

Work: Work is defined as amount of job assigned.

Efficiency: Work done by a person per unit time.

Efficiency $\propto$ Total work (When time is constant)

Efficiency $\propto \frac{1}{\text{Time taken}}$ (When total work is constant)

Work done = Efficiency $\times$ Time

Efficiency = $\frac{\text{Work done}}{\text{Time taken}}$

Time taken = $\frac{\text{Work done}}{\text{Efficiency}}$

Example: A can do a piece of work in 10 days, B in 12 days and C in 15 days. In how many days working together they can do the work?

Unitary Method: (Consider whole work as 1 unit)

A can do the work in 10 days.

In one day he will do $\frac{1}{10}$ part of the work.

B can do the work in 12 days.

In one day he will do $\frac{1}{12}$ part of the work.

C can do the work in 15 days.

In one day he will do $\frac{1}{15}$ part of the work.

In one day, together can complete = $\frac{1}{10} + \frac{1}{12} + \frac{1}{15}$

= $\frac{6+5+4}{60} = \frac{1}{4}$ part of the work

Time taken by them to complete the work

= $\frac{\text{Total work}}{\text{Efficiency}} = \frac{1}{\frac{1}{4}} = 4$ days

Percentage Method: (Consider whole work as 100%)

Let the total work = 100%

Efficiency of A = $\frac{100\%}{10} = 10\%$

Efficiency of B = $\frac{100\%}{12} = 8.33\%$

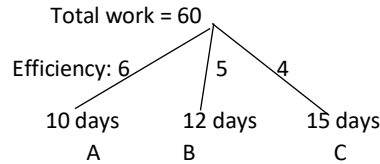
Efficiency of C = $\frac{100\%}{15} = 6.67\%$

Total Efficiency of (A + B + C) = 25%

Time taken by them to complete the work

= $\frac{\text{Total work}}{\text{Efficiency}} = \frac{100\%}{25\%} = 4$ days

LCM Method



Total Efficiency = 6 + 5 + 4 = 15

Time taken by them to complete the work

= $\frac{\text{Total work}}{\text{Efficiency}} = \frac{60}{15} = 4$ days

Concept: Suppose A and B working together can complete certain work in x days and A working alone takes $x + a$ days and B working alone takes $x + b$ days, then $x = \sqrt{ab}$

Example: A takes 3 hours more than that of A and B working together to finish certain piece of work while B takes 12 hours more than that of A and B working together. Then in how many days A and B working together can finish the work?

Solution: Working together they will finish the work in $\sqrt{3 \times 12} = 6$ days

EXERCISE

- A can do a piece of work in 216 days and B can do the same work in 540 days. With the help of C, they finished the work in 108 days. Working alone, C can do the same work in how many days?
(a) 330 (b) 350 (c) 360 (d) 340
(OSSC CGL 2021)
- A, B and C can complete a piece of work in 267, 178 and 534 days respectively. Working together, they will complete the same work in how many days?
(a) 89 (b) 85 (c) 83 (d) 87
(OSSC CGL 2021)
- A, B and C can complete a piece of work in 735, 490 and 1470 days respectively. Working together, they will complete the same work in how many days?
(a) 235 (b) 265 (c) 245 (d) 255
(OSSC CGL 2021)

4. A and B can do a piece of work in 32 days, while C and D can do the same work in 96 days. In how many days will A, B, C and D do it together?
(a) 18 (b) 24 (c) 22 (d) 20
(OSSC CGL 2021)
5. A and B working together can finish a piece of work in 156 days, while B alone can do it in 390 days. How many days will A alone take to finish it?
(a) 270 (b) 250 (c) 280 (d) 260
(OSSC CGL 2021)
6. A and B working together can finish a piece in 339 days, while A alone can do it in 565 days. How many days will B alone take to finish it?
(a) 857.5 (b) 867.5 (c) 847.5 (d) 837.5
(OSSC CGL 2021)
7. A can do a piece of work in 339 days while B can do it in 226 days. In how many days can they complete it, if they work together?
(a) 143.6 (b) 131.6 (c) 139.6 (d) 135.6
(OSSC CGL 2021)
8. X can finish a work in 126 days, Y can finish the same piece of work in 210 days and Z can finish the same piece of work in 280 days. How many days will they require to complete the work, if X, Y and Z are working together?
(a) $61\frac{19}{41}$ (b) $59\frac{19}{41}$ (c) $66\frac{19}{41}$ (d) $62\frac{19}{41}$
(OSSC CGL 2021)
9. A and B can do a work in 225 days, B and C can do it in 150 days and A and C can do it in 90 days. In what time A, B and C together can do the work? (in days)
(a) 130/90 (b) 140/75
(c) 110/85 (d) 120/80
(OSSC CGL 2021)
10. X can do a piece of work in 274 days. X worked at it for 57 days and then Y finished the remaining work in 217 days. In how many days can X and Y together finish the work?
(a) 139 (b) 143 (c) 137 (d) 141
(OSSC CGL 2021)
11. A can do a piece of work in 98 days, B can do it in 147 days and C can do the same work alone in 196 days. If on the first day, A worked alone and on the second day, B and C worked together and on the third day, A and C worked together and if they repeat the cycle, then in how many days, the total work can be completed?
(a) $80\frac{1}{3}$ (b) $82\frac{1}{3}$ (c) $84\frac{1}{3}$ (d) $86\frac{1}{3}$
(OSSC CGL 2021)
12. A can do a piece of work in 2175 days. B is 25% more efficient than A. Find the number of days taken by B to do the same piece of work.
(a) 1760 (b) 1740 (c) 1730 (d) 1750
(OSSC CGL 2021)
13. M is thrice as efficient a workman as N and therefore is able to finish a job in 254 days less than N. Then N can finish the entire work in how many days?
(a) 381 (b) 371 (c) 361 (d) 351
(OSSC CGL 2021)
14. Ashton is twice a workman as Brogan and together they can finish the same work in 40 days. In how many days will Ashton alone finish the same work?
(a) 60 (b) 66 (c) 64 (d) 62
(OSSC CGL 2021)
15. 2 men and 3 boys can do a piece of work in 765 days while 3 men and 2 boys can do the same work in 612 days. In how many days can 5 men and 5 boys do the work?
(a) 310 (b) 330 (c) 340 (d) 320
(OSSC CGL 2021)
16. 16 girls can dig a pit in 432 days. If a boy is twice as efficient as a girl, then 6 girls and 1 boy can dig a similar pit in how many days?
(a) 834 (b) 854 (c) 864 (d) 844
(OSSC CGL 2021)
17. A is twice as good a workman as B and therefore able to finish a piece of work in 30 days less than B. In how many days they can complete the whole work, working together?
(a) 30 days (b) 15 days
(c) 20 days (d) 40 days
(OSSC CGL 2022)
18. 150 workers were engaged to finish a piece of work in a certain number of days. Four workers dropped on the second day, four more workers

- dropped on the third day and so on. It takes 8 more days to finish the work now. Find the number of days in which the work was completed.
 (a) 20 days (b) 23 days
 (c) 25 days (d) None of these
(OSSC CGL 2021)
19. P can do a job in 12 days and Q can do the same job in 10 days. With the help of R, they can do the same job in 4 days. In how many days R alone can do this job?
 (a) 12 days (b) 13 days
 (c) 14 days (d) 15 days
(OSSC CGL 2023 & ATO 2024)
20. A contractor undertakes to make a canal in 60 days and he employs 30 men. After 30 days it is found that only one-third of the work is completed. How many extra men should he employ so that the work is completed on time?
 (a) 20 (b) 25 (c) 30 (d) 40
(OSSC CGL 2024)
21. A completes a work in 12 days. B completes the same work in 15 days. A started working alone and after 3 days B joined him. How many days will they now take together to complete the remaining work?
 (a) 5 (b) 9 (c) 6 (d) 4
(OSSC CGL 2024)
22. 7 men and 4 boys can complete a work in 6 days. A man does double the work than a boy. In how many days will 5 men and 4 boys complete the work?
 (a) 5 (b) 7 (c) 6 (d) None of the above
(OSSC CGL 2024)
23. If 20 boys and 20 girls eat 20 apples in 20 minutes, in how many minutes will one boy and one girl eat one apple?
 (a) 2 min (b) 1 min
 (c) 20 min (d) Cannot determine
(OSSC CGL SPL 2022)
24. A fort had provision of food for 150 men for 45 days. After 10 days, 25 men left the fort. The number of further days for which the remaining food will last is:
 (a) 29 (b) 37 (c) 42 (d) 54
(OSSC CGL SPL 2022)
25. Akash is half good a workman as Bimal and together they finish a job in 14 days. In how many days working alone will Bimal finish the job?
 (a) 21 days (b) 25 days
 (c) 28 days (d) 18 days
(OSSC CGL SPL 2023)
26. A group of 5 men or 12 women can do a task in 78 days. How much time is required by 5 men and 12 women to complete the task?
 (a) 39 days (b) 36 days
 (c) 29 days (d) 26 days
(OSSC CHSL 2024)
27. P, Q, R can do a job in 10, 20 and 40 days respectively. In how many days P can complete the job, if he is assisted by Q and R on every third day?
 (a) 9 days (b) 8 days (c) 7 days (d) 6 days
(OSSC CHSL 2024)
28. 1000 soldiers in a fort had enough food for 20 days. But some soldiers were transferred to another fort and the food lasted for 25 days. How many soldiers were transferred?
 (a) 180 (b) 210 (c) 240 (d) 200
(OSSC CHSL 2025)
29. 4 men and 6 women can complete a work in 8 days while 3 men and 7 women can complete it in 10 days. In how many days will 10 women complete it?
 (a) 35 (b) 40 (c) 45 (d) 50
(OSSC CTSRE 2022)
30. 16 workers working 6 hours a day, can build a wall of length 150m, breadth 20m and height 12m in 25 days. In how many days 12 workers working 8 hours a day, can build a wall of length 800m, breadth 15m and height 6m?
 (a) 60 (b) 50 (c) 40 (d) None of these
(OSSC CTSRE 2022)
31. E, F and G can do a piece of work in 20 days, 30 days and 60 days respectively. In how many days can E do work, if he is assisted by F and G on every third day?

- (a) 12 (b) 13 (c) 15 (d) 18
(OSSC CTSRE 2024 & Statistical Asst. 2024)
32. 9 girls can dig a pit in 306 days. If a boy is twice as efficient as a girl, then 1 girl and 4 boys can dig a similar pit in how many days?
(a) 306 (b) 310 (c) 304 (d) 308
(OSSC BSSO 2022)
33. Preston is twice good a workman as Rex and together they can finish the same work in 46 days. In how many days will Preston alone finish the same work?
(a) 75 (b) 73 (c) 71 (d) 69
(OSSC BSSO 2022)
34. A is thrice as good a workman as B and therefore is able to finish a job in 190 days less than B. Then A can do it in how many days?
(a) 97 (b) 93 (c) 95 (d) 91
(OSSC BSSO 2022)
35. Tilak can do a piece of work in 97.5 days. Erik is 25% more efficient than Tilak. Find the number of days taken by Erik to do the same piece of work.
(a) 76 (b) 72 (c) 78 (d) 74
(OSSC BSSO 2022)
36. A works twice as fast as B. If B can complete the work in 87 days independently, the number of days in which A and B can together finish the work is:
(a) 23 (b) 27 (c) 29 (d) 25
(OSSC BSSO 2022)
37. Amit and Sumit can do a piece of work in 20 days and 12 days respectively. Amit started the work alone and then after 4 days Sumit joined him till the completion of the work. How long did the work last?
(a) 6 days (b) 10 days
(c) 15 days (d) 20 days
(OSSC Accountant 2023)
38. A and B alone can complete a piece of work in 15 days and 20 days respectively. If they work on alternate days starting with A working on day 1, how many days will they need to complete the work?
(a) 19 days (b) 15 days
(c) 17 days (d) 20 days
(OSSC Junior clerk mains 2022)
39. Shiv, Shakti and Uma started a work together. Shiv, Shakti and Uma can finish this work alone in 12 days, 15 days and 10 days respectively. After 2 days, Shiv left the work. Then, after 2 more days, Shakti left the work. How many more days will Uma take to finish the remaining work?
(a) 1 day (b) 4/3 days
(c) 5/3 days (d) 3 days
(OSSC Junior clerk mains 2022)
40. A can do a piece of work in 15 days and B can do alone the same work in 18 days. They begin together but after 2 days, A quits. Now, how much time is required by B to complete the work?
(a) 68/5 days (b) 73/5 days
(c) 78/5 days (d) 83/5 days
(OSSC Junior clerk mains 2022)
41. A and B can do a piece of work in 15 days which B and C can do together in 20 days. After A had been working on it for 6 days and B for 8 days, C finished it in 18 days. In how many days will C alone do the work?
(a) 28 days (b) 34 days
(c) 32 days (d) 30 days
(OSSC Junior clerk mains 2022)
42. A, B and C can complete a job in 10 days while working together. If D joins them, the job is completed in 8 days. In how many days can D complete the job, if working alone?
(a) 30 (b) 40 (c) 50 (d) 60
(OSSC Amin 2023)
43. A, B and C together can do a work in 12 days. A alone can do the work in 36 days and B alone can do the same in 54 days. C alone can do it in:
(a) 9 days (b) 18 days
(c) 24 days (d) 27 days
(OSSC Amin 2023)
44. Sakshi can do a piece of work in 20 days. Tanya is 25% more efficient than Sakshi. The number of days taken by Tanya to do the same piece of work is:
(a) 15 days (b) 16 days

