**Chapter-12**

**Time and work**

**What is work?**

Work is the quantity of energy transferred from one system to another but for question based on this topic; Work is defined as the amount of job assigned or the amount of job actually done.

**Some Important Formula**

1. Time taken single piece of work, If **A Person** do a piece of work or job in n days, then person’s finish the work in n days =**1 / n.**
2. **A person**does a piece of work in**1**day = **1 / n,** then person can finish the work in**n** days.
3. If **A person twice** work a workman as **B person,** then**Ratio** of work done by**A and B** is =**2 : 1.**
4. The reciprocal of day work gives the alone time i.e., alone time ( or time to complete a job  by a single person) =  1 / 1 day’s work
5. When more than one person working on the same type of work, then there combined work = sum of 1 day work by each person. Suppose P, Q, R work same piece of work by each person (P + Q + R)”s 1 day’s work = P’s day’s work + Q’s day’s work + R’s day’s work.

**Example:**  
20 labors can do piece of work in 30 days, then how many days 15 laborcan complete double of the work?  
**Answer:**  
20 labor can do a piece of work in 30 days and Now we need to find the double of the work by 15 labor.  
We use  
=> (labor working days) = (labor working days)  
= 20 x 30 = 15 x ?  
= 600 = 15 x?  
? = 600 / 15 = 40  
now we need to double the working days is 40 x 2 = 80 days.

**Example:**  
Sameer and Karan can do a piece of work in 20 days and 12 days respectively.Sameer started the work alone and then after 4 days Karan joined him till the completion of the work.How long did the work last?  
**Answer:**  
**Step 1:** In 4 days Sameer work done = 1 x 4 / 20 = 1 / 5.and Remaining work is = (1 – 1 / 5) = 4 / 5.  
**Step 2:**Now Sameer and Karan work done by 1 day= (1 / 20 + 1 / 12) = 2 / 15.  
Step 3:4 / 5 work will be done by Sameer and Karan = (15 / 2 x 4 / 5) = 6 days.  
So the total time taken = (6 + 4) = 10 days.

**Examples:**  
Jagat painted a wall in**6 days of 12 hours** each andPradumnpainted the same wall in **8 days of 8 hours each.** How long will they work if**working together 36 / 17 hours a day?**  
**Answer:**  
**Step 1:** At first we find total work of both per day 12 hours than 6 day he total work**(6 x 12) = 72 hours.**AndPradumn’s total work is**(8 x 8) = 64 hours.**  
**Step 2:**both 1 hour’s work is 1 / 72, 1 / 64.So Both together work in 1 hour’s is **( 1 / 72 + 1 / 64 ) = 17 / 576 hour’s.**  
Both finish the work 576 / 17 hour’s.  
**Step 3:**number of days of 36 / 17 each = **(576 / 17 X 17 / 36) = 16 days.**  
**So Both together works in 16 days.**

**Example:**  
30 children can complete a piece of work in 50 days. In how many days 15 children can complete the same piece of work?  
**Answer:**  
we use (children x working days) = (children x working days)  
30 x 50 = 15 x ?  
1500 = 15 x ?  
?  = 100 days.

**Example:**  
6 women alone can complete a piece of work in 10 days,whereas 10 children alone take 15 days to complete the-same piece of work.How many days will 6 women and 10 children together take to complete the piece of work?  
**Answer:**  
6 women work done a piece of work in 10 days and 10 children done it 15 days  
**Step 1:** So 6 women x 10 days = 10 children x 15 days  
= 2women = 5 children  
**Step 2:**10children x ? = 6 w x 10  
? =6 days

**Example:**  
Rahul can complete a job in 16 days and Manish can complete equal job in 18 days,some reason Manish work for 9 days and left the job.Now in how many days Rahul can complete the remaining job?  
**Answer:**  
**Step 1:** Manish complete the job in 9 day that is (1 / 18 X 9) = 1 / 2.So remaining work is (1 – 1 / 2) = 1 / 2.  
**Step 2:** Now Rahul complete its work in (1 / 16 X 2) = 8 days.  
**So Rahul complete the work in 8 days.**

**Example:**  
The works of wall paint of ratio Amit & Vikas is 3 : 5. If Amit and Vikasworktogether in 30 days,in how many days Vikas alone can paint a complete wall?  
**Answer:**  
We know the ration of Amit and Vikas is 3 : 5  
So Amit + Vikas  together work done by in 30 days.  
Amit + Vikas = 30 x 15 = 450 work  
So, Vikas alone work done by = 450 / 5 = 90 days.  
Now Vikas alone can work of paint a wall completed in 90 days.

**Example:**  
20 boy are required to complete a work in 100 days .how many boys are required to complete that work in 5 days?  
**Answer:**  
Number of  boys required = 20 x 100 / 5 = 400  
So , 400 boy required to complete that work in 5 days .