Time and Work

1. **Work from Days:**

   If A can do a piece of work in n days, then A's 1 day's work = $\frac{1}{n}$.

2. **Days from Work:**

   If A's 1 day's work = $\frac{1}{n}$, then A can finish the work in n days.

3. **Ratio:**

   If A is thrice as good a workman as B, then:

   Ratio of work done by A and B = 3 : 1.

   Ratio of times taken by A and B to finish a work = 1 : 3.

If Roger can do a piece of work in 8 days and Antony can complete the same work in 5 days, in how many days will both of them together complete it?

Ans.: Roger's 1 day's work = 1/8

Antony's 1 day's work = 1/5

(Roger +Antony's) 1 day's work = (1/8)+(1/5) = 13/40

Therefore, both Roger and Antony will complete the work in 40/13 = 3 and 1/3 days.

A and B together can complete a piece of work in 15 days and B alone in 20 days. In how many days can A alone complete the work?

Ans.: (A+B)'s 1 day's work = 1/15

B's 1 day's work = 1/20

Therefore, A's 1 day's work = 1/15 – 1/20 = 1/60.

Hence, A alone can complete the work in 60 days.

3. A can do a work in 4 days, B in 5 days and C in 10 days. Find the time taken by A, B and C to do the work together.

A’s 1 day work = ¼

B’s 1 day work = 1/5

C’s 1 day work = 1/10

(A+B+C)’s 1 day work = 1/4 +1/5+1/10 = 11/20.

Hence A, B and C together can do the work in 20/11 days = 1 9/11 days.

A can do a piece of work in 7 days of 9 hours each and B can do it in 6 days of 7 hours each. How long will they take to do it, working together 8 2/5 hours a day.

A can complete the whole work in = 7 × 9 = 63 Hours

A's 1 hours work = 1/63

B can complete the whole work in = 6 × 7

= 42 Hours

B's 1 hours work = 1/42

(A + B)'s 1 hours work = 1/63 + 1/42

= 5/126

Both will finish the work in 126/5 Hours

Number of days required to finish the whole work, working together for $8\frac{2}{5}$ hours each = (126/5) / (42/5)

= 126/5 × 5/42

= 3 days

∴ The number of days required is 3 days.

Rahul takes twice as much as Manick and thrice as much as Sachin to complete a job. If working together, they can complete the job in 4 days, Find the time taken by each of them separately to complete the work.

Rahul takes to complete the job in x hr

Manick takes to complete the job in $\frac{x}{2}$ hr

Sachin takes to complete the job in $\frac{x}{3}$ hr

$\therefore$ Amount of the job Rahul can complete in 1 hr $= \frac{1}{x}$

Amount of the job Manick can complete in 1 hr $= \frac{1}{\frac{x}{2}} = \frac{2}{x}$

Amount of the job Sachin can complete in 1 hr $= \frac{1}{\frac{x}{3}} = \frac{3}{x}$

$\therefore$ The amount of the job they can complete in 4 days,

$$\frac{1}{x} + \frac{2}{x} + \frac{3}{x} = \frac{1}{4}$$

$$\Rightarrow \frac{6}{x} = \frac{1}{4}$$

$$\Rightarrow x = 24$$

Hence, Rahul can complete the job in 24 hrs,

Manick can complete the job in $= \frac{24}{2} = 12$ hrs,

and Sachin can complete the job in $= \frac{24}{3} = 8$ hrs.

A is twice as good a workman as B and together they finish a piece of work in 14 days. In how many days will A alone finish the work?

Let the work done by B be x.

$\therefore$ Work done by A = 2x

Work done by A and B together in 14 days = 1

Work done by A and B together in 1 day = $\frac{1}{14}$

$\Rightarrow$ Work done by A in 1 day + Work done by B in 1 day = $\frac{1}{14}$

$x + 2x = \frac{1}{14}$

$\Rightarrow \ 3x = \frac{1}{14}$

$\Rightarrow \ x = \frac{1}{42}$

Work done by B in 1 day = $\frac{1}{42}$

$\therefore$ Work done by A in 1 day = $\frac{1}{21}$

Hence, to finish the work, A require 21 days.

Hence, A alone can finish the work in 21 days.

