Chapter: Time and work
Page no.: 172
Exercise: 13A

Question 1:

Solution: Work done by Rajan in 1 day = $\frac{1}{24}$

Work done by Amit in 1 day= $\frac{1}{30}$

Work done by Rajan and Amit together in 1 day = $\frac{1}{24}+\frac{1}{30}$

$= \frac{54}{720} = \frac{3}{40}$

They complete the work in $\frac{40}{3}$ days

Question 2:
Solution:
Time taken by Ravi= 15 hour
Time taken by Raman= 12 hour

Work done per hour by Ravi = $\frac{1}{15}$

Work done per hour by Raman= $\frac{1}{12}$

Work done per hour by Ravi and Raman together = $\frac{1}{15} + \frac{1}{12} = \frac{9}{60} = \frac{3}{20}$

Time taken by Ravi and Raman together to finish the work = $\frac{20}{3}$ hour

Question 3:
Solution:
Time taken by a and b to finish a piece of work = 6 days

Work done per day by a and b = $\frac{1}{6}$

Time taken by a alone = 9 days

Work done per day by a alone = $\frac{1}{9}$

Work done per day by b = (work done by a and b) – (work done by a)

$= \frac{1}{6} - \frac{1}{9} = \frac{3-2}{18}$

$$= \frac{1}{18}$$

B alone will take 18 days to complete the work.

Question 4:

Solution:

Time taken by Raju = 15 hour

Work done by Raju in 1 hour = $\frac{1}{15}$

Time taken by Raju and Siraj working together = 6 hours

Work done by Siraj in 1 hour = (work done by Raju and Siraj) – (work done by Raju)

$= \frac{1}{6} - \frac{1}{15} = \frac{5-2}{30}$

$= \frac{3}{30} = \frac{1}{10}$

Siraj will take 10 hours to overhaul the scooter by himself

Question 5:

Solution:

Time taken by A to complete the work =10 days

Time taken by B to complete the work = 12 days

Time taken by C to complete the work = 15 days

Work done per day by A = $\frac{1}{10}$

Work done per day by B $= \frac{1}{12}$

Work done per day by C $= \frac{1}{15}$

Total work done per day = $\frac{1}{10} + \frac{1}{12} + \frac{1}{15}$

$$= \frac{6+5+4}{60}$$

$$= \frac{15}{60} = \frac{1}{4}$$

A, B and C will take 4 days to complete the work if they work together.

Question 6:

Solution:

Time taken by A to complete the piece of work = 24 h

Work done per hour by A = $\frac{1}{24}$

Time taken by B to complete the work = 16 h

Work done per hour by B = $\frac{1}{16}$

Total time taken when A, B and C work together = 8 h

Work done per hour by A, B and C = $\frac{1}{8}$

Work done per hour by A, B and C =(work done per hour by A) + (work done per hour by B) + (work done per hour by C) (Work done per hour by C) =(work done per hour by A, B and C) - (work done per hour by A) - (work done per hour by B)

$$= \frac{1}{8} - \frac{1}{24} - \frac{1}{16}$$

$$= \frac{6-2-3}{48} = \frac{1}{48}$$

Thus, C alone will take 48 h to complete the work.

Question 7:

Solution:

A can complete the work in 20 h.

Work done per hour by A= $\frac{1}{20}$

B can complete the work in 24 h.

Work done per hour by B= $\frac{1}{24}$

It takes 8 h to complete the work if A, B and C work together.

Work done together per hour by A, B and C= $\frac{1}{8}$

(Work done per hour by A, B and C) = (work done per hour by A) + (work done per hour by B) + (work done per hour by C)

OR

(Work done per hour by C)=(work done per hour by A, B and C)-(work done per hour by A)-(work done per hour by B)

$= \frac{1}{8} - \frac{1}{24} - \frac{1}{20} = \frac{1}{30}$

∴ C alone will take 30 h to complete the work.

