

Arithmetic (Level 2)

Question Paper, Set 05

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. B's 1 day's work is $\frac{1}{55}$. In how many days can B finish the whole work? [1 mark]
2. A is twice as good a workman as B. A can finish a piece of work in 18 days. How many days will B take to finish it? [1 mark]
3. A piece of work is done by 14 men. If 35 men do the same work instead, find the ratio of the time taken by the 14 men to the time taken by the 35 men. [1 mark]
4. 10 men can finish a piece of work in 46 days. In how many days can 46 men finish the same work? [2 marks]
5. A can do a piece of work in 34 days and B can do it in 51 days. Find (A + B)'s 1 day's work. [1 mark]
6. A can finish a piece of work in 40 days and B can finish it in 5 days. In how many days can they finish it working together? [2 marks]
7. A and B together can finish a piece of work in 21 days. A alone can do it in 30 days. In how many days can B alone do it? [2 marks]
8. A can do a piece of work in 34 days and B can finish it in 17 days. They work together for 4 days and then A goes away. In how many days will B finish the remaining work? [3 marks]
9. A can do a piece of work in 6 days while B alone can do it in 30 days. With the help of C they can finish it in 3 days. If they are paid ₹3200 for the whole work, how should the money be divided among them? [5 marks]
10. A and B together can do a piece of work in 20 days. B and C together can do it in 30 days. If A is twice as good a workman as C, find in what time B alone can do it. [3 marks]
11. If 2 men or 14 boys can finish a piece of work in 13 days, in how many days can 11 men and 14 boys finish it? [2 marks]
12. 6 men and 8 women working 3 hours a day finish a piece of work in 6 days; 2 men and 4 women working 5 hours a day do the same work in 9 days. Find the number of days in which the work is done by 4 men only, working 5 hours a day. [5 marks]

13. 42 men are employed to do a piece of work which they could finish in 25 days, but the men drop off by 3 at the end of every 10 days. In what time will the work be completed? [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 72 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 5 km/hr and the speed of the stream is 2.5 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 23 km/hr and upstream at 15 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 57 km upstream in 4 hours. Find its speed upstream. [1 mark]
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18. A man rows upstream 25 km and downstream 39 km, taking 4 hours each time. What is the velocity of the current? [2 marks]
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19. A man can row 5 km/hr in still water. If the river is running at 1 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. A man can row 9 km upstream and 75 km downstream in 6 hours, while he can row 45 km upstream and 30 km downstream in 7 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	55 days
2	36 days
3	5 : 2
4	10 days
5	$\frac{5}{102}$
6	$4\frac{4}{9}$ days
7	70 days
8	11 days
9	A ₹1600, B ₹320, C ₹1280
10	60 days
11	2 days
12	9 days
13	$26\frac{2}{3}$ days
14	$28\frac{4}{5}$ days
15	2.5 km/hr
16	Rate in still water 19 km/hr, rate of current 4 km/hr
17	14.25 km/hr
18	1.75 km/hr
19	2.4 km
20	Rate of current 3 km/hr, speed in still water 12 km/hr

Solutions

1. B's 1 day's work is $\frac{1}{55}$. In how many days can B finish the whole work? [1]

B does $\frac{1}{55}$ of the work in 1 day.

$\therefore$ B finishes the whole work in 55 days.

Ans: 55 days

2. A is twice as good a workman as B. A can finish a piece of work in 18 days. How many days will B take to finish it? [1]

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

$18 = \frac{1}{2} \times$ (Time taken by B)

$\therefore$ Time taken by B = $2 \times 18 = 36$ days

Ans: 36 days

3. A piece of work is done by 14 men. If 35 men do the same work instead, find the ratio of the time taken by the 14 men to the time taken by the 35 men. [1]

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

$$\frac{T_1}{T_2} = \frac{M_2}{M_1} = \frac{35}{14} = \frac{5}{2}$$

$\therefore T_1 : T_2 = 5 : 2$

Ans: 5 : 2

4. 10 men can finish a piece of work in 46 days. In how many days can 46 men finish the same work? [2]

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

$$10 \times 46 = 46 \times x$$

$$x = \frac{10 \times 46}{46} = 10 \text{ days}$$

Ans: 10 days

5. A can do a piece of work in 34 days and B can do it in 51 days. Find (A + B)'s 1 day's work. [1]

$$(A + B)\text{'s 1 day's work} = \frac{1}{34} + \frac{1}{51} = \frac{3+2}{102} = \frac{5}{102}$$

Ans: $\frac{5}{102}$

6. A can finish a piece of work in 40 days and B can finish it in 5 days. In how many days can they finish it working together? [2]

A's 1 day's work = $\frac{1}{40}$

B's 1 day's work = $\frac{1}{5}$

$$\therefore (A + B)\text{'s 1 day's work} = \frac{1}{40} + \frac{1}{5} = \frac{1+8}{40} = \frac{9}{40}$$

$\therefore$ Both together can finish the work in $\frac{40}{9}$ days = $4\frac{4}{9}$ days

Ans: $4\frac{4}{9}$ days

7. A and B together can finish a piece of work in 21 days. A alone can do it in 30 days. In how many days can B alone do it? [2]

$$(A + B)\text{'s 1 day's work} = \frac{1}{21}$$

$$A\text{'s 1 day's work} = \frac{1}{30}$$

$$\Rightarrow B\text{'s 1 day's work} = \frac{1}{21} - \frac{1}{30} = \frac{10-7}{210} = \frac{3}{210} = \frac{1}{70}$$

$\therefore$ B alone can finish the work in 70 days.

