

Arithmetic (Level 2)**Question Paper, Set 10**

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 24 days, find A's 1 day's work. [1 mark]
2. A is twice as good a workman as B. A can finish a piece of work in 41 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 6 : 5, find the ratio in which the time taken by them to finish the work changes. [1 mark]
4. 8 men can finish a piece of work in 26 hours. In how many hours can 52 men finish the same work? [2 marks]
5. A can do a piece of work in 10 days and B can do it in 70 days. Find (A + B)'s 1 day's work. [1 mark]
6. A can do a piece of work in 17 days and B alone can do it in 51 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 9 days. B alone can finish it in 90 days. In how many days can A alone finish the work? [2 marks]
8. A and B can do a piece of work in 63 days; B and C in 28 days; C and A in 36 days. In how many days will they finish it together and separately? [5 marks]
9. A is thrice as good a workman as B and is therefore able to finish a piece of work in 38 days less than B. Find the time in which they can do it working together. [3 marks]
10. A and B can do a piece of work in 56 and 28 days respectively. They began the work together, but B leaves after some days and A finishes the remaining work in 44 days. After how many days did B leave? [3 marks]
11. A can do a piece of work in 120 days and B can do it in 80 days. They work together for 7 days. Then B leaves and A alone continues the work. 29 days after that, C joins A and the work is completed in 21 days more. In how many days can C do the work alone? [5 marks]
12. If 3 men with 7 boys can earn ₹9990 in 9 days and 6 men with 3 boys can earn ₹11715 in 11 days, in what time will 7 men with 10 boys earn ₹28875? [5 marks]

13. A can do half as much again as B can do in the same time. B alone can do a piece of work in 45 days. In how many days can both together finish it? [3 marks]
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14. A man rows in still water at 7 km/hr and the rate of the current is 1.5 km/hr. Find the man's rate with the current. [1 mark]
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15. A man can row downstream at the rate of 13 km/hr and upstream at 11 km/hr. Find the man's rate in still water and the rate of the current. [2 marks]
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16. A boat goes 23 km downstream in 8 hours. Find its speed downstream. [1 mark]
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17. A man rows upstream 42 km and downstream 63 km, taking 6 hours each time. What is the velocity of the current? [2 marks]
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18. A man can row 5 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 6 km/hr, it takes him 1 hour to row to a place and back. How far is the place? [3 marks]
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20. The current of a stream runs at the rate of 1 km/hr. A motor boat goes 7 km upstream and back again to the starting point in 2 hours 55 minutes. Find the speed of the motor boat in still water. [5 marks]
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Key sheet

Q	Answer
1	$\frac{1}{24}$
2	82 days
3	5 : 6
4	4 hours
5	$\frac{4}{35}$
6	$12\frac{3}{4}$ days
7	10 days
8	Together $25\frac{1}{5}$ days; A alone 252 days, B alone 84 days, C alone 42 days
9	$14\frac{1}{4}$ days
10	4 days
11	48 days
12	15 days
13	18 days
14	8.5 km/hr
15	Rate in still water 12 km/hr, rate of current 1 km/hr
16	2.875 km/hr
17	1.75 km/hr
18	2.5 km/hr
19	6.3 km
20	5 km/hr

Solutions

1. If A can finish a piece of work in 24 days, find A's 1 day's work. [1]

A finishes the whole work in 24 days.

$$\therefore \text{A's 1 day's work} = \frac{1}{24}$$

Ans: $\frac{1}{24}$

2. A is twice as good a workman as B. A can finish a piece of work in 41 days. How many days will B take to finish it? [1]

$$\text{Time taken by A} = \frac{1}{2} \times (\text{Time taken by B})$$

$$41 = \frac{1}{2} \times (\text{Time taken by B})$$

$$\therefore \text{Time taken by B} = 2 \times 41 = 82 \text{ days}$$

Ans: 82 days

3. If the number of men to do a work is changed in the ratio 6 : 5, find the ratio in which the time taken by them to finish the work changes. [1]