Question 8:

Solution:

Time taken by A to complete the work = 16 days

Work done per day by A = $\frac{1}{16}$

Time taken by B to complete the work = 12 days

Work done per day by B = $\frac{1}{12}$

Work done per day by A and B = $\frac{1}{12} + \frac{1}{16}$

$= \frac{4+3}{48} = \frac{7}{48}$

Work done by A in two days = $\frac{2}{16} = \frac{1}{8}$

Work left =1- $\frac{1}{8} = \frac{7}{8}$

A and B together can complete $\frac{7}{48}$ of the work in 1 day.

Then, time taken to complete $\frac{7}{8}$ of the work = $\frac{7}{8} \div \frac{7}{48} == \frac{7}{8} \times \frac{48}{7}$ = 6 days

∴ Total time taken = 6 + 2 = 8 days.

Question 9:

Solution:

Time taken by A to complete the work = 14 days

Work done by A in one day = $\frac{1}{14}$

Time taken by B to complete the work = 21 days

Work done by B in one day = $\frac{1}{21}$

Work done jointly by A and B in one day = $\frac{1}{14} + \frac{1}{21}$

$= \frac{3+2}{42} = \frac{5}{42}$

Work done by A and B in 6 days = $\frac{5}{42} \times 6 = \frac{5}{7}$

Work left = 1-$\frac{5}{7} = \frac{2}{7}$

With B working alone, time required to complete the work = $\frac{2}{7} \div \frac{1}{21} = \frac{2}{7} \times 21 = 2 \times 3 = 6$ days

So, the total time taken to complete the work = 6 + 6 = 12 days

Question 10:

Solution:

A can do $\frac{2}{3}$ work in 16 days

So, work done by A in one day = $\frac{2}{48} = \frac{1}{24}$

B can do $\frac{1}{4}$ work in 3 days

So, work done by B in one day = $\frac{1}{12}$

Work done jointly by A and B in one day = $\frac{1}{24} + \frac{1}{12}$

$= \frac{1+2}{24}$

$= \frac{3}{24} = \frac{1}{8}$

So, A and B together will take 8 days to complete the work.

Question 11:

Solution:

Time taken by A = 15 days

Time taken by B = 12 days

Time taken by C = 20 days

Work d by A in one day = $\frac{1}{15}$

Work done by B in one day = $\frac{1}{12}$

Work done by C in one day = $\frac{1}{20}$

Work done in one day by A, B and C together = $\frac{1}{15} + \frac{1}{12} + \frac{1}{20}$

$= \frac{4+5+3}{60}$

$= \frac{12}{60} = \frac{1}{5}$

Work done by A, B and C together in 2 days = $\frac{2}{5}$

Work remaining = 1- $\frac{2}{5} = \frac{3}{5}$

Work done by A and B in one day $= \frac{1}{15} + \frac{1}{12}$

$= \frac{9}{60} = \frac{3}{20}$

Time required by A and B to complete the remaining work together $= \frac{3}{5} \div \frac{3}{20}$

$= \frac{3}{5} \times \frac{20}{3} = 4$ days

Question 12:

Solution:

Time needed by A and B to finish the work =18 days

Time needed by B and C to finish the work =24 days

Time needed by C and A to finish the work =36 days

Work done by A and B in one day $= \frac{1}{18}$

Work done by B and C in one day $= \frac{1}{24}$

Work done by C and A in one day $= \frac{1}{36}$

2 × Work done by A, B and C in one day $= \frac{1}{18} + \frac{1}{24} + \frac{1}{36}$

$= \frac{4+3+2}{72}$

$= \frac{9}{72} = \frac{1}{8}$

∴ Work done by A, B and C in one day $= \frac{1}{16}$

So, A, B and C working together will take 16 days to complete the work.

Question 13:

Solution:

(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.

Question 14:

Solution:

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 = $\frac{1}{10}+\frac{1}{15}$

$= \frac{3+2}{30}$

$= \frac{5}{30} = 16$

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

Question 15:

Solution:

Pipe A can fill a tank in 5 hours.

Pipe B can empty a full tank in 6 hours.

Pipe A fills 15 of the tank in one hour.

Pipe B empties 16 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 30 hours to fill the tank completely.

