Time and Work made easy

- Course overview

Presented By

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About me

- M. Tech. from IIT Kharagpur.

- Over 18 years of Corporate experience.

- Teaching from 10+ years

- Core Areas : Mathematics, Aptitude, English.

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Maths is Easy

Introduction

➢ Time & Work considered to be a bit difficult topic. But its not difficult. In fact if core concepts are understood well, it's possible to solve questions easily.

➢ Time & Work is very important topic. Almost all of the competitive exams carry Time & work problems.

➢ This course explains core concept in a very easy way. Also the method to solve problems are explained in simple steps.

➢ Concept and methods are explained with examples for easy understanding.

Objective

➢ Students shall be able to solve Time & work problems easily.

➢ Students develop strong hold on the topic and in-depth knowledge.

➢ Easily understand the core concepts and methods to solve any Time & work problem.

➢ Gateway to get successful in competitive exams.

Course Plan

This course is planned in following way :

❑ Basic understanding of Time & work and its practical usage.

❑ Core concepts explanation with examples.

❑ Easy methods to solve simple problems.

❑ Problems on " Two or more persons working independently"

❑ Problems on "Filling Tank with Taps".

❑ Problems related to "Taps filling and emptying tank"

Maths is Easy

Course Plan

❑ Problems on " Two or more persons working independently and some person leaves early before completion of work".

❑ Problems on " Two or more persons working independently and some person joins late"

❑ Complex Problems on "Filling & emptying Tank with Taps in various scenarios".

❑ Problems related to "when two or more people's work is not given independently"

Course Plan

❑ Problems on " Persons with varying work efficiency".

❑ Difficult Problems on " Persons with different work - time".

❑ Problems on " Alternate days working"

❑ Complex Problems on "Alternate/varied frequency working".

❑ Problems related to "Combination of resources in a group ".

❑ Complex problem on "group working"

❑ Problems which can be solved using algebra

❑ Various miscellaneous scenarios.

Course Plan

❑ Blitz Quiz for practice with speed.

❑ Strategies for quick thinking and fast solutions.

❑ Commonly asked question types.

❑ Tips to be successful in exams for Time & work problems.

❑ Previous years Questions and solutions with easy method.

❑ Mega Quiz.

Time and Work : Importance

- Time and work is very important topic.
- Applicable for most of the competitive exams like Banking, Railways, Management.
- Considered as one of the tough topic.
- But if concept and method are understood well its quite easy.

What is Time and Work ?

In the context of Time & Work topic :

- **Work :** A job assigned to be completed
- **Time :** Amount of time required to complete the assigned work
- **Time and Work :** Given the job, time required to complete the work by one or more resources.

Type of relationship Concept

To understand concept of Time & Work first two type of relationship needs to be known :

- **Directly proportional**

- **Inversely of indirectly proportional**

Type of relationship Example

→Directly proportional

- **Cost – Quantity – Expense**
- **Speed - Distance**

→Inversely of indirectly proportional

- **Speed – Time**
- **Time - Work**

Time and Work concept

➜ **Inversely of indirectly proportional**

■ **Time - Work**

Say X amount of work needs to be done.

• If one resource, it will take more time.

• If two resources, it will take less time

• If three resources, it will take much lesser time.

The more resources ➜

The lesser time needed

Time and Work Example

Say **A** can do a work in 10 days alone.

If **B** also joins with **A** to do same work.

Then, work can be completed in lesser than 10 days or not ????

Similarly, if **A** can do a work in 10 days alone and **B** also can do same work in 15 days alone.

Then, what if both **A and B work together** ????

Time and Work types of problems

Following types of problems are useful from exams perspective:

- Two or more people work together to complete work
- Two or more pipes to fill Tank
- Two or more pipes fill Tank, another empties it.
- Two or more people started work then one left in between
- Two or more people started work then another joins.
- Working on alternate days.
- Working in different intervals.

Time and Work concept

→Inversely proportional

The more resources →

The lesser time needed

Core concepts :

✓   *Find amount of work in unit time.*

✓   *Total work is considered as one unit.*

Let's understand it better with help of an example.

Time and Work Example

Q: **A** can do a work in 10 days alone. **B** also can do same work in 15 days alone. If both A and B work together, how much time it would take to complete the work?