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

$$\frac{T_1}{T_2} = \frac{M_2}{M_1} = \frac{5}{6}$$

$$\therefore T_1 : T_2 = 5 : 6$$

Ans: 5 : 6

4. 8 men can finish a piece of work in 26 hours. In how many hours can 52 men finish the same work? [2]

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

$$8 \times 26 = 52 \times x$$

$$x = \frac{8 \times 26}{52} = 4 \text{ hours}$$

Ans: 4 hours

5. A can do a piece of work in 10 days and B can do it in 70 days. Find (A + B)'s 1 day's work. [1]

$$(A + B)\text{'s 1 day's work} = \frac{1}{10} + \frac{1}{70} = \frac{7+1}{70} = \frac{8}{70} = \frac{4}{35}$$

Ans: $\frac{4}{35}$

6. A can do a piece of work in 17 days and B alone can do it in 51 days. How much time will both take to finish the work? [2]

$$\text{A's 1 day's work} = \frac{1}{17}$$

$$\text{B's 1 day's work} = \frac{1}{51}$$

$$\therefore (A + B)\text{'s 1 day's work} = \frac{1}{17} + \frac{1}{51} = \frac{3+1}{51} = \frac{4}{51}$$

$$\therefore \text{Both together can finish the work in } \frac{51}{4} \text{ days} = 12\frac{3}{4} \text{ days}$$

Ans: $12\frac{3}{4}$ days

7. A and B together can do a piece of work in 9 days. B alone can finish it in 90 days. In how many days can A alone finish the work? [2]

$$(A + B)\text{'s 1 day's work} = \frac{1}{9}$$

$$B\text{'s 1 day's work} = \frac{1}{90}$$

$$\Rightarrow A\text{'s 1 day's work} = \frac{1}{9} - \frac{1}{90} = \frac{10-1}{90} = \frac{9}{90} = \frac{1}{10}$$

$\therefore$ A alone can finish the work in 10 days.

Ans: 10 days

8. A and B can do a piece of work in 63 days; B and C in 28 days; C and A in 36 days. In how many days will they finish it together and separately? [5]

$$(A + B)\text{'s 1 day's work} = \frac{1}{63}$$

$$(B + C)\text{'s 1 day's work} = \frac{1}{28}$$

$$(C + A)\text{'s 1 day's work} = \frac{1}{36}$$

$$\text{Adding, } 2(A + B + C)\text{'s 1 day's work} = \frac{1}{63} + \frac{1}{28} + \frac{1}{36} = \frac{4+9+7}{252} = \frac{20}{252} = \frac{5}{63}$$

$$\Rightarrow (A + B + C)\text{'s 1 day's work} = \frac{5}{126}$$

$\therefore$ A, B, C together can finish the work in $25\frac{1}{5}$ days.

$$A\text{'s 1 day's work} = \frac{5}{126} - \frac{1}{28} = \frac{1}{252}, \text{ so A alone takes 252 days}$$

$$B\text{'s 1 day's work} = \frac{5}{126} - \frac{1}{36} = \frac{1}{84}, \text{ so B alone takes 84 days}$$

$$C\text{'s 1 day's work} = \frac{5}{126} - \frac{1}{63} = \frac{1}{42}, \text{ so C alone takes 42 days}$$

Ans: Together $25\frac{1}{5}$ days; A alone 252 days, B alone 84 days, C alone 42 days

9. A is thrice as good a workman as B and is therefore able to finish a piece of work in 38 days less than B. Find the time in which they can do it working together. [3]

Suppose B finishes the work in x days

$\Rightarrow$ A is able to finish it in $(x - 38)$ days

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

$$\therefore x - 38 = \frac{1}{3}x$$

$$\Rightarrow 3x - 114 = x \Rightarrow 2x = 114 \Rightarrow x = 57$$

$\therefore$ Time taken by B = 57 days, time taken by A = 19 days

$$A\text{'s 1 day's work} = \frac{1}{19}, B\text{'s 1 day's work} = \frac{1}{57}$$

$$(A + B)\text{'s 1 day's work} = \frac{1}{19} + \frac{1}{57} = \frac{3+1}{57} = \frac{4}{57}$$