Question 16:

Solution:

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 16 of the tank in one hour.

B fills 18 of the tank in one hour.

C fills 112 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 = $\frac{24}{9}=\frac{8}{3}$ hours

Question 17:

Solution:

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.

Question 18:

Solution:

A pipe can fill a cistern in 9 hours.

Part of the cistern filled by the pipe in one hour = 19
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.

Question 19:

Solution:

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 = $\frac{5}{12} \div \frac{1}{8} = \frac{5}{12} \times 8 = \frac{10}{3}$ hours

Exercise: 13B
Page no: 174

Question 1:

Solution: (b) 6 days

A can do a work in 10 days.

A's 1 day work = $\frac{1}{10}$

B can do a work in 15 days.

B's 1 day work = $\frac{1}{15}$

(A+B)'s 1 day work = $\frac{1}{10}+\frac{1}{15}=\frac{5}{30}$ =16

A and B together will take 6 days to complete the work.

Question 2:

Solution:

(c) $7\frac{1}{2}$ days

A man can do a work in 5 days.

The man's 1 day work = $\frac{1}{5}$

The man and the son can do the work in 3 days.

The man and his son's 1 day work = $\frac{1}{3}$

Let the son's 1 day work be $\frac{1}{x}$

Therefore, $\frac{1}{3}$

Let the son's 1 day work be $\frac{1}{x}$

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

or, $\frac{1}{x} =, \frac{1}{3} - \frac{1}{5} = \frac{5-3}{15} = \frac{2}{15}$

x = $\frac{15}{2}$ days

Question 3:

Solution:

(d) 48 days

A can do a job in 16 days.

B can do the job in 12 days.

Suppose C can do the job in x days. A's 1 day work = $\frac{1}{16}$

B's 1 day work = $\frac{1}{12}$

C's 1 day work = $\frac{1}{x}$

A, B and C together can complete the work in 6 days.

(A+B+C)'s 1 day work = 16

Therefore, $16 = \frac{1}{16} + \frac{1}{12} + \frac{1}{x}$

$$\frac{1}{x} = 16 - \frac{1}{16} - \frac{1}{12}$$

$$\frac{1}{x} = \frac{8-3-4}{48}$$

$$= \frac{1}{48} x$$

$$= 48$$

Therefore, C alone can complete the job in 48 days.

Question 4:

Solution:

(a) 30 days

Let B take x days to complete the work.

Then A takes $(x + \frac{50}{100} x) = 1.5x$

A's 1 day's work = $\frac{2}{1.5x} = \frac{2}{3x}$

B's 1 day's work = 1x

(A+B) takes 18 days to complete the work

(A+B)'s 1 day's net work = $\frac{1}{18}$

or $\frac{1}{18} = \frac{2}{3x} + \frac{1}{x}$

$$\frac{1}{18} = \frac{5}{3x}$$

By cross-multiplication, we get:

x=30 days

∴ B alone will take 30 days to complete the work.

Question 5:

Solution:

(c) 36 days

Let A take x days to complete the work.

Then B takes 2x days to complete the work.

A's 1 day's work= $\frac{1}{x}$

B's 1 day's work= $\frac{1}{2x}$

A and B take 12 days to complete the work.

Net work done by (A+B) in 1 day= $\frac{1}{12} = \frac{1}{x} + \frac{1}{2x}$

$$\frac{1}{12} = \frac{3}{2x}$$

$$2x = 36$$

$$X = 18$$

A can complete the work by himself in 18 days.
B will take 36 days, i.e., twice as long as the time taken by A.

Question 6:
Solution:
(c) Rs. 1800

Since the wage distribution will follow the work distribution ratio, we have:

Work done by A in 1 day = $\frac{1}{10}$

Work done by B in 1 day = $\frac{1}{15}$

Net work done by (A+B) in 1 day = $\frac{1}{10} + \frac{1}{15} = \frac{5}{30} = \frac{1}{6}$

i.e., (A+B) will take 6 days to complete the work.

