Exercise 13A

Q13.

Answer :

$(A+B)$ can complete the work in 12 days.

$(B+C)$ can complete the work in 15 days.

$(C+A)$ can complete the work in 20 days.

$(A+B)$'s 1 day work $= \frac{1}{12}$

$(B+C)$'s 1 day work $= \frac{1}{15}$

$(C+A)$'s 1 day work $= \frac{1}{20}$

$2(A+B+C)$'s 1 day work $= \frac{1}{12}+\frac{1}{15}+\frac{1}{20} = \frac{5+4+3}{60} = \frac{12}{60} = \frac{1}{5}$

$(A+B+C)$'s 1 day work $= \frac{1}{10}$

A's 1 day work $= \{(A+B+C)$'s 1 day work$\} - \{(B+C)$'s 1 day work$\} = \frac{1}{10} - \frac{1}{15} = \frac{3-2}{30} = \frac{1}{30}$

A will take 30 days to complete the work, if he works alone.

Q14.

Answer :

A can fill a tank in 10 hours.
B can fill a tank in 15 hours.
Pipe A fills $\frac{1}{10}$ of the tank in one hour.

Pipe B fills $\frac{1}{15}$ of the tank in one hour.

Part of tank filled by pipes A and B together $= \frac{1}{10}+\frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6}$

Thus, pipes A and B require 6 hours to fill the tank.

Q15.

Answer :

Pipe A can fill a tank in 5 hours.
Pipe B can empty a full tank in 6 hours.
Pipe A fills $\frac{1}{5}$ of the tank in one hour.

Pipe B empties $\frac{1}{6}$ of the tank in one hour.

Part of the tank filled in one hour using both pipes A and B $= \frac{1}{5}-\frac{1}{6} = \frac{6-5}{30} = \frac{1}{30}$

It takes $\frac{30}{1}$ or 30 hours to fill the tank completely.

Q16.

Answer :

Time taken by tap A to fill the tank $= 6$ hours
Time taken by tap B to fill the tank $= 8$ hours
Time taken by tap C to fill the tank $= 12$ hours

A fills $\frac{1}{6}$ of the tank in one hour.

B fills $\frac{1}{8}$ of the tank in one hour.

C fills $\frac{1}{12}$ of the tank in one hour.

Part of the tank filled in one hour using all the three pipes $= \frac{1}{6}+\frac{1}{8}+\frac{1}{12} = \frac{4+3+2}{24} = \frac{9}{24}$

Time taken by A, B and C together to fill the tank $= \frac{24}{9} = \frac{8}{3} = 2\frac{2}{3}$ hours

Q17.

Answer :

Inlet A can fill the cistern in 12 minutes.
Inlet B can fill the cistern in 15 minutes.
Outlet C empties the filled cistern in 10 minutes.

Part of the cistern filled by inlet A in one minute $= \frac{1}{12}$

Part of the cistern filled by inlet B in one minute $= \frac{1}{15}$

Part of the cistern emptied by outlet C in one minute $= -\frac{1}{10}$

(water flows out from C and empties the cistern)

Part of the cistern filled in one minute with A, B and C working together $= \frac{1}{12}+\frac{1}{15}-\frac{1}{10}$
$= \frac{5+4-6}{60} = \frac{3}{60} = \frac{1}{20}$

The time required to fill the cistern with all inlets, *A*, B and C, open is 20 minutes.

Q18.

Answer :

A pipe can fill a cistern in 9 hours.

Part of the cistern filled by the pipe in one hour $= \frac{1}{9}$

Let the leak empty the cistern in x hours.

Part of the cistern emptied by the leak in one hour $= -\frac{1}{x}$

(The leak drains out the water)

Considering the leak, the tank is filled in 10 hours.

Part of the tank filled in one hour $= \frac{1}{10}$

Therefore,

$\frac{1}{9} - \frac{1}{x} = \frac{1}{10}$ or, $\frac{1}{x} = \frac{1}{9} - \frac{1}{10} = \frac{10-9}{90} = \frac{1}{90}$ $x = 90$

The leak will empty the filled cistern in 90 hours.

Q19.

Answer :

Pipe A can fill a cistern in 6 hours.
Pipe B can fill a cistern in 8 hours.

Part of the cistern filled by pipe A in one hour $= \frac{1}{6}$

Part of the cistern filled by pipe B in one hour $= \frac{1}{8}$

Part of the cistern filled by pipes A and B in one hour $= \frac{1}{6}+\frac{1}{8} = \frac{4+3}{24} = \frac{7}{24}$

Part of the cistern filled by pipes A and B in 2 hours $= \frac{7}{24} \times 2 = \frac{7}{12}$

Part of the tank empty after 2 hours $= 1 - \frac{7}{12} = \frac{5}{12}$

Time taken by pipe B to fill the remaining tank $= \frac{5}{12} \div \frac{1}{8} = \frac{5}{12} \times 8 = \frac{10}{3} = 3\frac{1}{3}$ hours

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