- (c) 18 days (d) 25 days
(OSSC Statistical Asst. 2024)
45. Virat completes a job in $45\frac{1}{2}$ days. What part of the job will he do in 3 days?
(a) $\frac{2}{45}$ (b) $\frac{3}{15}$ (c) $\frac{3}{45}$ (d) $\frac{2}{15}$
(OSSC VSC 2023)
46. A alone can do a piece of work in 6 days and B alone in 8 days. A and B undertook to do it for Rs. 4800. With the help of C, they completed in 3 days. How much is to be paid to B?
(a) Rs. 1800 (b) Rs. 1900
(c) Rs. 1700 (d) Rs. 1600
(OSSC VSC 2023)
47. A, B and C can complete a work in 2 hours. If A does the job alone in 6 hours and B in 5 hours, how long will it take for C to finish the job alone?
(a) $5\frac{1}{2}$ hours (b) $7\frac{1}{2}$ hours
(c) 9 hours (d) $4\frac{1}{2}$ hours
(OSSC LTR 2024)
48. 120 men had food provision for 200 days. After five days, 30 men left the place. How long will the remaining food last?
(a) 220 days (b) 210 days
(c) 240 days (d) 260 days
(OSSC LTR 2024)
49. A can do a work in 6 days and B can do the same work in 5 days. The contract for the work is Rs. 220. How much shall B get if both of them work together?
(a) 110 (b) 150 (c) 120 (d) 160
(OSSC Steno 2022)
50. In a camp, there is enough provision for 500 students for 30 days. If 100 more students join the camp, for how many days will the provision last now?
(a) 25 (b) 30 (c) 32 (d) 28
(OSSC Steno 2022)
51. If 6 men and 8 boys can do a piece of work in 10 days while 26 men and 48 boys can do the same in 2 days, the time taken by 15 men and 20 boys in doing the same type of work will be:
(a) 4 days (b) 5 days
- (c) 6 days (d) 7 days
(OSSC Steno 2023)
52. A, B and C can complete a work in 20 days, 15 days and 12 days respectively. They all started the work together, but C left the job 3 days before its completion, and B left the job 2 days before C. In how many days did the work get completed?
(a) $7\frac{11}{12}$ days (b) $9\frac{11}{12}$ days
(c) $9\frac{7}{12}$ days (d) $7\frac{7}{12}$ days
(OSSC CGL Mains 2022)
53. A alone can do a work in 20 days. B is 25% more efficient than A. A and B started working together and worked for 4 days. If C alone completed the remaining work in 22 days, then how many days C alone will take to complete the entire work?
(a) 40 days (b) 60 days
(c) 35 days (d) 45 days
(OSSC CGL Mains 2022)
54. Amal can complete a job in 10 days and Bimal can complete it in 8 days. Amal, Bimal and Kamal together complete the job in 4 days. They are paid a total amount of Rs. 10000 as remuneration. If this amount is shared by them in proportion to their work, then Bimal's share is:
(a) Rs. 600 (b) Rs. 400
(c) Rs. 300 (d) Rs. 500
(OSSC CGL Mains 2022)
55. A contractor agreed to construct a 6km road in 200 days. He employed 140 persons for the work. After 60 days, he realized that only 1.5 km road had been completed. How many additional people would need to employ in order to finish the work exactly on time?
(a) 30 (b) 40 (c) 50 (d) 60
(OSSC CGL Mains 2022)
56. Working 7 hours a day, A can complete a work in 6 days and B can complete the same work in 8 days. Working 8 hours a day, in what time would they complete the work together?
(a) 2.3 days (b) 3 days
(c) 3.6 days (d) 4 days
(OSSC CGL Mains 2022)

57. A can do a certain piece of work in 14 days, B can do the same work in 17 days and C can do the same work in 8 days. Find the number of days it will take to complete the same work if they all work together.

(a) 952/121 (b) 476/243
(c) 243/952 (d) 952/243

(OSSC JEO & JA 2024)

58. Ritu and Rahul can complete a job in 24 days working together. Ritu alone can complete it in 32 days. Both worked together for 8 days and then Ritu left. How long will Rahul take to complete the remaining work?

(a) 96 days (b) 48 days
(c) 32 days (d) 64 days

(OSSC JEO & JA 2024)

59. 5 men or 8 women can do a job in 17 days. 5 men work for 9 days and leave. The number of women required to complete the remaining work in 8 days is:

(a) 6 (b) 11 (c) 7 (d) 8

(OSSC JEO & JA 2024)

60. X people were given a contract for doing a piece of work in 14 days. 2 people did not turn up to work due to sickness, and the rest of the people completed the work in 18 days. What is the value of X?

(a) 16 (b) 7 (c) 13 (d) 9

(OSSC JEO & JA 2024)

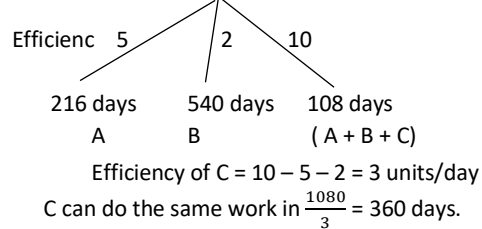
ANSWER KEY

01. (c) 02. (a) 03. (c) 04. (b) 05. (d) 06. (c)
07. (d) 08. (a) 09. (a) 10. (c) 11. (a) 12. (b)
13. (a) 14. (a) 15. (c) 16. (d) 17. (c) 18. (c)
19. (d) 20. (c) 21. (a) 22. (d) 23. (c) 24. (c)
25. (a) 26. (a) 27. (a) 28. (d) 29. (b) 30. (b)
31. (c) 32. (a) 33. (d) 34. (c) 35. (c) 36. (c)
37. (a) 38. (c) 39. (c) 40. (c) 41. (c) 42. (b)
43. (d) 44. (b) 45. (d) 46. (a) 47. (b) 48. (d)

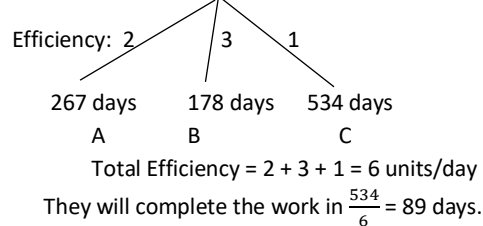
49. (c) 50. (a) 51. (a) 52. (a) 53. (a) 54. (d)
55. (b) 56. (b) 57. (d) 58. (d) 59. (d) 60. (d)

SOLUTION

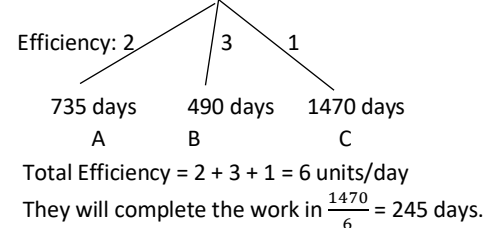
1. Total work = 1080



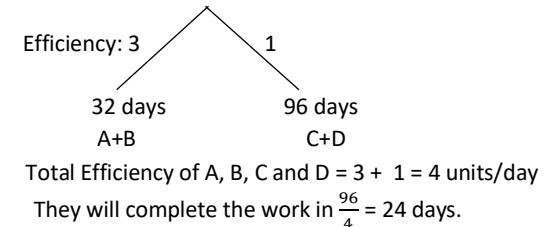
2. Total work = 534



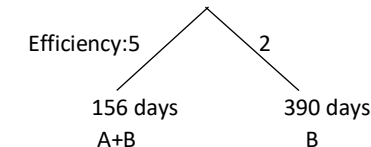
3. Total work = 1470



4. Total work = 96



5. Total work = 780



Efficiency of A = $5 - 2 = 3$ units/day
A will complete the work in $\frac{780}{3} = 260$ days.

6. Total work = 1695
- Efficiency: 5 3
- 339 days 565 days
- A+B A
- Efficiency of B = $5 - 3 = 2$ units/day
B alone finish the work in $\frac{1695}{2} = 847.5$ days.

7. Total work = 678
- Efficiency: 2 3
- 339 days 226 days
- A B
- Total Efficiency = $2 + 3 = 5$ units/day
They can complete the work in $\frac{678}{5} = 135.6$ days.

8. Total work = 2520
- Efficiency: 20 12 9
- 126 days 210 days 280 days
- X Y Z
- Total Efficiency = $20 + 12 + 9 = 41$ units/day
They will complete the work in $\frac{2520}{41} = 61\frac{19}{41}$ days.

9. Total work = 450
- Efficiency: 2 3 5
- 225 days 150 days 90 days
- A+B B+C C+A
- $2(A+B+C) = 10$ units/day
 $(A+B+C) = 5$ units/day
They can do the work in $\frac{450}{5} = 90$ days.

10. Total work = 274 units
- Efficiency: 1 unit per day
- 274 days
- X

In 57 days X can complete $57 \times 1 = 57$ units
Remaining works = $274 - 57 = 217$ units
Y alone complete the remaining work in 217 days

Efficiency of Y = $\frac{217}{217} = 1$ unit/day
X and Y can complete the work in = $\frac{274}{1+1} = 137$ days

11. Total work = 588
- Efficiency: 6 4 3
- 98 days 147 days 196 days
- A B C
- 1st day, A alone do 6 units
2nd day, (B+C) do $4 + 3 = 7$ units
3rd day (A+C) do $6 + 3 = 9$ units
(1st + 2nd + 3rd) day = $6 + 7 + 9 = 22$ units
In one cycle, in 22 units work is completed.

Work will finish in $\frac{588}{22} = 26\frac{16}{22}$
26 cycle (26×3 days) + 16 units
A will do 6 units and (B+C) will do 7 units.
Remaining $16 - 6 - 7 = 3$ units will be done by
(A+C) in $\frac{3}{9} = \frac{1}{3}$ days
Total number of days = $26 \times 3 + 2 + \frac{1}{3} = 80\frac{1}{3}$

12. Suppose efficiency of A = 100, then B = 125

	A	:	B
Efficiency:	4	:	5
Time:	5	:	4

5 units = 2175
1 unit = 435
4 units = $4 \times 435 = 1740$

- 13.
- | | | | |
|-------------|---|---|---|
| | M | : | N |
| Efficiency: | 3 | : | 1 |
| Time: | 1 | : | 3 |
- └──────────┘
2 units
- ATQ, 2 units = 254 days
1 unit = 127 days
3 units = $4 \times 127 = 381$ days

- 14.
- | | | | |
|-------------|--------|---|--------|
| | Ashton | : | Brogan |
| Efficiency: | 2 | : | 1 |

Total work = $(2+1) \times 40 = 120$ units

Time taken by Ashton to complete the work =
 $\frac{120}{2} = 60$ days

15. Suppose efficiency of a man be M and that of boy be B.

$$\text{Total work} = 765 (2M+3B) = 612(3M+2B)$$

$$5 (2M+3B) = 4 (3M+2B)$$

$$10M + 15B = 12M + 8B$$

$$2M = 7B$$

$$M : B = 7 : 2$$

$$\text{Total work} = 765 (2 \times 7 + 3 \times 2) = 765 \times 20 = 15300$$

$$\text{Efficiency of } 5M + 5B = 5 \times 7 + 5 \times 2 = 45$$

$$\text{Required days} = \frac{15300}{45} = 340 \text{ days}$$

16. Total work = 422×16

$$\text{Efficiency of boy to girl} = 2 : 1$$

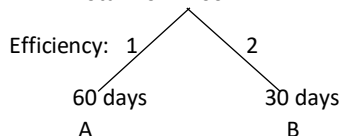
$$\text{Required time} = \frac{422 \times 16}{6 \times 1 + 1 \times 2} = 844$$

- 17.
- | | | | |
|-------------|---|---|---|
| | A | | B |
| Efficiency: | 2 | : | 1 |
| Time: | 1 | : | 2 |
- 1 unit = 30 days

$$\text{Time taken by A} = 2 \times 30 = 60 \text{ days}$$

$$\text{Time taken by B} = 1 \times 30 = 30 \text{ days}$$

$$\text{Total work} = 60$$



$$\text{Total Efficiency} = 1 + 2 = 3 \text{ units/day}$$

$$\text{They can complete the work in } \frac{60}{3} = 20 \text{ days.}$$

18. Let the work was completed in x days.

$$\text{Total work} = 150 (x - 8)$$

$$150 (x - 8) = 150 + 146 + 142 + \dots \times \text{days}$$

$$150 (x - 8) = \frac{x}{2} \{2 \times 150 + (x - 1)(-4)\}$$

$$150 (x - 8) = x (150 - 2x + 2)$$

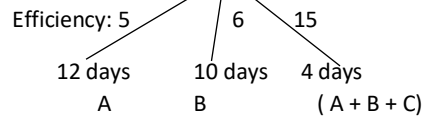
$$150 (x - 8) = 2x (76 - x)$$

$$75 (x - 8) = x (76 - x)$$

$$\text{From option (c), put } x = 25$$

$$75 \times 17 = 25 \times 51$$

19. Total work = 60



$$\text{Efficiency of R} = 15 - 5 - 6 = 4 \text{ units/day}$$

$$\text{R alone can do the same work in } \frac{60}{4} = 15 \text{ days.}$$

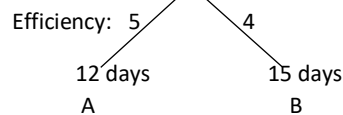
20. Let 'n' number of extra men required to complete on time.

$$\frac{30 \text{ men} \times 30 \text{ days}}{\frac{1}{3}} = \frac{(30+n) \text{ men} \times 30 \text{ days}}{\frac{2}{3}}$$

$$30 + n = 60$$

$$n = 30 \text{ days}$$

21. Total work = 60



$$3 \text{ days work of A} = 3 \times 5 = 15 \text{ units}$$

$$\text{Remaining work} = 60 - 15 = 45 \text{ units}$$

$$(A+B) \text{ can complete the remaining work in } \frac{45}{5+4} = 5 \text{ days.}$$

22. Efficiency of man to boy = 2 : 1

$$\text{Total work} = (7 \text{ men} + 4 \text{ boys}) \times 6$$

$$= (7 \times 2 + 4 \times 1) \times 6 = 108 \text{ units}$$

$$(5 \text{ men} + 4 \text{ boys}) \text{ can do it in } \frac{108}{(5 \times 2 + 4 \times 1)} = 7 \frac{5}{7} \text{ days}$$

23. $\frac{(20B \times 20G) \times 20 \text{ mins}}{20 \text{ apples}} = \frac{(B+G) \times x \text{ mins}}{1 \text{ apple}}$
 $x = 20 \text{ mins}$

24. Total days up to food will last

$$= \frac{150(45-10)}{(150-25)} = 42 \text{ days}$$

25. Efficiency of Akash to Bimal = 1 : 2

$$\text{Total work} = (2+1) \times 14 = 42 \text{ units}$$

$$\text{Bimal will finish in } \frac{42}{2} = 21 \text{ days}$$

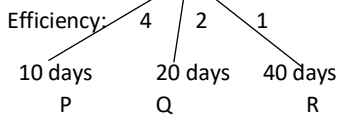
26. 5 men = 12 women

$$5 \text{ men} + 12 \text{ women} = 10 \text{ men}$$

$$5 \text{ men} \text{ ----- } 78 \text{ days}$$

$$10 \text{ men} \text{ ----- } 78/2 = 39 \text{ days}$$

27. Total work = 40



1st day, A alone do 4 units

2nd day, A alone do 4 units

3rd day (P+Q+R) do $4 + 3 + 1 = 7$ units

(1st + 2nd + 3rd) day = $4 + 4 + 7 = 15$ units

In one cycle, in 15 units work is completed.

Work will finish in $\frac{40}{15} = 2$ cycle (2×3 days) +

10 units

P will finish 8 units in 2 days.

Remaining $10 - 8 = 2$ units will be finished

by (P+Q+R) in $\frac{2}{7}$ days.

