

Arithmetic (Level 2)

Question Paper, Set 01

Time: 1 hour 30 minutes

Maximum marks: 50

Name: _____ Class: _____ Date: _____

1. Answer all 20 questions. The marks for each question are shown in brackets.
2. Show your working for the 2, 3 and 5 mark questions.
3. The key sheet and worked solutions are at the end of this paper.

1. If A can finish a piece of work in 57 days, find A's 1 day's work. [1 mark]
2. A is thrice as good a workman as B. A can finish a piece of work in 16 days. How many days will B take to finish it? [1 mark]
3. If the number of men to do a work is changed in the ratio 9 : 7, find the ratio in which the time taken by them to finish the work changes. [1 mark]
4. 9 men can do a piece of work in 50 days. How many men are needed to finish it in 75 days? [2 marks]
5. A can do a piece of work in 14 days and B can do it in 35 days. Find (A + B)'s 1 day's work. [1 mark]
6. A can do a piece of work in 13 days and B alone can do it in 52 days. How much time will both take to finish the work? [2 marks]
7. A and B together can do a piece of work in 10 days. B alone can finish it in 35 days. In how many days can A alone finish the work? [2 marks]
8. A and B can do a piece of work in 50 days; B and C in 100 days; C and A in 60 days. In how many days will they finish it together and separately? [5 marks]
9. A can do a piece of work in 23 days and B can finish it in 46 days. They work together for 11 days and then A goes away. In how many days will B finish the remaining work? [3 marks]
10. A and B can do a piece of work in 72 and 18 days respectively. They began the work together, but B leaves after some days and A finishes the remaining work in 12 days. After how many days did B leave? [3 marks]
11. A can do a piece of work in 135 days and B can do it in 60 days. They work together for 26 days. Then B leaves and A alone continues the work. 13 days after that, C joins A and the work is completed in 24 days more. In how many days can C do the work alone? [5 marks]
12. A certain number of men complete a piece of work in 26 days. If there were 8 men more, the work could be finished in 8 days less. How many men were there originally? [2 marks]

- 13.** 6 men and 4 women working 5 hours a day finish a piece of work in 4 days; 4 men and 4 women working 4 hours a day do the same work in 6 days. Find the number of days in which the work is done by 10 men only, working 8 hours a day. [5 marks]
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- 14.** A can do half as much again as B can do in the same time. B alone can do a piece of work in 12 days. In how many days can both together finish it? [3 marks]
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- 15.** The speed of a boat in still water is 7.5 km/hr and the speed of the stream is 1 km/hr. Find the speed of the boat upstream. [1 mark]
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- 16.** A man can row downstream at the rate of 20 km/hr and upstream at 17 km/hr. Find the man's rate in still water and the rate of the current. [2 marks]
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- 17.** A boat goes 25 km downstream in 8 hours. Find its speed downstream. [1 mark]
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- 18.** A man can row 3 km/hr in still water and he finds that it takes him thrice as long to row up as to row down the river. Find the rate of the stream. [2 marks]
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- 19.** A man can row 15 km/hr in still water. If the river is running at 1 km/hr, it takes him 1 hour 30 minutes to row to a place and back. How far is the place? [3 marks]
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- 20.** A man can row 7 km upstream and 60 km downstream in 5 hours, while he can row 42 km upstream and 60 km downstream in 10 hours. Find the rate of the current and the speed of the man in still water. [5 marks]
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Key sheet

Q	Answer
1	$\frac{1}{57}$
2	48 days
3	7 : 9
4	6 men
5	$\frac{1}{10}$
6	$10\frac{2}{5}$ days
7	14 days
8	Together $42\frac{6}{7}$ days; A alone 75 days, B alone 150 days, C alone 300 days
9	13 days
10	12 days
11	240 days
12	18 men
13	3 days
14	$4\frac{4}{5}$ days
15	6.5 km/hr
16	Rate in still water 18.5 km/hr, rate of current 1.5 km/hr
17	3.125 km/hr
18	1.5 km/hr
19	11.2 km
20	Rate of current 4 km/hr, speed in still water 11 km/hr

Solutions

1. If A can finish a piece of work in 57 days, find A's 1 day's work. [1]

A finishes the whole work in 57 days.

