

# Time and Work

**Work:** It is defined as something which has an effect or outcome; often the one desired or expected.

$$\text{Work} = \text{Efficiency} \times \text{Time}$$

**Efficiency :** It is defined as work done per unit time (day/min/hr/sec). It is inversely proportional to the time taken.

$$\text{Efficiency} \propto \frac{1}{\text{Time Taken}}$$

$$\text{Time} = \text{Work} / \text{Efficiency}$$



# Questions Based on Efficiency

1. A can do a piece of work in 70 days and B is 40% more efficient than A. The number of days taken by B to do the same work is

- |             |             |
|-------------|-------------|
| (1) 40 days | (2) 60 days |
| (3) 50 days | (4) 45 days |

2. A is 40% more efficient than B, they together completed the whole work in 15 days. In how much time B alone do the work?

- (1) 36 days
- (2) 28 days
- (3) 24 days
- (4) 12 days

3. A is 50% more efficient than B, then In how much time they together complete the whole work? If A alone completes the whole work in 25 days.

- (1) 70 days
- (2) 30 days
- (3) 40 days
- (4) 15 days

4. A is 200% more efficient than B, While A takes 30 days less than B to complete a work then In how much time (approx) they together complete the whole work?

- (1) 6 days
- (2) 8 days
- (3) 12 days
- (4) 16 days

# Questions Based On Chain Rule





$$M1D1H1/W1 = M2D2H2/W2$$

M- Men or type of worker

D- Day

H- Hour

W- work

5. 39 persons can repair a road in 12 days working 5 hours a day. In how many days will 30 persons working 6 hours a day complete the work ?

- (1) 10 days
- (2) 13 days
- (3) 14 days
- (4) 15 days

6. 5 persons can prepare an admission list in 8 days working 7 hours a day. If 2 persons join them so as to complete the work in 4 days, they need to work per day for :

- (1) 10 hours
- (2) 9 hours
- (3) 12 hours
- (4) 8 hours

7. 7 men can complete a piece of work in 12 days. How many additional men will be required to complete double the work in 8 days ?

(1) 28

(2) 21

(3) 14

(4) 7

8. There is sufficient food for 400 men for 31 days, after 28 days 280 men leave the place. For how many days will the rest of the food last for rest of the man?

(1) 24

(2) 10

(3) 16

(4) 18

9. There is sufficient food for 1600 men for 120 days and each take 900 gm food everyday, but after 80 days 400 men leave the place and now each one take 1000 gm food everyday. For how many days will the rest of the food last for rest of the man?

- (1) 32 days
- (2) 26 days
- (3) 48 days
- (4) 19 days

# Questions BASED ON WAGES

10. Suman can do a work in 3 days. Sumati can do the same work in 2 days. Both of them finish the work together and get 150. What is the share of Suman ?

- (1) 30
- (2) 60
- (3) 70
- (4) 75



11. A and B can do a work in 16 and 24 days respectively, and with the help of C in 6 days. If the total wages for work is Rs 400. Find share of C.

- (1) 120
- (2) 200
- (3) 150
- (4) 250

12. A, B and C completed a work costing 1,800. A worked for 6 days, B for 4 days and C for 9 days. If their daily wages are in the ratio of 5 : 6 : 4, how much amount will be received by A?

- (1) 800
- (2) 600
- (3) 900
- (4) 750

13. If 5 men or 7 women can earn 5,250 per day, how much would 7 men and 13 women earn per day ?

- (1) 11,600
- (2) 11,700
- (3) 16,100
- (4) 17,100

# Questions BASED ON Alternate Time

14. A and B can complete a work in 12 and 15 days respectively. They started the work alternately for 1 day each and A started the work first. In how much time the whole work will be completed?

- (1)  $13 \frac{1}{4}$  days
- (2) 11 days
- (3)  $16 \frac{1}{4}$  days
- (4) 17 days

15. Sita and Gita can complete a work in 8 and 12 hours respectively. If they work in stretches of one hour alternatively, Sita beginning at 9 am then at what time the work will be completed?

