Arithmetic

for

general competitions

Where Concept
is
Paramount

by
Neetu Singh

Paramount Reader Publication

Arithmetic

For General Competitions

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Preface

There are many books on Arithmetic available in the market with the questions solved in traditional manner. Those books are good to develop the base in Arithmetic but as far as competitive exams are concerned, they fail to give that cutting edge to the aspirants that help them give a tough fight to their competitors. I always felt that in the field of Government Jobs, the competition ends up finding who gets the best guidance and not who is the best. When it comes to solving maximum number of questions in minimum amount of time, the conceptual short tricks play the most important role. This attempt of Paramount is an honest endeavour to bring to your doorsteps the conceptual short tricks that are developed at Paramount. Many of the aspirants cannot come to Delhi due to lack of resources or awareness. This is a small step to help you take that much desired giant step towards your goal that you have always yearned for.

Our students' constructive feedback and suggestions are most welcome which have always remained and will remain our guiding light. I will be highly obliged if you message/mail/whatsapp me your feedback or suggestion on 8860330003 or on paramount.no1@gmail.com

Neetu Singh

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CONTENTS

1 TIME AND WORK

CHAPTER

1. 12 men can complete one-third of the work in 8 days. In how many days can 16 men complete that work?
(1) 18 days (2) 12 days
(3) 14 days (4) 6 days
(5) None of these

2. 22 Men can complete a job in 16 days. In how many days will 32 men complete that job?
(1) 14 days (2) 12 days
(3) 16 days (4) 9 days
(5) None of these

3. 16 men can complete a piece of work in 7 days. In how many days will 28 men complete the same work?
(1) 6 days (2) 8 days
(3) 3 days (4) 4 days
(5) None of these

4. 18 women can complete a work in 12 days and 12 men can complete the same work in 9 days. In how many days will 8 men and 8 women complete that work?
(1) 9 days (2) 6 days
(3) 12 days (4) 8 days
(5) None of these

5. 24 Men can complete a piece of work in 15 days. In how many days will 18 men complete that work?
(1) 16 days (2) 20 days
(3) 22 days (4) 25 days
(5) None of these

6. A and B can complete a work in 15 days and 10 days respectively. They started doing the work together but after 2 days B had to leave and A alone completed the remaining work. The whole work was completed in-
(1) 10 days (2) 8 days
(3) 12 days (4) 15 days
(5) None of these

7. A man can do a piece of work in 5 days, but with the help of his son, he can do it in 3 days. In what time can his son do it alone?
(1) 7 days (2) 8 days
(3) $7\frac{1}{2}$ days (4) $6\frac{1}{2}$ days
(5) None of these

8. If p men working p hours per day for p days produce p units of work, then the units of work produced by n men working n hours a day for n day is
(1) $\frac{p^2}{n^2}$ (2) $\frac{p^3}{n^2}$
(3) $\frac{n^2}{p^2}$ (4) $\frac{n^3}{p^2}$
(5) None of these

9. A and B can separately complete a piece of work in 20 days and 30 days respectively. They worked together for some time then B left the work. If A completed the rest of the work in 10 days, then B worked for
(1) 6 days (2) 8 days
(3) 12 days (4) 16 days
(5) None of these

10. If 28 men complete $\frac{7}{8}$ of a piece of work in a week, then the number of men, who must be engaged to get the remaining work completed in another week is
(1) 5 (2) 6
(3) 4 (4) 3
(5) None of these

11. While working 7 hours per day, A alone can complete a piece of work in 6 days and B alone in 8 days. In what time would they complete it together, working 8 hours per day?
(1) 3 days (2) 4 days
(3) 2.5 days (4) 3.6 days
(5) None of these

12. A and B together can do a work in 8 days, B and C together in 6 days, while C and A together in 10 days. If they all work together, the work will be completed in
(1) $3\frac{3}{4}$ days (2) $3\frac{3}{7}$ days
(3) $5\frac{5}{47}$ days (4) $4\frac{4}{9}$ days
(5) None of these

13. A work could be completed in 100 days by some workers. However, due to the absence of 10 workers, it was completed in 110 days. The original number of workers was
(1) 100 (2) 110
(3) 55 (4) 50
(5) None of these

