14. A cistern has two taps which fill it in 12 minutes and 15 minutes respectively. There is also a waste pipe in the cistern. when all the three are opened, The empty cistern is full in 20 minutes. How long will the waste pipe take to empty the full cistern?

- A. 15 minutes
- B. 20 minutes
- C. 10 minutes
- D. 25 minutes

**Answer & Explanation**

**Answer :**

10 minutes

**Explanation :**

Work done by the waste pipe in 1 minute =  $1/20 - (1/12 + 1/15) = -1/10$  (- negative sign means emptying) waste pipe will empty the full cistern in 10 minutes

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15. A pump can fill that tank in 4 hrs because of a leak in the tank it took  $5\frac{1}{2}$  hours to fill the tank.If the tank is full how much time will the leak take to empty it?

- A. 13 hrs
- B. 12 hrs 50 mins
- C. 14 hrs 40 mins
- D. 14 hrs

**Answer & Explanation**

**Answer :**

14 hrs 40 mins

**Explanation :**

Time taken by leak to empty the tank =  $1/4 - 1/(11/2) = 1/4 - 2/11 = 11 - 8/44 = 3/44$   
 $44/3 = 14\frac{2}{3} = 14$  hrs 40 mins

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16. Two pipes A & B can fill a tank in 20 and 30 minutes respectively.If the both pipes are used together,then how long will it take to fill the tank?

- A. 12 mins
- B. 15 mins
- C. 25 mins
- D. 50 mins

**Answer & Explanation**

**Answer :**

12 mins

**Explanation :**

Part filled by A in 1 minute =  $1/20$ ; Part filled by B in 1 minute =  $1/30$ . Part filled by (A+B) in 1 minute.  $(A+B) = (1/20+1/30) = 1/12$ . Hence both the pipes can fill the tank in 12 minutes

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17. 2 pipes A & B can fill a tank in 15 hrs and 20 hrs respectively while a 3<sup>rd</sup> pipe C can empty the full tank in 25 hrs. All the 3 pipes are opened in the beginning. After 10 hrs C is closed. In how much time will the tank be full?

- A. 12 hrs
- B. 13 hrs
- C. 16 hrs
- D. 18 hrs

**Answer & Explanation**

**Answer :**

12 hrs

**Explanation :**

Part filled in 10 hrs =  $10 ( 1/15 + 1/20 - 1/25 ) = 23/30$  Remaining part =  $(1-23/30) = 7/30$   
(A+B)'s 1 hrs work =  $(1/15 + 1/20) = 7/60$   $x = (7/30 * 1 * 60/7) = 2$  hrs Hence the tank will be full in  $(10+2)$  hrs = 12 hrs.

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18. Two the pipes fill the tank in 12 minutes and 15 minutes. There is also a waste pipe in the tank. When all the three are opened, the empty tank is full in 20 minutes. How long will the waste pipe take to empty the tank?

- A. 10 minutes
- B. 20 minutes
- C. 30 minutes
- D. 35 minutes

**Answer & Explanation**

**Answer :**

10 minutes

**Explanation :**

$(1/20) - ( (1/12)+(1/15)) = (1/20) - ((5+4)/60) = (3-9)/60 = - 6/60 = -1/10 = 10$  minutes.

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19. 2 pipes A & B can fill a tank in 15 minutes and 20 minutes respectively. Both the pipes are opened together but after 4 minutes pipe A is turned off. What is the total time required to fill the tank?

- A. 10 mins 20 sec

- B. 11 mins 45 sec
- C. 12 mins 30 sec
- D. 14 mins 40 sec

**Answer & Explanation**

**Answer :**

14 mins 40 sec

**Explanation :**

Part filled in 4 mins =  $4(1/15 + 1/20) = 7/15$  Remaining part =  $(1 - 7/15) = 8/15$  Part filled by B in 1 minute =  $1/20 \times (8/15 \times 1 \times 20) = 10 \frac{2}{3}$  min. = 10 min 40 sec. The tank will be full in ( 4 min + 10 min 40 sec) = 14 min.40 sec.

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20. Two pipes A & B can fill a tank in 20 minutes. If both pipes are opened simultaneously after how much time should B be closed so that the tank is full in 18 minutes?

- A. 10 mins
- B. 9 mins
- C. 8 mins
- D. None of these

**Answer & Explanation**

**Answer :**

None of these

**Explanation :**

A fill the tank in 1 minute =  $(20 \times 20 = 40) = 2$  units B fill the tank in 1 minute =  $(40 \times 1 = 40) = 1$  unit For 18 minutes (A) =  $18 \times 2 = 36$  units Remaining =  $40 - 36 = 4$  units Time for B be closed so that the tank is full in 18 minutes =  $4/1 = 4$  minutes

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21. A pipe can fill a tank in 4 hours. But due to a leak in the tank, it is filled in 5 hours. If the tank is full. How much time will the leak to empty the tank completely ?