Method :

A can complete the work in 10 days

➔ One day work of **A** = 1/10 part of work

B can complete the work in 15 days

➔ One day work of **B** = 1/15 part of work

Time and Work Example

➔ One day work of **A** = 1/10 part of work

➔ One day work of **B** = 1/15 part of work

If both A and B work together,

then amount of work that can be completed in 1 day =

1/10 + 1/15 right??

➔ Work completed in 1 day = 1/10 + 1/15 = (3+2)/30

➔ Work completed in 1 day = 5/30 = 1/6

1/6th of work can be completed in one day.

Then whole work can be completed in 6 days

Time and Work Example

Q: Tap **A** can fill a tank in 6 hours and Tap **B** can fill the same tank in 12 hours. If both Tap A and B are opened simultaneously how much time it would take to fill the tank completely ?

Method :

Tap A can fill the tank in 6 hours

➔ In One hour Tap **A** will fill = 1/6   part of tank

Tap B can fill the tank in 12 hours

➔ In One hour Tap **B** will fill = 1/12   part of tank

Time and Work Example

➔ In One hour Tap **A** will fill = 1/6   part of tank

➔ In One hour Tap **B** will fill = 1/12   part of tank

If both Tap A and B are opened together,

then in 1 hour amount of Tank filled would be

1/6   + 1/12   right??

➔ amount of Tank filled in 1 hour = 1/6 + 1/12 = (2+1)/12

➔   = 3/12 = 1/4

Full tank can be filled 4 /1 hours i.e.   4 hours.

Then in 4 hours, full tank can be filled.

Time and Work Example

Q: Tap **A** can fill a tank in 8 hours and Tap **B** can fill the same tank in 10 hours, while Tap **C** can empty the tank in 12 hours. If all Tap A, B and C are opened simultaneously how much time it would take to fill the tank completely ?

Note here that tap C would empty the tank

Tap A can fill the tank in 8 hours

➔ In One hour Tap **A** will fill = 1/8 part of tank

Tap B can fill the tank in 10 hours

➔ In One hour Tap **B** will fill = 1/10 part of tank

Tap C can empty the tank in 12 hours

➔ In One hour Tap **C** will empty = 1/12 part of tank

Time and Work Example

→ In One hour Tap **A** will fill = 1/8 part of tank

→ In One hour Tap **B** will fill = 1/10 part of tank

→ In One hour Tap **C** will fill = -1/12 part of tank

If all Taps A, B and C are opened together,

then in 1 hour amount of Tank filled would be

1/8 + 1/10 - 1/12 right??

→ amount of Tank filled in 1 hour = 1/8 + 1/10 - 1/12

→ = (15+12 -10) /120 = 17/120

Full tank can be filled 120 / 17 hours i.e. 7 and 1/19 hours.

Hence in 7 1/19 hours, full tank can be filled.

Key Aspects

- Very important topic from all exams perspective.

- Time and work is considered difficult topic but once core concept is understood it can be done easily.

- Finding *amount of work in unit time* important step.

- In upcoming lessons we will learn how to solve more difficult problems.

Time and Work concept

➡ **Inversely proportional**

The more resources ➡

The lesser time needed

Core concepts :

✓   *Find amount of work in unit time.*

✓   *Total work is considered as one unit.*

Let's understand it better with help of an example.

Time and Work – Varying efficiency

Q: **A** can do a work in 14 days. **B** is 40% more efficient than A. How many days does B alone take to do the same job?

Note : Work efficiency of A and B is different.

Concept : *B is more efficient means B will take less time than A for same work.*

B is 40% more efficient means :

➔ If A takes 140 units time of work, then B will take only 100 units for same work.

Ratio of Time taken by A and B is 140 : 100

Time and Work – Varying efficiency

On simplification : Ratio of Time taken by A and B is 7 : 5

Given that : A can complete work in 14 days.

Let B can complete in T days.

Forming ratio and proportion →

   7 : 5 :: 14 : T

Using rule of proportion,

7 * T = 5 * 14

T = 5 * 14 / 7   ➔   T = 10

   B will take 10 days.

Time and Work – One person leaves

Q: **A** can do a work in 10 days and **B** in 20 days. The work together but 2 days before the completion of the work, A leaves. In how many days was the work completed ?

