

Arithmetic (Level 2)

Question Paper, Set 04

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. Ravi can paint a wall in 49 hours. What part of the wall does he paint in 1 hour? [1 mark]
2. A is thrice as good a workman as B. If B can finish a piece of work in 33 days, in how many days can A finish it? [1 mark]
3. A piece of work is done by 35 men. If 45 men do the same work instead, find the ratio of the time taken by the 35 men to the time taken by the 45 men. [1 mark]
4. 28 men can finish a piece of work in 7 hours. In how many hours can 4 men finish the same work? [2 marks]
5. A can do a piece of work in 15 days and B can do it in 66 days. Find (A + B)'s 1 day's work. [1 mark]
6. A can finish a piece of work in 46 days and B can finish it in 23 days. In how many days can they finish it working together? [2 marks]
7. A and B can do a piece of work in 90 days; B and C in 45 days; C and A in 60 days. In how many days will they finish it together and separately? [5 marks]
8. A is twice as good a workman as B and is therefore able to finish a piece of work in 31 days less than B. Find the time in which they can do it working together. [3 marks]
9. A and B can do a piece of work in 35 and 70 days respectively. They began the work together, but A leaves after some days and B finishes the remaining work in 22 days. After how many days did A leave? [3 marks]
10. A can do a piece of work in 175 days and B can do it in 60 days. They work together for 30 days. Then B leaves and A alone continues the work. 8 days after that, C joins A and the work is completed in 18 days more. In how many days can C do the work alone? [5 marks]
11. A certain number of men complete a piece of work in 70 days. If there were 4 men more, the work could be finished in 5 days less. How many men were there originally? [2 marks]
12. If 6 men or 10 boys can finish a piece of work in 15 days, in how many days can 3 men and 20 boys finish it? [2 marks]

13. If 2 men with 7 boys can earn ₹2025 in 9 days and 4 men with 7 boys can earn ₹3795 in 11 days, in what time will 3 men with 3 boys earn ₹2025? [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 90 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 9.5 km/hr and the speed of the stream is 0.5 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 11 km/hr and upstream at 8 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 27 km downstream in 6 hours. Find its speed downstream. [1 mark]
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18. The rate of a stream is 4 km/hr. A man finds that it takes him thrice as long to row up the river as to row down. Find the man's rate in still water. [2 marks]
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19. A man can row 10 km/hr in still water. If the river is running at 3 km/hr, it takes him 2 hours 30 minutes 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 12 km upstream and back again to the starting point in 1 hour 25 minutes. Find the speed of the motor boat in still water. [5 marks]
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Key sheet

Q	Answer
1	$\frac{1}{49}$ of the wall
2	11 days
3	9 : 7
4	49 hours
5	$\frac{9}{110}$
6	$15\frac{1}{3}$ days
7	Together 40 days; A alone 360 days, B alone 120 days, C alone 72 days
8	$20\frac{2}{3}$ days
9	16 days
10	100 days
11	52 men
12	6 days
13	9 days
14	36 days
15	9 km/hr
16	Rate in still water 9.5 km/hr, rate of current 1.5 km/hr
17	4.5 km/hr
18	8 km/hr
19	11.375 km
20	17 km/hr

Solutions

1. Ravi can paint a wall in 49 hours. What part of the wall does he paint in 1 hour? [1]

Ravi paints the whole wall in 49 hours.

$$\therefore \text{Ravi's 1 hour's work} = \frac{1}{49}$$

Ans: $\frac{1}{49}$ of the wall

2. A is thrice as good a workman as B. If B can finish a piece of work in 33 days, in how many days can A finish it? [1]

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

$$= \frac{1}{3} \times 33 = 11 \text{ days}$$

Ans: 11 days

3. A piece of work is done by 35 men. If 45 men do the same work instead, find the ratio of the time taken by the 35 men to the time taken by the 45 men. [1]

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

$$\frac{T_1}{T_2} = \frac{M_2}{M_1} = \frac{45}{35} = \frac{9}{7}$$

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

Ans: 9 : 7

4. 28 men can finish a piece of work in 7 hours. In how many hours can 4 men finish the same work? [2]

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

$$28 \times 7 = 4 \times x$$

$$x = \frac{28 \times 7}{4} = 49 \text{ hours}$$

Ans: 49 hours

5. A can do a piece of work in 15 days and B can do it in 66 days. Find (A + B)'s 1 day's work. [1]

$$(A + B)\text{'s 1 day's work} = \frac{1}{15} + \frac{1}{66} = \frac{22+5}{330} = \frac{27}{330} = \frac{9}{110}$$

Ans: $\frac{9}{110}$

6. A can finish a piece of work in 46 days and B can finish it in 23 days. In how many days can they finish it working together? [2]

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

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

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

$$\therefore \text{Both together can finish the work in } \frac{46}{3} \text{ days} = 15\frac{1}{3} \text{ days}$$