14. A and B can do a piece of work in 12 days, B and C in 8 days, and C and A in 6 days. How long would B take to do the same work alone?
(1) 24 days (2) 32 days
(3) 40 days (4) 48 days
(5) None of these

15. A completes $\frac{7}{10}$ of work in 15 days, then he completes the remaining work with the help of B in 4 days. The time required for A and B together to complete the entire work is
(1) $10\frac{2}{3}$ days (2) $12\frac{2}{3}$ days
(3) $13\frac{1}{3}$ days (4) $8\frac{1}{4}$ days
(5) None of these

16. 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 the rest of the men?
(1) 5 days (2) 10 days
(3) 12 days (4) 15 days
(5) None of these

17. A and B together can do a piece of work in 4 days. If A alone can do it in 6 days, in how many days B can alone complete the same piece of work ?
(1) 12 Days (2) 8 Days
(3) 9 Days (4) 16 Days
(5) None of these

18. Raju, Rinku and Ram can do a work in 6, 12 and 24 days respectively. In what time will they finish the work while working together?
(1) $3\frac{3}{7}$ days (2) $2\frac{3}{7}$ days
(3) $4\frac{3}{7}$ days (4) $3\frac{3}{5}$ days
(5) None of these

19. A and B can finish a work in 30 days, B and C in 40 days while C and A in 60 days. How long will they take to finish it while working together?
(1) $24\frac{2}{3}$ days (2) $26\frac{2}{3}$ days
(3) $28\frac{1}{3}$ days (4) $27\frac{2}{3}$ days
(5) None of these

20. A can write 75 pages in 25 hrs. A and B together can write 135 pages in 27 hrs. In what time can B write 42 pages?
(1) 17 hrs. (2) 19 hrs.
(3) 21 hrs. (4) 23 hrs.
(5) None of these

21. A, B and C can finish a work in 10, 12 and 15 days respectively.They start working together. If B stops after 2 days, how long would it take A and C to finish the remaining work?

(1) 3 days (2) $3\frac{8}{11}$ days

(4) $2\frac{6}{11}$ days (4) $3\frac{6}{11}$ days

(5) None of these

22. I can finish a work in 15 days working 8 hrs a day. You can finish it in $6\frac{2}{3}$ days at 9 hrs a day. Find in how many days we can finish it together, if we work 10 hrs a day?

(1) 2 days (2) 3 days

(3) 4 days (4) 5 days

(5) None of these

23. A is twice as good a workman as B; and together they finish a work in 16 days. In how many days can it be done by each separately?

(1) 24 days, 48 days

(2) 22 days, 24 days

(3) 23 days, 25 days

(4) Can't be determined

(5) None of these

24. 1 man, 3 women and 4 boys can do a work in 96 hrs; 2 men and 8 boys can do it in 80 hrs; and 2 men and 3 women can do it in 120 hrs. In how many hours can it be done by 5 men and 12 boys?

(1) $41\frac{5}{11}$ hrs (2) $43\frac{7}{11}$ hrs

(3) $43\frac{5}{11}$ hrs (4) $42\frac{7}{11}$ hrs

(5) None of these

25. A and B working separately can do a piece of work in 9 and 12 days respectively. If they work for a day alternately, A starts the work. In how many days will the work be completed?

(1) $10\frac{1}{4}$ days (2) $12\frac{1}{4}$ days

(3) $8\frac{1}{6}$ days (4) $10\frac{5}{6}$ days

(5) None of these

26. A certain number of men complete a piece of work in 60 days. If there were 8 men more, the work could be finished in 10 days less. How many men were originally there?

(1) 30 men (2) 40 men

(3) 45 men (4) 50 men

(5) None of these

27. 8 children and 12 men complete a certain piece of work in 9 days. If each child takes twice the time taken by a man to finish the work, in how many days will 12 men finish the same work?

(1) 8 days (2) 10 days

(3) 11 days (4) 12 days

(5) None of these

28. A and B together can complete a work in 8 days and B and C together in 12 days. All of them together can complete the work in 6 days. In how much time will A and C together complete the work?