Note : Here A leaves before completion of Work

Concept : *To solve this type of Question making a diagram is very useful. See below*

A and B   **B only**

← 2 Days →

START   **Finish**

Time and Work – One person leaves

A and B | B only

START

2 Days

Finish

Steps :
1. First find B's 2 days work.
2. Then find remaining work.
3. Find one day work of A and B together.
4. Find number of days A and B worked together to complete remaining work.
5. Find total duration of work completion.

Time and Work – One person leaves

A and B | **B only**

START

← 2 Days →

Finish

Solution :

1. B completes full work in 20 days so B's 1 day work = 1/20

   *Hence B's 2 day work = 2/20 = **1/10***

2. Full work is 1 unit. So remaining work = 1 – 1/10 = **9/10**

3. A complete full work in 10 days so A's 1 day work = 1/10

   *Hence 1 day work of A and B together is 1/20 + 1/10 = **3/20***

4. Number of days A and B worked together

   = $\dfrac{\text{Work remaining}}{(1 \text{ day work A \& B})}$

Time and Work – One person leaves

Solution :

4. Number of days A and B worked together

$$= \frac{\text{Work remaining}}{(1 \text{ day work A \&B})}$$

$$= \frac{9/10}{3/20} = 6 \text{ days}$$

Hence total time taken to complete work = 6 + 2 = 8 Days

Key Aspects

- Very important topic from all exams perspective.

- Finding *amount of work in unit time* important step.

- In scenarios when someone left in between, making diagram helps to visualize the problem better.

- In upcoming lessons we will learn how to solve more difficult problems.

Time and Work concept

➔Inversely proportional

The more resources ➔

The lesser time needed

Core concepts :

- ✓ *Find amount of work in unit time.*
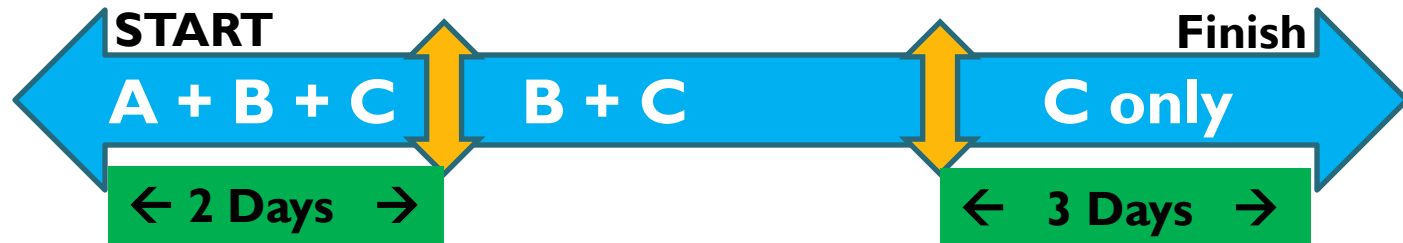- ✓ *Total work is considered as one unit.*

Let's understand it better with help of an example.
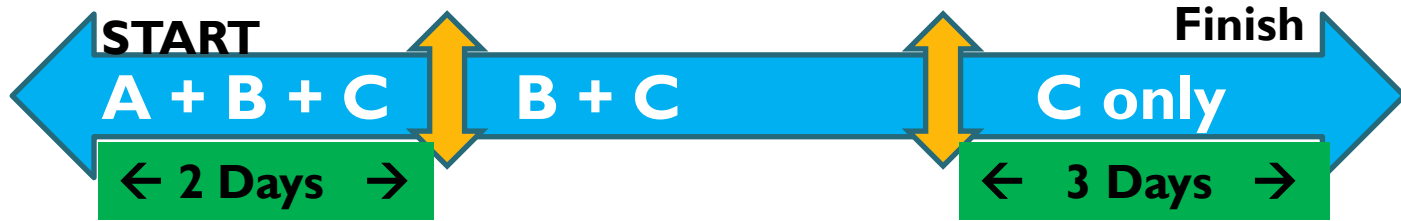
Time and Work – multiple persons leaves

Q: **A** can do a work in 10 days and **B** in 12 days and **C** in 15 days. All of them began work together but A left the work after 2 days of start and B, 3 days before the completion of work. How long did the work lasts ?

