

PIPES PROBLEMS SOLUTIONS

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- 2) A pump can fill a tank with water in 2 hours. Because of a leak, it took $2\frac{1}{3}$ hours to fill the tank. The leak can drain all the water of the tank in
- a) 5 Hours b) 7 Hours c) 8 Hours
d) 14 Hours e) None of these
- 3) Two pipes can fill a tank in 20 and 24 minutes respectively and a waste pipe can empty 3 gallons per minute. All the three pipes working together can fill the tank in 15 minutes. The capacity of the tank is
- a) 60 gallons b) 80 gallons c) 120 gallons
d) 180 gallons e) None of these
- 4) Two pipes can fill a tank in 10 hours and 12 hours respectively while a third pipe empties the full tank in 20 hours. If all the three pipes operate simultaneously, in how much time will the tank be filled?
- a) 7 hrs 30 min b) 7 hrs 45 min c) 8 hrs 30 min
d) 8 hrs 45 min e) None of these
- 5) A leak in the bottom of a tank can empty the full tank in 8 hours. An inlet pipe fills water at the rate of 6 litres a minute. When the tank is full, the inlet is opened and due to the leak, the tank is empty in 12 hours. How many litres does the cistern hold?
- a) 7580 b) 7960 c) 8290
d) 8640 e) None of these
- 6) Two taps A and B can fill a tank in 5 hours and 20 hours respectively. If both the taps are open then due to a leakage, it took 30 minutes more to fill the tank. If the tank is full, how long will it take for the leakage alone to empty the tank?
- a) 8 hrs b) 9 hrs c) 18 hrs
d) 36 hrs e) None of these
- 7) Two pipes A and B can fill a tank in 20 and 30 minutes respectively. If both the pipes are used together, then how long will it take to fill the tank ?
- a) 12 min b) 15 min c) 25 min
d) 50 min e) None of these
- 8) Pipes A and B can fill a tank in 5 and 6 hours respectively. Pipe C can empty it in 12 hours. If all the three pipes are opened together, then the tank will be filled in
- a) $1 \times \frac{13}{17}$ hours b) $2 \times \frac{8}{11}$ hours c) $3 \times \frac{9}{17}$ hours
d) $4 \times \frac{1}{2}$ hours e) None of these
- 9) 12 buckets of water fill a tank when the capacity of each tank is 13.5 litres. How many buckets will be needed to fill the same tank, if the capacity of each bucket is 9 litres?
- a) 8 b) 15 c) 16
d) 18 e) None of these

- 10) Two pipes A and B can separately fill a cistern in 60 minutes and 75 minutes respectively. There is a third pipe in the bottom of the cistern to empty it. If all the three pipes are simultaneously opened, then the cistern is full in 50 minutes. In how much time, the third pipe alone can empty the cistern?
- a) 90 min b) 100 min c) 110 min
d) 120 min e) None of these
- 11) A cistern can be filled by a tap in 4 hours while it can be emptied by another tap in 9 hours. If both the taps are opened simultaneously, then after how much time will the cistern get filled ?
- a) 4.5 Hours b) 5 Hours c) 6.5 Hours
d) 7.2 Hours e) None of these
- 12) A large tanker can be filled by two pipes A and 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 and B fill it together for the other half ?
- a) 15 min b) 20 min c) 27.5 min
d) 30 min e) None of these
- 13) One pipe can fill a tank three times as fast as another pipe. If together the two pipes can fill the tank in 86 minutes, then the slower pipe alone will be able to fill the tank in
- a) 81 min b) 108 min c) 144 min
d) 192 min e) None of these
- 14) A tap can fill a tank in 6 hours. After half the tank is filled, three more similar taps are opened. What is the total time taken to fill the tank completely ?
- a) 3 hrs 15 min b) 3 hrs 45 min c) 4 hrs
d) 4 hrs 15 mins e) None of these
- 15) Two pipes A and B can fill a tank in 6 hours and 4 hours respectively. If they are opened on alternate hours and if pipe A is opened first, in how many hours, the tank shall be full ?
- a) 4 Hrs b) 5 Hrs c) 7 Hrs
d) 9 Hrs e) None of these
- 16) Two pipes A and B can fill a cistern in $37\frac{1}{2}$ minutes and 45 minutes respectively. Both pipes are opened. The cistern will be filled in just half an hour, if the B is turned off after:
- a) 5 b) 9 c) 10
d) 15 e) None of these
- 17) 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 hours b) 25hours c) 35 hours
d) Data inadequate e) None of these

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Leak will empty the tank in 14 hours.