- (1) 5 : 30 pm
- (2) 6 : 00 am
- (3) 5 : 30 am
- (4) 6 : 30 pm

16. A & B working alone can do a work in 9 and 12 days, respectively. If they work for a day alternately, A beginning, in how many days the work will be completed?

A.12

B. $12\frac{1}{4}$

C.10

D. $10\frac{1}{4}$



# **Advance Questions**



17. A is twice as good a workman as B and B is twice as good a workman as C. If A and B can together finish a piece of work in 4 days, then C can do it by himself in

- (1) 6 days
- (2) 8 days
- (3) 24 days
- (4) 12 days

18. A does half as much work as B in one sixth of the time. If together they take 10 days to complete a work, how much time shall B take to do it alone?

- (1) 70 days
- (2) 30 days
- (3) 40 days
- (4) 50 days

19. Jyothi can do  $\frac{3}{4}$  of a job in 12 days. Mala is twice as efficient as Jyothi. In how many days will Mala finish the job ?

- (1) 6 days
- (2) 8 days
- (3) 12 days
- (4) 16 days

20. A and B together can do a work in 12 days. B and C together do it in 15 days. If A's efficiency is twice that of C, then the days required for B alone to finish the work is

- (1) 60 days
- (2) 30 days
- (3) 20 days
- (4) 15 days



21. Two workers A and B working together completed a job in 5 days. If A worked twice as efficiently as he actually did and B worked  $\frac{1}{3}$  as efficiently as he actually did, the work would have been completed in 3 days. To complete the job alone, A would require

- (1)  $5\frac{1}{5}$  days
- (2)  $6\frac{1}{4}$  days
- (3)  $7\frac{1}{2}$  days
- (4)  $8\frac{3}{4}$  days

22. If the work done by  $(x - 1)$  men in  $(x + 1)$  days is to the work done by  $(x + 2)$  men in  $(x - 1)$  days are in the ratio  $9 : 10$ , then the value of  $x$  is equal to :

- (1) 5
- (2) 6
- (3) 7
- (4) 8

23. A contractor undertook to finish a work in 92 days and employed 110 men. After 48 days, he found that he had already done  $\frac{3}{5}$  part of the work, the number of men he can withdraw so that the work may still be finished in time is :

- (1) 45
- (2) 40
- (3) 35
- (4) 30

24. A man undertakes to do a certain work in 150 days. He employs 200 men. He finds that only a quarter of the work is done in 50 days. The number of additional men that should be appointed so that the whole work will be finished in time is :

- (1) 75
- (2) 100
- (3) 125
- (4) 50



25. A man and a boy received 800 as wages for 5 days for the work they did together. The man's efficiency in the work was three times that of the boy. What are the daily wages of the boy ?

(1) 76

(2) 56

(3) 44

(4) 40

26. A daily-wage labourer was engaged for a certain number of days for 5,750; but being absent on some of those days he was paid only 5,000. What was his maximum possible daily wage?

- (1) 125
- (2) 250
- (3) 375
- (4) 500

27. A labourer was appointed by a contractor on the condition that he would be paid 75 for each day of his work but would be defined at the rate of 15 per day for his absence, apart from losing his wages, After 20 days, the contractor paid the labourer 1140. The number of days the labourer abstained from work was

- (1) 3      (2) 5  
(3) 4      (4) 2

28. A, B and C can do a piece of work in 20, 30 and 60 days, respectively. In how many days can A do the work if he is assisted by B and C on every third day?

A.12

B.15

C.16

D.18

29. A work was completed by three persons of equal ability, first one doing  $m$  hours for  $m$  days, second one doing  $n$  hours for  $n$  days ( $m$  and  $n$  being integers) and third one doing 16 hours for 16 days. The work could have been completed in 29 days by third person alone with his respective working hours. If all of them do the work together with their respective working hours, then they can complete it in about

[1] 12 days

[2] 13 days

[3] 14 days

[4] 15 days

30. Three labourers worked together for 30 days, in the course of work, all of them remained absent for few days. One of them was absent for 10 days more than the second labourer and the third labourer did one-third of the total work. How many days more than the third labourer was the first one absent?

