

# Arithmetic (Level 2)

## Question Paper, Set 09

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 13 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 45 days, in how many days can A finish it? [1 mark]
3. A piece of work is done by 35 men. If 42 men do the same work instead, find the ratio of the time taken by the 35 men to the time taken by the 42 men. [1 mark]
4. 36 men can finish a piece of work in 40 hours. In how many hours can 40 men finish the same work? [2 marks]
5. A can do a piece of work in 29 days and B can do it in 58 days. Find (A + B)'s 1 day's work. [1 mark]
6. A can do a piece of work in 42 days and B alone can do it in 63 days. How much time will both take to finish the work? [2 marks]
7. A can do a piece of work in 15 days and B can finish it in 24 days. They work together for 8 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 27 days and B in 24 days. They work together for 9 days. The rest of the work is finished by C in 2 days. If they get ₹2160 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 22 days, B in 33 days and C in 32 days. All begin together, but A leaves the work after 3 days 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 12 and 8 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 28 days. If there were 4 men more, the work could be finished in 2 days less. How many men were there originally? [2 marks]
12. If 4 men or 6 boys can finish a piece of work in 9 days, in how many days can 8 men and 6 boys finish it? [2 marks]

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- 13.** 3 men and 8 women working 10 hours a day finish a piece of work in 8 days; 5 men and 4 women working 10 hours a day do the same work in 9 days. Find the number of days in which the work is done by 12 men only, working 6 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 57 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 12 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 boat goes 17 km downstream in 4 hours. Find its speed downstream. [1 mark]
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- 17.** A man rows upstream 16 km and downstream 30 km, taking 5 hours each time. What is the man's speed in still water? [2 marks]
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- 18.** A man can row 10.5 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 13.5 km/hr in still water. If the river is running at 4.5 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 30 km upstream and 40 km downstream in 9 hours, while he can row 36 km upstream and 40 km downstream in 10 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  | $\frac{1}{13}$ of the wall                                        |
| 2  | 15 days                                                           |
| 3  | 6 : 5                                                             |
| 4  | 36 hours                                                          |
| 5  | $\frac{3}{58}$                                                    |
| 6  | $25\frac{1}{5}$ days                                              |
| 7  | 2 days                                                            |
| 8  | Shares: A ₹720, B ₹810, C ₹630; daily wages: A ₹80, B ₹90, C ₹315 |
| 9  | 16 days                                                           |
| 10 | $9\frac{2}{3}$ days                                               |
| 11 | 52 men                                                            |
| 12 | 3 days                                                            |
| 13 | 10 days                                                           |
| 14 | $22\frac{4}{5}$ days                                              |
| 15 | 11.5 km/hr                                                        |
| 16 | 4.25 km/hr                                                        |
| 17 | 4.6 km/hr                                                         |
| 18 | 3.5 km/hr                                                         |
| 19 | 15 km                                                             |
| 20 | Rate of current 2 km/hr, speed in still water 8 km/hr             |

## Solutions

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1. Ravi can paint a wall in 13 hours. What part of the wall does he paint in 1 hour? [1]

Ravi paints the whole wall in 13 hours.

$$\therefore \text{Ravi's 1 hour's work} = \frac{1}{13}$$

**Ans:**  $\frac{1}{13}$  of the wall

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2. A is thrice as good a workman as B. If B can finish a piece of work in 45 days, in how many days can A finish it? [1]

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

$$= \frac{1}{3} \times 45 = 15 \text{ days}$$

**Ans:** 15 days

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3. A piece of work is done by 35 men. If 42 men do the same work instead, find the ratio of the time taken by the 35 men to the time taken by the 42 men. [1]

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

$$\frac{T_1}{T_2} = \frac{M_2}{M_1} = \frac{42}{35} = \frac{6}{5}$$

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

**Ans:** 6 : 5

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4. 36 men can finish a piece of work in 40 hours. In how many hours can 40 men finish the same work? [2]