Note : Here both A and B leaves before completion of Work

**Concept :** Let's *make a diagram to visualize the problem*

START		Finish
A + B + C	**B + C**	**C only**
← 2 Days →		← 3 Days →

Time and Work – multiple persons leaves

START

Finish

| A + B + C | B + C | C only |

← 2 Days →

← 3 Days →

Steps :
1. First find C's 3 days work.
2. Find one day work of A, B and C together.
3. Then find 2 days work of A+B+C
4. Then find remaining work after #1 and #3 are done.
5. Find number of days B and C worked together to complete remaining work.
6. Find total duration of work completion.

Time and Work – multiple persons leaves

START   **Finish**

A + B + C	B + C	C only
← 2 Days →		← 3 Days →
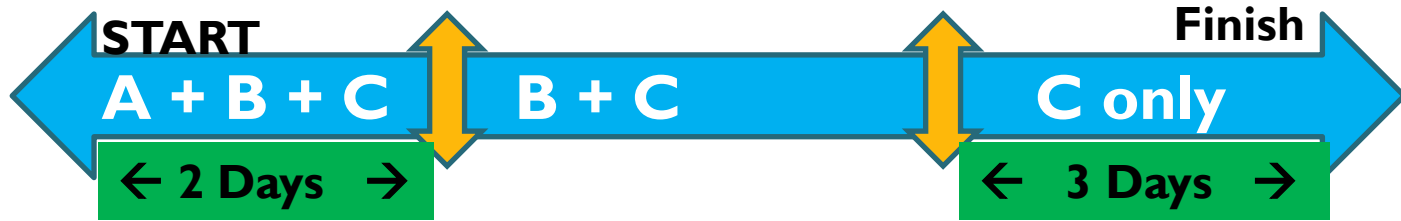
Solution :

1. C completes full work in 15 days so C's 1 day work = **1/15**

   *Hence C's 3 day work = 3 / 15 = **1 / 5***

2. Full work is 1 unit. So **remaining work** = 1 – 1/5 = **4 / 5**
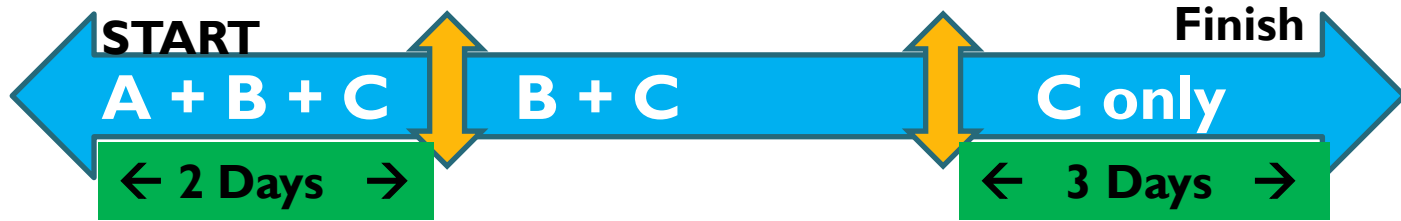
3. A complete full work in 10 days so A's 1 day work = **1/10**

4. B complete full work in 12 days so B's 1 day work = **1/12**

   Hence 1 day work of A, B and C together is 1/10 + 1/12 + 1 / 15

   *= (6+5+4)/60 = 15 / 60 = **1/4***

Time and Work – multiple persons leaves

START　　　　　　　　　　　　　　　　　　　　　　**Finish**

A + B + C	B + C	C only

← 2 Days →　　　　　　　　　　　← 3 Days →

Solution :

5.   A, B and C together   1 day work = 1 / 4
      So 2 day work of A, B and C together = **1 / 2**
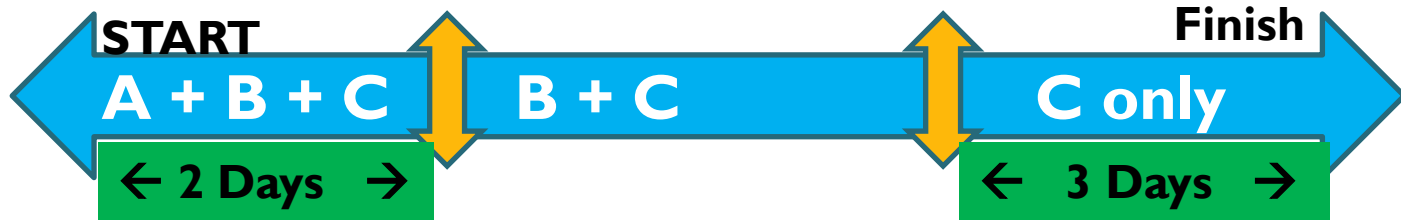
6.   **Remaining work =** 4 / 5 - 1 / 2 = (8-5) / 10 =   **3 / 10**