Total number of days = $2 \times 3 + 2 + \frac{2}{7} = 8\frac{2}{7}$

28. $1000 \times 20 = x \times 25$

$x = 800$

Number of person should leave the work = $1000 - 800 = 200$

29. $4M + 6W$ ----- 8 days

$8(4M+6W)$ ----- 1 day

$3M + 7W$ ----- 10 days

$10(3M+7W)$ ----- 1 day

$8(4M+6W) = 10(3M+7W)$

$16M+24W = 15M+35W$

$1M = 11W$

$3\text{men} + 7\text{women} = 3 \times 11\text{women} + 7\text{women} = 40$ women

Total work = $40 \times 10 = 400$

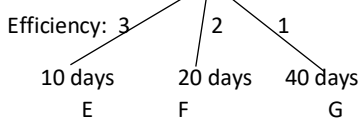
10 women can complete in $\frac{400}{10} = 40$ days

$$30. \frac{M_1 H_1 D_1}{L_1 B_1 H_1} = \frac{M_2 H_2 D_2}{L_2 B_2 H_2}$$

$$\frac{16 \times 6 \times 25}{150 \times 20 \times 12} = \frac{12 \times 8 \times x}{800 \times 15 \times 6}$$

$x = 50$ days

31. Total work = 60 units



1st day, E alone do 3 units

2nd day, E alone do 3 units

3rd day (E+F+G) do $3 + 2 + 1 = 6$ units

(1st + 2nd + 3rd) day = $3 + 3 + 6 = 12$ units

In one cycle, in 12 units work is completed.

Work will finish in $\frac{60}{12} = 5$ cycle

$= 5 \times 3 = 15$ days

32. 1 boy = 2 girls

Efficiency of boys to girl = $2 : 1$

Total work = 306×9

(1 girl + 4 boys) can dig a similar pit in $\frac{306 \times 9}{(1 \times 1 + 4 \times 2)} =$

306 days

33. Efficiency of Preston to Rex = $2 : 1$

Total work = $(2 + 1) \times 46$

Time taken by Preston to finish the same work in

$\frac{3 \times 46}{2} = 69$ days

34.

	A		B
Efficiency:	3	:	1
Time:	1	:	3
	$\frac{1 \times 3}{2} = 1.5$		

ATQ, 2 units = 190 days

1 unit = 95 days

35.

	Erik		Thilak
Efficiency:	125	:	100
	5	:	4
Time:	4	:	5
	$\frac{4 \times 5}{2} = 10$		

ATQ, 5 units = 97.5 days

1 unit = 19.5 days

4 units = $4 \times 19.5 = 78$ days

36.

	A		B
Efficiency	2	:	1
Time:	1	:	2

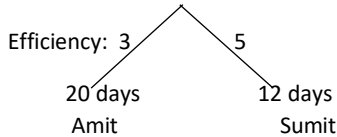
B: 2 units = 87 days

A: 1 unit = 87/2

Total work = 87 units

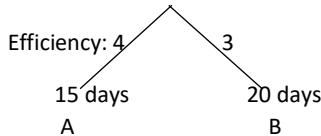
(A+B) can finish the work in $\frac{87}{3} = 29$ days

37. Total work = 60



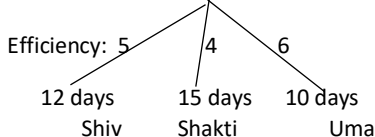
In 4 days, Amit will do $4 \times 3 = 12$ units
 Remaining works = $60 - 12 = 48$ units
 Amit and Sumit will do the work in $\frac{48}{3+5} = 6$ days.

38. Total work = 60



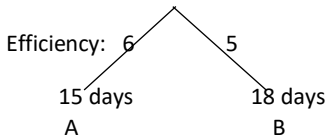
Day 1: A can do in 4 days
 Day 2: B can do in 3 days
 In one cycle, 7 units work is completed $\frac{60}{7}$
 $= 8\frac{4}{7} = 8$ cycle + 4 units is left
 A will finish 4 units in one day
 Total time = $8 \times 2 + 1 = 17$ days

39. Total work = 60 units



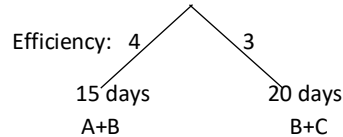
In 2 days, Shiv will finish = $2 \times 5 = 10$ units
 In 4 days, Shakti will finish = $4 \times 4 = 16$ units
 Remaining work = $60 - 10 - 16 = 34$ units
 Uma alone can do remaining work in $\frac{34}{6} = 5\frac{2}{3}$
 Required number of days = $5\frac{2}{3} - 4 = 1\frac{2}{3}$ days.

40. Total work = 90



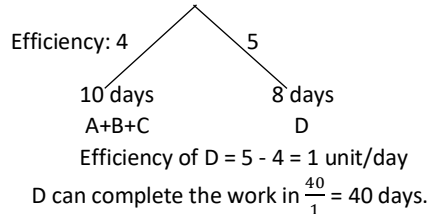
In 2 days, A will finish $2 \times 6 = 12$ units
 Remaining works = $90 - 12 = 78$ units
 Time taken by B to complete the remaining work
 in $\frac{78}{5} = 15\frac{3}{5}$ days.

41. Total work = 60



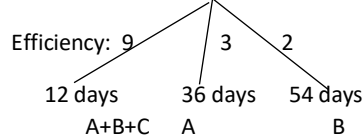
A worked for 6 days and B worked for 8 days.
 If A and B work together for 6 days, they
 would complete = $4 \times 6 = 24$ units
 Remaining works = $60 - 24 = 36$ units
 Now B has to work 2 more days and if he does it
 along with C for two day, they would complete
 $3 \times 2 = 6$ units
 Remaining works = $36 - 6 = 30$ units
 Now C completes remaining work in $18 - 2 = 16$ days
 Efficiency of C = $\frac{30}{16} = \frac{3}{2}$ units/day
 C will complete the whole work in $\frac{60}{3/2} = \frac{60}{30/16}$
 = 32 days

42. Total work = 40



Efficiency of D = $5 - 4 = 1$ unit/day
 D can complete the work in $\frac{40}{1} = 40$ days.

43. Total work = 108 units



Efficiency of C = $9 - 3 - 2 = 4$ units/day
 C can complete the whole work in $\frac{108}{4} = 27$ days.

44.	Tanya	Sakshi
Efficiency	5	: 4
Time:	4	: 5

Sakshi: 5 units = 20 days
 Tanya: 4 unit = 16 days

45. Virat completes in $\frac{45}{2}$ days
 In one day, he completes $\frac{2}{45}$ part

In three day, he completes $\frac{6}{45}$ part = $\frac{2}{15}$ part

46. Total work = 24 units
- Efficiency: 8 4 3
- 3 days 6 days 8 days
- A+B+C A B
- Efficiency of C = $8 - 4 - 3 = 1$ unit/day
- Wages always divided in the ratio of their efficiency.
- Total wages: 8 units ----- Rs. 4800
- 1 unit ----- Rs. 600
- B wages: 3 units ----- $3 \times 600 = \text{Rs. } 1800$

47. Total work = 30 units
- Efficiency: 15 5 6
- 2 days 6 days 5 days
- A+B+C A B
- Efficiency of C = $15 - 5 - 6 = 4$ units/day
- C can complete the whole work in $\frac{30}{4} = 7.5$ days.

48. Number of days up to when food will last = $\frac{120 \times 195}{90}$
- = 260 days.

- 49.
- | | | | |
|-------------|---|---|---|
| | A | | B |
| Time: | 6 | : | 5 |
| Efficiency: | 5 | : | 6 |
- Wages always divided in the ratio of their efficiency.
- Total wages: 11 units ----- Rs. 220
- 1 unit ----- Rs. 20
- B wages: 6 units ----- $6 \times 20 = \text{Rs. } 120$

50. Let the number of days upto when food will last = x
- $500 \times 30 = (500+100)x$
- $x = 25$ days

51. Total work = $10(6M+8B) = 2(26M+48B)$
- $30M+40B = 26M+48B$
- $4M = 8B$
- $M : B = 2 : 1$
- Total work = $(6 \times 2 + 8 \times 1) \times 10 = 200$ units

(15M + 20B) will do the same work in $\frac{200}{(15 \times 2 + 20 \times 1)} = 4$ days

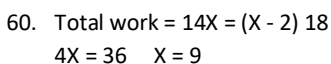
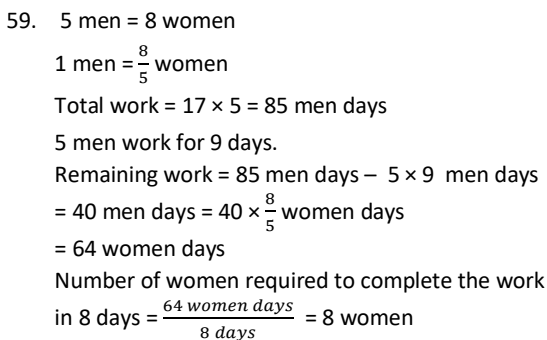
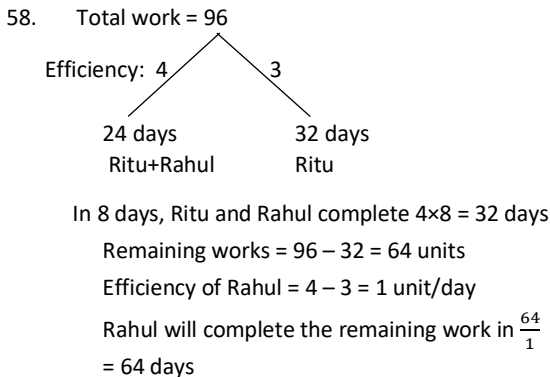
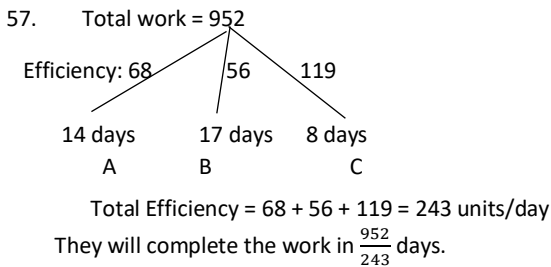
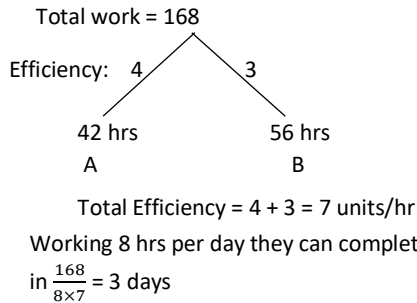
52. Total work = 60 units
- Efficiency: 3 4 5
- 20 days 15 days 12 days
- A B C
- B alone can do $4 \times 5 = 20$ units in 5 days
- C alone can do $5 \times 3 = 15$ units in 3 days
- Total work = $60 + 20 + 15 = 95$ units
- Total Efficiency = $3 + 4 + 5 = 12$ units/day
- (A + B + C) can complete the whole work in $\frac{95}{12} = 7\frac{11}{12}$ days.

- 53.
- | | | | |
|------------|---|---|---|
| | A | | B |
| Efficiency | 4 | : | 5 |
| Time: | 5 | : | 4 |
- A: 5 units = 20 days B: 4 unit = 16 days
- Total work = 80 units (LCM of 20 and 16)
- In 4 days, (A + B) complete $9 \times 4 = 36$ units
- Remaining work = $80 - 36 = 44$ units
- C alone complete in 22 days
- Efficiency of C = $\frac{44}{22} = 2$ units/day
- C alone will complete the entire work in $= \frac{80}{2} = 40$ days.

54. Total work = 40 units
- Efficiency: 10 4 5
- 10 days 8 days 4 days
- Amal Bimal (Amal+Bimal+Kamal)
- Wages always divided in the ratio of their efficiency.
- Total wages: 10 units ----- Rs. 1000
- Bimal wages: 5 units ----- Rs. 500

55. Let additional men be x
- $\frac{140 \times 60}{1.5} = \frac{(140+x)140}{4.5}$
- $x = 40$ men

56. A complete the work in $6 \times 7 = 42$ hrs
- B complete the work in $8 \times 7 = 56$ hrs

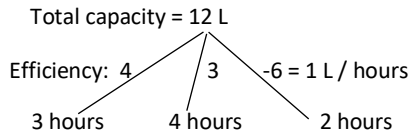


Concept of negative work

In this case, one side work is being done and other side it is being destroyed.

Example: Two pipes can fill a cistern in 3 hours and 4 hours respectively and a waste pipe can empty it in 2 hours. If all the three pipes are kept open, then the cistern will be filled in:

Solution: Let the capacity of cistern = LCM of 3, 4, 2 = 12 litre



Efficiency of three pipes = $4 + 3 - 6 = 1$ litre per hour

Empty cistern will be filled in $\frac{\text{Total Capacity}}{\text{Efficiency}} = \frac{12}{1} = 12$ hrs

EXERCISE

1. Pipe A can fill a tank in 843 minutes and Pipe B can fill the same tank in 1686 minutes. If both pipes are opened together, how many minutes will it take to fill the empty tank?
(a) 552 (b) 562 (c) 582 (d) 572
(OSSC CGL 2021)
2. Pipe A can fill a tank in 744 minutes and Pipe B can empty the same tank in 390 minutes. If both pipes are opened together, how many hours will it take to fill the empty tank?
(a) 62 (b) 60 (c) 66 (d) 64
(OSSC CGL 2021)
3. Pipe A can empty a tank in 155 minutes. Pipe B can fill the same tank in 93 minutes and Pipe C can fill the same tank in 62 minutes. If all three pipes are opened together, how many minutes will it take to fill the empty tank?
(a) 940 (b) 920 (c) 950 (d) 930
(OSSC CGL 2021)
4. Two pipes fill the tank in 729 minutes and 1215 minutes. There is also a leak pipe in the tank. When all the three are opened simultaneously, the empty tank is filled in 486 minutes. How many minutes will the leak pipe alone take to empty the filled tank?
(a) 7285 (b) 7250 (c) 7290 (d) 7295
(OSSC CGL 2021)
5. Three pipes A, B and C can fill a cistern in 204 hours. After working together for 68 hours, C is closed and A and B filled the remaining part in 204 hours. Find the number of hours taken by C alone to fill the cistern.
(a) 604 (b) 612 (c) 608 (d) 616
(OSSC CGL 2021)
6. Two pipes A and B can fill a cistern in 37.5 minutes and 45 minutes respectively. Both pipes are opened. The cistern will be filled in just half an hour, if pipe B is turned off after:
(a) 5 min (b) 9 min (c) 10 min (d) 15 min
(OSSC CGL 2022)
7. A pipe can fill a tank in 6 hours and another pipe can empty the tank in 12 hours. If both the pipes are opened at the same time, then the tank can be filled in how many hours?
(a) 10 hours (b) 12 hours
(c) 14 hours (d) 16 hours
(OSSC CGL 2023 & CHSL 2024)
8. A tank is filled in 5 hours by 3 pipes A, B and C. The pipe C is twice as fast as B and B is twice as fast as A. How much time will pipe A alone take to fill the tank?
(a) 20 hours (b) 25 hours
(c) 35 hours (d) 30 hours
(OSSC CGL SPL 2023 and Steno 2025)
9. Three pipes P_1 , P_2 , P_3 can fill a tank in 50 minutes, 120 minutes and 60 minutes respectively. If all the pipes are opened together, how much time will it take to fill 27% of the tank?
(a) 10 minutes (b) 6 minutes
(c) 4 minutes (d) 2 minutes
(OSSC CHSL 2023)
10. A tank can be filled in 10 hours. After a leak in its bottom it takes 12 hours to fill the tank. What would be the time required by the leak to empty the full tank?
(a) 45 hours (b) 50 hours

