

Arithmetic (Level 2)**Question Paper, Set 07**

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 $\frac{1}{15}$. In how many days can B finish the whole work? [1 mark]
2. A is twice as good a workman as B. If B can finish a piece of work in 20 days, in how many days can A finish it? [1 mark]
3. If the number of men to do a work is changed in the ratio 8 : 7, find the ratio in which the time taken by them to finish the work changes. [1 mark]
4. A can do a piece of work in 42 days and B can do it in 56 days. Find (A + B)'s 1 day's work. [1 mark]
5. A can finish a piece of work in 39 days and B can finish it in 26 days. In how many days can they finish it working together? [2 marks]
6. A and B together can finish a piece of work in 14 days. A alone can do it in 63 days. In how many days can B alone do it? [2 marks]
7. A and B can do a piece of work in 35 days; B and C in 70 days; C and A in 30 days. In how many days will they finish it together and separately? [5 marks]
8. A can do a piece of work in 20 days and B can finish it in 40 days. They work together for 6 days and then B goes away. In how many days will A finish the remaining work? [3 marks]
9. A and B can do a piece of work in 22 and 44 days respectively. They began the work together, but A leaves after some days and B finishes the remaining work in 35 days. After how many days did A leave? [3 marks]
10. A can do a piece of work in 180 days and B can do it in 90 days. They work together for 7 days. Then B leaves and A alone continues the work. 3 days after that, C joins A and the work is completed in 66 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 34 days. If there were 14 men more, the work could be finished in 7 days less. How many men were there originally? [2 marks]
12. If 5 men or 7 boys can finish a piece of work in 17 days, in how many days can 10 men and 3 boys finish it? [2 marks]

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- 13.** 2 men and 6 women working 5 hours a day finish a piece of work in 10 days; 3 men and 3 women working 5 hours a day do the same work in 12 days. Find the number of days in which the work is done by 4 men only, working 3 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 27 days. In how many days can both together finish it? [3 marks]
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- 15.** A man rows in still water at 8 km/hr and the rate of the current is 4 km/hr. Find the man's rate with the current. [1 mark]
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- 16.** A man can row downstream at the rate of 21 km/hr and upstream at 9 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 33 km upstream in 4 hours. Find its speed upstream. [1 mark]
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- 18.** The rate of a stream is 2.5 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 16.5 km/hr in still water. If the river is running at 5.5 km/hr, it takes him 3 hours to row to a place and back. How far is the place? [3 marks]
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- 20.** A man can row 32 km upstream and 70 km downstream in 11 hours, while he can row 40 km upstream and 20 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	15 days
2	10 days
3	7 : 8
4	$\frac{1}{24}$
5	$15\frac{3}{5}$ days
6	18 days
7	Together $26\frac{1}{4}$ days; A alone 42 days, B alone 210 days, C alone 105 days
8	11 days
9	3 days
10	132 days
11	54 men
12	7 days
13	25 days
14	$10\frac{4}{5}$ days
15	12 km/hr
16	Rate in still water 15 km/hr, rate of current 6 km/hr
17	8.25 km/hr
18	5 km/hr
19	22 km
20	Rate of current 1 km/hr, speed in still water 9 km/hr

Solutions

1. B's 1 day's work is $\frac{1}{15}$. In how many days can B finish the whole work? [1]

B does $\frac{1}{15}$ of the work in 1 day.

$\therefore$ B finishes the whole work in 15 days.

Ans: 15 days

2. A is twice as good a workman as B. If B can finish a piece of work in 20 days, in how many days can A finish it? [1]

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

$$= \frac{1}{2} \times 20 = 10 \text{ days}$$

Ans: 10 days

3. If the number of men to do a work is changed in the ratio 8 : 7, find the ratio in which the time taken by them to finish the work changes. [1]

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

$$\frac{T_1}{T_2} = \frac{M_2}{M_1} = \frac{7}{8}$$

$$\therefore T_1 : T_2 = 7 : 8$$

Ans: 7 : 8

4. A can do a piece of work in 42 days and B can do it in 56 days. Find (A + B)'s 1 day's work. [1]

$$(A + B)\text{'s 1 day's work} = \frac{1}{42} + \frac{1}{56} = \frac{4+3}{168} = \frac{7}{168} = \frac{1}{24}$$

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

5. A can finish a piece of work in 39 days and B can finish it in 26 days. In how many days can they finish it working together? [2]

$$A\text{'s 1 day's work} = \frac{1}{39}$$

$$B\text{'s 1 day's work} = \frac{1}{26}$$

$$\therefore (A + B)\text{'s 1 day's work} = \frac{1}{39} + \frac{1}{26} = \frac{2+3}{78} = \frac{5}{78}$$

$$\therefore \text{Both together can finish the work in } \frac{78}{5} \text{ days} = 15\frac{3}{5} \text{ days}$$

Ans: $15\frac{3}{5}$ days

6. A and B together can finish a piece of work in 14 days. A alone can do it in 63 days. In how many days can B alone do it? [2]

$$(A + B)\text{'s 1 day's work} = \frac{1}{14}$$

$$A\text{'s 1 day's work} = \frac{1}{63}$$

$$\Rightarrow B\text{'s 1 day's work} = \frac{1}{14} - \frac{1}{63} = \frac{9-2}{126} = \frac{7}{126} = \frac{1}{18}$$

$\therefore$ B alone can finish the work in 18 days.