3. Option C

Work done by the waste pipe in 1 minute = $\frac{1}{15} - \left[\frac{1}{20} + \frac{1}{24} \right] = \left[\frac{1}{15} - \frac{11}{20} \right] = -\frac{1}{40}$ (-ve sign means emptying) volume of 1/40 part = 3 gallons. Volume of whole = $(3 \times 40) = 120$ gallons.

4. Option A

Net part filled in 1 hour = $\left[\frac{1}{10} + \frac{1}{12} - \frac{1}{20} \right] = \frac{8}{60} = \frac{2}{15}$. Therefore the tank will be full in $\frac{15}{2}$ hours = 7 hours 30 minute

5. Option D

Work done by the inlet in 1 hour = $\left[\frac{1}{8} - \frac{1}{12} \right] = \frac{1}{24}$

Work done by the inlet in 1 minute = $\left[\frac{1}{24} \times \frac{1}{60} \right] = \frac{1}{1440}$

Volume of $\frac{1}{1440}$ part = 6 litres. Therefore, Volume of whole = $[1440 \times 6] = 8640$ litres

6. Option D

Part filled by (A + B) in 1 hour = $\left[\frac{1}{5} + \frac{1}{20} \right] = \frac{1}{4}$

So, A and B together can fill the tank in 4 hours.

Work done by the leak in 1 hour = $\left[\frac{1}{4} - \frac{2}{9} \right] = \frac{1}{36}$

Therefore, leak will empty the tank in 36 hours.

7. Option A

Part filled by A in 1 min. = $\frac{1}{20}$

Part filled by B in 1 min. = $\frac{1}{30}$

Part filled by (A + B) in 1 min. = $\left[\frac{1}{20} + \frac{1}{30} \right] = \frac{1}{12}$

Both the pipes can fill the tank in 12 minutes.

8. Option C

Net part filled in 1 hour = $\left[\frac{1}{5} + \frac{1}{6} - \frac{1}{12} \right]$

$$= \frac{17}{60}$$

Therefore, the tank will be full in $\frac{60}{17}$ hrs. = $3 \times \frac{9}{17}$ hrs.

9. Option D

Capacity of the tank = (12×13.5) litres
= 162 litres

Capacity of each bucket = 9 litres

Number of buckets needed = $\left[\frac{162}{9} \right] = 18$

10. Option B

$$\begin{aligned} \text{Work done by the third pipe in 1 min.} &= \frac{1}{50} - \left[\frac{1}{60} + \frac{1}{75} \right] \\ &= \left[\frac{1}{50} - \frac{3}{100} \right] \\ &= \frac{1}{100} \end{aligned}$$

Therefore, the third pipe alone can empty the cistern in 100 min.

11. Option D

$$\begin{aligned} \text{Net part filled in 1 hour} &= \left[\frac{1}{4} - \frac{1}{9} \right] \\ &= \frac{5}{36} \end{aligned}$$

Therefore, the cistern will be filled in $\frac{36}{5}$ hours i.e. 7.2 hours

12. Option D

$$\begin{aligned} \text{Part filled by (A + B) in 1 minute} &= \left[\frac{1}{60} + \frac{1}{40} \right] \\ &= \frac{1}{24} \end{aligned}$$

Suppose the tank is filled in x minutes = $\frac{4}{8}$

$$\text{Then, } \frac{x}{2} \times \frac{1}{15} = 30 \text{ min.}$$

13. Option C

Let the slower pipe alone fill the tank in x minutes. Then, faster pipes will fill it in $\frac{x}{3}$ minutes

$$\text{Therefore, } \frac{1}{x} + \frac{3}{x} = \frac{1}{36}$$

$$\frac{4}{x} = \frac{1}{36}$$

$$x = 144 \text{ min.}$$

14. Option B

Time taken by one tap to fill the half tank = 3 hours

$$\begin{aligned}\text{Part filled by the four taps in 1 hour} &= \left[4 \times \frac{1}{6} \right] \\ &= \frac{2}{3}\end{aligned}$$

$$\text{Remaining part} = \left[1 - \frac{1}{2} \right]$$

$$\begin{aligned}\text{Therefore } \frac{\frac{1}{2}}{\frac{2}{3}} &: \frac{1}{2} :: 1 : x \\ \left[\frac{1}{2} \times 1 \times \frac{3}{2} \right] & \\ &= \frac{3}{4} \text{ hours i.e. 45 minutes.}\end{aligned}$$