- (c) 55 hours (d) 60 hours
(OSSC CHSL 2023)
11. Three pipes A, B and C together can fill a tank in 6 hours. After working together for 2 hours, C is closed and A, B filled the remaining part in the tank in 7 hours. Then the number of hours the pipe C alone would take to fill the tank will be:
(a) 10 hours (b) 12 hours
(c) 14 hours (d) 16 hours
(OSSC CHSL 2024 & CTSRE 2024)
12. A cistern is filled in 6 hours by three pipes A, B and C. The pipe C is thrice as fast as B and B is twice as fast as A. How much time will pipe B alone take to fill the tank?
(a) 20 hours (b) 54 hours
(c) 27 hours (d) cannot be determined
(OSSC CTSRE 2022)
13. Three pipes A, B and C can fill separately a cistern in 3, 4 and 6 minutes respectively. A was opened first. After 1 minute, B was opened and after 2 minutes from the start of A, C was also opened. Find the time when the cistern will be full?
(a) $2\frac{1}{9}$ mins (b) $4\frac{1}{2}$ mins (c) $3\frac{3}{4}$ mins (d) 3 mins
(OSSC CPGL 2024)
14. Two pipes can fill a tank in 20 minutes and 24 minutes respectively. A waste pipe attached to the tank can empty 8 gallons per minute. If all the three pipes working together can fill the tank in 15 minutes, then what is the capacity of the tank?
(a) 1160 gallons (b) 700 gallons
(c) 1620 gallons (d) 720 gallons
(OSSC Statistical Assistant 2024 & Accountant)
15. A pump can fill a tank with water in 2 hours. Because of a leak, it took $2\frac{1}{3}$ hours to fill the tank. If now the pump is shut down, how much time the leak would take to drain all the water out of the tank?
(a) 12 hrs (b) 13 hrs (c) 14 hrs (d) 15 hrs
(OSSC ESI 2023)
16. Two pipes A and B can fill a tank in 12 minutes and 15 minutes respectively while a third pipe C can empty the full tank in 20 minutes. All the three pipes are opened in the beginning. However, pipe 'C' is closed 6 minutes before the tank is filled. In what time will the tank be full?
(a) 5 minutes (b) 7 minutes
(c) 9 minutes (d) 11 minutes
(OSSC LTR 2024)
17. Two pipes A and B together can fill a cistern in 4 hours. Had they been opened separately, then B would have taken 6 hours more than A to fill the cistern. How much time will be taken by A to fill the cistern separately?
(a) 1 hour (b) 2 hours (c) 6 hours (d) 8 hours
(OSSC Steno 2023)
18. A tank has an inlet pipe and an outlet pipe. If the outlet pipe is closed, then the inlet pipe fills the empty tank in 8 hours. If the outlet pipe is open, then the inlet pipe fills the empty tank in 10 hours. If only the outlet pipe is open, then in how many hours the full tank becomes half full?
(a) 30 hours (b) 16 hours
(c) 25 hours (d) 20 hours
(OSSC CGL Mains 2022)
19. Pipe A and B can fill an empty cistern in 76 minutes and 57 minutes, respectively. Both pipe A and pipe B are opened together. After how much time should pipe A be turned off so that the empty cistern is completely filled in a total of 30 minutes?
(a) 16 min (b) 20 min (c) 36 min (d) 35 min
(OSSC JEO & JA 2024)
20. Pipe P can fill $\frac{7}{9}$ part of a tank in 28 hours and pipe Q can fill $\frac{2}{3}$ part of the same tank in 16 hours. Both P and Q were kept open. In how hours the tank is filled.
(a) 58 hours (b) 79 hours
(c) 59 hours (d) 72 hours
(OSSC JEO & JA 2024)
21. Pipe A and B can fill an empty cistern in 32 minutes and 80 minutes, respectively. Both pipe A and pipe B are opened together. After how much time should pipe A be turned off so that the empty cistern is completely filled in a total of 15 minutes?
(a) 20 min (b) 26 min (c) 45 min (d) 25 min
(OSSC JEO & JA 2024)

ANSWER KEY

01. (b) 02. (a) 03. (d) 04. (c) 05. (b) 06. (b)
 07. (b) 08. (c) 09. (b) 10. (d) 11. (c) 12. (c)
 13. (a) 14. (d) 15. (c) 16. (b) 17. (c) 18. (d)
 19. (c) 20. (d) 21. (b)

SOLUTION

1. Total capacity = 1686 L
 Efficiency: 2 + 1 = 3 L/mins
 843 mins 1686 mins
 A and B can fill the empty tank in $1686/3 = 562$ minutes
2. Total capacity = 3720 L
 Efficiency: 5 - 4 = 1 L/mins
 744 mins 930 mins
 (A + B)'s can fill the tank in $3720/1 = 3720$ mins = 62 hours
3. Total capacity = 930 L
 Efficiency: 6 10 - 15 = 1 L/mins
 155 mins 93 mins 62 mins
 (A + B - C) together can fill the empty tank in $930/1 = 930$ minutes
4. Total capacity = 7290 L
 Efficiency: 6 10 15
 729 mins 1215 mins 486 mins
 P_1 P_2 ($P_1 + P_2 - L$)
 ($P_1 + P_2 - L$) = 15
 $L = 6 + 10 - 15 = 1$ L/mins
 Leak pipe can empty the full tank in = T.C./L' s
 efficiency = $7290/1 = 7290$ minutes

5. Total capacity = 204 units

Efficiency: 1

204 h

(A + B + C)

(A + B + C) can fill in 68 hours = 68×168 units

Remaining = $204 - 68 = 136$

Remaining part is filled by (A + B) in 204 hours

Efficiency of A and B = $\frac{136}{204} = \frac{2}{3}$

Efficiency of C = $1 - \frac{2}{3} = \frac{1}{3}$

C can fill the cistern = $\frac{204}{\frac{1}{3}} = 612$

6. Total capacity = 225 L

Efficiency 6

5

75/2 mins

45 mins

A

B

So, pipe A worked for 30 minutes, $6 \times 30 = 180$ units filled.

Remaining capacity = $225 - 180 = 45$ mins

So remaining capacity must be filled by B in $45/5 = 9$ min.

Pipe B is turned off after 9 minutes.

7. Total capacity = 12 L

Efficiency: 2

-

1 = 1 L/mins

6 mins

12 mins

Tank will be filled in $\frac{12}{2-1} = 12$ hours

- 8.

A

B

C

1

:

2

(1 : 2) $\times 2$

Efficiency: 1 : 2 : 4

Total capacity = $(1 + 2 + 4) \times 35$ units

Pipe A can fill the tank in $35/1 = 35$ hours

9. Total capacity = 600 L

Efficiency: 12

+

5

+

10 = 27 L/min

50 mins

120 mins

60 mins

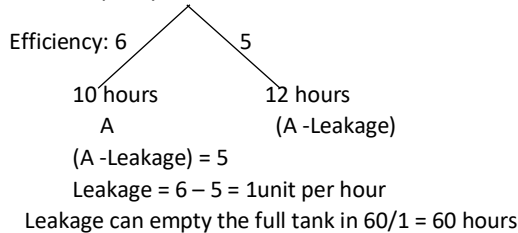
P_1

P_2

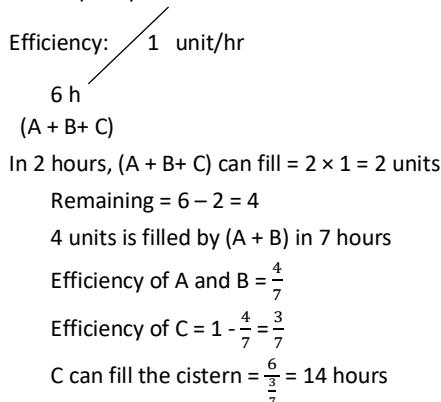
P_3

$$\text{Required time} = \frac{600}{27} \times \frac{27}{100} = 6 \text{ mins}$$

10. Total capacity = 60 units



11. Total capacity = 6 units



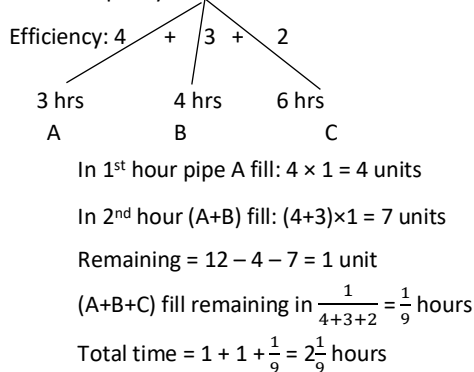
- 12.
- | | | |
|---|-------------|---|
| A | B | C |
| 1 | 2 | |
| | (1 : 3) × 2 | |

Efficiency: 1 : 2 : 6

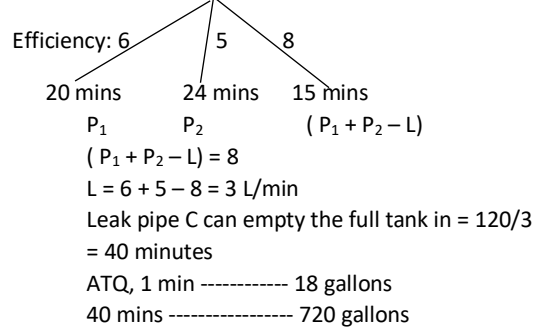
Total capacity = $(1 + 2 + 6) \times 6$ units = 54 units

Pipe B can fill the tank in $\frac{54}{2} = 27$ hours

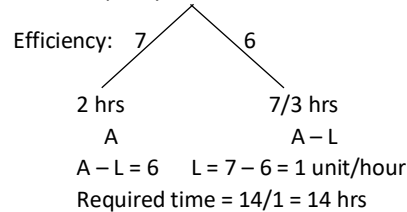
13. Total capacity = 12



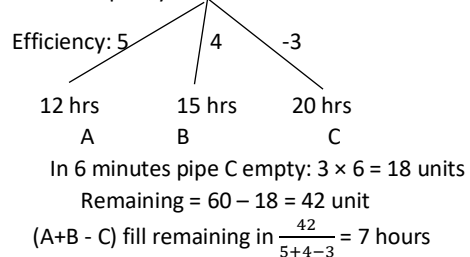
14. Total capacity = 120 L



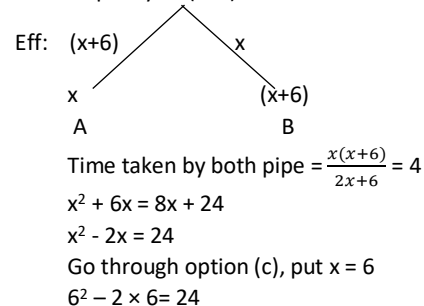
15. Total capacity = 14 unit



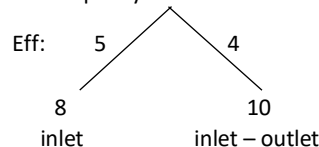
16. Total capacity = 60



17. Total capacity = $x(x+6)$ unit



18. Total capacity = 40 unit

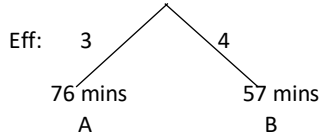


$$\text{inlet} - \text{outlet} = 4$$

$$\text{Outlet} = 5 - 4 = 1 \text{ units/hr}$$

$$\begin{aligned} \text{Required time to fill } \frac{1}{2} \text{ of the tank} &= \frac{1}{2} \times \frac{40}{1} \\ &= 20 \text{ hours} \end{aligned}$$

19. Total capacity = 228 L



So, pipe B worked for 30 minutes, $4 \times 30 = 120$ units filled.

$$\text{Remaining capacity} = 228 - 120 = 108 \text{ minutes}$$

So remaining capacity must be filled by A in $108/3 = 36 \text{ min}$.

Pipe B is turned off after 36 minutes.

20. P: $7/9$ ----- 28 hours

$$1 \text{ ----- } 36 \text{ hours}$$

$$Q: 2/3 \text{ ----- } 16 \text{ hours}$$

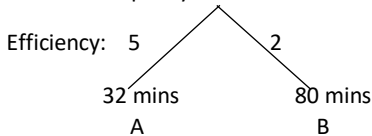
$$1 \text{ ----- } 24 \text{ hours}$$

$$\text{Total capacity} = 72 \text{ units}$$



$$\text{The tank is filled in } \frac{72}{4-3} = 72 \text{ hours}$$

21. Total capacity = 160 units



So, pipe B worked for 15 minutes, $2 \times 15 = 30$ units filled.

$$\text{Remaining capacity} = 160 - 30 = 130 \text{ minutes}$$

So remaining capacity must be filled by A in $130/5 = 26 \text{ min}$. So Pipe B is turned off after 26 minutes.

Speed is defined as the distance covered by a body per unit time.

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

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

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

It can be infer from above formula that

- Speed $\propto \frac{1}{\text{Time}}$ (When distance is constant.)

If the distance is constant then ratio of speed is inversely proportional to ratio of time.

$$\text{Speed:} \quad a \quad : \quad b$$

$$\text{Time:} \quad b \quad : \quad a$$

- Distance $\propto$ Time (When speed is constant.)

If the speed is constant then ratio of distance is same as ratio of time.

$$\text{Speed:} \quad a \quad : \quad b$$

$$\text{Time:} \quad a \quad : \quad b$$

- Speed $\propto$ Distance (When time is constant.)