$$\therefore \text{A's 1 day's work} = \frac{1}{57}$$

Ans: $\frac{1}{57}$

2. A is thrice as good a workman as B. A can finish a piece of work in 16 days. How many days will B take to finish it? [1]

$$\text{Time taken by A} = \frac{1}{3} \times (\text{Time taken by B})$$

$$16 = \frac{1}{3} \times (\text{Time taken by B})$$

$$\therefore \text{Time taken by B} = 3 \times 16 = 48 \text{ days}$$

Ans: 48 days

3. If the number of men to do a work is changed in the ratio 9 : 7, find the ratio in which the time taken by them to finish the work changes. [1]

$$\text{No. of men} \propto \frac{1}{\text{Time taken}}$$

$$\frac{T_1}{T_2} = \frac{M_2}{M_1} = \frac{7}{9}$$

$$\therefore T_1 : T_2 = 7 : 9$$

Ans: 7 : 9

4. 9 men can do a piece of work in 50 days. How many men are needed to finish it in 75 days? [2]

$$\text{No. of men} \propto \frac{1}{\text{No. of days}}$$

$$9 \times 50 = x \times 75$$

$$x = \frac{9 \times 50}{75} = 6 \text{ men}$$

Ans: 6 men

5. A can do a piece of work in 14 days and B can do it in 35 days. Find (A + B)'s 1 day's work. [1]

$$(A + B)\text{'s 1 day's work} = \frac{1}{14} + \frac{1}{35} = \frac{5+2}{70} = \frac{7}{70} = \frac{1}{10}$$

Ans: $\frac{1}{10}$

6. A can do a piece of work in 13 days and B alone can do it in 52 days. How much time will both take to finish the work? [2]

$$\text{A's 1 day's work} = \frac{1}{13}$$

$$\text{B's 1 day's work} = \frac{1}{52}$$

$$\therefore (A + B)\text{'s 1 day's work} = \frac{1}{13} + \frac{1}{52} = \frac{4+1}{52} = \frac{5}{52}$$

$$\therefore \text{Both together can finish the work in } \frac{52}{5} \text{ days} = 10\frac{2}{5} \text{ days}$$

Ans: $10\frac{2}{5}$ days

7. A and B together can do a piece of work in 10 days. B alone can finish it in 35 days. In how many days can A alone finish the work? [2]

$$(A + B)\text{'s 1 day's work} = \frac{1}{10}$$

$$B\text{'s 1 day's work} = \frac{1}{35}$$

$$\Rightarrow A\text{'s 1 day's work} = \frac{1}{10} - \frac{1}{35} = \frac{7-2}{70} = \frac{5}{70} = \frac{1}{14}$$

$\therefore$ A alone can finish the work in 14 days.

Ans: 14 days

8. A and B can do a piece of work in 50 days; B and C in 100 days; C and A in 60 days. In how many days will they finish it together and separately? [5]

$$(A + B)\text{'s 1 day's work} = \frac{1}{50}$$

$$(B + C)\text{'s 1 day's work} = \frac{1}{100}$$

$$(C + A)\text{'s 1 day's work} = \frac{1}{60}$$

$$\text{Adding, } 2(A + B + C)\text{'s 1 day's work} = \frac{1}{50} + \frac{1}{100} + \frac{1}{60} = \frac{6+3+5}{300} = \frac{14}{300} = \frac{7}{150}$$

$$\Rightarrow (A + B + C)\text{'s 1 day's work} = \frac{7}{300}$$

$\therefore$ A, B, C together can finish the work in $42\frac{6}{7}$ days.

$$A\text{'s 1 day's work} = \frac{7}{300} - \frac{1}{100} = \frac{1}{75}, \text{ so A alone takes 75 days}$$

$$B\text{'s 1 day's work} = \frac{7}{300} - \frac{1}{60} = \frac{1}{150}, \text{ so B alone takes 150 days}$$

$$C\text{'s 1 day's work} = \frac{7}{300} - \frac{1}{50} = \frac{1}{300}, \text{ so C alone takes 300 days}$$

Ans: Together $42\frac{6}{7}$ days; A alone 75 days, B alone 150 days, C alone 300 days