(1) 8 days (2) 10 days

(3) 12 days (4) 20 days

(5) None of these

29. A can complete a work in 10 days, B in 12 days and C in 15 days. All of them began the work together; but A had to leave the work after 2 days of the start and B, 3 days before the completion of the work. How long did the work last?

(1) 7 days (2) 8 days

(3) 10 days (4) 12 days

(5) None of these

30. 5 men can prepare 10 toys in 6 days working 6 hours a day. Then in how many days can 12 men prepare 16 toys working 8 hrs a day?

(1) 5 days (2) 3 days

(4) 4 days (4) 6 days

(5) None of these

31. Two women, Ganga and Saraswati, working separately can mow a field in 8 hrs. and 12 hrs. respectively. If they work in stretches of one hour alternately, Ganga beginning at 9 am., when will the mowing be finished?

(1) 6:30 pm. (2) 5:30 pm.

(3) 7:00 pm. (4) 6:30 am.

(5) None of these

32. A is twice as good a workman as B. Together, they finish the work in 14 days. In how many days can it be done by each separately?
(1) 21 days, 42 days
(2) 23 days, 46 days
(3) 22 days, 44 days
(4) 24 days, 48 days
(5) None of these

33. A certain number of men complete a work in 160 days. If there were 18 men more, the work could be finished in 20 days less. How many men were originally there?
(1) 116 (2) 122
(3) 124 (4) 126
(5) None of these

34. A is thrice as good a workman as B. Together they can do a work in 15 days. In how many days will B finish the work?
(1) 40 days (2) 50 days
(3) 60 days (4) 20 days
(5) None of these

35. A group of men decided to do a work in 10 days, but five of them absented themselves. If the rest of the group finished the work in 12 days, find the original number of men.
(1) 20 men (2) 30 men
(3) 40 men (4) 50 men
(5) None of these

36. A builder decided to build a farmhouse in 40 days. He employed 100 men in the beginning and 100 more after 35 days and completed the construction in stipulated time. If he had not employed the additional men, how many days behind schedule would it have been finished?
(1) 5 days (2) 6 days
(3) 8 days (4) 10 days
(5) None of these

37. A contractor undertakes to dig a canal 12 km long in 350 days and employs 45 men. After 200 days he finds that only 4.5 km of the canal has been completed. Find the number of extra men he must employ to finish the work in time.
(1) 45 men (2) 55 men
(3) 65 men (4) 75 men
(5) None of these

38. A and B together can complete a piece of work in 24 days; B and C together in 30 days; and C and A together in 40 days. How many days will each take separately to complete the same work?
(1) 60, 40, 120 (2) 40, 20, 60
(3) 120, 60, 80
(4) Can't be determined
(5) None of these

39. A and B, working separately, can mow a field in 12 and 15 hours respectively. They work alternately, each for one hour, with A beginning at 5 a.m. At what time will the mowing be completed?
(1) 5:30 pm (2) 4:30 pm
(3) 6:30 pm (4) 6:30 am
(5) None of these

40. 10 women can complete a work in 7 days and 10 children take 14 days to complete the work. How many days will 5 women and 10 children take to complete the work?
(1) 5 (2) 7
(3) 3
(4) Can't be determined
(5) None of these

41. 8 men working for 9 hours a day complete a piece of work in 20 days. In how many days can 7 men working for 10 hours a day complete the same piece of work?
(1) 21 days (2) $20\frac{3}{5}$ days
(3) $20\frac{1}{2}$ days (4) $21\frac{3}{7}$ days
(5) None of these

42. A team of 30 men is supposed to do a work in 38 days. After 25 days, 5 more men were employed and the work was finished one day earlier. How many days would it have been delayed if 5 more men were not employed?
(1) 1 day (2) 2 days
(3) 3 days (4) 4 days
(5) None of these

Answers with explanations

1.1; $12M \Rightarrow \frac{1}{3}W \Rightarrow 8$ Days

$12M \Rightarrow 1W \Rightarrow 24$ Days

$M_1 \times D_1 = M_2 \times D_2$

$$D_2 = \frac{M_1 \times D_1}{M_2}$$

Required number of days $= \frac{12 \times 24}{16} = 18$

Basic concept:-

Men	days	Work
12 ↓	8 ↑	1/3 ↓
16 ↓	x ↑	1 ↓

More men means less days. Hence the arrows are pointing towards opp. direction. More men means more work, hence both will point towards the same direction