7.   B and C's 1 day work = 1/12 + 1/15 =   (5+4) / 60 = 9/60 = **3/20**

8.   Number of days B and C worked together

$$= \frac{Work \ remaining}{(1 \ day \ work \ of \ B \ \& \ C \ )}$$

Time and Work – multiple persons leaves

START   **Finish**

| A + B + C | B + C | C only |

← 2 Days →   ←   3 Days   →

Solution :

8.   Number of days B and C worked together

= $\dfrac{\text{Work remaining}}{\text{(1 day work of B \& C)}}$

= $\dfrac{3 / 10}{3 / 20}$ =   2 days

Total time taken to complete work = 2 + 2 + 3 = 7 Days

Time and Work – Example

Q: **A** and **B** can do a piece of work in 12 days and **B** and **C** together can do it in 15 days. If A is twice as good as workman as **C,** find in how much time B alone can do it.

Note : Here work time is given as A and B together, not individually.

Concept : A is twice as good as C.

Means if A completes certain amount of work in 1 unit time then C can do same work in 2 units of time.

➔ A's 1 day work = C's 2 day work

We will solve this problem by forming equation.

Time and Work – Example

➔   A's 1 day work = C's 2 day work   …equation(1)

A + B   completes work in 12 days

So A's 1 day work +B's 1 day work = 1/12 (now subs from eq(1)

➔ C's 2 day work + B's 1 day work = 1/12 …equation(2)

B + C   completes work in 15 days

So C's 1 day work + B's 1 day work = 1/15 …equation(3)

Now to find C's 1 day work subtract eq(3) from eq(2)

➔ C's 1 day work = 1/12 - 1/15   =   (5-4) /60 = **1 / 60**

➔ B's 1 day work = 1/15 – 1/60 = (4-1)/60 = **3 / 60 = 1/20**

B alone can finish the work in 20 days

Key Aspects

- Very important topic from all exams perspective.

- Finding *amount of work in unit time* important step.

- In scenarios when someone left in between, making diagram helps to visualize the problem better.

- If combined work is given, the forming equations is helpful.

- In upcoming lessons we will learn how to solve work problems involving alternate days working.

Time and Work concept

➔ **Inversely proportional**

The more resources ➔

> **The lesser time needed**

Core concepts :

✓   *Find amount of work in unit time.*

✓   *Total work is considered as one unit.*

Let's understand it better with help of an example.

Time and Work – Alternate day problem

Q: **A** and **B** working separately can do a work in 9 days and 12 days respectively. If they work for a day alternately, **A** starting, in how many days the work will be completed ?

Note : **Here A and B are working on alternate days**

Let's *make a diagram to visualize the problem*

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
A	B	A	B	A	B

A starting

Core Concept : Let's make pair of 2 days

Time and Work – Alternate day problem

Core Concept : Let's make pair of 2 days

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
A	B	A	B	A	B

A starting

Method :
1. Find A's Day 1 work.
2. Find B's Day 2 work.
3. Since A and B are working on alternate days, find first 2 day's work of A and B.
4. Find how many pair of days required to complete the work.
5. If full work still is not completed then find remaining work.
6. Find who will work on that day and duration of work needed.

Time and Work – Alternate day problem

Core Concept : Let's make pair of 2 days

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
A	B	A	B	A	B

A starting

Solution :

➔ A can do whole work in 9 days. ➔ A's Day 1 work = 1/9

➔ B can do whole work in 12 days. ➔ B's Day 2 work = 1/12

➔ First 2 day's work of A and B = 1/9 + 1/12 = **7/36**

Important

First 2 day's work of A and B = **7/36**

How many pair of days required to complete the full work or closest to it ?????