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

$$36 \times 40 = 40 \times x$$

$$x = \frac{36 \times 40}{40} = 36 \text{ hours}$$

**Ans:** 36 hours

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5. A can do a piece of work in 29 days and B can do it in 58 days. Find (A + B)'s 1 day's work. [1]

$$(A + B)\text{'s 1 day's work} = \frac{1}{29} + \frac{1}{58} = \frac{2+1}{58} = \frac{3}{58}$$

**Ans:**  $\frac{3}{58}$

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6. A can do a piece of work in 42 days and B alone can do it in 63 days. How much time will both take to finish the work? [2]

$$\text{A's 1 day's work} = \frac{1}{42}$$

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

$$\therefore (A + B)\text{'s 1 day's work} = \frac{1}{42} + \frac{1}{63} = \frac{3+2}{126} = \frac{5}{126}$$

$$\therefore \text{Both together can finish the work in } \frac{126}{5} \text{ days} = 25\frac{1}{5} \text{ days}$$

**Ans:**  $25\frac{1}{5}$  days

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7. A can do a piece of work in 15 days and B can finish it in 24 days. They work together for 8 days and then B goes away. In how many days will A finish the remaining work? [3]

$$\text{A's 1 day's work} = \frac{1}{15}$$

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

$$(\text{A} + \text{B})\text{'s 1 day's work} = \frac{1}{15} + \frac{1}{24} = \frac{8+5}{120} = \frac{13}{120}$$

$$(\text{A} + \text{B})\text{'s 8 days' work} = 8 \times \frac{13}{120} = \frac{13}{15}$$

$$\text{Remaining work} = 1 - \frac{13}{15} = \frac{2}{15}$$

$$\text{This work is done by A in } \frac{2}{15} \times 15 = 2 \text{ days}$$

**Ans: 2 days**

8. A can do a piece of work in 27 days and B in 24 days. They work together for 9 days. The rest of the work is finished by C in 2 days. If they get ₹2160 for the whole work, how should they divide the money? Also find their daily wages. [5]

$$\text{A's 1 day's work} = \frac{1}{27}, \text{ B's 1 day's work} = \frac{1}{24}$$

$$(\text{A} + \text{B})\text{'s 1 day's work} = \frac{1}{27} + \frac{1}{24} = \frac{8+9}{216} = \frac{17}{216}$$

$$(\text{A} + \text{B})\text{'s 9 days' work} = \frac{17}{24}$$

$$\text{Remaining work} = 1 - \frac{17}{24} = \frac{7}{24}, \text{ done by C in 2 days}$$

$$\text{A's 9 days' work} = \frac{9}{27} = \frac{1}{3}, \text{ B's 9 days' work} = \frac{9}{24} = \frac{3}{8}, \text{ C's 2 days' work} = \frac{7}{24}$$

$$\text{Consider } \frac{1}{3} : \frac{3}{8} : \frac{7}{24} = 8 : 9 : 7$$

$$\text{A's share} = 8 \times \frac{2160}{24} = 720, \text{ i.e. ₹720}$$

$$\text{B's share} = 9 \times \frac{2160}{24} = 810, \text{ i.e. ₹810}$$

$$\text{C's share} = 7 \times \frac{2160}{24} = 630, \text{ i.e. ₹630}$$

$$\text{A's daily wage} = \frac{720}{9} = 80, \text{ i.e. ₹80}$$

$$\text{B's daily wage} = \frac{810}{9} = 90, \text{ i.e. ₹90}$$

$$\text{C's daily wage} = \frac{630}{2} = 315, \text{ i.e. ₹315}$$

**Ans: Shares: A ₹720, B ₹810, C ₹630; daily wages: A ₹80, B ₹90, C ₹315**

9. A can do a piece of work in 22 days, B in 33 days and C in 32 days. All begin together, but A leaves the work after 3 days and B leaves 4 days before the work is finished. How long did the work last? [5]

$$\text{A's 1 day's work} = \frac{1}{22}, \text{ B's} = \frac{1}{33}, \text{ C's} = \frac{1}{32}$$