Ans: $15\frac{1}{3}$ days

7. A and B can do a piece of work in 90 days; B and C in 45 days; C and A in 60 days. In how many days will they finish it together and separately? [5]

$$(A + B)\text{'s 1 day's work} = \frac{1}{90}$$

$$(B + C)\text{'s 1 day's work} = \frac{1}{45}$$

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

$$\text{Adding, } 2(A + B + C)\text{'s 1 day's work} = \frac{1}{90} + \frac{1}{45} + \frac{1}{60} = \frac{2+4+3}{180} = \frac{9}{180} = \frac{1}{20}$$

$$\Rightarrow (A + B + C)\text{'s 1 day's work} = \frac{1}{40}$$

$\therefore$ A, B, C together can finish the work in 40 days.

$$A\text{'s 1 day's work} = \frac{1}{40} - \frac{1}{45} = \frac{1}{360}, \text{ so A alone takes 360 days}$$

$$B\text{'s 1 day's work} = \frac{1}{40} - \frac{1}{60} = \frac{1}{120}, \text{ so B alone takes 120 days}$$

$$C\text{'s 1 day's work} = \frac{1}{40} - \frac{1}{90} = \frac{1}{72}, \text{ so C alone takes 72 days}$$

Ans: Together 40 days; A alone 360 days, B alone 120 days, C alone 72 days

8. A is twice as good a workman as B and is therefore able to finish a piece of work in 31 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 $(x - 31)$ days

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

$$\therefore x - 31 = \frac{1}{2}x$$

$$\Rightarrow 2x - 62 = x \Rightarrow x = 62$$

$\therefore$ Time taken by B = 62 days, time taken by A = 31 days

$$A\text{'s 1 day's work} = \frac{1}{31}, B\text{'s 1 day's work} = \frac{1}{62}$$

$$(A + B)\text{'s 1 day's work} = \frac{1}{31} + \frac{1}{62} = \frac{2+1}{62} = \frac{3}{62}$$

A and B together can finish the work in $20\frac{2}{3}$ days

Ans: $20\frac{2}{3}$ days

9. A and B can do a piece of work in 35 and 70 days respectively. They began the work together, but A leaves after some days and B finishes the remaining work in 22 days. After how many days did A leave? [3]

$$A\text{'s 1 day's work} = \frac{1}{35}, B\text{'s 1 day's work} = \frac{1}{70}$$

$$(A + B)\text{'s 1 day's work} = \frac{1}{35} + \frac{1}{70} = \frac{2+1}{70} = \frac{3}{70}$$

$$B\text{'s 22 days' work} = 22 \times \frac{1}{70} = \frac{11}{35}$$

$$\text{Remaining work} = 1 - \frac{11}{35} = \frac{24}{35}$$

$$(A + B)\text{'s } x \text{ days' work} = \frac{24}{35} \Rightarrow \frac{3}{70} \times x = \frac{24}{35}$$

$x = 16$, so A left after 16 days

Ans: 16 days

10. A can do a piece of work in 175 days and B can do it in 60 days. They work together for 30 days. Then B leaves and A alone continues the work. 8 days after that, C joins A and the work is completed in 18 days more. In how many days can C do the work alone? [5]

$$\begin{aligned} \text{A's 1 day's work} &= \frac{1}{175}, \text{ B's 1 day's work} = \frac{1}{60} \\ (\text{A} + \text{B})\text{'s 1 day's work} &= \frac{1}{175} + \frac{1}{60} = \frac{12+35}{2100} = \frac{47}{2100} \\ (\text{A} + \text{B})\text{'s 30 days' work} &= 30 \times \frac{47}{2100} = \frac{47}{70} \\ \text{A's 8 days' work} &= \frac{8}{175} \\ (\text{A} + \text{C})\text{'s 18 days' work} &= 1 - \left(\frac{47}{70} + \frac{8}{175} \right) = \frac{99}{350} \\ \Rightarrow (\text{A} + \text{C})\text{'s 1 day's work} &= \frac{99}{350} \div 18 = \frac{11}{700} \\ \text{C's 1 day's work} &= \frac{11}{700} - \frac{1}{175} = \frac{11-4}{700} = \frac{7}{700} = \frac{1}{100} \\ \text{C can finish the work in 100 days} \end{aligned}$$

Ans: 100 days

11. A certain number of men complete a piece of work in 70 days. If there were 4 men more, the work could be finished in 5 days less. How many men were there originally? [2]

Let the original number of men be x

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

$$x \times 70 = (x + 4) \times 65$$

$$70x = 65x + 260$$

$$5x = 260 \Rightarrow x = 52$$

Ans: 52 men

12. If 6 men or 10 boys can finish a piece of work in 15 days, in how many days can 3 men and 20 boys finish it? [2]

$$6 \text{ men} = 10 \text{ boys}$$

$$3 \text{ men} = \frac{10}{6} \times 3 = 5 \text{ boys}$$

$$3 \text{ men} + 20 \text{ boys} = 5 \text{ boys} + 20 \text{ boys} = 25 \text{ boys}$$