9. A can do a piece of work in 23 days and B can finish it in 46 days. They work together for 11 days and then A goes away. In how many days will B finish the remaining work? [3]

$$A\text{'s 1 day's work} = \frac{1}{23}$$

$$B\text{'s 1 day's work} = \frac{1}{46}$$

$$(A + B)\text{'s 1 day's work} = \frac{1}{23} + \frac{1}{46} = \frac{2+1}{46} = \frac{3}{46}$$

$$(A + B)\text{'s 11 days' work} = 11 \times \frac{3}{46} = \frac{33}{46}$$

$$\text{Remaining work} = 1 - \frac{33}{46} = \frac{13}{46}$$

$$\text{This work is done by B in } \frac{13}{46} \times 46 = 13 \text{ days}$$

Ans: 13 days

10. A and B can do a piece of work in 72 and 18 days respectively. They began the work together, but B leaves after some days and A finishes the remaining work in 12 days. After how many days did B leave? [3]

$$A\text{'s 1 day's work} = \frac{1}{72}, B\text{'s 1 day's work} = \frac{1}{18}$$

$$(A + B)\text{'s 1 day's work} = \frac{1}{72} + \frac{1}{18} = \frac{1+4}{72} = \frac{5}{72}$$

$$A\text{'s 12 days' work} = 12 \times \frac{1}{72} = \frac{1}{6}$$

$$\text{Remaining work} = 1 - \frac{1}{6} = \frac{5}{6}$$

$$(A + B)\text{'s } x \text{ days' work} = \frac{5}{6} \Rightarrow \frac{5}{72} \times x = \frac{5}{6}$$

$$x = 12, \text{ so B left after 12 days}$$

Ans: 12 days

11. A can do a piece of work in 135 days and B can do it in 60 days. They work together for 26 days. Then B leaves and A alone continues the work. 13 days after that, C joins A and the work is completed in 24 days more. In how many days can C do the work alone? [5]

$$\begin{aligned} \text{A's 1 day's work} &= \frac{1}{135}, \text{ B's 1 day's work} = \frac{1}{60} \\ (\text{A} + \text{B})\text{'s 1 day's work} &= \frac{1}{135} + \frac{1}{60} = \frac{4+9}{540} = \frac{13}{540} \\ (\text{A} + \text{B})\text{'s 26 days' work} &= 26 \times \frac{13}{540} = \frac{169}{270} \\ \text{A's 13 days' work} &= \frac{13}{135} \\ (\text{A} + \text{C})\text{'s 24 days' work} &= 1 - \left(\frac{169}{270} + \frac{13}{135} \right) = \frac{5}{18} \\ \Rightarrow (\text{A} + \text{C})\text{'s 1 day's work} &= \frac{5}{18} \div 24 = \frac{5}{432} \\ \text{C's 1 day's work} &= \frac{5}{432} - \frac{1}{135} = \frac{25-16}{2160} = \frac{9}{2160} = \frac{1}{240} \\ \text{C can finish the work in 240 days} \end{aligned}$$

Ans: 240 days

12. A certain number of men complete a piece of work in 26 days. If there were 8 men more, the work could be finished in 8 days less. How many men were there originally? [2]

Let the original number of men be x

$$\text{No. of men} \propto \frac{1}{\text{No. of days}}$$

$$x \times 26 = (x + 8) \times 18$$

$$26x = 18x + 144$$

$$8x = 144 \Rightarrow x = 18$$

Ans: 18 men

13. 6 men and 4 women working 5 hours a day finish a piece of work in 4 days; 4 men and 4 women working 4 hours a day do the same work in 6 days. Find the number of days in which the work is done by 10 men only, working 8 hours a day. [5]

Let 1 man do m and 1 woman do w units of work in 1 hour.

$$\text{Case (i): } (6m + 4w) \times 5 \times 4 = 120m + 80w$$

$$\text{Case (ii): } (4m + 4w) \times 4 \times 6 = 96m + 96w$$

$$\text{Same work: } 120m + 80w = 96m + 96w$$

$$\Rightarrow 16w = 24m \Rightarrow 2w = 3m$$

So 4 women = 6 men, and $6m + 4w = 12$ men

12 men working 5 hours a day for 4 days do the same work as 10 men working 8 hours a day for x days

$$12 \times 5 \times 4 = 10 \times 8 \times x \Rightarrow x = 3 \text{ days}$$

Ans: 3 days

14. A can do half as much again as B can do in the same time. B alone can do a piece of work in 12 days. In how many days can both together finish it? [3]

