

Arithmetic (Level 2)

Question Paper, Set 02

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 28 hours. What part of the wall does he paint in 1 hour? [1 mark]
2. A is twice as good a workman as B. A can finish a piece of work in 21 days. How many days will B take to finish it? [1 mark]
3. A piece of work is done by 16 men. If 10 men do the same work instead, find the ratio of the time taken by the 16 men to the time taken by the 10 men. [1 mark]
4. A can do a piece of work in 36 days and B can do it in 44 days. Find (A + B)'s 1 day's work. [1 mark]
5. A can do a piece of work in 18 days and B alone can do it in 30 days. How much time will both take to finish the work? [2 marks]
6. A and B together can do a piece of work in 30 days. B alone can finish it in 45 days. In how many days can A alone finish the work? [2 marks]
7. A can do a piece of work in 28 days while B alone can do it in 48 days. With the help of C they can finish it in 14 days. If they are paid ₹6960 for the whole work, how should the money be divided among them? [5 marks]
8. A is twice as good a workman as B and is therefore able to finish a piece of work in 54 days less than B. Find the time in which they can do it working together. [3 marks]
9. A and B together can do a piece of work in 60 days. B and C together can do it in 84 days. If A is twice as good a workman as C, find in what time B alone can do it. [3 marks]
10. A certain number of men complete a piece of work in 71 days. If there were 24 men more, the work could be finished in 24 days less. How many men were there originally? [2 marks]
11. If 6 men or 12 boys can finish a piece of work in 10 days, in how many days can 4 men and 2 boys finish it? [2 marks]
12. If 6 men with 5 boys can earn ₹5340 in 6 days and 12 men with 8 boys can earn ₹13120 in 8 days, in what time will 7 men with 8 boys earn ₹11900? [5 marks]
13. 60 men are employed to do a piece of work which they could finish in 8 days, but the men drop off by 3 at the end of every 4 days. In what time will the work be completed? [5 marks]

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 24 days. In how many days can both together finish it? [3 marks]
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15. A man rows in still water at 11 km/hr and the rate of the current is 5 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 18 km/hr and upstream at 6 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 46 km downstream in 5 hours. Find its speed downstream. [1 mark]
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18. A man rows upstream 12 km and downstream 36 km, taking 5 hours each time. What is the velocity of the current? [2 marks]
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19. A man can row 12.5 km/hr in still water. If the river is running at 2 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. The current of a stream runs at the rate of 4 km/hr. A motor boat goes 21 km upstream and back again to the starting point in 1 hour 20 minutes. Find the speed of the motor boat in still water. [5 marks]
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Key sheet

Q	Answer
1	$\frac{1}{28}$ of the wall
2	42 days
3	5 : 8
4	$\frac{5}{99}$
5	$11\frac{1}{4}$ days
6	90 days
7	A ₹3480, B ₹2030, C ₹1450
8	36 days
9	140 days
10	47 men
11	12 days
12	10 days
13	$8\frac{2}{9}$ days
14	$9\frac{3}{5}$ days
15	16 km/hr
16	Rate in still water 12 km/hr, rate of current 6 km/hr
17	9.2 km/hr
18	2.4 km/hr
19	18.27 km
20	32 km/hr

Solutions

1. Ravi can paint a wall in 28 hours. What part of the wall does he paint in 1 hour? [1]

Ravi paints the whole wall in 28 hours.

$$\therefore \text{Ravi's 1 hour's work} = \frac{1}{28}$$

Ans: $\frac{1}{28}$ of the wall

2. A is twice as good a workman as B. A can finish a piece of work in 21 days. How many days will B take to finish it? [1]

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

$$21 = \frac{1}{2} \times (\text{Time taken by B})$$

$$\therefore \text{Time taken by B} = 2 \times 21 = 42 \text{ days}$$

Ans: 42 days

3. A piece of work is done by 16 men. If 10 men do the same work instead, find the ratio of the time taken by the 16 men to the time taken by the 10 men. [1]

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

$$\frac{T_1}{T_2} = \frac{M_2}{M_1} = \frac{10}{16} = \frac{5}{8}$$

$$\therefore T_1 : T_2 = 5 : 8$$

Ans: 5 : 8

4. A can do a piece of work in 36 days and B can do it in 44 days. Find (A + B)'s 1 day's work. [1]

$$(A + B)\text{'s 1 day's work} = \frac{1}{36} + \frac{1}{44} = \frac{11+9}{396} = \frac{20}{396} = \frac{5}{99}$$

Ans: $\frac{5}{99}$

5. A can do a piece of work in 18 days and B alone can do it in 30 days. How much time will both take to finish the work? [2]

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

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

$$\therefore (A + B)\text{'s 1 day's work} = \frac{1}{18} + \frac{1}{30} = \frac{5+3}{90} = \frac{8}{90} = \frac{4}{45}$$

$$\therefore \text{Both together can finish the work in } \frac{45}{4} \text{ days} = 11\frac{1}{4} \text{ days}$$