Time and Work – Alternate day problem

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
A	B	A	B	A	B

A starting

➔ First 2 day's work of A and B = **7/36**

How many pair of days needed to complete the full work or closest to it?
(7 / 36) x 5 = 35 / 36 ➔ closest to 1 i.e. Full work

= 5 pair of days = 10 Days

➔ In 10 days 35 / 36 part of work can be completed.

➔ Remaining work = 1 - 35/36 = **1 / 36**

➔ Now on **11th Day** , it's **A's turn to work**.

➔ 1 day of A's work = 1/9.

➔ Time required to complete remaining work = work remaining / A's 1 day work

➔ = (1/36) / (1/9) = **¼** day

➔ Total time needed is **10 ¼ days**

Time and Work – Alternate day problem

Q: **Swati** and **Vaishali** working separately can do a work in 12 days and 15 days respectively. If they work for a day alternately, Swati starting, in how many days the work will be completed ?

Let's make a diagram to visualize the problem

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
S	V	S	V	S	V

Swati starting

Core Concept : Let's make pair of 2 days

Time and Work – Alternate day problem

Core Concept : Let's make pair of 2 days

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
S	V	S	V	S	V

Swati starting

Method :
1. Find Swati's Day 1 work.
2. Find Vaishali's Day 2 work.
3. Since Swati and Vaishali are working on alternate days, find first 2 day's work of Swati and Vaishali.
4. Find how many pair of days required to complete the work.
5. If full work still is not completed then find remaining work.
6. Find who will work on that day and duration of work needed.

Time and Work – Alternate day problem

Core Concept : Let's make pair of 2 days

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6

Swati starting

S	V	S	V	S	V

Solution :
➔ Swati can do whole work in 12 days. ➔ Swati's Day 1 work = 1/12
➔ Vaishali can do whole work in 15 days. ➔ Vaishali's Day 2 work = 1/15
➔ First 2 day's work of both = 1/12 + 1/15 = **9/60 = 3 / 20**

Important
First 2 day's work of Swati and Vaishali = **3/20**

How many pair of days required to complete the full work or closest to it ?????

Time and Work – Alternate day problem

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
S	V	S	V	S	V

Swati starting

➔ First 2 day's work of Swati and Vaishali = **3 / 20**

How many pair of days needed to complete the full work or closest to it?

(3 / 20) x 6 = 18 / 20 = 9 / 10 ➔ closest to 1 i.e. Full work

= 6 pair of days = 12 Days

➔ In 12 days 9 / 10 part of work can be completed.

➔ Remaining work = 1 - 9/10 = **1 / 10**

➔ Now on **13th Day** , it's **Swati's turn to work**.

➔ 1 day work of Swati is = 1/12

➔ Amount of work Swati can complete on 13th day = 1/12

Time and Work – Alternate day problem

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
S	V	S	V	S	V

Swati starting

➔ Remaining work = 1 - 9/10   = **1 / 10**

➔ Amount of work Swati can complete on **13th day = 1/12**

➔ Work remaining after 13 days of work = 1/10 - 1/12 = **1 /60**

➔ Now on **14th Day** , it's   **Vaishali's turn to work**.

➔ 1 day work of Vaishali is = 1/15

➔ Amount of work Vaishali can complete on 14th day = 1/15

Time required to complete remaining work by Vaishali

= work remaining / Vaishali's 1 day work

➔   = (1/60) / (1/15) = **¼** day

➔ Total time needed is   **13 ¼ days**

Key Aspects

- Very important topic from all exams perspective.

- Finding *amount of work in unit time* important step.

- In scenarios when work is being done on alternate days by different people, forming pair of days is helpful..

- Find whose turn on the last day is important.

- In upcoming lessons we will learn how to solve work problems involving multiple people together.

Time and Work concept

→Inversely proportional

The more resources →

The lesser time needed

Core concepts :

✓   *Find amount of work in unit time.*

✓   *Find amount of work of 1 resource in unit time.*

✓   *Total work is considered as one unit.*

Let's understand it better with an example.