$\frac{12}{16} \times \frac{1/3}{1} = \frac{x}{8}$

Keep all the pointers at one location i.e. either as numerator or denominator and all the base at opposite position

$$x = \frac{12 \times 8}{16 \times \frac{1}{3}} = \frac{12 \times 8 \times 3}{16 \times 1} = 18 \text{ days}$$

Paramount concept:-

Remember except work all are kept together $m_1\ d_1\ w_2 = m_2\ d_2\ w_1$

$$d_2 = \frac{12 \times 8 \times 1}{16 \times \frac{1}{3}} = 18 \text{ days}$$

2.5;

Men	days
22 ↓	16 ↑
32 ↓	x ↑

$$\frac{22}{32} = \frac{x}{16}$$

$$x = \frac{22 \times 16}{32} = 11 \text{ days}$$

or

$m_1\ d_1 = m_2\ d_2$

$$d_2 = \frac{22 \times 16}{32} = 11 \text{ days}$$

3. 4;

Men	days
16 ↓	7 ↑
28 ↓	x ↑

$$\frac{16}{28} = \frac{x}{7}$$

$$x = \frac{16 \times 7}{28} = 4 \text{ days}$$

or

$m_1\ d_1 = m_2\ d_2$

$$d_2 = \frac{16 \times 7}{28} = 4 \text{ days}$$

4.1; 18 w's one day's work $= \frac{1}{12}$ ____(i)

12 m's one day's work $= \frac{1}{9}$ ____(ii)

Now dividing equation (i) by equation (ii), we have

$$\frac{18w}{12m} = \frac{1}{12} \times \frac{9}{1} = \frac{9}{12}$$

or, $18 \times 12\ w = 12 \times 9\ m$

or, $2w = 1\ m$

or, 1 man = 2 women

or, 8 men = 16 women

$\therefore$ 8 men and 8 women = (16 + 8) = 24 women.

$\therefore$ 18 women can complete the work in 12 days

$\therefore$ 24 women can complete the work in $\frac{12 \times 18}{24} = 9$ days

Short Trick :-

$M_1 \times D_1 = M_2 \times D_2$

Thus, $18W \times 12 = 12M \times 9$

$\Rightarrow 2W = 11M$

Paramount concept:-

Women	days
18 ↓	12 ↑
x ↓	9 ↑

$$\frac{18}{x}=\frac{9}{12}$$

$$x=\frac{18\times 9}{9}=24 \text{ women}$$

$\therefore$ 12 men = 24 women (since 12 men can complete the work in 9 days)
1 man = 2 women

$\therefore$ 8 men + 8 women = 24 women
(8 men = 16 women)
= 24 women = ? days

$w_1 d_1 = w_2 d_2$

$18 \times 12 = 24 \times x$

$$x=\frac{18\times 12}{24}=9 \text{ days}$$

5.2; Required number of days

$$=\frac{24\times 15}{18}=20 \text{ days}$$

6.3; **Paramount concept:-**

Explanation of this method:-

A	B
15 days	10 days
2 units/days	3 units/ day

Total work = (30) units

LCM of 10, 15 = 30
So, let total work = 30 unit
Now, A does the work in 15 days.

$\therefore$ A's 1 day efficiency = $\frac{30}{15}$ units day
= 2 units/day

Similarly,
B's 1 day efficiency = 3 unit/day

Thus,
(A + B)'s 1day efficiency → 5 units/day
(A+B)'s 2 days work = 10 units
Remaining work done by A only
= 30 - 10 = 20 units
No. of days taken by A to complete the remaining work = $\frac{20}{2}$ days
= 10 days.
$\therefore$ Total no. of days = 10 + 2 = 12 days

Method 2 :