If the time is constant then ratio of speed is same as ratio of distance.

$$\text{Speed:} \quad a \quad : \quad b$$

$$\text{Distance:} \quad a \quad : \quad b$$

Units of Measurement

Distance is usually measured in meters (m), Kilometers (km), mile or feet

Time is usually measured in seconds (sec), minutes (mins) or hours (hr)

Speed is usually measured in m/sec, km/hr or mile/hr

Conversion of Units

$$1 \text{ hour} = 60 \text{ min} = 60 \times 60 \text{ Seconds} = 3600 \text{ sec}$$

$$1 \text{ km} = 1000 \text{ m}$$

$$1 \text{ mile} = 1.6 \text{ km or } 5 \text{ mile} = 8 \text{ km}$$

$$a \text{ km / hr} = a \times \frac{1000 \text{ m}}{3600 \text{ sec}} = a \times \frac{5}{18} \text{ m / sec}$$

$$5 \text{ m / sec} = 18 \text{ km / hr}$$

Concept: A man go to a certain distance with x km / hr and come back with a speed of y km / hr. If he takes t hours to go and come back. Find the distance?

$$\text{Distance} = \left(\frac{xy}{x-y} \right) t$$

Concept: A man go to a certain distance with x km / hr and come back with a speed of y km / hr. If he takes t hours more to come back. Find the distance?

$$\text{Distance} = \left(\frac{xy}{x-y} \right) \times \text{time difference}$$

Average Speed

$$\text{Average Speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$$

Type - 1

Case -1 (When distance is constant)

$$\text{Average speed} = \frac{2S_1S_2}{S_1+S_2}$$

Case -2 (When time is constant)

$$\text{Average speed} = \frac{S_1+S_2}{2}$$

Type -2 Average speed with Stoppage

$$= \frac{\text{Total distance}}{\text{Running time} + \text{Stoppage time}}$$

Relative Speed

When two objects are moving in the same direction, the relative speed is the difference between their respective speeds.

When two objects are moving in the opposite direction, the relative speed is the sum of their respective speeds.

Concept: Buses are leaving bus terminal after every T_1 minutes. But a person who is moving towards the terminal meets buses after every T_2 minutes.

$$\frac{\text{Speed of man}}{\text{Speed of bus}} = \frac{|T_1 - T_2|}{T_2}$$

Concept: Pikul starts his journey from Jagatsinghpur to Khurda and Mahesh starts his journey from khurda to Jagatsinghpur, towards each other. The Speeds of Pikul and Mahesh are S_1 km / hr and S_2 km / hr respectively and they meet Cuttack after T hours. After meeting each other, Pikul takes T_1 hour to reach Khurda and Mahesh takes T_2 hours to reach Jagatsinghpur.

$$\text{Then } \frac{S_1}{S_2} = \sqrt{\frac{T_2}{T_1}}$$

$$T = \sqrt{T_1 \times T_2}$$

Concept: Without stoppage a person travel a distance at an average speed of a km/hr and with stoppage he

travels at same distance at b km / hr, then number of minutes per hour does he stop

$$= \frac{a-b}{a} \times 60$$

EXERCISE

- How many seconds will a train take to cover a distance of 4095 meters, if it runs at a speed of 378 km/hr?
(a) 36 (b) 33 (c) 42 (d) 39
(OSSC CGL 2021)
- How many seconds will a train take to cover a distance of 5120 meters, if it runs at a speed of 288 km/hr?
(a) 66 (b) 60 (c) 62 (d) 64
(OSSC CGL 2021)
- A train travels at a speed of 540 kmph and covers a certain distance in 36 minutes. Find the distance covered in meters.
(a) 334000 (b) 344000
(c) 314000 (d) 324000
(OSSC CGL 2021)
- A man travels at a speed of 150 kmph and covers a certain distance in 10 minutes. Find the distance covered in meters.
(a) 26000 (b) 28000 (c) 27000 (d) 25000
(OSSC CGL 2021)
- If a traveler covers a distance of 8225 meters in 47 seconds, find the speed of the traveler (in kmph).
(a) 640 (b) 620 (c) 630 (d) 610
(OSSC CGL 2021)
- If A drives from X to Y at 78 km/h and then Y to X at 120 km/h, what is the average speed for the whole journey? (in kmph - upto two decimals)
(a) 100.54 (b) 91.54 (c) 97.54 (d) 94.54
(OSSC CGL 2021)
- A train travels from Dwarka to Amritsar at a speed of 78 km/h and returns at a speed of 80 km/h. If it takes 158 hours for travel, then find the distance between Dwarka to Amritsar (in km).
(a) 6440 (b) 6140 (c) 6240 (d) 6340
(OSSC CGL 2021)
- Q completes a journey in 63 hours. She travels first half of the journey at the rate of 78 kmph and second half at the rate of 84 kmph. Find the distance of entire journey (in km).
(a) 5096 (b) 6662 (c) 6552 (d) 6442
(OSSC CGL 2021)
- If a man drives at 101 kmph instead of 97 kmph, he will travel 148 kms more. Find the distance travelled by him at 101 kmph (in km).
(a) 4137 (b) 3737 (c) 3937 (d) 3537
(OSSC CGL 2021)
- A travels from X to Y at a speed of 132 kmph and reaches 180 minutes late. If he travels at a speed of 220 kmph and reaches early by 180 minutes, find the distance between X and Y (in km).
(a) 2080 (b) 2280 (c) 2180 (d) 1980
(OSSC CGL 2021)
- A flight covers a distance between A and B in 23 hours. If the speed of the flight is reduced by 240 km/h, then the same distance is covered in 28 hours. Find the distance between A and B (in km).
(a) 30712 (b) 30812 (c) 30912 (d) 30612
(OSSC CGL 2021)
- The distance between office and home of Uma is 80 km. One day she was late by 1 hour than the normal time to leave for the office, so she increased her speed by 4 km/hr. Thus she reached to office at the normal time. What is the changed speed of Uma?
(a) 20 km/hr (b) 16 km/hr
(c) 40 km/hr (d) 10 km/hr
(OSSC CGL 2021)
- Two places, A and B are 4144 kms from each other. A train leaves from A to B and at the same time, another train leaves from B to A. The two trains meet at the end of 37 hours. If the train travelling from A to B travels 37 kmph faster than the other, find the speed of the faster train (in km1ph).
(a) 76.5 (b) 75.5 (c) 77.5 (d) 74.5
(OSSC CGL 2021)
- A train started from station A and proceeded towards station B at a speed of 204 kmph. 45 minutes later, another train started from station B

and proceeded towards station A at 30 kmph. If the distance between two stations is 855 km, at what distance from station A will the trains meet? (in km)

- (a) 765 (b) 725 (c) 785 (d) 795

(OSSC CGL 2021)

15. A truck driver, once in a week, leaves his house and drives to the river dock to pick up supplies. At 6:05 pm, one-fifth of the way to the dock, he passes the temple. At 6:15 pm, one-third of the way, he passes the Dhaba. At what time does he reach the dock?

- (a) 6:50 pm (b) 6:55 pm
(c) 7:00 pm (d) 7:05 pm

(OSSC CGL 2022)

16. Two trains, one from Howrah to Patna and the other from Patna to Howrah, start simultaneously. After they meet, the trains reach their destinations after 9 hours and 16 hours respectively. The ratio of their speeds is:

- (a) 2:3 (b) 4:3 (c) 6:7 (d) 9:16

(OSSC CGL 2022)

17. A car takes 2 hours to reach a destination by travelling at the speed of 60 km/hr. How long (in hours) will it take when the car travels at the speed of 80 km/hr?

- (a) $1\frac{1}{4}$ hours (b) $1\frac{1}{2}$ hours
(c) $1\frac{1}{3}$ hours (d) $1\frac{2}{5}$ hours

(OSSC CGL 2023)

18. A truck covers distance of 376 km at a certain speed in 8 hours. How much time would a car take at an average speed which is 18 kmph more than that of the speed of the truck to cover a distance which is 14 km more than that travelled by the truck?

- (a) 6 hours (b) 5 hours
(c) 7 hours (d) 8 hours

(OSSC CGL 2024)

19. Two cars A and B are running towards each other from different places 88 km apart. If the ratio of their speeds of the cars A and B is 5:6 and the speed of the car B is 90 km per hour, then after how long will the two meet each other?

- (a) $26\frac{2}{3}$ minutes (b) 24 minutes
(c) 32 minutes (d) 36 minutes

(OSSC CGL 2024)

20. Two people enter a race in which one runs to a point and comes back to the starting point. Anil runs at a speed of 20 mph to and from the point. Sunil runs to the point going at 10 mph and comes back from the point at 30 mph. Then who wins the race?

- (a) Anil (b) Sunil
(c) Both reach at the same time
(d) None of these

(OSSC CGL SPL 2022)

21. Two stations A and B are 110 km apart on a straight line. One train starts from A at 7 a.m. and travels towards B at 20 kmph. Another train starts from B at 8 a.m. and travels towards A at a speed of 25 kmph. At what time will they meet?

- (a) 9 a.m. (b) 10 a.m.
(c) 10:30 a.m. (d) 11 a.m.

(OSSC CGL SPL 2022)

22. If a person walks at 14 km/h instead of 10 km/h, he would have walked 20 km more. The actual distance travelled by him is:

- (a) 50 km (b) 56 km (c) 70 km (d) 80 km

(OSSC CGL SPL 2022)

23. A boy walking at a speed of 10 km/h reaches his school 12 minutes late. Next time, at a speed of 15 km/hr, he reaches his school 7 minutes late. Find the distance of his school from his house.

- (a) 1 km (b) 1.5 km (c) 2 km (d) 2.5 km

(OSSC CGL SPL 2023)

24. Two cyclists A and B start from the same place to ride in the same direction. A starts at noon at 8 km/hr and B at 1:30 p.m. at 10 km/hr. How far will A have ridden before he is overtaken by B?

- (a) 40 km (b) 50 km (c) 60 km (d) 70 km

(OSSC CGL SPL 2023)

25. A running man crosses a bridge of length 500 meters in 4 minutes. At what speed the man was running?

- (a) 9.5 km/hr (b) 8.5 km/hr
(c) 7.5 km/hr (d) 6.5 km/hr

(OSSC CHSL 2023)

26. Travelling at $\frac{1}{6}$ th of his usual speed, a man is late by 30 minutes. What will be the usual time taken by the man to cover the same distance?
(a) 5 min (b) 5.25 min (c) 5.50 min (d) 6 min
(OSSC CHSL 2023)
27. A farmer travelled a distance of 61 in 9 hours. If he travelled partly on foot at the rate of 4 km/hr and partly on bicycle at the rate of 9 km/hr, then what is the distance travelled by the farmer on foot?
(a) 12 km (b) 13 km (c) 16 km (d) 20 km
(OSSC CHSL 2024 & Statistical Asst. 2024)
28. Two cars leaves simultaneously from points A and B on a straight line towards each other. The distance between A and B is 100 km. They meet at a point 40 km from A. Find the ratio of their speeds.
(a) $1/3$ (b) $2/3$ (c) $1/4$ (d) $3/4$
(OSSC CHSL 2024)
29. Sunil covered a certain distance at some speed. Had he moved 3 kmph faster, he would have taken 20 minutes less. If he had moved 2 kmph slower, he would have taken 20 minutes more. The distance (in km) is:
(a) 20 (b) $26\frac{2}{3}$ (c) $15\frac{1}{2}$ (d) 30
(OSSC CTSRE 2022)
30. A and B started simultaneously towards each other from P and Q respectively. The distance between P and Q is 600 km and the ratio of speed of A and B is 5:7. If they meet at a point 'M', then the distance PM is:
(a) 50 km (b) 150 km (c) 250 km (d) None of these
(OSSC CTSRE 2022)
31. It takes eight hours for a 600 km journey, If 120 km of it is done by train and the rest is done by car. It takes 20 minutes more if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the car is:
(a) 3:5 (b) 3:4 (c) 4:3 (d) 4:5
(OSSC CTSRE 2024)
32. A man travels at a speed of 540 kmph and covers a certain distance in 45 minutes. Find the distance covered in meters.
(a) 415000 (b) 405000 (c) 385000 (d) 395000
(OSSC BSSO 2022)
33. If a man drives at 107 kmph instead of 103 kmph, he will travel 156 kms more. Find the distance travelled by him at 107 kmph (in km).
(a) 4073 (b) 4373 (c) 4173 (d) 4273
(OSSC BSSO 2022)
34. If A drives from X to Y at 60 kmph and then from Y to X at 108 kmph, what is the average speed of the whole journey (in km/h - up to two decimals)?
(a) 77.14 (b) 79.14 (c) 75.14 (d) 81.14
(OSSC BSSO 2022)
35. A flight covers a distance between A and B in 26 hours. If the speed of the flight is reduced by 270 km/hr, then the same distance is covered in 31 hours. Find the distance between A and B (in km).
(a) 46524 (b) 44524 (c) 43524 (d) 45524
(OSSC BSSO 2022)
36. Walking at $\frac{3}{4}$ th of the normal speed, Rabi is delayed by 16 minutes to reach his office. What is the usual time taken by Rabi to cover the distance from his home to the office?
(a) 58 minutes (b) 52 minutes (c) 48 minutes (d) 42 minutes
(OSSC CPGL 2024)
37. B runs 20% faster than A. If A covers a distance of 100 meters in 10 secs, how much time will B take to cover 360 meters?
(a) 33 secs (b) 35 secs (c) 30 secs (d) 40 secs
(OSSC Jr Clerk Mains 2022)
38. The average speed of the bus is 80 kmph and it reaches its destination on time. If the bus goes with the average speed of 40 kmph, it is late by 21 minutes. The total distance travelled by the bus till destination is:
(a) 7 km (b) 8 km (c) 28 km (d) 70 km
(OSSC Jr Clerk Mains 2022)
39. A man driving his bike at 36 kmph reached his office 20 minutes early. Had he driven the bike at 24 kmph he would have reached 40 minutes late. How far is his office?
(a) 48 km (b) 60 km (c) 72 km (d) 80 km
(OSSC Jr Clerk Mains 2022)