A and B together can finish the work in $14\frac{1}{4}$ days

Ans: $14\frac{1}{4}$ days

10. A and B can do a piece of work in 56 and 28 days respectively. They began the work together, but B leaves after some days and A finishes the remaining work in 44 days. After how many days did B leave? [3]

$$A\text{'s 1 day's work} = \frac{1}{56}, B\text{'s 1 day's work} = \frac{1}{28}$$

$$(A + B)\text{'s 1 day's work} = \frac{1}{56} + \frac{1}{28} = \frac{1+2}{56} = \frac{3}{56}$$

$$A\text{'s 44 days' work} = 44 \times \frac{1}{56} = \frac{11}{14}$$

$$\text{Remaining work} = 1 - \frac{11}{14} = \frac{3}{14}$$

$$(A + B)\text{'s } x \text{ days' work} = \frac{3}{14} \Rightarrow \frac{3}{56} \times x = \frac{3}{14}$$

$x = 4$, so B left after 4 days

Ans: 4 days

11. A can do a piece of work in 120 days and B can do it in 80 days. They work together for 7 days. Then B leaves and A alone continues the work. 29 days after that, C joins A and the work is completed in 21 days more. In how many days can C do the work alone? [5]

$$\begin{aligned} \text{A's 1 day's work} &= \frac{1}{120}, \text{ B's 1 day's work} = \frac{1}{80} \\ (\text{A} + \text{B})\text{'s 1 day's work} &= \frac{1}{120} + \frac{1}{80} = \frac{2+3}{240} = \frac{5}{240} = \frac{1}{48} \\ (\text{A} + \text{B})\text{'s 7 days' work} &= 7 \times \frac{1}{48} = \frac{7}{48} \\ \text{A's 29 days' work} &= \frac{29}{120} \\ (\text{A} + \text{C})\text{'s 21 days' work} &= 1 - \left(\frac{7}{48} + \frac{29}{120} \right) = \frac{49}{80} \\ \Rightarrow (\text{A} + \text{C})\text{'s 1 day's work} &= \frac{49}{80} \div 21 = \frac{7}{240} \\ \text{C's 1 day's work} &= \frac{7}{240} - \frac{1}{120} = \frac{7-2}{240} = \frac{5}{240} = \frac{1}{48} \\ \text{C can finish the work in 48 days} \end{aligned}$$

Ans: 48 days

12. If 3 men with 7 boys can earn ₹9990 in 9 days and 6 men with 3 boys can earn ₹11715 in 11 days, in what time will 7 men with 10 boys earn ₹28875? [5]

$$\begin{aligned} \text{Let 1 man earn ₹}x \text{ and 1 boy earn ₹}y \text{ in 1 day.} \\ (3x + 7y) \times 9 &= 9990 \Rightarrow 3x + 7y = 1110 \quad \dots (1) \\ (6x + 3y) \times 11 &= 11715 \Rightarrow 6x + 3y = 1065 \quad \dots (2) \\ (1) \times 2 \Rightarrow 6x + 14y &= 2220 \\ (1) \times 2 - (2) \Rightarrow 11y &= 1155 \Rightarrow y = 105 \\ \text{From (1): } 3x &= 1110 - 735 = 375 \Rightarrow x = 125 \\ (7x + 10y)n &= 28875 \\ \Rightarrow (875 + 1050)n &= 28875 \Rightarrow 1925n = 28875 \\ \Rightarrow n &= 15 \text{ days} \end{aligned}$$

Ans: 15 days

13. A can do half as much again as B can do in the same time. B alone can do a piece of work in 45 days. In how many days can both together finish it? [3]

$$\begin{aligned} \text{If B does } x, \text{ A does } \frac{x}{2} + x &= \frac{3x}{2} \text{ in the same time} \\ \text{Ratio of working of A and B} &= \frac{3}{2} : 1 = 3 : 2 \\ \text{Ratio of time taken for the same work} &= 2 : 3 \\ \text{Time taken by B} &= 3k = 45 \Rightarrow k = 15 \\ \text{Time taken by A} &= 2k = 30 \text{ days} \\ \text{A's 1 day's work} &= \frac{1}{30}, \text{ B's 1 day's work} = \frac{1}{45} \\ (\text{A} + \text{B})\text{'s 1 day's work} &= \frac{1}{30} + \frac{1}{45} = \frac{3+2}{90} = \frac{5}{90} = \frac{1}{18} \\ \text{Time taken by (A + B) to finish the work} &= 18 \text{ days} \end{aligned}$$