Work done by A in 1 day = $\frac{1}{15}$ part

Work done by B in 1 day = $\frac{1}{10}$ part

Work done by A and B together in 2 days

$$=2\left(\frac{1}{15}+\frac{1}{10}\right)=\frac{1}{3} \text{ part}$$

Remaining work = $1-\frac{1}{3}=\frac{2}{3}$

$\therefore$ A does the remaining $\frac{2}{3}$ part in

$$=\frac{2}{3}\times\frac{15}{1}=10 \text{ days}$$

Hence, the whole work was completed in
10 + 2 = 12 days

Method 3 :

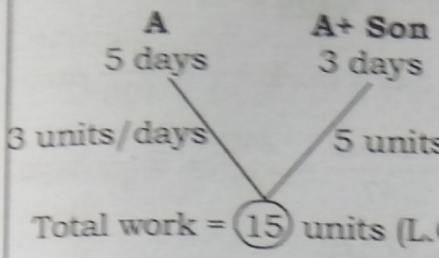
Let the work be completed in x days.

as A's 1 day work is $\frac{1}{15}$ (Hence his x days work = $\frac{x}{15}$ and as B's 1 day work is $\frac{1}{10}$, hence B's 2 days work = $\frac{2}{10}$)

Then $\frac{x}{15}+\frac{2}{10}=1$

$$\Rightarrow \frac{x}{15}=1-\frac{2}{10}=\frac{4}{5} \Rightarrow x=\frac{4}{5}\times 15=12 \text{ days}$$

7. 3; **Paramount concept:-**



Total work = (15) units (L.C.M. of 3 & 5)

Son's efficiency = 5 - 3 = 2 units/day

$\therefore$ Time taken by Son alone = $\frac{15}{2}$ days

$= 7\frac{1}{2}$ days

Short Tricks:

Son's 1 day work = (Man+ son)'s 1 day work- Man's 1 day work

$= \frac{1}{3} - \frac{1}{5} = \frac{2}{15}$ part

Days taken by son = $\frac{15}{2} = 7\frac{1}{2}$ days

(No. of days = reciprocal of 1 day's work)

8. 4; $\because$ P men working P hours/day for P days

produce P units of work.

$\therefore$ 1 man working 1 hour/day for 1 day produce

$\frac{P}{P^3} = \frac{1}{P^2}$ units of work.

$\therefore$ n men working n hours a day for n days

produce $\frac{n^3}{p^2}$ units of work.

Paramount concept :-

Men	hours	days	units i.e. work
P	P	P	P
n ↓	n ↑	n ↑	? ↑

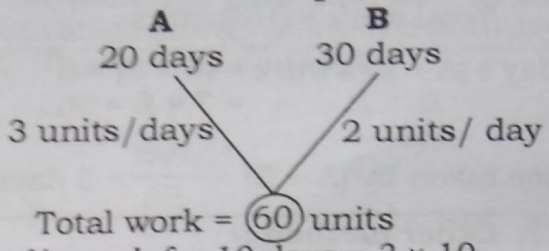
Remember except work all are on one side

hence, $m_1 h_1 d_1 w_2 = m_2 h_2 d_2 w_1$

$P \times P \times P \times x = n \times n \times n \times p$

$x = \frac{n^3 p}{p^3} = \frac{n^3}{p^2}$ units

9.1; **Paramount concept :-**



Total work = (60) units

A's work for 10 days = 3 × 10

= 30 units

Remaining work = 60 - 30 = 30 units

(A + B) take $\frac{30}{3+2}$ = 6 days for remaining work,

so, B worked for 6 days

Short cut :

A + B 1 day's work

$\frac{1}{20} + \frac{1}{30} = \frac{5}{60}$ part

Hence work done in x day = $\frac{5x}{60}$ part

A's 10 day work = $\frac{10}{20} = \frac{1}{2}$

$\therefore$ Remaining part = $\frac{1}{2}$

$\therefore$ Done part = $\frac{1}{2}$

This means = $\frac{5n}{60} = \frac{1}{2} = 6$ days

10. 3; **Short cut** :

men	work	time
28	7/8	7 days
x	1/8	7 days

$m_1 t_1 w_2 = m_2 t_2 w_1$

$28 \times 7 \times \frac{1}{8} = x \times 7 \times \frac{7}{8}$

$x = \frac{28 \times 7 \times \frac{1}{8}}{7 \times \frac{7}{8}} = 4$