A's share of work in a day = $\frac{1}{10} \div \frac{1}{6}$

$$= \frac{1}{10} \times 6$$

$$= \frac{6}{10} = \frac{3}{5}$$

∴ A's wage = $\frac{3}{5} \times 3000$=Rs 1800

Question 7:
Solution:
(c) 4:3

The number of days taken for working is the reciprocal of the rate of work.

i.e., number of days taken = $\frac{1}{rateofwork} = \frac{1}{3/4} = \frac{4}{3}$

Question 8:
Solution:
(c) 10 days

(A+B) can do a work in 12 days.
(B+C) can do a work in 20 days.
(C+A) can do a work in 15 days.
Now, we have:

Work done by (A+B) in 1 day = $\frac{1}{12}$

Work done by (B+C) in 1 day = $\frac{1}{20}$

Work done by (C+A) in 1 day = $\frac{1}{15}$

Net work done by 2(A+B+C) = $\frac{1}{12} + \frac{1}{20} + \frac{1}{15}$

$$= \frac{5+3+4}{60}$$

$$= \frac{12}{60} = 15$$

Net work done by (A+B+C) in 1 day= $\frac{1}{10}$

∴If A, B and C work together, they will complete the work in 10 days.

Question 9:
Solution:
(c) 4 days

Three men can complete the work in 12 days.
Thus, one man can complete the work in 36 days.

Rate of work done by one man in 1 day $= \frac{1}{36}$

Similarly, rate of work done by one woman in 1 day $= \frac{1}{5 \times 12} = \frac{1}{60}$

Now, six men will do $\frac{6}{36}$, i.e., $\frac{1}{6}$ unit of work in a day.

Five women will do $\frac{5}{60}$, i,e., $\frac{1}{12}$ unit of work in a day

$\therefore$ Total work done in 1 day $= \frac{1}{6} + \frac{1}{12} = \frac{1}{4}$ unit

Thus, six men and five women will take 4 days to complete the work.

The work can be completed in 4 days.

Question 10:

Solution:

(a) 10 days

Work done by A in 1 day $= \frac{1}{15}$

B is 50% more efficient than A.

$\therefore$ Work done by B in 1 day $= \frac{150}{100} \times \frac{1}{15} = \frac{1}{10}$

Thus, B can complete the work in 10 days.

Question 11:

Solution:

(c) 6 hours

Time taken by A to finish the piece of work $= 7\frac{1}{2}$ hours $= \frac{15}{2}$ hours

Work done by A in 1 hour $= \frac{2}{15}$

Let B take x hours to finish the work.

Work done by B in 1 hours $= \frac{1}{x}$

A can work 20% less than B, or A can do 45 of B's work.

Now, $\frac{\frac{4}{5}}{1} = \frac{\frac{2}{15}}{\frac{1}{x}}$

$$\frac{4}{15}=\frac{2x}{15}$$

$$x=\frac{15\times 4}{5\times 2}=6 \text{ hours}$$

Question 12:

Solution:

(b) 5 days

A can complete the work in 20 days.

Work done by A in 1 day= $\frac{1}{20}$

B can complete the work in 12 days.

Work done by B in 1 day= $\frac{1}{12}$

In 9 days, B completes $\frac{9}{12}$, i.e., $\frac{3}{4}$ of the work and leaves 1-$\frac{3}{4}$, i.e., $\frac{1}{4}$ of the work undone.∴ Time taken by A= $\frac{1}{4}\div\frac{1}{20}=\frac{1}{4}\times 20 = 5$ days

Question 13:

Solution:

(c) $6\frac{2}{3}$ days

A can do the piece of work in 25 days.

Work done by A in 1 day= $\frac{1}{25}$

B can do the same work in 20 days.

Work done by B in 1 day= $\frac{1}{20}$

A alone completes $\frac{10}{25}$, i,e., $\frac{2}{5}$ of the work in 10 days.

Now, work remaining =1-$\frac{2}{5}=\frac{3}{5}$

Work done by (A+B) in 1 day= $\frac{1}{25}+\frac{1}{20}=\frac{9}{100}$

∴ Time taken if they work together= $\frac{3}{5}\div\frac{9}{100}$

$$= \frac{3}{5} \times \frac{100}{9} = \frac{20}{3} \text{ days}$$

Question 14:
Solution:
(b) 12 minutes

First pipe can fill a tank in 20 minutes.
Second pipe can fill the tank in 30 minutes.