Ans: 18 days

14. A man rows in still water at 7 km/hr and the rate of the current is 1.5 km/hr. Find the man's rate with the current. [1]

$$\begin{aligned} \text{Speed downstream} &= (x + y) \text{ km/hr} \\ &= 7 + 1.5 = 8.5 \text{ km/hr} \end{aligned}$$

Ans: 8.5 km/hr

15. A man can row downstream at the rate of 13 km/hr and upstream at 11 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 $x + y = 13$ and $x - y = 11$

Adding, $2x = 24 \Rightarrow x = 12$ km/hr

Subtracting, $2y = 2 \Rightarrow y = 1$ km/hr

Ans: Rate in still water 12 km/hr, rate of current 1 km/hr

16. A boat goes 23 km downstream in 8 hours. Find its speed downstream. [1]

$$\begin{aligned}\text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ &= \frac{23}{8} = 2.875 \text{ km/hr}\end{aligned}$$

Ans: 2.875 km/hr

17. A man rows upstream 42 km and downstream 63 km, taking 6 hours each time. What is the velocity of the current? [2]

Speed downstream: $x + y = \frac{63}{6}$ km/hr

Speed upstream: $x - y = \frac{42}{6}$ km/hr

Subtracting, $2y = \frac{63}{6} - \frac{42}{6} = \frac{21}{6}$

$y = \frac{21}{12} = 1.75$ km/hr

Ans: 1.75 km/hr

18. A man can row 5 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 $3(5 - y) = 5 + y$

$\Rightarrow 15 - 3y = 5 + y \Rightarrow 4y = 10$

$\Rightarrow y = 2.5$ km/hr

Ans: 2.5 km/hr

19. A man can row 15 km/hr in still water. If the river is running at 6 km/hr, it takes him 1 hour to row to a place and back. How far is the place? [3]

Let the required distance be d km

Speed downstream = $15 + 6 = 21$ km/hr

Speed upstream = $15 - 6 = 9$ km/hr

Time = $\frac{\text{Distance}}{\text{Speed}}$, so $\frac{d}{21} + \frac{d}{9} = 1$

$\Rightarrow d \left(\frac{1}{21} + \frac{1}{9} \right) = 1$

$\Rightarrow d \times \frac{10}{63} = 1$

$\Rightarrow d = 6.3$ km

Ans: 6.3 km

20. The current of a stream runs at the rate of 1 km/hr. A motor boat goes 7 km upstream and back again to the starting point in 2 hours 55 minutes. Find the speed of the motor boat in still water. [5]

Let the speed of the boat in still water be x km/hr

Speed upstream = $(x - 1)$ km/hr, speed downstream = $(x + 1)$ km/hr

Total time = 175 min = $\frac{175}{60}$ hr = $\frac{35}{12}$ hr

$$\frac{7}{x-1} + \frac{7}{x+1} = \frac{35}{12}$$

$$\Rightarrow 7 \left(\frac{(x+1)+(x-1)}{(x-1)(x+1)} \right) = \frac{35}{12}$$

$$\Rightarrow \frac{14x}{x^2-1} = \frac{35}{12}$$

$$\Rightarrow 168x = 35x^2 - 35$$

$$\Rightarrow 5x^2 - 24x - 5 = 0$$

$$\Rightarrow (x - 5)(5x + 1) = 0$$

$$\Rightarrow x = 5 \text{ (or) } x = -\frac{1}{5} \text{ (rejected, a speed cannot be negative)}$$

$\therefore$ Speed of the boat in still water = 5 km/hr

Ans: 5 km/hr