Time and Work – multiple resources problem

Q: **24 men, working 8 hours a day can do a work in 21 days. In how many days will 32 men working 7 hours a day do the same work ?**

Here few points to note :

- *Multiple resources are mentioned.*
- *Different working hours per day*
- *Numbers of days are also different.*

Maths is Easy

Core Concept : Find 1 man – 1 hour work

Time and Work – multiple resources problem

Q: 24 men, working 8 hours a day can do a work in 21 days. In how many days will 32 men working 7 hours a day do the same work ?

Method :

24 Men, 8 Hours daily work in 21 days ➔ full work ➔ 1

24 Men, 8 Hours daily work in **1 day** ➔ 1 / 21

24 Men, **1 Hour** daily work in 1 day ➔ 1/(21* 8)

1 Man, 1 Hour daily work in 1 day ➔ 1/(21* 8 * 24)

Core Concept : Find 1 man – 1 hour work

Time and Work – multiple resources problem

Q: 24 men, working 8 hours a day can do a work in 21 days. In how many days will 32 men working 7 hours a day do the same work ?

Solution :

1 Man, 1 Hour daily work in 1 day ➔   1/(21* 8 * 24)

To find days require for 32 men working 7 hours a day :

1 Man, **7 Hours** daily work in 1 day ➔   7/(21* 8 * 24)

32 Men, 7 Hours daily work in 1 day ➔   (7*32)/(21* 8 * 24)

32 Men, 7 Hours per day will need ➔(21* 8 * 24) /(7*32) days

   =   *18 Days*

Time and Work – multiple resources problem

Q: 8 men and 12 boys can do a piece of work in 10 days. 6 men and 12 boys can do the same in 12 days. Find in how many days 6 men and 2 boys can do same work ?

Here few points to note :

- *Multiple resources are mentioned.*
- *Different types of resources like men, boys..*
- *Numbers of days are also different.*

Core Concept : Find 1 resource – 1 unit work

Time and Work – multiple resources problem

Q: **8 men and 12 boys can do a piece of work in 10 days. 6 men and 12 boys can do the same in 12 days. Find in how many days 6 men and 2 boys can do same work ?**

Method :

8 Men and 12 boys completes full work in 10 days

➔ 8 Men and 12 boys 1 day work is 1/10   (equation 1)

6 Men and 12 boys completes full work in 12 days

➔ 6 Men and 12 boys 1 day work is 1/12   (equation 2)

Core Concept : Find 1 man – 1 hour work

Time and Work – multiple resources problem

Q: **8 men and 12 boys can do a piece of work in 10 days. 6 men and 12 boys can do the same in 12 days. Find in how many days 6 men and 2 boys can do same work ?**

➔ 8 Men and 12 boys 1 day work is 1/10 (equation 1)

➔ 6 Men and 12 boys 1 day work is 1/12 (equation 2)

equation 2 – equation 1 will give 2 men 1 day work

➔ 2 Men 1 day work is = 1/10 - 1/12 = 1/60

➔ 1 Man 1 day work is = 1/(2*60) = 1/120

➔ 8 Men 1 day work is = 8/120 = 1 / 15

Time and Work – multiple resources problem

Q: 8 men and 12 boys can do a piece of work in 10 days. 6 men and 12 boys can do the same in 12 days. Find in how many days 6 men and 2 boys can do same work ?

➜ 8 Men 1 day work is = 1 / 15   (1 Man 1 day work is = 1/120)

➜ 12 boys 1 day work = 1/10 - 1/15   =   1/30

➜ 1 boy 1 day work = 1/(30*12) = 1/360

Now we know 1 day work of 1 man as well as 1 day work of 1 boy.

➜ **6 men 1 day work = 6/120 = 1/20**

➜ **2 boys 1 day work = 2/360 = 1/180**

➜ **6 men and 2 boys 1 day work = 1/20 + 1/180 = 10/180 = 1/18**

6 men and 2 boys will take 18 days to complete work.

Key Aspects

- Very important topic from all exams perspective.

- Finding *amount of work in unit time per resource* is important.

- In upcoming lessons we will learn how to solve more difficult problems involving multiple people together.

My courses

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SPEED MASTER

Time and Work concept

→ **Inversely proportional**

The more resources →

The lesser time needed

Core concepts :

- ✓ *Find amount of work in unit time.*
- ✓ *Find amount of work of 1 resource in unit time.*
- ✓ *Total work is considered as one unit.*

Let's understand it better with an example.