Part of tank filled by the first pipe in one minute = $\frac{1}{20}$

Part of tank filled by the second pipe in one minute $\frac{1}{30}$

Part of tank filled by both pipes in one minute = $\frac{1}{20} + \frac{1}{30}$

$$= \frac{5}{60} = \frac{1}{12}$$

Thus, it takes 12 minutes to fill the tank using both the pipes.

Question 15:
Solution:
(c) 16 hours

A tap can fill a cistern in 8 hours.

Part of cistern filled in one hour = $\frac{1}{8}$

A tap can empty the cistern in 16 hours.

Part of cistern emptied in one hour =- $\frac{1}{16}$ (negative sign shows that the cistern is being drained)

∴ Part of cistern filled in one hour = $\frac{1}{8} - \frac{1}{16} = \frac{1}{16}$

Time required to fill the cistern = 16 hours

Question 16:
Solution:
(d) 14 hours

A pump can fill a tank in 2 hours.

Part of the tank filled by the pump in one hour = $\frac{1}{2}$

Suppose the leak empties a full tank in x hours.

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

Part of tank filled in one hour = $\frac{1}{2}-\frac{1}{x}$ = 37 (given)

$\frac{1}{x}=\frac{1}{2}-\frac{3}{7}$

$\frac{1}{x}=\frac{7-6}{14}$

$\frac{1}{x}=\frac{1}{14}$

x = 14 hours

Question 17:

Solution: (b) 7 hours 30 minutes

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

Part of the tank filled by the second pipe in one hour = $\frac{1}{12}$

Part of the tank filled by the third pipe in one hour = $-\frac{1}{20}$

Part of the tank filled by three pipes in one hour = $\frac{1}{10}+\frac{1}{12}-\frac{1}{20}=\frac{2}{15}$

Total time taken to fill the tank = $\frac{15}{2}$ hrs= 7 hours 30 minutes

Test paper

Page no.: 176

Question 1:

Solution:

A can do a piece of work in 10 days.

A's 1 day work = $\frac{1}{10}$

B can do a piece of work in 15 days.

B's 1 day work = $\frac{1}{15}$

(A+B)'s 1 day work = $\frac{1}{10}+\frac{1}{15}$

$$= \frac{3+2}{30}$$

$$= \frac{5}{30} = \frac{1}{6}$$

A and B working together can complete the work in 6 days.

Question 2:

Solution:

(A+B) can do a work in 15 days.

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

(B+C) can do a work in 12 days.

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

(C+A) can do a work in 20 days.

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

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

$$= \frac{4+5+3}{60}$$

$$= \frac{12}{60} = \frac{1}{5}$$

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

A, B and C working together require 10 days to complete the work.

Question 3:

Solution:

Tap A can fill a cistern in 8 hours.

Part of cistern filled by Tap A in 1 hour= $\frac{1}{8}$

Tap B empties the cistern in 12 hours.

Part of cistern emptied by Tap B in 1 hour = $-\frac{1}{12}$ (negative sign shows that tap B drains the tank)

Part of cistern filled in one hour when both taps are opened together = $\frac{1}{8} - \frac{1}{12} = \frac{3-2}{24} = \frac{1}{24}$

Therefore, it will take 24 hours to fill the cistern.

Question 4:

Solution:

Work of 2 men = Work of 3 women

Work of 1 man = $\frac{3}{2}$ women

Three women can do a piece of work in 16 days.

As 4 men and 6 women = $(4\times\frac{3}{2})$ women + 6 women = 6 women + 6 women = 12 women

Also, 3 women can do the work in 16 days.

So, work done by 3 women in one day = $\frac{1}{16}$ $\therefore$ Work done by 1 woman in one day = $\frac{1}{48}$

Work done by 12 women in one day = $\frac{1}{4}$

Thus, 4 men and 6 women will complete the work in 4 days.