Ans: $11\frac{1}{4}$ days

6. A and B together can do a piece of work in 30 days. B alone can finish it in 45 days. In how many days can A alone finish the work? [2]

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

$$\text{B's 1 day's work} = \frac{1}{45}$$

$$\Rightarrow \text{A's 1 day's work} = \frac{1}{30} - \frac{1}{45} = \frac{3-2}{90} = \frac{1}{90}$$

$$\therefore \text{A alone can finish the work in 90 days.}$$

Ans: 90 days

7. A can do a piece of work in 28 days while B alone can do it in 48 days. With the help of C they can finish it in 14 days. If they are paid ₹6960 for the whole work, how should the money be divided among them? [5]

$$\text{A's 1 day's work} = \frac{1}{28}$$

$$\text{B's 1 day's work} = \frac{1}{48}$$

$$(\text{A} + \text{B})\text{'s 1 day's work} = \frac{1}{28} + \frac{1}{48} = \frac{12+7}{336} = \frac{19}{336}$$

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

$$\text{C's 1 day's work} = \frac{1}{14} - \frac{19}{336} = \frac{24-19}{336} = \frac{5}{336}$$

$$\text{Consider } \frac{1}{28} : \frac{1}{48} : \frac{5}{336} = \frac{12}{336} : \frac{7}{336} : \frac{5}{336} = 12 : 7 : 5$$

∴ ₹6960 must be divided in the ratio 12 : 7 : 5 (12 + 7 + 5 = 24)

$$\text{A's share} = 6960 \times \frac{12}{24} = 3480, \text{ i.e. ₹3480}$$

$$\text{B's share} = 6960 \times \frac{7}{24} = 2030, \text{ i.e. ₹2030}$$

$$\text{C's share} = 6960 \times \frac{5}{24} = 1450, \text{ i.e. ₹1450}$$

Ans: A ₹3480, B ₹2030, C ₹1450

8. A is twice as good a workman as B and is therefore able to finish a piece of work in 54 days less than B. Find the time in which they can do it working together. [3]

Suppose B finishes the work in x days

⇒ A is able to finish it in $(x - 54)$ days

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

$$\therefore x - 54 = \frac{1}{2}x$$

$$\Rightarrow 2x - 108 = x \Rightarrow x = 108$$

∴ Time taken by B = 108 days, time taken by A = 54 days

$$\text{A's 1 day's work} = \frac{1}{54}, \text{ B's 1 day's work} = \frac{1}{108}$$

$$(\text{A} + \text{B})\text{'s 1 day's work} = \frac{1}{54} + \frac{1}{108} = \frac{2+1}{108} = \frac{3}{108} = \frac{1}{36}$$

A and B together can finish the work in 36 days

Ans: 36 days

9. A and B together can do a piece of work in 60 days. B and C together can do it in 84 days. If A is twice as good a workman as C, find in what time B alone can do it. [3]

$$(\text{A} + \text{B})\text{'s 1 day's work} = \frac{1}{60}, (\text{B} + \text{C})\text{'s 1 day's work} = \frac{1}{84}$$

A's 1 day's work = C's 2 days' work

$$\text{C's 2 days' work} + \text{B's 1 day's work} = \frac{1}{60}$$

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

$$\Rightarrow \text{C's 1 day's work} + \frac{1}{84} = \frac{1}{60}$$

$$\text{C's 1 day's work} = \frac{1}{60} - \frac{1}{84} = \frac{7-5}{420} = \frac{2}{420} = \frac{1}{210}$$

$$\text{B's 1 day's work} = \frac{1}{84} - \frac{1}{210} = \frac{5-2}{420} = \frac{3}{420} = \frac{1}{140}$$

∴ B alone can finish the work in 140 days

Ans: 140 days

10. A certain number of men complete a piece of work in 71 days. If there were 24 men more, the work could be finished in 24 days less. How many men were there originally? [2]

Let the original number of men be x

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

$$x \times 71 = (x + 24) \times 47$$

$$71x = 47x + 1128$$

$$24x = 1128 \Rightarrow x = 47$$

Ans: 47 men

11. If 6 men or 12 boys can finish a piece of work in 10 days, in how many days can 4 men and 2 boys finish it? [2]

$$6 \text{ men} = 12 \text{ boys}$$

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

$$4 \text{ men} + 2 \text{ boys} = 8 \text{ boys} + 2 \text{ boys} = 10 \text{ boys}$$

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

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

Ans: 12 days

12. If 6 men with 5 boys can earn ₹5340 in 6 days and 12 men with 8 boys can earn ₹13120 in 8 days, in what time will 7 men with 8 boys earn ₹11900? [5]