40. A person covers a certain distance walking at the speed of 10 kmph. If he had walked at the speed of 15 kmph, then he could have covered 15 km more. What is the distance covered by the person?
(a) 25 km (b) 30 km (c) 35 km (d) 40 km
(OSSC Jr clerk mains 2022)
41. Robert is travelling on his bicycle. He has calculated that to reach a point P at 2 PM, he needs to travel at 10 km/hr and to reach there at 12 PM, he needs to travel at 15 km/hr. At what speed must he travel to reach the point P at 1 PM?
(a) 11 km/hr (b) 12 km/hr
(c) 13 km/hr (d) 14 km/hr
(OSSC Statistical Asst. 2024)
42. Ayush rides his bicycle for 30 minutes at the speed of 25 km/hr. Further he travels 20 minutes at the speed of 40 km/hr. Find his average speed for the entire journey.
(a) 30 km/hr (b) 35 km/hr
(c) 31 km/hr (d) 28 km/hr
(OSSC ESI 2023)
43. Since Ashish overslept, so he missed his train by 10 minutes, which started from origin station exactly on time. If the average speed of the train is 50 km/hr, then at what average speed he must drive his car, to catch the train on the next station, which is one hour away from the origin station?
(a) 40 km/hr (b) 55 km/hr
(c) 70 km/hr (d) 60 km/hr
(OSSC ESI 2023)
44. Raj completed a trip of 162 km in 7 hours. Some parts of the trip were covered at 30 km/h and remaining at 18 km/h. What was the distance covered at 18 km/hr?
(a) 42 km (b) 90 km (c) 64 km (d) 72 km
(OSSC VSA 2023)
45. How many seconds does Seema take to cover a distance of 500 m, if she runs at a speed of 30 km/hr?
(a) 20 sec (b) 40 sec (c) 60 sec (d) 80 sec
(OSSC VSA 2023)
46. A train reaches from X to Y in 6 hours travelling at a speed of 70 km/hr. If its speed is increased by 14 km/hr, then the time of journey is reduced by:
(a) 1 hour (b) 6 hours
(c) 5 hours (d) 2 hours
(OSSC VSA 2023)
47. A person travels from K to S at a speed of 50 km/h and returns by increasing his speed by 50%. What is his average speed for both the trips?
(a) 60 km/h (b) 70 km/h
(c) 30 km/h (d) 50 km/h
48. With an average speed of 40 km/hr, a train reaches its destination on time. If it goes with an average speed of 35 km/hour, it is late by 15 minutes. The total journey is:
(a) 30 km (b) 40 km (c) 70 km (d) 80 km
(OSSC LTR 2024)
49. A boy goes to school at a speed of 3 km/hr and returns to the village at a speed of 2 km/hr. If he takes 5 hours in all, what is the distance between the village and the school?
(a) 8 (b) 5 (c) 6 (d) 7
(OSSC Steno 2022)
50. Two runners cover the same distance at the rate of 15 km and 16 km per hour respectively. Find the distance travelled when one takes 16 minutes longer than the other.
(a) 62 km (b) 60 km (c) 64 km (d) 66 km
(OSSC Steno 2022)
51. Two trains approach each other at 30 km/hr and 27 km/hr from two places 342 km apart. After how many hours will they meet?
(a) 5 hours (b) 6 hours
(c) 7 hours (d) 12 hours
(OSSC Steno 2024)
52. Mitali travelled from her home to her office at a speed of 20 km/hr and walked back at a speed of 5 km/hr. The whole journey took 4 hours. The distance between her office and her home is:
(a) 16 km (b) 10 km (c) 8 km (d) 6 km
(OSSC Steno 2024)
53. A car driver travels to a place 150km away at an average speed of 50 km/hr and returns at 30 km/hr. His average speed for the whole journey in km/hr is:
(a) 36.5 (b) 37

- (c) 37.5 (d) None of the above
(OSSC Steno 2024)
54. A motorbike leaves a point X at 1 P.M. and moves towards the point Y at a uniform speed. A car leaves the point Y at 2 P.M. and moves towards the point X at a uniform speed which is double that of the motorbike. They meet at 3:40 P.M. at a point which is 168 km away from X. What is the distance between the points X and Y?
(a) 480 km (b) 378 km (c) 680 km (d) 266 km
(OSSC SSC Mains 2022)
55. A runs twice as fast as B and B runs thrice as fast as C. Then the distance covered by C in 72 minutes will be covered by A in:
(a) 24 min (b) 18 min (c) 16 min (d) 12 min
(OSSC SSC Mains 2023)
56. A car moving at a speed of 75 km/hr covers a certain distance in 2 hours. If its speed is reduced by 15 km/hr, then in what time will it cover the same distance?
(a) 125 minutes (b) 135 minutes
(c) 140 minutes (d) 150 minutes
(OSSC ATO 2024)
57. Rishi travels 780 km at 78 km/hr, the next 285 km at 95 km/hr and the next 712 km at 89 km/hr. What is his average speed (in km/hr) for the whole journey? (Correct to two decimal places)
(a) 75.16 (b) 84.62 (c) 83.56 (d) 86.58
(OSSC JEO & JA 2024)
58. Walking at $\frac{4}{7}$ of his usual speed, a man takes 27 minutes more than usual to reach his work place. How much time (in minutes) does he usually take?
(a) 45 (b) 36 (c) 27 (d) 40
(OSSC JEO & JA 2024)
59. In covering a distance of 176 km, Amit takes 5 hours more than Vinay. If Amit doubles his speed, then he would take 3 hours less than Vinay. Amit's speed is:
(a) 6 km/hr (b) 11 km/h
(c) 1 km/h (d) 14 km/h
(OSSC JEO & JA 2024)
60. Aarav has to reach Delhi which is 719 km away in 15 hours. His starting speed for 8 hours was 26 km/hr. For the next 138 km his speed was 23 km/hr. By what speed he must travel now so as to reach Delhi in decided time of 15 hours?
(a) 373 km/hr (b) 372 km/hr
(c) 367 km/hr (d) 369 km/hr
(OSSC JEO & JA 2024)
61. Raghav travelled between two cities and covered one-third of the distance with the speed of 40 km/hr and rest of the distance in 33 minutes. If his average speed during the whole journey was 60 km/h, find the distance between the cities.
(a) 63 km (b) 60 km (c) 69 km (d) 66 km
(OSSC JEO & JA 2024)
62. A person takes 6 hours 30 minutes in going by foot and coming back by a cycle to cover a certain distance. He would have lost 3 hours 30 minutes by going on foot both the ways. How long would it take him to go by cycle both the ways (in hours)?
(a) 10 (b) 13 (c) 5 (d) 3
(OSSC JEO & JA 2024)
63. Train A leaves station M at 6:20 a.m. and reaches station N at 3:20 p.m. on the same day. Train B leaves station N at 8:20 a.m. and reaches station M at 1:20 p.m. on the same day. Find the time when trains A and B meet.
(a) 10:33 p.m. (b) 10:50 a.m.
(c) 11:13 a.m. (d) 12:57 p.m.
(OSSC JEO & JA 2024)

ANSWER KEY

- | | | | | | |
|---------|---------|---------|---------|---------|---------|
| 01. (d) | 02. (d) | 03. (d) | 04. (d) | 05. (c) | 06. (d) |
| 07. (c) | 08. (a) | 09. (b) | 10. (d) | 11. (c) | 12. (a) |
| 13. (d) | 14. (a) | 15. (b) | 16. (b) | 17. (b) | 18. (a) |
| 19. (c) | 20. (a) | 21. (b) | 22. (a) | 23. (d) | 24. (c) |
| 25. (c) | 26. (d) | 27. (c) | 28. (b) | 29. (a) | 30. (c) |
| 31. (b) | 32. (b) | 33. (c) | 34. (a) | 35. (c) | 36. (c) |
| 37. (c) | 38. (c) | 39. (c) | 40. (b) | 41. (b) | 42. (c) |
| 43. (d) | 44. (d) | 45. (c) | 46. (a) | 47. (a) | 48. (c) |

49. (c) 50. (c) 51. (b) 52. (a) 53. (c) 54. (b)
 55. (d) 56. (d) 57. (b) 58. (b) 59. (b) 60. (a)
 61. (d) 62. (d) 63. (b)

SOLUTION

1. $378 \text{ km/hr} = 378 \times 5 \text{ m/18 sec} = 105 \text{ m/sec}$
 Required time = $\frac{4095 \text{ m}}{105 \text{ m/sec}} = 39 \text{ m/sec}$
2. $288 \text{ km/hr} = 288 \times 5 \text{ m/18 sec} = 80 \text{ m/sec}$
 Required time = $\frac{5120 \text{ m}}{80 \text{ m/sec}} = 64 \text{ m/sec}$
3. Distance = $540 \times \frac{5}{18} \times 36 \times 60 = 324000$
4. $150 \text{ kmph} = 150 \times 5 \text{ m/18 sec} = (125/3) \text{ m/sec}$
5. Speed of traveler = $\frac{8225}{47} \times \frac{18}{5} = 630 \text{ km/hr}$
6. Average speed = $\frac{2 \times 78 \times 120}{78 + 120} = 94.54$
7. Let the distance be x.
 ATQ, $\frac{x}{78} + \frac{x}{80} = 158$
 $x \frac{158}{78 \times 80} = 158$
 $x = 78 \times 80 = 6240$
8. Let the half of the distance be x km.
 ATQ, $\frac{x}{78} + \frac{x}{84} = 63$
 $x \frac{162}{78 \times 84} = 63$
 $x = \frac{63 \times 78 \times 84}{162} = 2548$
 Total distance = $2 \times 2548 = 5096$
9. Increase in speed = 4 km/hr
 Speed $\propto$ Distance
 4 km/hr ----- 148 km
 1 km/hr ----- 37 km
 101 km/hr ----- $101 \times 37 = 3737 \text{ km}$
10. Let the distance be x km.
 $\frac{x}{132} - 180 \text{ mins} = \frac{x}{220} + 180 \text{ mins}$
 $\frac{x}{132} - \frac{x}{220} = 360 \text{ mins} = 6 \text{ hrs}$
 $x \frac{220 - 132}{220 \times 132} = 6$

$$x \frac{88}{132 \times 220} = 158$$

$$x \frac{1}{66 \times 5} = 6$$

$$x = 1980 \text{ km}$$

11. Let the speed of flight = x km/hr
 Distance = $(x - 240) \text{ km/hr} \times 28 \text{ h}$
 $= x \text{ km/hr} \times 23 \text{ hr}$
 $28x - 28 \times 240 = 23x$
 $5x = 28 \times 240$
 $x = \frac{28 \times 240}{5} = 1344 \text{ km/hr}$
 Distance = $1344 \times 23 \text{ h} = 30,912$
12. Let the speed of Uma be x km/hr.
 ATQ, $\frac{80}{x-4} + \frac{80}{x} = 1$
 $80 \frac{4}{x(x-4)} = 1$
 $x(x-4) = 320$
 Solving the equation, You get x = 20.
13. Let the speed of slower train = x km/hr
 Speed of faster train = $(x + 37) \text{ km/hr}$
 ATQ, Relative speed = $2x + 37 = \frac{4144}{37}$
 $2x + 37 = 112 \quad x = 37.5$
 Speed of faster train = $37.5 + 37 = 74.5$
14. Distance travelled by A in 45 mins = $204 \times \frac{3}{4} = 153 \text{ km}$
 Remaining distance = $855 - 153 = 702 \text{ km}$
 Relative speed of A and B = $204 + 30 = 234 \text{ km/hr}$
 Time = $702/234 = 3 \text{ hrs}$
 Distance from station A to meeting point = $153 + 204 \times 3 = 765 \text{ km}$
15. Let the distance be 15 km (LCM of 5 and 3)
 2 km ----- 10 mins
 10 km ----- 50 mins
 He reaches the duck at 6:15 + 50 mins = 6 : 55 P.M.
16. $\frac{S_1}{S_2} = \sqrt{\frac{t_1}{t_2}} = \sqrt{\frac{16}{9}} = \frac{4}{3}$
17. Distance = 80 km/hr = 60 km/hr $\times 2 \text{ hrs} = 120 \text{ km}$
 $T = 120/80 = 1.5 \text{ hrs}$
18. Speed of truck = $376/8 = 47 \text{ km/hr}$
 Increased speed = $47 + 18 = 65 \text{ km/hr}$

Now distance travelled by truck = $376 + 14 = 390$ km

Time = $390/65 = 6$ hrs

19. Speed of car A and B = 5 : 6

Speed of car B = 6 units = 90 km/hr

1 unit = 15 km/hr

Speed of car A = 5 units = $5 \times 15 = 75$ km/hr

Relative speed in opposite direction = $90 + 75 = 165$ km/hr

Required time = $\frac{88}{165} = \frac{8}{15}$ hr = $\frac{8}{15} \times 60$ mins = 32 mins

20. Average speed = $\frac{2xy}{x+y}$

Avg. speed of Anil = 20 km/hr

Avg. speed of Sunil = $\frac{2 \times 10 \times 30}{10+30} = 15$ km/hr

Speed of Anil > Speed of Sunil

Anil won the race.

21. Distance travelled by train started from before 8

a.m. = 20 km/hr $\times$ 1 hr = 20 km

Remaining distance = $110 - 20 = 90$ km

Relative speed in opposite direction = $25 + 20 = 45$ km/hr

Time taken to cover 90 km = $90/45 = 2$ hr

They will meet each other at 8 a.m. + 2 hr = 10 a.m.

22. If time is constant, Ratio of speed is same ratio of distance.

Speed : 10 km/hr : 14 km/hr

Distance : 5 : 7

ATQ, $7 - 5 = 2$ units = 20 km

Actual distance = 5 unit = 50 km

23. Speed : 10 km/h : 15 km/hr

Time : 15 : 10

3 : 2

Total change in time = 12 mins – 7 mins = 5 mins

ATQ, $3 - 2 = 1$ unit = 5 mins

3 units = $3 \times 5 = 15$ mins

Distance = $10 \times \frac{15}{60} = 2.5$ km

24. Distance covered by cyclist in 1.5 hrs = 8 km/hr $\times$ 1.5 = 12 km

Relative speed in same direction = $10 - 8 = 2$ km/hr

Time taken by cyclist B to overtake cyclist A = $12/2 = 6$ hrs

In 6 hrs, cyclist B cover = 6 hr $\times$ 10 km/hr = 60 km

Time taken to overtake by B = 60 km

25. Speed = $\frac{500}{4 \times 60} \times \frac{18}{5}$ km/hr = 7.5 km/hr

26. Usual : Decreased

Speed : 6 : 1

Time : 6 : 1

ATQ, $6 - 1 = 5$ units = 30 mins

Usual time = 1 unit = 6 mins

27. Average speed = $\frac{61}{9}$

Foot : Bicycle

4 : 9
20/9 : 25/9
4 : 5

ATQ, 4 hrs + 5 hrs = 9hrs

Distance travelled on foot = 4 km/hr $\times$ 4 hrs = 16 km

28. A 40 km 60 km B

Ratio of speed = Ratio of distance

Since time is equal for both cars.

Ratio of speed = 40 : 60 = 2 : 3

29. Distance = $\frac{\text{product of speed}}{\text{diff. of speed}} \times \text{time}$

$$D = \frac{S(S+3)}{3} \times 20 = \frac{S(S-2)}{2} \times 20$$

$$2(S+3) = 3(S-2)$$

$$S = 12 \text{ km/hr}$$

$$D = \frac{12(12+3)}{3} \times \frac{20}{60} = 20 \text{ km}$$

30. Ratio of speed = Ratio of distance

Since time is equal for both cars.