Time and Work – High level problems

Q: **Efficiency of A and B are in ratio 4:5, B and C in ratio 2:3 and C and D in ratio 4:5. If C takes 20 days more than D to complete the work then in how many days will A, B, C and D together complete the work ?**

Here few points to note :

- *Actual number of days is not provided but Work efficiency ratios of A,B,C and D are given.*

- *If we can find actual work efficiency in days of any one of the above then other's time can be found out.*

- *And then time required for working together can be calculated.*

Core Concept : Find individual's work

Time and Work – High level problems

Q: **Efficiency of A and B are in ratio 4:5, B and C in ratio 2:3 and C and D in ratio 4:5. If C takes 20 days more than D to complete the work then in how many days will A, B, C and D together complete the work ?**

Work efficiency of C : D = 4:5   *(D is more efficient than C)*

→ If C takes 5x days then D takes 4x days

→ Given 5x – 4x = 20 days ➡   x = 20

→ Means C takes 100 days & D takes 80 days to do same work.

Now since C's work is known and ratio of B:C work efficiency is given, B's work can be found out.

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Time and Work – High level problems

Q: Efficiency of A and B are in ratio 4:5, B and C in ratio 2:3 and C and D in ratio 4:5. If C takes 20 days more than D to complete the work then in how many days will A, B, C and D together complete the work ?

C takes 100 days & D takes 80 days to do same work.

➔ B:C work efficiency is 2 : 3 (C is 1.5 times more efficient than B)

➔ Since C takes 100 days, B will take 150 days for same work.

➔ A:B work efficiency is 4 : 5 (B is 5/4 = 1.25 times more efficient than A)

➔ Since B takes 150 days, A will take 187.5 days for same work.

A ➔ 187.5 days   B ➔ 150 days

C ➔ 100 days   D ➔ 80 days

Time and Work – High level problems

Q: Efficiency of A and B are in ratio 4:5, B and C in ratio 2:3 and C and D in ratio 4:5. If C takes 20 days more than D to complete the work then in how many days will A, B, C and D together complete the work ?

A ➜ 187.5 days   B ➜ 150 days

C ➜ 100 days   D ➜ 80 days

(A, B, C, D)'s   1 day work = 1/187.5 + 1/150 + 1/100 + 1/80

= 69/2000

Days required to complete work together = 2000/69

= **28** 68/69   days = 28.98 days

Time and Work – High level problem

Q: 25 men can do a work in 10 days and 20 children can do the same work in 50 days. 5 men start doing that work. After 10 days how many children should join the 5 men, so that remaining work is finished in 20 days ?

Core Concept : Find 1 person – 1 day work

25 Men, can do a work in 10 days

➔ 1 Man, will do same in **250 days** ➔ **1 Man** 1 day work = 1/250

20 Children, can do a work in 50 days

➔ 1 child, will do same in **1000 days**

    ➔ **1 child** 1 day work = 1/1000

Time and Work – High level problem

Q: 25 men can do a work in 10 days and 20 children can do the same work in 50 days. 5 men start doing that work. After 10 days how many children should join the 5 men, so that remaining work is finished in 20 days ?

1 Man 1day work = 1/250   &   **1 child** 1day work = 1/1000

First 10 days 5 men working. Amount of work completed would be

= 10*5 / 250 = 1/5 part of work

➔ **Remaining work = 1- 1/5 =   4/5**

➔ **Remaining 4/5 work needs to be completed in 20 days.**

➔ **Per day work needed would be   4/5   divided by 20**

= 1/25

Time and Work – High level problem

Q: 25 men can do a work in 10 days and 20 children can do the same work in 50 days. 5 men start doing that work. After 10 days how many children should join the 5 men, so that remaining work is finished in 20 days ?

1 Man 1day work = 1/250   &   **1 child** 1day work = 1/1000

➔ **For 20 days, Per day work needed would be =   1/25**

This work needs to be done by 5 men and some children.

➔ **Out of 1/25 work, 5 men will complete 5 /250 = 1/50 work daily**

➔**So children needs to complete 1/25 – 1/50 = 1/50 work daily**

1 child 1day work = 1/1000

So number of children require to complete work

= 1/50 divided by 1/1000   =   20   ➔   20 children should join.

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