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

$$(6x + 5y) \times 6 = 5340 \Rightarrow 6x + 5y = 890 \quad \dots (1)$$

$$(12x + 8y) \times 8 = 13120 \Rightarrow 12x + 8y = 1640 \quad \dots (2)$$

$$(1) \times 2 \Rightarrow 12x + 10y = 1780$$

$$(1) \times 2 - (2) \Rightarrow 2y = 140 \Rightarrow y = 70$$

$$\text{From (1): } 6x = 890 - 350 = 540 \Rightarrow x = 90$$

$$(7x + 8y)n = 11900$$

$$\Rightarrow (630 + 560)n = 11900 \Rightarrow 1190n = 11900$$

$$\Rightarrow n = 10 \text{ days}$$

Ans: 10 days

13. 60 men are employed to do a piece of work which they could finish in 8 days, but the men drop off by 3 at the end of every 4 days. In what time will the work be completed? [5]

$$\text{Work done by 60 men in 4 days} = 4 \times \frac{1}{8} = \frac{1}{2}$$

$$\text{So 1 man's work in 4 days} = \frac{1}{2} \div 60 = \frac{1}{120}$$

$$\text{Remaining work} = \frac{1}{2}, \text{ remaining men} = 57; \text{ work done by 57 men in 4 days} = 57 \times \frac{1}{120} = \frac{19}{40}$$

$$\text{Remaining work} = \frac{1}{40}, \text{ remaining men} = 54; \text{ work done by 54 men in 4 days} = \frac{9}{20}$$

$$\frac{1}{40} \text{ work is done by 54 men in } \frac{1}{40} \div \frac{9}{20} \times 4 = \frac{2}{9} \text{ days}$$

$$\text{Total time} = 4 + 4 + \frac{2}{9} = 8\frac{2}{9} \text{ days}$$

Ans: $8\frac{2}{9}$ 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 24 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 = $3k = 24 \Rightarrow k = 8$

Time taken by A = $2k = 16$ days

A's 1 day's work = $\frac{1}{16}$, B's 1 day's work = $\frac{1}{24}$

(A + B)'s 1 day's work = $\frac{1}{16} + \frac{1}{24} = \frac{3+2}{48} = \frac{5}{48}$

Time taken by (A + B) to finish the work = $9\frac{3}{5}$ days

Ans: $9\frac{3}{5}$ days

15. A man rows in still water at 11 km/hr and the rate of the current is 5 km/hr. Find the man's rate with the current. [1]

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

= $11 + 5 = 16$ km/hr

Ans: 16 km/hr

16. A man can row downstream at the rate of 18 km/hr and upstream at 6 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 $x + y = 18$ and $x - y = 6$

Adding, $2x = 24 \Rightarrow x = 12$ km/hr

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

Ans: Rate in still water 12 km/hr, rate of current 6 km/hr

17. A boat goes 46 km downstream in 5 hours. Find its speed downstream. [1]

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

= $\frac{46}{5} = 9.2$ km/hr

Ans: 9.2 km/hr

18. A man rows upstream 12 km and downstream 36 km, taking 5 hours each time. What is the velocity of the current? [2]

Speed downstream: $x + y = \frac{36}{5}$ km/hr

Speed upstream: $x - y = \frac{12}{5}$ km/hr

Subtracting, $2y = \frac{36}{5} - \frac{12}{5} = \frac{24}{5}$

$y = \frac{24}{10} = 2.4$ km/hr

Ans: 2.4 km/hr

19. A man can row 12.5 km/hr in still water. If the river is running at 2 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

Speed downstream = $12.5 + 2 = 14.5$ km/hr

Speed upstream = $12.5 - 2 = 10.5$ km/hr

Time = $\frac{\text{Distance}}{\text{Speed}}$, so $\frac{d}{14.5} + \frac{d}{10.5} = 3$

$$\Rightarrow d \left(\frac{2}{29} + \frac{2}{21} \right) = 3$$

$$\Rightarrow d \times \frac{100}{609} = 3$$

$$\Rightarrow d = 18.27 \text{ km}$$

Ans: 18.27 km

20. The current of a stream runs at the rate of 4 km/hr. A motor boat goes 21 km upstream and back again to the starting point in 1 hour 20 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 = $(x - 4)$ km/hr, speed downstream = $(x + 4)$ km/hr

Total time = 80 min = $\frac{80}{60}$ hr = $\frac{4}{3}$ hr

$$\frac{21}{x-4} + \frac{21}{x+4} = \frac{4}{3}$$

$$\Rightarrow 21 \left(\frac{(x+4)+(x-4)}{(x-4)(x+4)} \right) = \frac{4}{3}$$

$$\Rightarrow \frac{42x}{x^2-16} = \frac{4}{3}$$

$$\Rightarrow 126x = 4x^2 - 64$$

$$\Rightarrow 2x^2 - 63x - 32 = 0$$

$$\Rightarrow (x - 32)(2x + 1) = 0$$

$$\Rightarrow x = 32 \text{ (or) } x = -\frac{1}{2} \text{ (rejected, a speed cannot be negative)}$$

$\therefore$ Speed of the boat in still water = 32 km/hr

Ans: 32 km/hr