Ans: 18 days

7. A and B can do a piece of work in 35 days; B and C in 70 days; C and A in 30 days. In how many days will they finish it together and separately? [5]

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

$$(B + C)\text{'s 1 day's work} = \frac{1}{70}$$

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

$$\text{Adding, } 2(A + B + C)\text{'s 1 day's work} = \frac{1}{35} + \frac{1}{70} + \frac{1}{30} = \frac{6+3+7}{210} = \frac{16}{210} = \frac{8}{105}$$

$$\Rightarrow (A + B + C)\text{'s 1 day's work} = \frac{4}{105}$$

$\therefore$ A, B, C together can finish the work in $26\frac{1}{4}$ days.

$$A\text{'s 1 day's work} = \frac{4}{105} - \frac{1}{70} = \frac{1}{42}, \text{ so A alone takes 42 days}$$

$$B\text{'s 1 day's work} = \frac{4}{105} - \frac{1}{30} = \frac{1}{210}, \text{ so B alone takes 210 days}$$

$$C\text{'s 1 day's work} = \frac{4}{105} - \frac{1}{35} = \frac{1}{105}, \text{ so C alone takes 105 days}$$

Ans: Together $26\frac{1}{4}$ days; A alone 42 days, B alone 210 days, C alone 105 days

8. A can do a piece of work in 20 days and B can finish it in 40 days. They work together for 6 days and then B goes away. In how many days will A finish the remaining work? [3]

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

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

$$(A + B)\text{'s 1 day's work} = \frac{1}{20} + \frac{1}{40} = \frac{2+1}{40} = \frac{3}{40}$$

$$(A + B)\text{'s 6 days' work} = 6 \times \frac{3}{40} = \frac{9}{20}$$

$$\text{Remaining work} = 1 - \frac{9}{20} = \frac{11}{20}$$

$$\text{This work is done by A in } \frac{11}{20} \times 20 = 11 \text{ days}$$

Ans: 11 days

9. A and B can do a piece of work in 22 and 44 days respectively. They began the work together, but A leaves after some days and B finishes the remaining work in 35 days. After how many days did A leave? [3]

$$A\text{'s 1 day's work} = \frac{1}{22}, B\text{'s 1 day's work} = \frac{1}{44}$$

$$(A + B)\text{'s 1 day's work} = \frac{1}{22} + \frac{1}{44} = \frac{2+1}{44} = \frac{3}{44}$$

$$B\text{'s 35 days' work} = 35 \times \frac{1}{44} = \frac{35}{44}$$

$$\text{Remaining work} = 1 - \frac{35}{44} = \frac{9}{44}$$

$$(A + B)\text{'s } x \text{ days' work} = \frac{9}{44} \Rightarrow \frac{3}{44} \times x = \frac{9}{44}$$

$$x = 3, \text{ so A left after 3 days}$$

Ans: 3 days

10. A can do a piece of work in 180 days and B can do it in 90 days. They work together for 7 days. Then B leaves and A alone continues the work. 3 days after that, C joins A and the work is completed in 66 days more. In how many days can C do the work alone? [5]

$$\text{A's 1 day's work} = \frac{1}{180}, \text{ B's 1 day's work} = \frac{1}{90}$$

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

$$(\text{A} + \text{B})\text{'s 7 days' work} = 7 \times \frac{1}{60} = \frac{7}{60}$$

$$\text{A's 3 days' work} = \frac{3}{180} = \frac{1}{60}$$

$$(\text{A} + \text{C})\text{'s 66 days' work} = 1 - \left(\frac{7}{60} + \frac{1}{60}\right) = \frac{13}{15}$$

$$\Rightarrow (\text{A} + \text{C})\text{'s 1 day's work} = \frac{13}{15} \div 66 = \frac{13}{990}$$

$$\text{C's 1 day's work} = \frac{13}{990} - \frac{1}{180} = \frac{26-11}{1980} = \frac{15}{1980} = \frac{1}{132}$$

C can finish the work in 132 days

Ans: 132 days

11. A certain number of men complete a piece of work in 34 days. If there were 14 men more, the work could be finished in 7 days less. How many men were there originally? [2]