Ans: 70 days

8. A can do a piece of work in 34 days and B can finish it in 17 days. They work together for 4 days and then A goes away. In how many days will B finish the remaining work? [3]

$$A\text{'s 1 day's work} = \frac{1}{34}$$

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

$$(A + B)\text{'s 1 day's work} = \frac{1}{34} + \frac{1}{17} = \frac{1+2}{34} = \frac{3}{34}$$

$$(A + B)\text{'s 4 days' work} = 4 \times \frac{3}{34} = \frac{6}{17}$$

$$\text{Remaining work} = 1 - \frac{6}{17} = \frac{11}{17}$$

$$\text{This work is done by B in } \frac{11}{17} \times 17 = 11 \text{ days}$$

Ans: 11 days

9. A can do a piece of work in 6 days while B alone can do it in 30 days. With the help of C they can finish it in 3 days. If they are paid ₹3200 for the whole work, how should the money be divided among them? [5]

$$A\text{'s 1 day's work} = \frac{1}{6}$$

$$B\text{'s 1 day's work} = \frac{1}{30}$$

$$(A + B)\text{'s 1 day's work} = \frac{1}{6} + \frac{1}{30} = \frac{5+1}{30} = \frac{6}{30} = \frac{1}{5}$$

$$\text{Given } (A + B + C)\text{'s 1 day's work} = \frac{1}{3}$$

$$C\text{'s 1 day's work} = \frac{1}{3} - \frac{1}{5} = \frac{5-3}{15} = \frac{2}{15}$$

$$\text{Consider } \frac{1}{6} : \frac{1}{30} : \frac{2}{15} = \frac{5}{30} : \frac{1}{30} : \frac{4}{30} = 5 : 1 : 4$$

$\therefore$ ₹3200 must be divided in the ratio 5 : 1 : 4 (5 + 1 + 4 = 10)

$$A\text{'s share} = 3200 \times \frac{5}{10} = 1600, \text{ i.e. ₹1600}$$

$$B\text{'s share} = 3200 \times \frac{1}{10} = 320, \text{ i.e. ₹320}$$

$$C\text{'s share} = 3200 \times \frac{4}{10} = 1280, \text{ i.e. ₹1280}$$

Ans: A ₹1600, B ₹320, C ₹1280

10. A and B together can do a piece of work in 20 days. B and C together can do it in 30 days. If A is twice as good a workman as C, find in what time B alone can do it. [3]

$$(A + B)\text{'s 1 day's work} = \frac{1}{20}, (B + C)\text{'s 1 day's work} = \frac{1}{30}$$

$$A\text{'s 1 day's work} = C\text{'s 2 days' work}$$

$$C\text{'s 2 days' work} + B\text{'s 1 day's work} = \frac{1}{20}$$

$$\Rightarrow C\text{'s 1 day's work} + (B + C)\text{'s 1 day's work} = \frac{1}{20}$$

$$\Rightarrow C\text{'s 1 day's work} + \frac{1}{30} = \frac{1}{20}$$

$$C\text{'s 1 day's work} = \frac{1}{20} - \frac{1}{30} = \frac{3-2}{60} = \frac{1}{60}$$

$$B\text{'s 1 day's work} = \frac{1}{30} - \frac{1}{60} = \frac{2-1}{60} = \frac{1}{60}$$

$\therefore$ B alone can finish the work in 60 days

Ans: 60 days

11. If 2 men or 14 boys can finish a piece of work in 13 days, in how many days can 11 men and 14 boys finish it? [2]

$$2 \text{ men} = 14 \text{ boys}$$

$$11 \text{ men} = \frac{14}{2} \times 11 = 77 \text{ boys}$$

$$11 \text{ men} + 14 \text{ boys} = 77 \text{ boys} + 14 \text{ boys} = 91 \text{ boys}$$

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

$$14 \times 13 = 91 \times x \Rightarrow x = 2 \text{ days}$$

Ans: 2 days

12. 6 men and 8 women working 3 hours a day finish a piece of work in 6 days; 2 men and 4 women working 5 hours a day do the same work in 9 days. Find the number of days in which the work is done by 4 men only, working 5 hours a day. [5]