One day work by A: One day work by B = 2:1

A's 1 day work = 2/3*1/14 = 1/21

A complete the work in 21 days

George and Victor can finish making a painting in 12 hours, Victor and Sam in 15 hours, Sam and George in 20 hours. Find in how many hours will they together finish the painting?

George and Victor, one hour work, = 1/12
Victor and Sam one hour work = 1/15
Sam and George one hour work = 1/20
George, Victor, and Sam's one hour work = (1/2)(1/12 + 1/15 + 1/20) = 1/10
Therefore, George, Victor, and Sam can finish the painting in 10 hours.

A and B can do a piece of work in 5 days, B and C can do it in 7 days, A and C can do it in 4 days. How long would each take separately to do the same work?

(A + B)'s 1 day's work = 1 /5 ;
(B + C)'s 1 day's work = 1/7 and
(A + C)'s 1 day's work = 1/4
2(A + B + C)'s 1 day's work
∴ (A + B + C)'s 1 day's work = 83/280
A's 1 day's work = (A + B + C)'s 1 day's work - (B + C)'s 1 day's work

$$\text{Similarly, } = \left(\frac{83}{280} - \frac{1}{7}\right) = \frac{43}{280}$$

$$\text{B's 1 day's work} = \left(\frac{83}{280} - \frac{1}{4}\right) = \frac{13}{280}$$

$$\text{C's 1 day's work} = \left(\frac{83}{280} - \frac{1}{5}\right) = \frac{27}{280}$$

Thus time taken by A, B, C is $\frac{20}{43}$ days, $\frac{280}{13}$ days, $\frac{280}{27}$ days respectively

A can do a certain job in 12 days. B is 60% more efficient than A. How many days does B alone take to do the same job.

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

$$\therefore \text{B's 1 days' work} = \frac{1.6}{12} = \frac{16}{120} = \frac{2}{15}$$

$$\therefore \text{B shall complete the work in } \frac{15}{2} \text{ days} = 7\frac{1}{2} \text{ days}$$

A can do a piece of work in 80 days. He work at it for 10 days and then B alone finishes the remaining work in 42 days. In how much time will A and B working together finish the work

A can do a piece of work in 80 days.

$$\text{Work done by A in 1 days} = \frac{1}{80}$$

$$\text{Work done by A in 10 days} = \frac{1}{80} \times 10 = \frac{1}{8}$$

$$\therefore \text{Remaining work to be done by B} = 1 - \frac{1}{8} = \frac{7}{8}$$

$\frac{7}{8}$ of the work is done by B in 42 days

$$\therefore \text{Complete work is done by B in} = 42 \times \frac{8}{7} = 6 \times 8 = 48 \text{ days}$$

$$\text{Work done by A in 1 day} = \frac{1}{80} \text{ and work done by B in 1 day} = \frac{1}{48}$$

$$\therefore \text{A and B's 1 day's work} = \frac{1}{80} + \frac{1}{48} = \frac{8}{240} = \frac{1}{30}$$

∴ Both will finish the work in 30 days.

A can do a piece of work in 10 days and B in 20 days. They worked together but 2 days before the completion of the work, A leaves. In how many days was the work completed.

Let the work will be done in x days.

1 day work of A = 1/ 10

1 day work of B = 1/20

$x - 2 / 10 + x / 20 = 1$

$2x - 4 + x / 20 = 1$

$3x - 4 = 20$

$3x = 24$

$x = 8$ days

Hence the whole work will be done in 8 days.

A and B can do a piece of work in 45 days and 40 days respectively. They began the work together but A leaves after some days and B finishes the remaining work in 23 days. After how long did A leave.

$$\text{A's one day's work} = \frac{1}{45}$$

$$\text{B's one day's work} = \frac{1}{40}$$

$$\therefore (\text{A} + \text{B})\text{'s 1 day's work} = \frac{1}{45} + \frac{1}{40} = \frac{8+9}{360} = \frac{17}{360}$$

$$\text{Work done by B in 23 days} = \frac{1}{40} \times 23 = \frac{23}{30}$$

$$\text{Remaining work} = 1 - \frac{23}{40} = \frac{40-23}{40} = \frac{17}{40}$$

$$(\text{A} + \text{B})\text{'s 1 day work} = \frac{17}{360}$$

$$\frac{17}{40}\text{work done by (A + B) in } 1 \times \frac{360}{17} \times \frac{17}{40} = 9 \text{ Days}$$