So, total time taken = 3 hours 45 minute

15. Option B

$$\text{A's work in 1 hour} = \frac{1}{6}$$

$$\text{B's work in 1 hour} = \frac{1}{4}$$

$$\text{(A + B)'s 2 hours work when opened alternately} = \left[\frac{1}{6} + \frac{1}{4} \right]$$

$$= \frac{5}{12}$$

(A + B)'s 4 hours work when opened alternately

$$= \frac{5}{6}$$

$$= \frac{5}{6}$$

$$\text{Remaining part} = \left[1 - \frac{5}{6} \right]$$

$$= \frac{1}{6}$$

Therefore, total time to fill the tank (4 + 1) hours = 5 hours

16. Option E

Let B be turned off after x minutes. Then,

Part filled by (A + B) in x min + Part filled by A in (30 - x) min. = 1

$$\text{So, } x \left[\frac{2}{75} + \frac{1}{45} \right] + (30 - x) \times \frac{2}{75} = 1$$

17. Option E

Suppose pipe A alone takes x hours to fill the tank.

Then, pipes B and C will take $\frac{x}{2}$ and $\frac{x}{4}$ hours respectively to fill the tank.

$$\text{So, } \frac{1}{x} + \frac{2}{x} + \frac{4}{x} = \frac{1}{5}$$

$$\frac{7}{x} = \frac{1}{5}$$

$$x = 35 \text{ hours}$$

18. Option C

$$(A + B)\text{'s 1 hour work} = \left[\frac{1}{12} + \frac{1}{15} \right] = \frac{9}{60} = \frac{3}{20}$$

$$(A + C)\text{'s 1 hour work} = \left[\frac{1}{12} + \frac{1}{20} \right] = \frac{8}{60} = \frac{2}{15}$$

$$\text{Part filled in 2 hours} = \left[\frac{3}{20} + \frac{2}{15} \right] = \frac{17}{60}$$

$$\text{Part filled in 6 hours} = \left[3 \times \frac{17}{60} \right] = \frac{17}{20}$$

$$\text{Remaining part} = \left[1 - \frac{17}{20} \right] = \frac{3}{20}$$

Now, it is the turn of A and B and $\frac{3}{20}$ part is filled by A and B in 1 hour.

So, total time taken to fill the tank = (6 + 1) = 7 hours

19. Option D

$$\text{Part filled in 4 minutes} = 4 \left[\frac{1}{15} + \frac{1}{20} \right] = \frac{7}{15}$$

$$\text{Remaining part} = \left[1 - \frac{7}{15} \right] = \frac{8}{15}$$

$$\text{Part filled by B in 1 minute} = \frac{1}{20}$$

$$\text{So, } \frac{1}{20} : \frac{8}{15} :: 1 : x$$

$$x = \left[\frac{8}{15} \times 1 \times 20 \right] = 10 \frac{2}{3} \text{ minute} = 10 \text{ minute } 40 \text{ seconds}$$

So, the tank will be full in (4 minute + 10 minute + 40 seconds) = 14 minute 40 seconds

20. Option C

$$\text{Part filled in 2 hours} = \frac{2}{6} = \frac{1}{3}$$

$$\text{Remaining part} = \left[1 - \frac{1}{3} \right] = \frac{2}{3}$$

$$\text{So, (A + B)\text{'s 7 hours work} = \frac{2}{3}$$

$$(A + B)\text{'s 1 hour work} = \frac{2}{21}$$

$$\text{So, C\text{'s 1 hour work} = \left[(A + B + C)\text{'s 1 hour work} \right] - (A + B)\text{'s 1 hour\text{'s work} =$$

$$\left[\frac{1}{6} - \frac{2}{21} \right] = \frac{1}{14}$$

So, C alone can fill the tank in 14 hours.

21. Option D

$$\begin{aligned}\text{Capacity of the tank} &= (12 \times 13.5) \text{ litre} = 162 \text{ litres} \\ \text{Capacity of each bucket} &= 9 \text{ litres} \\ \text{Number of buckets needed} &= \frac{162}{9} = 18\end{aligned}$$

22. Option D

$$\text{Part filled by (A + B + C) in 1 hour} = \left[\frac{1}{5} + \frac{1}{10} + \frac{1}{30} \right] = \frac{1}{3}$$

So, all the three pipes together will fill the tank in 3 hours.

23. Option D

Half tank will be filled in 3 hours

Lets calculate remaining half,

$$\text{Part filled by the four taps in 1 hour} = 1 \times \frac{1}{6} = \frac{2}{3}$$

$$\text{Remaining part after } \frac{1}{2} \text{ filled} = 1 - \frac{1}{2} = \frac{1}{2}$$

$$\frac{2}{3} : \frac{1}{2} :: 1 : x$$

$$x = \left[\frac{1}{2} \times 1 \times 32 \right]$$

$$x = \frac{3}{4} \text{ hours} = 45 \text{ mins.}$$

Total time = 3
hours + 45 mins.
= 3 hours 45
mins

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