A, B, C together work for 3 days; C alone works for the last 4 days; B and C work together in between.

$$(\text{A} + \text{B} + \text{C})\text{'s 1 day's work} = \frac{1}{22} + \frac{1}{33} + \frac{1}{32} = \frac{48+32+33}{1056} = \frac{113}{1056}$$

$$(\text{A} + \text{B} + \text{C})\text{'s 3 days' work} = 3 \times \frac{113}{1056} = \frac{113}{352}$$

$$\text{C's 4 days' work} = 4 \times \frac{1}{32} = \frac{1}{8}$$

$$\text{Remaining work} = 1 - \left( \frac{113}{352} + \frac{1}{8} \right) = \frac{195}{352}$$

$$(\text{B} + \text{C})\text{'s 1 day's work} = \frac{1}{33} + \frac{1}{32} = \frac{32+33}{1056} = \frac{65}{1056}$$

$$\text{Remaining work is done by (B + C) in } \frac{195}{352} \div \frac{65}{1056} = 9 \text{ days}$$

$$\text{Total time} = 3 + 9 + 4 = 16 \text{ days}$$

**Ans: 16 days**

**10.** A and B working alone can finish a piece of work in 12 and 8 days respectively. If they work at it alternately for a day, A beginning, in how many days will the work be finished? [3]

$$\text{A's 1 day's work} = \frac{1}{12}, \text{ B's 1 day's work} = \frac{1}{8}$$

$$\text{Work done in the first 2 days} = \frac{1}{12} + \frac{1}{8} = \frac{2+3}{24} = \frac{5}{24}$$

$$\text{Work done in the first 8 days} = 4 \times \frac{5}{24} = \frac{5}{6}$$

$$\text{On day 9 it is A's turn: work done in the first 9 days} = \frac{5}{6} + \frac{1}{12} = \frac{11}{12}$$

$$\text{Remaining work} = 1 - \frac{11}{12} = \frac{1}{12}$$

$$\text{B does it in } \frac{1}{12} \div \frac{1}{8} = \frac{2}{3} \text{ day}$$

$$\therefore \text{Total no. of days} = 9 + \frac{2}{3} = 9\frac{2}{3} \text{ days}$$

**Ans:**  $9\frac{2}{3}$  days

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**11.** A certain number of men complete a piece of work in 28 days. If there were 4 men more, the work could be finished in 2 days less. How many men were there originally? [2]

Let the original number of men be  $x$

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

$$x \times 28 = (x + 4) \times 26$$

$$28x = 26x + 104$$

$$2x = 104 \Rightarrow x = 52$$

**Ans:** 52 men

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**12.** If 4 men or 6 boys can finish a piece of work in 9 days, in how many days can 8 men and 6 boys finish it? [2]

$$4 \text{ men} = 6 \text{ boys}$$

$$8 \text{ men} = \frac{6}{4} \times 8 = 12 \text{ boys}$$

$$8 \text{ men} + 6 \text{ boys} = 12 \text{ boys} + 6 \text{ boys} = 18 \text{ boys}$$

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

$$6 \times 9 = 18 \times x \Rightarrow x = 3 \text{ days}$$

**Ans:** 3 days

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**13.** 3 men and 8 women working 10 hours a day finish a piece of work in 8 days; 5 men and 4 women working 10 hours a day do the same work in 9 days. Find the number of days in which the work is done by 12 men only, working 6 hours a day. [5]

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

$$\text{Case (i): } (3m + 8w) \times 10 \times 8 = 240m + 640w$$

$$\text{Case (ii): } (5m + 4w) \times 10 \times 9 = 450m + 360w$$

$$\text{Same work: } 240m + 640w = 450m + 360w$$

$$\Rightarrow 280w = 210m \Rightarrow 4w = 3m$$

$$\text{So } 8 \text{ women} = 6 \text{ men, and } 3m + 8w = 9 \text{ men}$$

9 men working 10 hours a day for 8 days do the same work as 12 men working 6 hours a day for  $x$  days

$$9 \times 10 \times 8 = 12 \times 6 \times x \Rightarrow x = 10 \text{ days}$$

**Ans:** 10 days

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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 57 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 =  $3k = 57 \Rightarrow k = 19$