P 5 M 7 Q

Ratio of Distance = 5 : 7

12 units = 600 km

1 unit = 50 km

PM = 5 units = $5 \times 50 = 250$ km

31.

Train	Car	Time
120 km	480 km	8h
+80		+20 mins
200 km	400 km	8h 20 mins
+80×5		+20×5 mins
600 km	0 km	10 h

Speed of train = $600/10 = 60$ km/hr
 Again, $\frac{120}{60} + \frac{480}{C} = 8$
 $\frac{480}{C} = 8 - 2 = 6$
 Speed of car C = $480/6 = 80$ km/hr

32. 540 km/hr: 60 mins ----- 540 km
 1 min ----- 9 km
 45 mins ----- $45 \times 9 = 405$ km = 405000 m

33. Time → same
 Speed: 103 : 107
 Distance 103 : 107
 $107 - 103 = 4$ units = 156 km
 1 unit = 39 km
 Distance travelled by driver at 107 km/hr = 107 units = $107 \times 39 = 4173$ km

34.

540 km
9h 4h
60km/h 108 km/hr

Average speed = $\frac{2 \times 540}{9+5} = 77.14$ km/hr

35. Let the speed of flight = x km/hr
 Distance = $(x - 270)$ km/hr $\times$ 31 h
 $= x$ km/hr $\times$ 26 hr
 $31x - 31 \times 270 = 26x$
 $5x = 31 \times 270$
 $x = \frac{31 \times 270}{5} = 1674$ km
 Distance between A and B = $1674 \times 26 = 43524$

36.

	Usual		Now
Speed:	4	:	3
Time:	3	:	4

1 unit = 16 mins
 3 units = 3×16 mins = 48 mins

37. Speed of A = $100/10 = 10$ m/sec
 Speed of B is 20% more than A.
 Ratio of speed of A and B = 5 : 6
 5 units = 10m/sec
 6 units = 12 m/sec
 Time taken to cover 360 m = $360/12 = 30$ sec

38. Distance = 80 km
- | | | |
|-----------------------|---|----------|
| 1h | - | 2hr = 1h |
| 80 km/h | | 40km/h |
| 1 hr or 60 mins ----- | | 80 km |
| 3 mins ----- | | 4 km |
| 21 mins ----- | | 28 km |

39. Diff. of time = 20 mins + 40mins = 1 hr
 Distance = 72 km

- | | | |
|-----------------------|---|---------|
| 2h | - | 3h = 1h |
| 36km/h | | 24 km/h |
| 1 hr or 60 mins ----- | | 72 km |

40. Speed: 10 : 15
 Distance: 2 : 3
 1 unit = 15 km

Distance covered = 2 units = $2 \times 15 = 30$ km

41. Distance → Constant
 Speed: 10 : 15
 Time: 3 : 2

1 unit = time diff. = 2 p.m. - 12 p.m. = 2 h

3 units = $3 \times 2 = 6$ hr

Distance = 10 km/hr $\times$ 6 hr = 60 km

To reach destination at 2 p.m., he takes 6 hours

To reach destination at 1 p.m., he takes 5 hours

Required speed = $60/5 = 12$ km/hr

42. Average speed = $\frac{\frac{25 \text{ km}}{\text{hr}} \times \frac{1}{2} \text{ hr} + \frac{40 \text{ km}}{\text{hr}} \times \frac{1}{3} \text{ hr}}{\frac{1}{2} + \frac{1}{3}}$
 $= \left(\frac{25}{2} + \frac{40}{3} \right) \times \frac{6}{5} = 15 + 16 = 31$ km/hr

43. ATQ, Distance travelled train = 50 km/hr $\times$ 1 hr = 50 km

$$\text{Speed of car} = \frac{50 \text{ km}}{(60-10) \text{ min}} = 60 \text{ km/hr}$$

44. Average speed = $\frac{162}{7}$ km/hr

$$\begin{array}{ccc} \text{1st part} & & \text{2nd part} \\ 30 & & 18 \\ & \searrow \quad \swarrow & \\ & \frac{162}{7} & \\ & \swarrow \quad \searrow & \\ 36/7 & : & 48/7 \\ 3\text{h} & + & 4\text{h} = 7 \text{ hr} \end{array}$$

Distance covered at 18 km/hr
= 18 km/hr $\times$ 4 hrs = 72 km

45. Required time = $\frac{500}{30} \times \frac{18}{5} = 60$ sec

46. Distance from X to Y = 70 km/hr $\times$ 6 hr = 420 km

Increased speed = 70 + 14 = 84 km/hr

Time = $\frac{420}{84} = 5$ hrs

Time reduced by 6hrs - 5 hrs = 1 hr

47. K to S $\rightarrow$ 50 km/hr

S to K $\rightarrow$ 150% of 50 = 75 km/hr

Average speed = $\frac{2 \times 50 \times 75}{50 + 75} = 60$ km/hr

48. Distance = 280 km

$$\begin{array}{ccc} 7 \text{ h} & - & 8 \text{ h} = 1 \text{ hr} \\ 40 \text{ km/hr} & & 35 \text{ km/hr} \\ 60 \text{ mins} & \text{-----} & 280 \text{ km} \\ 15 \text{ mins} & \text{-----} & 70 \text{ km} \end{array}$$

49. Let the distance travelled be x km.

ATQ, $\frac{x}{3} + \frac{x}{2} = 5$ hrs

$x \left(\frac{3+2}{3 \times 2} \right) = 5$

x = 6 km

50. Speed: 15 : 16

Time: 16 : 15

1 unit = 16 mins = $\frac{4}{15}$ hrs

16 units = $16 \times \frac{4}{15}$ hrs

Distance covered = $15 \times 16 \times \frac{4}{15} = 64$ km

51. Relative speed in opposite direction = 30 + 27 = 57 km/hr

Time = $\frac{342}{57} = 6$ hours

52. Distance = 20 km

$$\begin{array}{ccc} 1 \text{ h} & + & 4 \text{ h} = 5 \text{ hr} \\ 20 \text{ km/hr} & & 5 \text{ km/hr} \\ 5 \text{ h} & \text{-----} & 20 \text{ km} \\ 4 \text{ h} & \text{-----} & 16 \text{ km} \end{array}$$

53. Distance = 150 km

$$\begin{array}{ccc} 3 \text{ h} & + & 5 \text{ h} = 8 \text{ hr} \\ 50 \text{ km/hr} & & 30 \text{ km/hr} \end{array}$$

Average speed = $\frac{2 \times 150}{8} = 37.5$ km/hr

54. 1 p.m. 3.40 p.m. 2 p.m.

X Y Z

Time taken to reach Z = 3:40 - 1 = 2:40 = $\frac{8}{3}$ hrs

Distance between X and Z = 168 KM

Speed of motorbike = $168 \times \frac{3}{8} = 63$ km/hr

Speed of car = $63 \times 2 = 126$ km/hr

Time taken by car to reach Z = 3:40 - 2:00

= 1:40 = $\frac{5}{3}$ hrs

Distance by car (Y to Z) = $126 \times \frac{5}{3} = 210$ km

Distance between X to Y = 168 + 210 = 378 km

55. Speed of A and B $\rightarrow (2 : 1)_{\times 3}$

Speed of B and C $\rightarrow 3 : 1$

Speed of A, B and C $\rightarrow 6 : 3 : 1$

Ratio of time $\rightarrow \frac{1}{6} : \frac{1}{3} : \frac{1}{1} = 1 : 2 : 6$

ATQ, 6 units = 72 minutes

1 unit = 12 minutes

56. Distance travelled by car = 75 km/h

Reduced speed = 75 - 15 = 60 km/hr

Time = $\frac{150}{60} \times 60 = 150$ km

57. Average Speed = $\frac{780 + 285 + 712}{\frac{780}{78} + \frac{285}{95} + \frac{712}{89}}$

$$= \frac{1777}{10+3+8} = 84.62(\text{approx})$$

58. Usual Reduced

Speed: 7 : 4

Time: 4 : 7



3 units = 27 mins

1 unit = 9 mins

Usual time = 4 units = 4×9 mins = 36 mins

59. Let the speed of Amit = A km/hr
-
- speed of Vinit = V km/hr

$$\text{ATQ, } \frac{176}{A} - \frac{176}{B} = 5 \dots\dots\dots (1)$$

$$\text{Again, } \frac{176}{B} - \frac{176}{2A} = 3 \dots\dots\dots (2)$$

Adding equation (1) & (2) we get

$$\frac{176}{A} - \frac{176}{2A} = 8$$

$$\frac{176}{A} \left(1 - \frac{1}{2}\right) = 8$$

$$\frac{176}{2A} = 8$$

$$A = 11 \text{ km/hr}$$

60. 1st phase: Time = 8h, Speed = 26 km/hr
Distance = $8 \times 26 = 208$ km
2nd phase: Distance = 138 km, Speed = 23 km/hr
Time = $138/23 = 6$ h
3rd phase: Distance = $719 - 208 - 138 = 373$ km
Time = $15 - 8 - 6 = 1$ hr
Required speed = $373/1 = 373$ km/hr

61. Let the distance between two cities = 3x km.

$$\text{ATQ, } \frac{3x}{\frac{x}{40}} + \frac{33}{60} = 60$$

$$\frac{120 \times 3x}{3x + 66} = 60$$

$$6x = 3x + 66$$

$$3x = 66 \text{ km}$$

62. Foot + Cycle = 6h 30 mins

$$\text{Foot} + \text{Foot} = 10 \text{ h}$$

$$\text{Foot} = 5 \text{ h}$$

$$\text{Cycle} = 6 \text{ h } 30 \text{ mins} - 5 = 1 \text{ h } 30 \text{ mins}$$

$$\text{Cycle} + \text{Cycle} = 2 \times 1 \text{ h } 30 \text{ mins} = 3 \text{ h}$$

63. 6.20 a.m. 3.20 p.m.

M ————— N

8.20 a.m. 1.20 p.m.

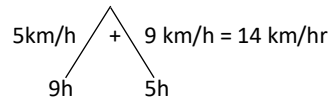
Time taken by Train A to reach station N = 3.

$$20 \text{ p.m.} - 6.20 \text{ p.m.} = 3 \text{ h}$$

Time taken by Train B to reach station M = 1.

$$20 \text{ p.m.} - 8.20 \text{ p.m.} = 7 \text{ h}$$

Distance = 45 km

Distance travelled by train A before train B
started = $5 \text{ km/hr} \times 2 \text{ h} = 10 \text{ km}$

$$\text{Remaining Distance } 45 - 10 = 35 \text{ km}$$

$$\text{Time taken by trains to meet} = \frac{35}{14} = 2 \text{ h } 30 \text{ mins}$$

$$\text{Required time} = 8 : 20 \text{ a.m.} + 2 \text{ h } 30 \text{ mins}$$

$$= 10 \text{ h } 50 \text{ mins a.m.}$$

- When a train crosses a standing person, pole, or signal post etc., the distance covered by the train is equal to length of the train.
- When a train passes a stationary object L_2 such as platform, tunnel, another train, bridge etc., the distance covered by the train = $L_1 + L_2$
- If two trains of length L_1 and L_2 meters travel in the same direction at S_1 and S_2 m / sec, then time taken to cross each other from the time they meet

$$\text{Time} = \frac{\text{Sum of their lengths}}{\text{Relative Speed}} = \frac{L_1 + L_2}{S_1 - S_2}$$
- If two trains of length L_1 and L_2 meters travel in the opposite direction at S_1 and S_2 m / sec, then time taken to cross each other from the time they meet

$$\text{Time} = \frac{\text{Sum of their lengths}}{\text{Relative Speed}} = \frac{L_1 + L_2}{S_1 + S_2}$$
- Two trains start at same time from A and B towards each other and after crossing each other they take t_1 and t_2 hours to reach B and A respectively, then

$$\frac{S_A}{S_B} = \sqrt{\frac{t_2}{t_1}}$$

EXERCISE

- A train takes 59 seconds to cross a bridge of length 55 m. If the same train takes 54 seconds to cross a man standing on the bridge, find the length of the train (in m).
 (a) 584 (b) 594 (c) 564 (d) 574
 (OSSC CGL 2021)
- A truck, 1825 meters long, is running at a speed of 139 km/hr. How many seconds will it take to cross a 1725 meters long train running in the same direction at a speed of 109 km/hr?
 (a) 436 (b) 456 (c) 426 (d) 446
 (OSSC CGL 2021)
- A train travelling at 140 km/h completely crossed another train having half its length and travelling in the opposite direction at 40 km/h in 6 seconds. If it also passed a railway platform in 45 seconds, then find the length of the platform (in m).
 (a) 1650 (b) 1750 (c) 1550 (d) 1850
 (OSSC CGL 2021)
- A train of length 1025 m travelling at a speed of 288 km/h crossed a tunnel in 70 seconds. Find the length of the tunnel.
 (a) 4575 (b) 4975 (c) 4775 (d) 7375
 (OSSC CGL 2021)
- Z1 Express and X1 Express are two trains of 745 m and 700 m long, that run at the rate of 158 km/h and 148 km/h respectively on parallel rails. How many seconds will it take for the second train to pass the first train if they run in the opposite direction?
 (a) 21 (b) 17 (c) 19 (d) 23
 (OSSC CGL 2021)
- A train is moving at 120 km/hr. The length of the train is 150 meters. How long it will take to cross a platform of length 100 meters.
 (a) 7.5 seconds (b) 10 seconds
 (c) 20 seconds (d) 25 seconds
 (OSSC CGL 2023)
- A 240 meter long train running at the speed of 60 km/h will take how much time to cross another 270 meter long train running in opposite direction at the speed of 48 km/h?
 (a) 17 seconds (b) 3 seconds
 (c) 12 seconds (d) 8 seconds
 (OSSC CGL 2024 & CGL SPL 2023)
- A train 125 m long passes a man running at 5 km/hr in the same direction in which the train is going, in 10 seconds. The speed of the train is:
 (a) 45 km/hr (b) 50 km/hr
 (c) 54 km/hr (d) 55 km/hr
 (OSSC CGL SPL 2023 & CGL MAIN 2022 & Statistical Asst 2024)
- A train 360 m long is running at a speed of 45 km/hr. In what time will it pass a bridge 140 m long?
 (a) 40 sec (b) 42 sec (c) 45 sec (d) 48 sec
 (OSSC CHSL 2022 & Steno 2022)
- A train running at 120 km/hr crosses a pole in 9 sec. What is the length of the train?
 (a) 240 meters (b) 270 meters
 (c) 300 meters (d) 320 meters
 (OSSC CHSL 2023)