Let the original number of men be x

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

$$x \times 34 = (x + 14) \times 27$$

$$34x = 27x + 378$$

$$7x = 378 \Rightarrow x = 54$$

Ans: 54 men

12. If 5 men or 7 boys can finish a piece of work in 17 days, in how many days can 10 men and 3 boys finish it? [2]

$$5 \text{ men} = 7 \text{ boys}$$

$$10 \text{ men} = \frac{7}{5} \times 10 = 14 \text{ boys}$$

$$10 \text{ men} + 3 \text{ boys} = 14 \text{ boys} + 3 \text{ boys} = 17 \text{ boys}$$

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

$$7 \times 17 = 17 \times x \Rightarrow x = 7 \text{ days}$$

Ans: 7 days

13. 2 men and 6 women working 5 hours a day finish a piece of work in 10 days; 3 men and 3 women working 5 hours a day do the same work in 12 days. Find the number of days in which the work is done by 4 men only, working 3 hours a day. [5]

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

Case (i): $(2m + 6w) \times 5 \times 10 = 100m + 300w$

Case (ii): $(3m + 3w) \times 5 \times 12 = 180m + 180w$

Same work: $100m + 300w = 180m + 180w$

$\Rightarrow 120w = 80m \Rightarrow 3w = 2m$

So 6 women = 4 men, and $2m + 6w = 6$ men

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

$6 \times 5 \times 10 = 4 \times 3 \times x \Rightarrow x = 25$ days

Ans: 25 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 27 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 = $3k = 27 \Rightarrow k = 9$

Time taken by A = $2k = 18$ days

A's 1 day's work = $\frac{1}{18}$, B's 1 day's work = $\frac{1}{27}$

(A + B)'s 1 day's work = $\frac{1}{18} + \frac{1}{27} = \frac{3+2}{54} = \frac{5}{54}$

Time taken by (A + B) to finish the work = $10\frac{4}{5}$ days

Ans: $10\frac{4}{5}$ days

15. A man rows in still water at 8 km/hr and the rate of the current is 4 km/hr. Find the man's rate with the current. [1]

Speed downstream = $(x + y)$ km/hr

$= 8 + 4 = 12$ km/hr

Ans: 12 km/hr

16. A man can row downstream at the rate of 21 km/hr and upstream at 9 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 $x + y = 21$ and $x - y = 9$

Adding, $2x = 30 \Rightarrow x = 15$ km/hr

Subtracting, $2y = 12 \Rightarrow y = 6$ km/hr

Ans: Rate in still water 15 km/hr, rate of current 6 km/hr

17. A boat goes 33 km upstream in 4 hours. Find its speed upstream. [1]

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

$= \frac{33}{4} = 8.25$ km/hr

Ans: 8.25 km/hr

18. The rate of a stream is 2.5 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

$$\text{Given } 3(x - 2.5) = x + 2.5$$

$$\Rightarrow 3x - 7.5 = x + 2.5 \Rightarrow 2x = 10$$

$$\Rightarrow x = 5 \text{ km/hr}$$

Ans: 5 km/hr

19. A man can row 16.5 km/hr in still water. If the river is running at 5.5 km/hr, it takes him 3 hours to row to a place and back. How far is the place? [3]

Let the required distance be d km

$$\text{Speed downstream} = 16.5 + 5.5 = 22 \text{ km/hr}$$

$$\text{Speed upstream} = 16.5 - 5.5 = 11 \text{ km/hr}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}, \text{ so } \frac{d}{22} + \frac{d}{11} = 3$$

$$\Rightarrow d \left(\frac{1}{22} + \frac{1}{11} \right) = 3$$

$$\Rightarrow d \times \frac{3}{22} = 3$$

$$\Rightarrow d = 22 \text{ km}$$

Ans: 22 km

20. A man can row 32 km upstream and 70 km downstream in 11 hours, while he can row 40 km upstream and 20 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 $p = \frac{1}{x-y}$, $q = \frac{1}{x+y}$

$$\frac{32}{x-y} + \frac{70}{x+y} = 11 \Rightarrow 32p + 70q = 11 \quad \dots (1)$$

$$\frac{40}{x-y} + \frac{20}{x+y} = 7 \Rightarrow 40p + 20q = 7 \quad \dots (2)$$

$$(1) \times 5 \Rightarrow 160p + 350q = 55; (2) \times 4 \Rightarrow 160p + 80q = 28$$

$$(1) \times 5 - (2) \times 4 \Rightarrow 270q = 27 \Rightarrow q = \frac{1}{10}$$

$$\text{From (1): } 32p + 7 = 11 \Rightarrow 32p = 4 \Rightarrow p = \frac{1}{8}$$

$$\text{So } x - y = 8 \text{ and } x + y = 10$$

$$\text{Adding, } 2x = 18 \Rightarrow x = 9; \text{ then } y = 10 - 9 = 1$$

$\therefore$ Rate of the current = 1 km/hr, speed in still water = 9 km/hr

Ans: Rate of current 1 km/hr, speed in still water 9 km/hr