Time taken by A =  $2k = 38$  days

A's 1 day's work =  $\frac{1}{38}$ , B's 1 day's work =  $\frac{1}{57}$

(A + B)'s 1 day's work =  $\frac{1}{38} + \frac{1}{57} = \frac{3+2}{114} = \frac{5}{114}$

Time taken by (A + B) to finish the work =  $22\frac{4}{5}$  days

**Ans:  $22\frac{4}{5}$  days**

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**15.** The speed of a boat in still water is 12 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

=  $12 - 0.5 = 11.5$  km/hr

**Ans: 11.5 km/hr**

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**16.** A boat goes 17 km downstream in 4 hours. Find its speed downstream. [1]

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

=  $\frac{17}{4} = 4.25$  km/hr

**Ans: 4.25 km/hr**

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**17.** A man rows upstream 16 km and downstream 30 km, taking 5 hours each time. What is the man's speed in still water? [2]

Speed downstream:  $x + y = \frac{30}{5}$  km/hr

Speed upstream:  $x - y = \frac{16}{5}$  km/hr

Adding,  $2x = \frac{30}{5} + \frac{16}{5} = \frac{46}{5}$

$x = \frac{46}{10} = 4.6$  km/hr

**Ans: 4.6 km/hr**

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**18.** A man can row 10.5 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  $2(10.5 - y) = 10.5 + y$

$\Rightarrow 21 - 2y = 10.5 + y \Rightarrow 3y = 10.5$

$\Rightarrow y = 3.5$  km/hr

**Ans: 3.5 km/hr**

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**19.** A man can row 13.5 km/hr in still water. If the river is running at 4.5 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 =  $13.5 + 4.5 = 18$  km/hr

Speed upstream =  $13.5 - 4.5 = 9$  km/hr

Total time = 2 hours 30 minutes = 2.5 hours

Time =  $\frac{\text{Distance}}{\text{Speed}}$ , so  $\frac{d}{18} + \frac{d}{9} = 2.5$

$$\Rightarrow d \left( \frac{1}{18} + \frac{1}{9} \right) = 2.5$$

$$\Rightarrow d \times \frac{1}{6} = 2.5$$

$$\Rightarrow d = 15 \text{ km}$$

**Ans: 15 km**

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**20.** A man can row 30 km upstream and 40 km downstream in 9 hours, while he can row 36 km upstream and 40 km downstream in 10 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  $p = \frac{1}{x-y}$ ,  $q = \frac{1}{x+y}$

$$\frac{30}{x-y} + \frac{40}{x+y} = 9 \Rightarrow 30p + 40q = 9 \quad \dots (1)$$

$$\frac{36}{x-y} + \frac{40}{x+y} = 10 \Rightarrow 36p + 40q = 10 \quad \dots (2)$$

$$(1) \times 6 \Rightarrow 180p + 240q = 54; (2) \times 5 \Rightarrow 180p + 200q = 50$$

$$(1) \times 6 - (2) \times 5 \Rightarrow 40q = 4 \Rightarrow q = \frac{1}{10}$$

$$\text{From (1): } 30p + 4 = 9 \Rightarrow 30p = 5 \Rightarrow p = \frac{1}{6}$$

$$\text{So } x - y = 6 \text{ and } x + y = 10$$

$$\text{Adding, } 2x = 16 \Rightarrow x = 8; \text{ then } y = 10 - 8 = 2$$

$\therefore$  Rate of the current = 2 km/hr, speed in still water = 8 km/hr

**Ans: Rate of current 2 km/hr, speed in still water 8 km/hr**

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