Time and Work

$$Speed = \frac{Distance}{Time}$$

Similarly

$$Rate = \frac{Work}{Time}$$

Distance is similar to work

Speed is similar to rate

Q. A can complete a certain work in 20 days and B can complete same work in 30 days then in how many days A and B together can same work?

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	A	B	(A+B)
Time	20	30	60/5=12
Rate	3	2	3+2=5
Work	60	60	60

Alternate:
If A can complete a certain work in a days and B can complete same work in b days then A and B together can complete same work in $\frac{ab}{a+b}$ days

Alternate

Q. A can complete a certain work in 20 days and A & B together can complete same work in 8 days. In how many days B alone can complete same work.?

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Soln:
Work = LCM (8,20) = 80

	A	B	(A+B)
Time	20		8
Rate	4	6	10
work	80	80	80

Time for B = 80/6 = 13.33

Q. A and B can complete a certain work in 20 and 25 days respectively. A starts the work. After 5 days B joins. After 5 more days B leaves then in how many days A can complete the remaining work?

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Solution:

	A	B	(A+B)
Time	20	25	
Rate	5	4	5+4=9
Work	100	100	100

In 5 days A completes = 5×5 = 25

In 5 days A and B complete = 9×5 = 45

Work done = 45+25 = 70

Remaining work = 100- 70 = 30

$$\text{time} = \frac{\text{work}}{\text{rate}} = \frac{30}{5} = 6$$

Q. A, B and C can complete a certain work in 12, 28 and x days respectively. A starts the work and after 3 days B joins. After 1 more day A leaves. After 6 more days C joins and thus work is completed in total 17 days. In how many days C alone can complete same work?

Q. A, B and C can complete a certain work in 12, 28 and x days respectively. A starts the work and after 3 days B joins. After 1 more day A leaves. After 6 more days C joins and thus work is completed in total 17 days. In how many days C alone can complete same work?

Solution:

	A	B	C	
Time	12	28	X	
Rate	7	3		
Work	84	84	84	

Work done by A in 4 days $= 4{\times}7 = 28$

By B in 14 days $= 3{\times}14 = 42$

Remaining work i.e. done by C $= 84{-}(28{+}42) = 14$

Work done by C in 7 day is 14

Therefore for, 84 work in 42 days.

Q. X working alone completes 40% of the job in 6 days. Then he is joined by Y and they together complete the remaining work in 4 days. How long Y alone would take to do the same work?

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Solution:

X – 40% work in 6 days

Therefore, 100% work in 15days.

A in 10 days- $2/3^{rd}$ work

Remaining $1/3^{rd}$ work is done by Y in 4 days therefore

$4 \times 3 = 12$ days

Q. A and B can complete a certain work in 12 and 16 days respectively. A and B work on the alternate days starting from A then in how many days work is completed?

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	A	B	(A+B)
Time	12	16	
Rate	4	3	
work	48	48	

(AB)(AB)(AB)(AB)…….
1 cycle- 2 days – 7 work

Speed α $\dfrac{1}{\text{time}}$

Rate α $\dfrac{1}{\text{Time}}$ (If work is constant)

If A is thrice as efficient as B

A = 3B   or   B = 3A

Work done by B is x/day
Work done by A is 3x/day
Or
If A takes y days then B takes 3y days.

And
 D α S (when time is constant)
Similarly
Work α Rate (when time is constant)

Q. Ratio of efficiencies for A, B and C is 3:4:9 then find the ratio of their time taken to complete the same work?

Q. If A is twice efficient as B and C is thrice efficient as B and A,B and C together can complete same work in 20days then in how many days C alone can complete.

Soln: Let rate of B = x then rate of A = 2x and rate of C = 3x
Rate of C is half of total i.e. combined of A,B & C.
Therefore, time taken by C is double of time taken by all 3.
20×2 = 40

A can complete a certain work in 20 days. A is 25% more efficient than B. In how many days B can complete same work?

A can complete a certain work in 20 days. A is 25% more efficient than B. In how many days B can complete same work?

	A	B
Ratio of rate	5	4
Ratio of time	4	5

4x = 20
⇨ x = 5
⇨ Time for B = 5×5 = 25 days

Q. Pipe A can fill a tank in 24 min and Pipe B can empty same tank in 32min. Both the pipes are opened together then in how many minutes tank is filled?

Soln:

	A	B	(A+B)
Time	24	32	96/1 = 96
Rate	4	-3	4-3 = 1
Work	96	96	96

Q. Pipe A can fill a tank in 18 min and pipe B can empty same tank in 24min. Both the pipes are opened together then after how many minutes pipe B should be closed so that tank is filled in exactly 30min.

Solution:

	A	B	
Time	18	24	
Rate	4	-3	
Work	72 lit		

Intake pipe A in 30min = 30×4 = 120lit

Overflow = 120- 72 = 48

This 48lit is work done by B

$$\text{time} = \frac{\text{work}}{\text{rate}} = \frac{48}{3} = 16\text{min}$$

If 20men take – 30 days
10men take-
40 men take-

$20\times30 = 10\times60 = 40\times15$
A man takes- 600 days
600 men take – 1 day

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

M_1 men can do W_1 work in D_1 days working H_1 hours per day.

If 10 men can make 10 mats in 10 minutes, how much time will it take for one man to make 1 mat?

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$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

M_1 men can do W_1 work in D_1 days working H_1 hours per day.
From this 1 man takes 10 min to make 1 mat.
Therefore, for 1 mat 10 min.

Q. A project was to be completed in 40 days. 16 men were employed and they finished $2/5^{th}$ of the job in 25 days. How many more men should be hired for the remaining days to complete the project on or before time?(Mark all the correct answers)?
(A) 18   (B) 20   (C) 24   (D) 30   (E) 36

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(A) 18   (B) 20   (C) 24   (D) 30   (E) 36

Solution:

$$\frac{16\times25}{2} = \frac{(16+x_{min})\times15}{3}$$

$X_{min} = 24$

Q. 3 Men or 5 women can complete a certain work in 20 days then in how many days 9men and 10 women can complete same work?

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Solution:

3Men = 5Women

6Men = 10 women

9Men+10Women = 9Men+6Men = 15Men

Total work = 20×3Men = 60Men

$$\text{Time} = \frac{\text{work}}{\text{rate}} = \frac{60\text{Men}}{15\text{Men}} = 4\text{days}$$