- A. 10 hours
- B. 15 hours
- C. 20 hours
- D. 12 hours

**Answer & Explanation**

**Answer :**

20 hours

**Explanation :**

In 1 hour., water filled =  $1/4$  th of the tank.  $1/4$  th is emptied by leakage in 5 hours Full tank would be emptied in 20 hours (or) [using formula,  $t = (5 \times 4) / (5 - 4) = 20$  hours]



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22. 3 pipes A, B & C can fill a tank in 6 hours. After working at it together for 2 hours, C is closed and A and B can fill the remaining part in 7 hours. The number of hours taken by C alone to fill the tank is?

- A. 10
- B. 12
- C. 14
- D. 16

**Answer & Explanation**

**Answer :**

14

**Explanation :**

Part filled in 2 hours =  $\frac{2}{6} = \frac{1}{3}$ , Remaining part =  $(1 - \frac{1}{3}) = \frac{2}{3}$ . Therefore (A+B)'s 7 hours work =  $\frac{2}{3}$ : (A+B)'s 1 hour's work =  $\frac{2}{21}$ . Therefore C's 1 hour's work =  $\{(A+B+C)'s\ 1\ hour's\ work - (A+B)'s\ 1\ hour's\ work\} = (\frac{1}{6} - \frac{2}{21}) = \frac{1}{14}$  Therefore C alone can fill the tank in 14 hours. t

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23. The volume of water flowing through a pipe is directly proportional to square of its radius. A tank has four inlet pipes with diameters as 2 cm, 4 cm, 6 cm and 8 cm. if the smallest pipe, alone, can fill a tank in 30 hours, then how much time would all the four pipes, when working together would take ?

- A. 1 hours
- B. 4 hours
- C. 6 hours
- D. None of these

**Answer & Explanation**

**Answer :**

1 hours

**Explanation :**

We are given that  $V = k(r^2)$  where V is volume of water and 'r' is radius of pipe and k is a constant. The smallest pipe takes 30 hours to fill the tank alone, hence work done in 1 hour =  $\frac{1}{30}$  Radius = diameter / 2 =  $\frac{2}{2} = 1$   $\frac{1}{30} = k(1^2)$ , so  $k = \frac{1}{30}$  Work done in 1 hour by pipe 2 =  $\frac{1}{30}(4/2)^2 = \frac{4}{30}$  Work done in 1 hour by pipe 3 =  $\frac{1}{30}(6/2)^2 = \frac{9}{30}$  Work done in 1 hour by pipe 4 =  $\frac{1}{30}(8/2)^2 = \frac{16}{30}$  In 1 hour, work done by all the four pipes =  $(\frac{1}{30}) + (\frac{4}{30}) + (\frac{9}{30}) + (\frac{16}{30}) = \frac{30}{30} = 1$  Hence, the whole tank gets filled in 1 hour.

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24. Pipes A and B can fill a tank in 5 & 6 hrs respectively. Pipe C can empty it in 12 hrs. If all the 3 pipes are opened together, then the tank will be filled in?

- A.  $1 \frac{13}{17}$  hrs
- B.  $2 \frac{8}{11}$  hrs
- C.  $3 \frac{9}{17}$  hrs
- D.  $4 \frac{1}{2}$  hrs

Answer & Explanation

Answer :

$3 \frac{9}{17}$  hrs

Explanation :

Net part filled in 1 hr =  $(\frac{1}{5} + \frac{1}{6} - \frac{1}{12}) = \frac{17}{60}$ . Therefore the tank will be full in  $\frac{60}{17}$  hrs i.e.  $3 \frac{9}{17}$  hrs.

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25. A tank is usually filled in 18 hours. But because of a leak in its bottom, it takes another 6 hours to fill. How much time will be taken by the leak to empty the full tank ?

- A. 30 hours
- B. 72 hours
- C. 42 hours
- D. 55 hours

Answer & Explanation

Answer :

72 hours

Explanation :

Consider the case when there is no leak . Then in one hour, work done =  $\frac{1}{18}$ , and in 6 hours =  $\frac{6}{18} = \frac{1}{3}$ . This means  $\frac{1}{3}$ rd of the tank is emptied because of the leakage in  $18 + 6 = 24$  hours So,  $\frac{1}{3}$ rd is emptied in 24 hours, full tank would be emptied in  $24 \times 3 = 72$  hours.

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