Question 5:

Solution:

Time taken by the pipe to fill the cistern = 9 hours

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

Suppose the leak empties the full cistern in x hours

Part of the cistern emptied in one hour = - $\frac{1}{x}$ (negative sign implies a leak)

Time taken by the cistern to fill completely due to the leak = 10 hours

Part of the cistern filled in one hour due to the leak = $\frac{1}{10}$

$\therefore \frac{1}{10} = \frac{1}{9} - \frac{1}{x}$

$\frac{1}{x} = \frac{1}{9} - \frac{1}{10}$

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

x = 90 hours

Therefore, the leak will empty a full cistern in 90 hours.

Mark () against the correct Solution in each of the following;

Question 6:

Solution:

(b) 3:2

Rates at which taps A and B work = 2:3

The ratio of time taken by taps A and B to fill the cistern = $\frac{1}{Rate at which taps A and B work}$

1Rates at which taps A and B work = $\frac{1}{2/3}$

$= \frac{3}{2} = 3:2$

Question 7:

Solution:

(b) $6\frac{2}{3}$ hours

A's 1 hour work = $\frac{1}{12}$

B's 1 hour work = $\frac{1}{15}$

(A+B)'s 1 hour work = $\frac{1}{12} + \frac{1}{15}$

$= \frac{9}{60} = \frac{3}{20}$

Time taken by A and B to complete the work together = $\frac{20}{3} = 6\frac{2}{3}$ hours

Question 8:

Solution:

(a) 10 days

A's 1 day work = $\frac{1}{14}$

B is 40% more efficient than A.

∴ B's 1 day work = $\frac{140}{100} \times \frac{1}{14} = \frac{1}{10}$

B takes 10 days to complete the work.

Question 9:

Solution:

(b) 14 hours

A pump fills a tank in 2 hours.

Part of tank filled by the pump in one hour = 12

Let x hours be the time required for water to leak from the cistern.

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

Time required to fill the leaking cistern = $2\frac{1}{3}=\frac{7}{3}$ hours

Part of tank stored with water in one hour = $\frac{3}{7}$

$$\frac{3}{7}=\frac{1}{2}-\frac{1}{x}$$

$$\frac{1}{x}=\frac{1}{2}-\frac{3}{7}$$

$$\frac{1}{x}=\frac{7-6}{14}$$

$$\frac{1}{x}=\frac{1}{14}$$

x =14 hours

Question 10:

Solution:

(c) 36 hours

Suppose B takes x hours to complete the work.

∴ B's 1 hour work = $\frac{1}{x}$

A works twice as fast as B.

∴ A's 1 hour work = $\frac{2}{x}$

$$\frac{1}{12}=\frac{1}{x}+\frac{2}{x}$$

$$\frac{1}{12}=\frac{3}{x}$$

x = 36 hours

Question 11:

(i) Solution: A tap can fill a tank in 6 hours. In 1 hour, $\frac{1}{6}$ of the tank is filled.

(ii) Solution: 18 hours

(A+B)'s 1 hour work = $\frac{1}{6}$

A's 1 hour work = $\frac{1}{9}$

B's 1 hour work = $\frac{1}{6} - \frac{1}{9}$

$= \frac{3-2}{18} = \frac{1}{18}$

Thus, B takes 18 hours to finish the work.

(iii) Solution: 48 hours

A' s 1 hour work = $\frac{1}{16}$

B's 1 hour work = $\frac{1}{24}$

C's 1 hour work = $\frac{1}{x}$

(A+B+C)'s 1 hour work = $\frac{1}{8}$

Therefore, $\frac{1}{x} = \frac{1}{8} - \frac{1}{16} - \frac{1}{24}$

$\frac{1}{x} = \frac{6-3-2}{48} =$

$\frac{1}{48}$ or, x = 48 hours

Thus, C alone takes 48 hours to complete the work.

(iv) Solution: The time for completion is the reciprocal of the work done in one day.

Therefore, A can complete the whole work in

$\frac{20}{3} = 6\frac{2}{3}$ days