

**Arithmetic (Level 2)****Question Paper, Set 03**

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  $\frac{1}{14}$ . 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 4 days. How many days will B take to finish it? [1 mark]
3. A piece of work is done by 20 men. If 8 men do the same work instead, find the ratio of the time taken by the 20 men to the time taken by the 8 men. [1 mark]
4. 33 men can do a piece of work in 18 days. How many men are needed to finish it in 54 days? [2 marks]
5. A can do a piece of work in 11 days and B can do it in 55 days. Find (A + B)'s 1 day's work. [1 mark]
6. A and B together can do a piece of work in 20 days. B alone can finish it in 36 days. In how many days can A alone finish the work? [2 marks]
7. A can do a piece of work in 24 days and B can finish it in 36 days. They work together for 12 days and then B goes away. In how many days will A finish the remaining work? [3 marks]
8. A can do a piece of work in 18 days and B in 36 days. They work together for 10 days. The rest of the work is finished by C in 7 days. If they get ₹1260 for the whole work, how should they divide the money? Also find their daily wages. [5 marks]
9. A can do a piece of work in 30 days, B in 24 days and C in 10 days. All begin together, but A leaves the work after 1 day and B leaves 4 days before the work is finished. How long did the work last? [5 marks]
10. A and B working alone can finish a piece of work in 8 and 22 days respectively. If they work at it alternately for a day, A beginning, in how many days will the work be finished? [3 marks]
11. A certain number of men complete a piece of work in 78 days. If there were 16 men more, the work could be finished in 32 days less. How many men were there originally? [2 marks]
12. If 7 men or 11 boys can finish a piece of work in 30 days, in how many days can 7 men and 4 boys finish it? [2 marks]

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- 13.** 4 men and 8 women working 5 hours a day finish a piece of work in 3 days; 3 men and 2 women working 10 hours a day do the same work in 4 days. Find the number of days in which the work is done by 6 men only, working 5 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. A alone can do a piece of work in 6 days. In how many days can both together finish it? [3 marks]
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- 15.** A man rows in still water at 15 km/hr and the rate of the current is 2 km/hr. Find the man's rate with the current. [1 mark]
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- 16.** A boat goes 28 km upstream in 5 hours. Find its speed upstream. [1 mark]
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- 17.** A man rows upstream 5 km and downstream 7 km, taking 2 hours each time. What is the man's speed in still water? [2 marks]
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- 18.** A man can row 6 km/hr in still water and he finds that it takes him twice 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 12.5 km/hr in still water. If the river is running at 1.5 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.** A man can row 12 km upstream and 12 km downstream in 3 hours, while he can row 42 km upstream and 84 km downstream in 14 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  | 14 days                                                          |
| 2  | 8 days                                                           |
| 3  | 2 : 5                                                            |
| 4  | 11 men                                                           |
| 5  | $\frac{6}{55}$                                                   |
| 6  | 45 days                                                          |
| 7  | 4 days                                                           |
| 8  | Shares: A ₹700, B ₹350, C ₹210; daily wages: A ₹70, B ₹35, C ₹30 |
| 9  | 8 days                                                           |
| 10 | $11\frac{1}{2}$ days                                             |
| 11 | 23 men                                                           |
| 12 | 22 days                                                          |
| 13 | 8 days                                                           |
| 14 | $3\frac{3}{5}$ days                                              |
| 15 | 17 km/hr                                                         |
| 16 | 5.6 km/hr                                                        |
| 17 | 3 km/hr                                                          |
| 18 | 2 km/hr                                                          |
| 19 | 15.4 km                                                          |
| 20 | Rate of current 3 km/hr, speed in still water 9 km/hr            |

## Solutions

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1. B's 1 day's work is  $\frac{1}{14}$ . In how many days can B finish the whole work? [1]

B does  $\frac{1}{14}$  of the work in 1 day.

$\therefore$  B finishes the whole work in 14 days.