[1] 4

[2] 5

[3] 6

[4] cannot be determined

31. Two persons A and B can do a work alone in 29 days. A takes the rest of one day after every 4 days and B takes the rest of one day after every 5 days. If A and B starts working together, then the work will be completed on

- [1] 15th day
- [2] 16th day
- [3] 17th day
- [4] 18th day

Thank  
you







# Pipes and Cistern

# 1. Basic Concepts:

1. A pipe which fills up the tank is known as inlet.
2. A pipe which empties the tank is known as outlet.
3. A pipe takes  $x$  hours to fill up the tank. Then  $\frac{1}{x}$  parts of the tank will be filled in **1 hour**.
4. A pipe takes  $y$  hours to empty the tank. Then part emptied in 1 hour =  $\frac{1}{y}$
5. Pipe **A** can fill a tank  $n$  times as fast as another pipe **B**. This means: If slower pipe **B** takes  $x$  min to fill up the empty tank, then faster pipe **A** takes  $\frac{x}{n}$  min to fill up the empty tank. If they operate together, then part of the tank that is filled up in **1 hour** is  $(n + 1)/x$ .

## 2. Rules and Tricks:

### Rule 1:

Two pipes A and B can fill (or empty) a cistern in X and Y hours respectively, while working alone. If both the pipes are opened together, then the time taken to fill (or empty) the cistern is given by

$$\frac{XY}{X + Y} \text{ hours.}$$

## Example:

Two pipes A and B can fill a cistern in 20 and 30 minutes respectively. If both the pipes are opened together, how long will it take to fill the cistern?

### Solution 1:

Let's say  $x = 20$  and  $y = 30$ , then

$$20 * 30 = 600/50 = 12\text{minutes.}$$

$$\frac{20 + 30}{}$$

So it will take 12 minutes for both the pipes to full the cistern.

## **Solution 2: (UNITARY METHOD)**

Let the total work be assumed as  $\text{LCM}(20,30) = 60$  Units

Now to complete 60 units A takes 20 mins

To complete 60 units B takes 30 mins

Units done in 1 min by A = 3

Units done in 1 min by B = 2

Units done in 1 min by A & B = 5

To complete 60 units they will take  $60/5 = 12$  minutes.

## Rule 2:

Three pipes can fill (or empty) a cistern in X, Y and Z hours while working alone. If all the three pipes are opened together, the time taken to fill (or empty) the cistern is given by

$$\frac{XYZ}{XY + YZ + XZ} \text{ hours.}$$

## Example:

Three pipes A,B and C can fill a tank in 20 minutes, 30 minutes and 40 minutes respectively while working alone. If, all the pipes are opened together, how long will it take to fill the tank full?

### Solution 1:

Let's say X = 20 minutes, Y = 30 minutes, Z = 40 minutes, then

$$= \frac{20 * 30 * 40}{(20*30) + (30*40) + (20*40)} = 9.23 \text{ mins}$$

So it will take 9.23 minutes to fill the tank full.

## **Solution 2:(UNITARY METHOD)**

Let the total work be assumed as  $\text{LCM}(20,30,40)= 120$  Units

Now to complete 120 units A takes 20 mins

To complete 120 units B takes 30 mins

To complete 120 units C takes 40 mins

Units done in 1 min by A = 6

Units done in 1 min by B = 4

Units done in 1 min by C = 3

Units done in 1 min by A+B+C = 13

To complete 120 units they will take  $120/13 = 9.23$  minutes.



### Rule 3:

If a pipe can fill a cistern in X hours and another can fill the same cistern in Y hours, but a third one can empty the full tank in Z hours, and all of them are opened together, then

Net part filled in 1 hour =  $\frac{1}{X} + \frac{1}{Y} - \frac{1}{Z}$

Time taken to fill the full cistern =

$\frac{XYZ}{YZ + XZ - XY}$  hours.

$YZ + XZ - XY$

## Example:

Two pipes can fill a cistern in 20 minutes and 30 minutes respectively. Third pipe can empty the tank in 40 minutes. If all the three pipes are opened together, how long it will take to fill the tank full?