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

$$\text{Case (i): } (6m + 8w) \times 3 \times 6 = 108m + 144w$$

$$\text{Case (ii): } (2m + 4w) \times 5 \times 9 = 90m + 180w$$

$$\text{Same work: } 108m + 144w = 90m + 180w$$

$$\Rightarrow 36w = 18m \Rightarrow 2w = m$$

So 8 women = 4 men, and $6m + 8w = 10m$

10 men working 3 hours a day for 6 days do the same work as 4 men working 5 hours a day for x days

$$10 \times 3 \times 6 = 4 \times 5 \times x \Rightarrow x = 9 \text{ days}$$

Ans: 9 days

13. 42 men are employed to do a piece of work which they could finish in 25 days, but the men drop off by 3 at the end of every 10 days. In what time will the work be completed? [5]

$$\text{Work done by 42 men in 10 days} = 10 \times \frac{1}{25} = \frac{2}{5}$$

$$\text{So 1 man's work in 10 days} = \frac{2}{5} \div 42 = \frac{1}{105}$$

$$\text{Remaining work} = \frac{3}{5}, \text{ remaining men} = 39; \text{ work done by 39 men in 10 days} = 39 \times \frac{1}{105} = \frac{13}{35}$$

$$\text{Remaining work} = \frac{8}{35}, \text{ remaining men} = 36; \text{ work done by 36 men in 10 days} = \frac{12}{35}$$

$$\frac{8}{35} \text{ work is done by 36 men in } \frac{8}{35} \div \frac{12}{35} \times 10 = 6\frac{2}{3} \text{ days}$$

$$\text{Total time} = 10 + 10 + 6\frac{2}{3} = 26\frac{2}{3} \text{ days}$$

Ans: $26\frac{2}{3}$ 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 72 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 = $3k = 72 \Rightarrow k = 24$

Time taken by A = $2k = 48$ days

A's 1 day's work = $\frac{1}{48}$, B's 1 day's work = $\frac{1}{72}$

(A + B)'s 1 day's work = $\frac{1}{48} + \frac{1}{72} = \frac{3+2}{144} = \frac{5}{144}$

Time taken by (A + B) to finish the work = $28\frac{4}{5}$ days

Ans: $28\frac{4}{5}$ days

15. The speed of a boat in still water is 5 km/hr and the speed of the stream is 2.5 km/hr. Find the speed of the boat upstream. [1]

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

= $5 - 2.5 = 2.5$ km/hr

Ans: 2.5 km/hr

16. A man can row downstream at the rate of 23 km/hr and upstream at 15 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 $x + y = 23$ and $x - y = 15$

Adding, $2x = 38 \Rightarrow x = 19$ km/hr

Subtracting, $2y = 8 \Rightarrow y = 4$ km/hr

Ans: Rate in still water 19 km/hr, rate of current 4 km/hr

17. A boat goes 57 km upstream in 4 hours. Find its speed upstream. [1]

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

= $\frac{57}{4} = 14.25$ km/hr

Ans: 14.25 km/hr

18. A man rows upstream 25 km and downstream 39 km, taking 4 hours each time. What is the velocity of the current? [2]

Speed downstream: $x + y = \frac{39}{4}$ km/hr

Speed upstream: $x - y = \frac{25}{4}$ km/hr

Subtracting, $2y = \frac{39}{4} - \frac{25}{4} = \frac{14}{4}$

$y = \frac{14}{8} = 1.75$ km/hr

Ans: 1.75 km/hr

19. A man can row 5 km/hr in still water. If the river is running at 1 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 = $5 + 1 = 6$ km/hr

Speed upstream = $5 - 1 = 4$ km/hr

Time = $\frac{\text{Distance}}{\text{Speed}}$, so $\frac{d}{6} + \frac{d}{4} = 1$

$$\Rightarrow d \left(\frac{1}{6} + \frac{1}{4} \right) = 1$$

$$\Rightarrow d \times \frac{5}{12} = 1$$

$$\Rightarrow d = 2.4 \text{ km}$$

Ans: 2.4 km

20. A man can row 9 km upstream and 75 km downstream in 6 hours, while he can row 45 km upstream and 30 km downstream in 7 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 $p = \frac{1}{x-y}$, $q = \frac{1}{x+y}$

$$\frac{9}{x-y} + \frac{75}{x+y} = 6 \Rightarrow 9p + 75q = 6 \quad \dots (1)$$

$$\frac{45}{x-y} + \frac{30}{x+y} = 7 \Rightarrow 45p + 30q = 7 \quad \dots (2)$$

$$(1) \times 5 \Rightarrow 45p + 375q = 30$$

$$(1) \times 5 - (2) \Rightarrow 345q = 23 \Rightarrow q = \frac{1}{15}$$

$$\text{From (1): } 9p + 5 = 6 \Rightarrow 9p = 1 \Rightarrow p = \frac{1}{9}$$

$$\text{So } x - y = 9 \text{ and } x + y = 15$$

$$\text{Adding, } 2x = 24 \Rightarrow x = 12; \text{ then } y = 15 - 12 = 3$$

$\therefore$ Rate of the current = 3 km/hr, speed in still water = 12 km/hr

Ans: Rate of current 3 km/hr, speed in still water 12 km/hr