**Ans: 14 days**

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2. A is twice as good a workman as B. A can finish a piece of work in 4 days. How many days will B take to finish it? [1]

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

$4 = \frac{1}{2} \times$  (Time taken by B)

$\therefore$  Time taken by B =  $2 \times 4 = 8$  days

**Ans: 8 days**

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3. A piece of work is done by 20 men. If 8 men do the same work instead, find the ratio of the time taken by the 20 men to the time taken by the 8 men. [1]

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

$$\frac{T_1}{T_2} = \frac{M_2}{M_1} = \frac{8}{20} = \frac{2}{5}$$

$\therefore T_1 : T_2 = 2 : 5$

**Ans: 2 : 5**

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4. 33 men can do a piece of work in 18 days. How many men are needed to finish it in 54 days? [2]

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

$$33 \times 18 = x \times 54$$

$$x = \frac{33 \times 18}{54} = 11 \text{ men}$$

**Ans: 11 men**

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5. A can do a piece of work in 11 days and B can do it in 55 days. Find (A + B)'s 1 day's work. [1]

$$(A + B)\text{'s 1 day's work} = \frac{1}{11} + \frac{1}{55} = \frac{5+1}{55} = \frac{6}{55}$$

**Ans:  $\frac{6}{55}$**

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6. A and B together can do a piece of work in 20 days. B alone can finish it in 36 days. In how many days can A alone finish the work? [2]

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

$$\text{B's 1 day's work} = \frac{1}{36}$$

$$\Rightarrow \text{A's 1 day's work} = \frac{1}{20} - \frac{1}{36} = \frac{9-5}{180} = \frac{4}{180} = \frac{1}{45}$$

$\therefore$  A alone can finish the work in 45 days.

**Ans: 45 days**

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7. A can do a piece of work in 24 days and B can finish it in 36 days. They work together for 12 days and then B goes away. In how many days will A finish the remaining work? [3]

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

$$\text{B's 1 day's work} = \frac{1}{36}$$

$$(\text{A} + \text{B})\text{'s 1 day's work} = \frac{1}{24} + \frac{1}{36} = \frac{3+2}{72} = \frac{5}{72}$$

$$(\text{A} + \text{B})\text{'s 12 days' work} = 12 \times \frac{5}{72} = \frac{5}{6}$$

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

$$\text{This work is done by A in } \frac{1}{6} \times 24 = 4 \text{ days}$$

**Ans: 4 days**

8. A can do a piece of work in 18 days and B in 36 days. They work together for 10 days. The rest of the work is finished by C in 7 days. If they get ₹1260 for the whole work, how should they divide the money? Also find their daily wages. [5]

$$\text{A's 1 day's work} = \frac{1}{18}, \text{ B's 1 day's work} = \frac{1}{36}$$

$$(\text{A} + \text{B})\text{'s 1 day's work} = \frac{1}{18} + \frac{1}{36} = \frac{2+1}{36} = \frac{3}{36} = \frac{1}{12}$$

$$(\text{A} + \text{B})\text{'s 10 days' work} = \frac{5}{6}$$

$$\text{Remaining work} = 1 - \frac{5}{6} = \frac{1}{6}, \text{ done by C in 7 days}$$

$$\text{A's 10 days' work} = \frac{10}{18} = \frac{5}{9}, \text{ B's 10 days' work} = \frac{10}{36} = \frac{5}{18}, \text{ C's 7 days' work} = \frac{1}{6}$$

$$\text{Consider } \frac{5}{9} : \frac{5}{18} : \frac{1}{6} = 10 : 5 : 3$$

$$\text{A's share} = 10 \times \frac{1260}{18} = 700, \text{ i.e. ₹700}$$

$$\text{B's share} = 5 \times \frac{1260}{18} = 350, \text{ i.e. ₹350}$$

$$\text{C's share} = 3 \times \frac{1260}{18} = 210, \text{ i.e. ₹210}$$

$$\text{A's daily wage} = \frac{700}{10} = 70, \text{ i.e. ₹70}$$

$$\text{B's daily wage} = \frac{350}{10} = 35, \text{ i.e. ₹35}$$

$$\text{C's daily wage} = \frac{210}{7} = 30, \text{ i.e. ₹30}$$

**Ans: Shares: A ₹700, B ₹350, C ₹210; daily wages: A ₹70, B ₹35, C ₹30**

9. A can do a piece of work in 30 days, B in 24 days and C in 10 days. All begin together, but A leaves the work after 1 day and B leaves 4 days before the work is finished. How long did the work last? [5]

$$\text{A's 1 day's work} = \frac{1}{30}, \text{ B's} = \frac{1}{24}, \text{ C's} = \frac{1}{10}$$