## Solution:

Let's say  $x = 20$ ,  $y = 30$  and  $z = 40$

$$= \frac{20 * 30 * 40}{(30*40) + (20*40) - (20*30)} = 17.14 \text{ min}$$

So it will take 17.14 minutes to fill the tank full.

## Rule 4:

A pipe can fill a cistern in  $x$  hours. Because of a leak in the bottom, it is filled in  $y$  hours. If it is full, the time taken by the leak to empty the cistern is

$$\frac{xy}{y - x} \text{ hours.}$$

## Example:

A pipe can fill a tank in 3 hours. Because of leak in the bottom, it is filled in 4 hours. If the tank is full, how much time will the leak take to empty it?

## Solution:

Work done by leak in one hour =  $\frac{1}{3} - \frac{1}{4} = \frac{1}{12}$

So leak will empty the tank in 12 hours.

## By formula

Let's say  $x = 3$  and  $y = 4$

$$= \frac{3 \times 4}{4 - 3} = 12 \text{ hours.}$$

$$4 - 3$$

## Rule 5:

A cistern has a leak which can empty it in X hours. A pipe which admits Y litres of water per hour into the cistern is turned on and now the cistern is emptied in Z hours. The capacity of the cistern is

$$\left\{ \frac{XYZ}{Z-X} \right\} \text{ litres.}$$

## Example:

A leak in the bottom of a tank can empty the full tank in 6 hours. An inlet pipe fills water at the rate of 4 litres per minute. When the tank is full, the inlet is opened and due to leak, the tank is empty in 8 hours. Find the capacity of the tank.

## Solution:

Here,  $X=6$ ,  $Y = 4 * 60 = 240$  and  $Z = 8$ .

The capacity of the tank is

$$= \frac{6 * 240 * 8}{8 - 6} = 5760 \text{ litres.}$$

## Rule 6:

One fill pipe A is K times faster than the other fill pipe B. If B can fill a cistern in X hours, then the time in which the cistern will be full, if both the fill pipes are opened together, is

$$\frac{X}{K + 1} \text{ hours.}$$

## Example:

One fill pipe A is 10 times faster than second fill pipe B. If B can fill a cistern in 55 minutes, then find the time when the cistern will be full if both fill pipes are opened together.

## Solution:

Here,  $K = 10$  and  $X = 55$

$$= \frac{55}{10 + 1} = 5 \text{ mins.}$$



## Rule 7:

One fill pipe A is K times faster than the other fill pipe B. If A can fill a cistern in X hours, then the time in which the cistern will be full, if both the fill pipes are opened together, is

$$\frac{K}{K+1} X \text{ hours.}$$

## Example:

One fill pipe A is 4 times faster than second fill pipe B. If A can fill a cistern in 15 minutes, then find the time when the cistern will be full if both fill pipes are opened together.

## Solution:

$$\begin{aligned}\text{Here, } K &= 4 \text{ and } X = 15 \\ &= (4/4 + 1) 15 \\ &= 12 \text{ minutes.}\end{aligned}$$

## Rule 9:

If one fill pipe A is K times faster and takes X minutes less time than the other fill pipe B, then

a) A will fill the cistern in

X minutes.

**K - 1**

(b) B will fill the cistern in

KX minutes.

**K - 1**



# Practice Questions

1. Pipe A can fill a tank in 36 minutes and pipe B can fill it in 45 minutes. If both the pipes are opened to fill an empty tank, in how many minutes will it be full?

a)15

b)18

c)20

d)25

2. Two pipes A & B can fill a Cistern in 8 and 24 minutes respectively. If both pipes opened together, but pipe A is closed 4 minutes before the Cistern will full. In what time the Cistern will full?

- a)  $9 \frac{1}{7}$  min
- b)  $7 \frac{1}{7}$  min
- c) 8min
- d) 9 min

3. Two taps A & B can fill a tank in 48 and 36 minutes respectively. If both taps are opened together then after how much time pipe A is closed so that the tank is filled in 25 minutes 30 seconds?