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

$$10 \times 15 = 25 \times x \Rightarrow x = 6 \text{ days}$$

Ans: 6 days

13. If 2 men with 7 boys can earn ₹2025 in 9 days and 4 men with 7 boys can earn ₹3795 in 11 days, in what time will 3 men with 3 boys earn ₹2025? [5]

Let 1 man earn ₹ x and 1 boy earn ₹ y in 1 day.

$$(2x + 7y) \times 9 = 2025 \Rightarrow 2x + 7y = 225 \quad \dots (1)$$

$$(4x + 7y) \times 11 = 3795 \Rightarrow 4x + 7y = 345 \quad \dots (2)$$

$$(1) \times 2 \Rightarrow 4x + 14y = 450$$

$$(1) \times 2 - (2) \Rightarrow 7y = 105 \Rightarrow y = 15$$

$$\text{From (1): } 2x = 225 - 105 = 120 \Rightarrow x = 60$$

$$(3x + 3y)n = 2025$$

$$\Rightarrow (180 + 45)n = 2025 \Rightarrow 225n = 2025$$

$$\Rightarrow n = 9 \text{ days}$$

Ans: 9 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 90 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 = $3k = 90 \Rightarrow k = 30$

Time taken by A = $2k = 60$ days

A's 1 day's work = $\frac{1}{60}$, B's 1 day's work = $\frac{1}{90}$

(A + B)'s 1 day's work = $\frac{1}{60} + \frac{1}{90} = \frac{3+2}{180} = \frac{5}{180} = \frac{1}{36}$

Time taken by (A + B) to finish the work = 36 days

Ans: 36 days

15. The speed of a boat in still water is 9.5 km/hr and the speed of the stream is 0.5 km/hr. Find the speed of the boat upstream. [1]

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

= $9.5 - 0.5 = 9$ km/hr

Ans: 9 km/hr

16. A man can row downstream at the rate of 11 km/hr and upstream at 8 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 $x + y = 11$ and $x - y = 8$

Adding, $2x = 19 \Rightarrow x = 9.5$ km/hr

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

Ans: Rate in still water 9.5 km/hr, rate of current 1.5 km/hr

17. A boat goes 27 km downstream in 6 hours. Find its speed downstream. [1]

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

= $\frac{27}{6} = 4.5$ km/hr

Ans: 4.5 km/hr

18. The rate of a stream is 4 km/hr. A man finds that it takes him thrice as long to row up the river as to row down. Find the man's rate in still water. [2]

Let the man's rate in still water be x km/hr

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

Given $3(x - 4) = x + 4$

$\Rightarrow 3x - 12 = x + 4 \Rightarrow 2x = 16$

$\Rightarrow x = 8$ km/hr

Ans: 8 km/hr

19. A man can row 10 km/hr in still water. If the river is running at 3 km/hr, it takes him 2 hours 30 minutes to row to a place and back. How far is the place? [3]

Let the required distance be d km

Speed downstream = $10 + 3 = 13$ km/hr

Speed upstream = $10 - 3 = 7$ km/hr

Total time = 2 hours 30 minutes = 2.5 hours

Time = $\frac{\text{Distance}}{\text{Speed}}$, so $\frac{d}{13} + \frac{d}{7} = 2.5$

$$\Rightarrow d \left(\frac{1}{13} + \frac{1}{7} \right) = 2.5$$

$$\Rightarrow d \times \frac{20}{91} = 2.5$$

$$\Rightarrow d = 11.375 \text{ km}$$

Ans: 11.375 km

20. The current of a stream runs at the rate of 1 km/hr. A motor boat goes 12 km upstream and back again to the starting point in 1 hour 25 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 = 85 min = $\frac{85}{60}$ hr = $\frac{17}{12}$ hr

$$\frac{12}{x-1} + \frac{12}{x+1} = \frac{17}{12}$$

$$\Rightarrow 12 \left(\frac{(x+1)+(x-1)}{(x-1)(x+1)} \right) = \frac{17}{12}$$

$$\Rightarrow \frac{24x}{x^2-1} = \frac{17}{12}$$

$$\Rightarrow 288x = 17x^2 - 17$$

$$\Rightarrow 17x^2 - 288x - 17 = 0$$

$$\Rightarrow (x - 17)(17x + 1) = 0$$

$$\Rightarrow x = 17 \text{ (or) } x = -\frac{1}{17} \text{ (rejected, a speed cannot be negative)}$$

$\therefore$ Speed of the boat in still water = 17 km/hr

Ans: 17 km/hr