A, B, C together work for 1 day; C alone works for the last 4 days; B and C work together in between.

$$(\text{A} + \text{B} + \text{C})\text{'s 1 day's work} = \frac{1}{30} + \frac{1}{24} + \frac{1}{10} = \frac{4+5+12}{120} = \frac{21}{120} = \frac{7}{40}$$

$$\text{C's 4 days' work} = 4 \times \frac{1}{10} = \frac{2}{5}$$

$$\text{Remaining work} = 1 - \left( \frac{7}{40} + \frac{2}{5} \right) = \frac{17}{40}$$

$$(\text{B} + \text{C})\text{'s 1 day's work} = \frac{1}{24} + \frac{1}{10} = \frac{5+12}{120} = \frac{17}{120}$$

$$\text{Remaining work is done by (B + C) in } \frac{17}{40} \div \frac{17}{120} = 3 \text{ days}$$

$$\text{Total time} = 1 + 3 + 4 = 8 \text{ days}$$

**Ans: 8 days**

**10.** A and B working alone can finish a piece of work in 8 and 22 days respectively. If they work at it alternately for a day, A beginning, in how many days will the work be finished? [3]

$$\text{A's 1 day's work} = \frac{1}{8}, \text{ B's 1 day's work} = \frac{1}{22}$$

$$\text{Work done in the first 2 days} = \frac{1}{8} + \frac{1}{22} = \frac{11+4}{88} = \frac{15}{88}$$

$$\text{Work done in the first 10 days} = 5 \times \frac{15}{88} = \frac{75}{88}$$

$$\text{On day 11 it is A's turn: work done in the first 11 days} = \frac{75}{88} + \frac{1}{8} = \frac{43}{44}$$

$$\text{Remaining work} = 1 - \frac{43}{44} = \frac{1}{44}$$

$$\text{B does it in } \frac{1}{44} \div \frac{1}{22} = \frac{1}{2} \text{ day}$$

$$\therefore \text{Total no. of days} = 11 + \frac{1}{2} = 11\frac{1}{2} \text{ days}$$

**Ans:**  $11\frac{1}{2}$  days

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**11.** A certain number of men complete a piece of work in 78 days. If there were 16 men more, the work could be finished in 32 days less. How many men were there originally? [2]

Let the original number of men be  $x$

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

$$x \times 78 = (x + 16) \times 46$$

$$78x = 46x + 736$$

$$32x = 736 \Rightarrow x = 23$$

**Ans:** 23 men

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**12.** If 7 men or 11 boys can finish a piece of work in 30 days, in how many days can 7 men and 4 boys finish it? [2]

$$7 \text{ men} = 11 \text{ boys}$$

$$7 \text{ men} = \frac{11}{7} \times 7 = 11 \text{ boys}$$

$$7 \text{ men} + 4 \text{ boys} = 11 \text{ boys} + 4 \text{ boys} = 15 \text{ boys}$$

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

$$11 \times 30 = 15 \times x \Rightarrow x = 22 \text{ days}$$

**Ans:** 22 days

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**13.** 4 men and 8 women working 5 hours a day finish a piece of work in 3 days; 3 men and 2 women working 10 hours a day do the same work in 4 days. Find the number of days in which the work is done by 6 men only, working 5 hours a day. [5]