- a) 14 min
- b) 25 min
- c) 22 min
- d) None of these

4. A Boy and a Girl together fill a Cistern with water. The Boy pours 4 liters water in every 3 minutes and Girl pours 3 liters water in every 4 minutes. In how much time they will fill 100 liters of water in Cistern?

- a) 32 minutes
- b) 1 hour
- c) 48 minutes
- d) 2 hours



5. Two pipes A & B can fill a Cistern in 1 hour & 75 minutes respectively. There is also an outlet pipe C. If all three pipes are opened together, the Cistern is full in 50 minutes. How much time will be taken by C to empty the full Cistern?

- A. 60 min.
- B. 44 min.
- C. 52 min.
- D. 100 min.

6. Two pipes A & B can fill a tank in 5 hour & 20 hours respectively. There is a third pipe to empty it, but the operator did not notice it. Due to which it caused a delay of 1 hour in filling of tank. Find the time in which the third pipe would empty the filled tank?

- a) 34 hours
- b) 18 hours
- c) 20 hours
- d) 80 hours

7. Two pipes A & B can fill a Cistern in 30 hour & 20 hours respectively. A third pipe C can leaks out 45 liters of water per minute. If all the pipes are opened together, the Cistern will fill in 15 hours. Find capacity of the Cistern?

- a) 162000 liters
- b) 820000 liters
- c) 14000 liters
- d) 28000 liters

8. A cistern is normally filled in 8 hours but takes two hours longer to fill because of a leak in its bottom. If the cistern is full, the leak will empty it in?

- a) 16 hrs
- b) 20 hrs
- c) 40 hrs
- d) 25 hrs

9. A leak in bottom of a tank can empty it in 6 hours. A tap fill the tank @ 4 liters/minutes. If both taps are opened, then the tank will empty in 8 hours. Find capacity of the tank?

- a) 6720 liters
- b) 8100 liters
- c) 5760 liters
- d) 4750 liters

10. If tap A & B can fill a tank in 10 & 15 hour respectively. An outlet pipe C can empty it in 20 hours. Initially tap A & B are opened and when the tank was supposed to fill it was found that tap C was open by mistake. Now, the tap C being closed, after how much time the tank will fill?

- a) 2 h
- b) 1 h 48 min
- c) 1 h
- d) 2h 20 min

11. A, B & C are pipes attached to a Cistern. A & B can fill it in 20 and 30 minutes respectively. While, C can empty it in 15 minutes. If A, B, & C are kept open successively for 1 minute each. How soon will Cistern be filled?

- a) 520 min
- b) 167 min
- c) 120 min
- d) 620 min

12.  $\frac{3}{4}$  part of a tank is full of water. When 30 litres of water is taken out, the tank becomes empty. The capacity of the tank is

- (1) 36 litres
- (2) 42 litres
- (3) 40 litres
- (4) 38 litres



13. If  $\frac{3}{5}$  th of a cistern is filled in 1 minute, the time needed to fill the rest is

- (1) 40 sec
- (2) 30 sec
- (3) 36 sec
- (4) 24 sec

14. There are two pumps to fill a tank with water. First pump can fill the empty tank in 8 hours, while the second in 10 hours. If both the pumps are opened at the same time and kept open for 4 hours, the part of tank that will be filled up is :

(1)  $\frac{9}{10}$

(2)  $\frac{1}{10}$

(3)  $\frac{2}{5}$

(4)  $\frac{1}{5}$



# Advance Questions

12. In what time a Cistern be filled by 3 pipes of diameter 1 cm, 1.33 cm and 2 cm running together, while the largest can fill alone in 61 minutes? The amount of water flowing in by each pipe being proportional to square of its diameter.

- a) 36 min
- b) 24 min
- c) 45 min
- d) 40 min

13. In what time a Cistern be filled by 3 pipes whose diameters are 1 cm, 2 cm and 4 cm, running together, when largest alone fill it in  $1\frac{1}{20}$  hours? The amount of water flowing in by each pipe being proportional to square of its diameter.

- a) 60 min
- b) 48 min
- c) 25 min
- d) 30 min