If B does x , A does $\frac{x}{2} + x = \frac{3x}{2}$ in the same time

Ratio of working of A and B = $\frac{3}{2} : 1 = 3 : 2$

Ratio of time taken for the same work = $2 : 3$

Time taken by B = $3k = 12 \Rightarrow k = 4$

Time taken by A = $2k = 8$ days

A's 1 day's work = $\frac{1}{8}$, B's 1 day's work = $\frac{1}{12}$

(A + B)'s 1 day's work = $\frac{1}{8} + \frac{1}{12} = \frac{3+2}{24} = \frac{5}{24}$

Time taken by (A + B) to finish the work = $4\frac{4}{5}$ days

Ans: $4\frac{4}{5}$ days

15. The speed of a boat in still water is 7.5 km/hr and the speed of the stream is 1 km/hr. Find the speed of the boat upstream. [1]

Speed upstream = $(x - y)$ km/hr

= $7.5 - 1 = 6.5$ km/hr

Ans: 6.5 km/hr

16. A man can row downstream at the rate of 20 km/hr and upstream at 17 km/hr. Find the man's rate in still water and the rate of the current. [2]

Let the man's rate in still water be x km/hr and the rate of the current be y km/hr.

Given $x + y = 20$ and $x - y = 17$

Adding, $2x = 37 \Rightarrow x = 18.5$ km/hr

Subtracting, $2y = 3 \Rightarrow y = 1.5$ km/hr

Ans: Rate in still water 18.5 km/hr, rate of current 1.5 km/hr

17. A boat goes 25 km downstream in 8 hours. Find its speed downstream. [1]

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

= $\frac{25}{8} = 3.125$ km/hr

Ans: 3.125 km/hr

18. A man can row 3 km/hr in still water and he finds that it takes him thrice as long to row up as to row down the river. Find the rate of the stream. [2]

Let the rate of the stream be y km/hr

Same distance, thrice the time, so speed down = $3 \times$ speed up

Given $3(3 - y) = 3 + y$

$\Rightarrow 9 - 3y = 3 + y \Rightarrow 4y = 6$

$\Rightarrow y = 1.5$ km/hr

Ans: 1.5 km/hr

19. A man can row 15 km/hr in still water. If the river is running at 1 km/hr, it takes him 1 hour 30 minutes to row to a place and back. How far is the place? [3]

Let the required distance be d km

Speed downstream = $15 + 1 = 16$ km/hr

Speed upstream = $15 - 1 = 14$ km/hr

Total time = 1 hour 30 minutes = 1.5 hours

Time = $\frac{\text{Distance}}{\text{Speed}}$, so $\frac{d}{16} + \frac{d}{14} = 1.5$

$$\Rightarrow d \left(\frac{1}{16} + \frac{1}{14} \right) = 1.5$$

$$\Rightarrow d \times \frac{15}{112} = 1.5$$

$$\Rightarrow d = 11.2 \text{ km}$$

Ans: 11.2 km

20. A man can row 7 km upstream and 60 km downstream in 5 hours, while he can row 42 km upstream and 60 km downstream in 10 hours. Find the rate of the current and the speed of the man in still water. [5]

Let the speed of the man in still water be x km/hr and the rate of the current y km/hr.

Speed upstream = $(x - y)$ km/hr, speed downstream = $(x + y)$ km/hr. Put $p = \frac{1}{x-y}$, $q = \frac{1}{x+y}$

$$\frac{7}{x-y} + \frac{60}{x+y} = 5 \Rightarrow 7p + 60q = 5 \quad \dots (1)$$

$$\frac{42}{x-y} + \frac{60}{x+y} = 10 \Rightarrow 42p + 60q = 10 \quad \dots (2)$$

$$(1) \times 6 \Rightarrow 42p + 360q = 30$$

$$(1) \times 6 - (2) \Rightarrow 300q = 20 \Rightarrow q = \frac{1}{15}$$

$$\text{From (1): } 7p + 4 = 5 \Rightarrow 7p = 1 \Rightarrow p = \frac{1}{7}$$

So $x - y = 7$ and $x + y = 15$

Adding, $2x = 22 \Rightarrow x = 11$; then $y = 15 - 11 = 4$

$\therefore$ Rate of the current = 4 km/hr, speed in still water = 11 km/hr

Ans: Rate of current 4 km/hr, speed in still water 11 km/hr