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

$$\text{Case (i): } (4m + 8w) \times 5 \times 3 = 60m + 120w$$

$$\text{Case (ii): } (3m + 2w) \times 10 \times 4 = 120m + 80w$$

$$\text{Same work: } 60m + 120w = 120m + 80w$$

$$\Rightarrow 40w = 60m \Rightarrow 2w = 3m$$

$$\text{So } 8 \text{ women} = 12 \text{ men, and } 4m + 8w = 16 \text{ men}$$

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

$$16 \times 5 \times 3 = 6 \times 5 \times x \Rightarrow x = 8 \text{ days}$$

**Ans:** 8 days

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**14.** A can do half as much again as B can do in the same time. A alone can do a piece of work in 6 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 A =  $2k = 6 \Rightarrow k = 3$

Time taken by B =  $3k = 9$  days

A's 1 day's work =  $\frac{1}{6}$ , B's 1 day's work =  $\frac{1}{9}$

(A + B)'s 1 day's work =  $\frac{1}{6} + \frac{1}{9} = \frac{3+2}{18} = \frac{5}{18}$

Time taken by (A + B) to finish the work =  $3\frac{3}{5}$  days

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

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**15.** A man rows in still water at 15 km/hr and the rate of the current is 2 km/hr. Find the man's rate with the current. [1]

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

=  $15 + 2 = 17$  km/hr

**Ans: 17 km/hr**

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**16.** A boat goes 28 km upstream in 5 hours. Find its speed upstream. [1]

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

=  $\frac{28}{5} = 5.6$  km/hr

**Ans: 5.6 km/hr**

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**17.** A man rows upstream 5 km and downstream 7 km, taking 2 hours each time. What is the man's speed in still water? [2]

Speed downstream:  $x + y = \frac{7}{2}$  km/hr

Speed upstream:  $x - y = \frac{5}{2}$  km/hr

Adding,  $2x = \frac{7}{2} + \frac{5}{2} = \frac{12}{2}$

$x = \frac{12}{4} = 3$  km/hr

**Ans: 3 km/hr**

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**18.** A man can row 6 km/hr in still water and he finds that it takes him twice 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, twice the time, so speed down =  $2 \times$  speed up

Given  $2(6 - y) = 6 + y$

$\Rightarrow 12 - 2y = 6 + y \Rightarrow 3y = 6$

$\Rightarrow y = 2$  km/hr

**Ans: 2 km/hr**

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**19.** A man can row 12.5 km/hr in still water. If the river is running at 1.5 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 =  $12.5 + 1.5 = 14$  km/hr

Speed upstream =  $12.5 - 1.5 = 11$  km/hr

Total time = 2 hours 30 minutes = 2.5 hours

Time =  $\frac{\text{Distance}}{\text{Speed}}$ , so  $\frac{d}{14} + \frac{d}{11} = 2.5$

$$\Rightarrow d \left( \frac{1}{14} + \frac{1}{11} \right) = 2.5$$

$$\Rightarrow d \times \frac{25}{154} = 2.5$$

$$\Rightarrow d = 15.4 \text{ km}$$

**Ans: 15.4 km**

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**20.** A man can row 12 km upstream and 12 km downstream in 3 hours, while he can row 42 km upstream and 84 km downstream in 14 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  $p = \frac{1}{x-y}$ ,  $q = \frac{1}{x+y}$

$$\frac{12}{x-y} + \frac{12}{x+y} = 3 \Rightarrow 12p + 12q = 3 \quad \dots (1)$$

$$\frac{42}{x-y} + \frac{84}{x+y} = 14 \Rightarrow 42p + 84q = 14 \quad \dots (2)$$

$$(1) \times 7 \Rightarrow 84p + 84q = 21; (2) \times 2 \Rightarrow 84p + 168q = 28$$

$$(2) \times 2 - (1) \times 7 \Rightarrow 84q = 7 \Rightarrow q = \frac{1}{12}$$

$$\text{From (1): } 12p + 1 = 3 \Rightarrow 12p = 2 \Rightarrow p = \frac{1}{6}$$

So  $x - y = 6$  and  $x + y = 12$

Adding,  $2x = 18 \Rightarrow x = 9$ ; then  $y = 12 - 9 = 3$

$\therefore$  Rate of the current = 3 km/hr, speed in still water = 9 km/hr

**Ans: Rate of current 3 km/hr, speed in still water 9 km/hr**

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