11. A train 77 m long is running at 60 km/hr. If it takes 30 seconds to cross a bridge, then find the length of the bridge.
(a) 412 m (b) 420 m (c) 423 m (d) 426 m
(OSSC CHSL 2024)
12. Two trains of equal length take 10 seconds and 15 seconds respectively to cross a telegraph post. If the length of each train be 150 meters, in what time (in seconds) will they cross each other travelling in opposite direction?
(a) 10 (b) 12 (c) 15 (d) 20
(OSSC CTSRE 2022)
13. A train passes a telegraph post in 8 seconds and a 264 meters long bridge in 20 seconds. What is the length of the train?
(a) 180 meters (b) 176 meters
(c) 164 meters (d) 158 meters
(OSSC CTSRE 2023)
14. Two trains in opposite directions cross a man standing on the platform in 27 seconds and 17 seconds respectively and they cross each other in 23 seconds. What is the ratio of their speeds?
(a) 3:2 (b) 2:1 (c) 4:3 (d) 1:2
(OSSC CTS 2024 & CGL mains 2023)
15. Train A running at a speed of 72 km/hr crossed a platform of same length as that of the train in 34 sec. If train B, which is 160 meters long crosses the same platform in 20 sec, then find speed of train B (in km/h)?
(a) 54 km/hr (b) 90 km/hr
(c) 84 km/hr (d) 72 km/hr
(OSSC CPGL 2024)
16. If a train passes two bridges of length 800 meters, 400 meters in 100 seconds and 60 seconds respectively, then what is the length of the train?
(a) 200 meters (b) 150 meters
(c) 120 meters (d) 90 meters
(OSSC CPGL 2024)
17. A 230 meters long train running at the speed of 110 kmph crosses another train running in opposite direction at the speed of 70 kmph in 10 seconds. What is the length of the other train?
(a) 220 m (b) 240 m (c) 270 m (d) 320 m
(OSSC Accountant 2023)
18. Trains P, Q and R are moving in same direction at speeds of 36 km/hr, 72 km/hr and 144 km/hr respectively on the three parallel tracks. At this instance, rear of train P is 2.1 km ahead of front of train Q, and train R is just about to start to overtake train Q. All the trains have a length of 300 meters. In how much time will train R completely overtake train P?
(a) 1 minute (b) 1 minute and 10 seconds
(c) 1 minute and 20 seconds
(d) 1 minute and 40 seconds
(OSSC Jr clerk 2022 mains)
19. A train passes a pole in 15 seconds and passes a platform 100 m long in 25 seconds. Find its length.
(a) 120 m (b) 130 m (c) 140 m (d) 150 m
(OSSC Steno 2022 and CGL Mains 2024-2)
20. Two trains are moving in the same direction at 50 km/hr and 30 km/hr respectively. The faster train crosses a man in the slower train in 18 seconds. Find the length of the faster train.
(a) 120 m (b) 110 m (c) 100 m (d) 130 m
(OSSC Steno 2022)
21. A train 240 m long passed a pole in 24 seconds. How long will it take to pass a platform 650 m long?
(a) 65 sec (b) 89 sec (c) 100 sec (d) 150 sec
(OSSC Steno 2023)
22. A goods train 350 m long passed through a tunnel of length 1250 m in 80 sec. What is the speed of the train?
(a) 58 km/hr (b) 64 km/hr
(c) 72 km/hr (d) 87 km/hr
(OSSC Steno 2024)
23. A train of length 200 meters crossed a man running at 10 km/hr in the same direction in 10 seconds. What is the speed of the train?
(a) 72 km/hr (b) 82 km/hr
(c) 85 km/hr (d) 95 km/hr
(OSSC ATO 2024)
24. Two trains are moving in opposite directions at speeds of 100 km/h and 50 km/h. The length of one train is 190 m. The time taken by them to cross each other is 22 seconds. The length (in m) of the other train, correct to 2 decimal places, is:

- (a) 726.84 (b) 726.99 (c) 725.49 (d) 726.66

(OSSC JEO & JA 2024)

25. If a 6372 m long train crosses a pole in 118 seconds, then find the time (in seconds) taken by the train to cross a 810 m long platform.

- (a) 123 (b) 125 (c) 130 (d) 143

(OSSC JEO & JA 2024) 4.

ANSWER KEY

01. (b) 02. (c) 03. (c) 04. (a) 05. (b)
 06. (a) 07. (a) 08. (b) 09. (a) 10. (c)
 11. (c) 12. (b) 13. (b) 14. (a) 15. (b)
 16. (a) 17. (c) 18. (c) 19. (d) 20. (c)
 21. (b) 22. (c) 23. (a) 24. (d) 25. (a)

SOLUTION

1. Let the length of the train = L m.

Speed of the stream = x m/sec

$$\frac{L+55}{x} = 59 \quad L = 59x - 55$$

$$\text{Again, } \frac{L}{x} = 54$$

$$L = 59x - 55 = 54x$$

$$5x = 55$$

$$x = 11 \text{ m/sec}$$

$$\text{Length of the train} = 54x = 54 \times 11 = 594 \text{ m}$$

2. Relative speed in opposite direction = 139 – 109 = 30 km/hr

Time taken to cross the train = Sum of length of two train $(L_1 + L_2)/\text{Relative Speed}$

$$= \frac{1825+1725}{30 \times \frac{5}{18}} = \frac{3350}{30} \times \frac{18}{5} = 426$$

3. Let the length of the train = 2L.

$$\text{ATQ, } \frac{2L+L}{R.S.} = 6$$

$$\frac{3L}{(140+40)} \times \frac{18}{5} = 6$$

$$L = 6 \times \frac{5}{18} \times \frac{180}{3} = 100 \text{ m}$$

$$\text{Length of the train} = 2L = 2 \times 100 = 200 \text{ m}$$

$$\text{Again, } \frac{L+P}{140 \times \frac{5}{18}} = 45$$

$$L + P = 45 \times 140 \times \frac{5}{18} = 1750$$

$$\text{Length of platform} = 1750 - 200 = 1550$$

$$\text{Length of the tunnel} = T$$

$$\frac{1025+T}{288 \times \frac{5}{18}} = 70$$

$$1025 + T = 70 \times 288 \times \frac{5}{18} = 5600$$

$$T = 5600 - 1025 = 4575$$

$$5. \text{ Required time} = \frac{745+700}{158+148} \times \frac{18}{5}$$

$$= \frac{1445}{306} \times \frac{18}{5} = 17 \text{ seconds}$$

$$6. \text{ Required time} = (L_T + L_P)/S_T$$

$$= \frac{150+100}{120} \times \frac{18}{5}$$

$$= \frac{250}{120} \times \frac{18}{5} = 7.5 \text{ seconds}$$

$$7. \text{ Required time} = (L_1 + L_2)/R.S.$$

$$= \frac{240+270}{(60+48)} \times \frac{18}{5}$$

$$= \frac{510}{108} \times \frac{18}{5} = 17 \text{ seconds}$$

$$8. \text{ Let the speed of the train} = T \text{ km/hr}$$

$$\frac{L}{R.S.} = 10 \quad \frac{125}{(T-5)} \times \frac{18}{5} = 10$$

$$T - 5 = 45 \text{ km/hr}$$

$$T = 45 + 5 = 50 \text{ km/hr}$$

$$9. \text{ Required time} = \frac{360+140}{45} \times \frac{18}{5}$$

$$= 40 \text{ seconds}$$

$$10. \text{ Length of the train} = 120 \times \frac{5}{18} \times 9 = 300$$

$$11. \text{ Let length of bridge} = B.$$

$$\frac{77+B}{60} \times \frac{18}{5} = 30$$

$$B = 30 \times \frac{5}{18} \times 60 - 77 = 423 \text{ m}$$

$$12. \text{ Let the length of two trains be } x \text{ m/sec and } y \text{ m/sec.}$$

$$L = 10x = 15y = 150$$

$$x = 15 \text{ m/sec and } y = 10 \text{ m/sec}$$

$$\text{Required time} = \frac{2 \times 150}{15 + 10} = 12 \text{ sec}$$

13. 20 sec = 8 sec (to cross its length) + 12 sec (to cross the bridge)

$$12 \text{ sec} \text{ ----- } 264 \text{ m}$$

$$1 \text{ sec} \text{ ----- } 22 \text{ m}$$

$$8 \text{ sec} \text{ ----- } 22 \times 8 = 176 \text{ m}$$

$$23 \text{ units} = 23 \times 1.5 = 34.5 \text{ kg}$$

14.
$$\begin{array}{ccccc} 27 & & & & 17 \\ & \searrow & & \nearrow & \\ & 23 & & & \\ & \nearrow & & \searrow & \\ 6 & & & & 4 \\ 3 & & : & & 2 \end{array}$$

15. $L_T + L_P = 72 \times \frac{5}{18} \times 34 = 680 \text{ M}$

$$2L = 680 \quad L = 340$$

Let the speed of B be B km/hr

$$\text{Again, } \frac{340 + 160}{B} \times \frac{18}{5} = 20$$

$$B = \frac{500}{20} \times \frac{18}{5} = 90 \text{ km/hr}$$

16. Let length of train be L m.

Speed of train be x m/sec

$$L + 800 = 100x$$

$$\text{Again, } L + 400 = 60x$$

$$L = 100x - 800 = 60x - 400$$

$$40x = 400$$

$$x = 10 \text{ m/sec}$$

$$\text{Length of train} = 100x - 800$$

$$= 100 \times 10 - 800 = 200 \text{ m}$$

17. $\frac{230 + L}{110 + 70} \times \frac{18}{5} = 10$

$$230 + L = 500$$

$$L = 500 - 230 = 270 \text{ m}$$

18. Time taken by Train R overtake train P = $\frac{2400}{144 - 36} \times$

$$\frac{18}{5} = 80 \text{ seconds}$$

$$= 1 \text{ min } 20 \text{ seconds}$$

19. sec = 15 sec (to cross the length of train) + 10 sec (to cross the platform)

$$10 \text{ sec} \text{ ----- } 100 \text{ m}$$

$$1 \text{ sec} \text{ ----- } 10 \text{ m}$$

$$15 \text{ sec} \text{ ----- } 15 \times 10 = 150 \text{ m}$$

20. Let the length of faster train be L m

$$\frac{L}{50 - 30} \times \frac{18}{5} = 18 \quad L = 100 \text{ m}$$

21. Train: 240 m ----- 24 sec

$$10 \text{ m} \text{ ----- } 1 \text{ sec}$$

$$\text{Platform: } 650 \text{ m} \text{ ----- } 65 \text{ sec}$$

$$T = 24 + 65 = 89 \text{ sec}$$

22. Speed of train = $\frac{350 + 1250}{80} \times \frac{18}{5}$
= 72 km/hr

23. Let the speed of the train be x km/hr.

$$\text{Relative speed} = \frac{200}{10} \times \frac{18}{5} = 72$$

$$\text{ATQ, } x - 10 = 72$$

$$x = 72 \text{ km/hr}$$

24. Let the length of other train be x m.

$$\text{ATQ, } 190 + x = 150 \times \frac{5}{18} \times 22$$

$$190 + x = 916.66$$

$$x = 726.66 \text{ m}$$

25. ATQ, 6372 m ----- 118 sec

$$1 \text{ m} \text{ ----- } \frac{118}{6372} = \frac{1}{54} \text{ sec}$$

$$810 \text{ m} \text{ ----- } \frac{1}{54} \times 810 = 15 \text{ sec}$$

$$\text{Time taken by the train to cross a 810 m long platform} = 118 + 15 = 123$$

Stream: The flow of water in the river.

Speed of Stream: The speed at which water is flowing.

Speed of Boat: Speed of boat in still water.

Still water: Speed of stream is zero.

Upstream: Motion of boat against the direction of Stream.

Downstream: Motion of boat along the direction of Stream.

Basic Formulae

Let the speed of Boat be B m/sec and the speed of stream be S m/sec.

1. Downstream Speed $= (B + S)$ m / sec

2. Upstream Speed $= (B - S)$ m / sec

3. Speed of Boat in still water

$$= \frac{\text{Downstream speed} + \text{Upstream speed}}{2}$$

4. Speed of Stream

$$= \frac{\text{Downstream speed} - \text{Upstream speed}}{2}$$

EXERCISE

1. A boat goes 150 km upstream in 30 hours and a distance of 217 km downstream in 31 hours. Find the speed of boat in still water (in km/h).

(a) 4 (b) 6 (c) 2 (d) 8

(OSSC CGL 2021)

2. A boat goes 261 km downstream in 29 hours and a distance of 196 km upstream in 28 hours. Find the speed of the water (in km/h).

(a) 1.5 (b) 1 (c) 0.5 (d) 0

(OSSC CGL 2021)

3. Arjun rows 40.5 kmph in still water. If the river is running at 13.5 kmph, it takes him 90 minutes to row to a place and back. How far is the place? (in km)

(a) 21 (b) 27 (c) 25 (d) 23

(OSSC CGL 2021)

4. A man takes twice as long to row a distance against the stream as to row the same distance in the direction of the stream. The ratio of the speed of the boat (in still water) and the stream is:

(a) 2 : 1 (b) 3 : 1 (c) 3 : 2 (d) 4 : 3

(OSSC CGL 2022)

5. A man swims 12 km downstream and 10 km upstream. If he takes 2 hours each time, then what is the speed of the stream?

(a) 1.5 km/h (b) 1.7 km/h
(c) 0.5 km/h (d) 0.7 km/h

(OSSC CGL 2023)

6. A boatman goes 2 km against the current of the stream in 1 hour and goes 1 km along the current in 10 minutes. How long will it take to go 5 km on stationary water?

(a) 40 mins (b) 1 hour
(c) 1 hour 15 mins (d) 1 hour 30 minutes

(OSSC CGL 2024)

7. A motorboat, whose speed is 15 km/hr in still water goes 30 km downstream and comes back in 4 hours 30 minutes. The speed of the stream is:

(a) 3 km/hr (b) 5 km/hr
(c) 7 km/hr (d) 10 km/hr

(OSSC CGL 2024 & Amin 2023)

8. Speed of a boat in standing water is 9 kmph and the speed of the stream is 1.5 kmph. A man rows to a place at a distance of 105 km and comes back to the starting point. The time taken by him is:

(a) 16 hours (b) 18 hours
(c) 20 hours (d) 24 hours

(OSSC CGL Spl 2022)

9. A boat can travel at a speed of 13 km/h in still water. If the speed of the stream is 4 km/hr, find the time taken by the boat to go 68 km downstream.

(a) 2 hours (b) 3 hours (c) 4 hours (d) 5 hours

(OSSC CGL Spl 2023)

10. The speed of a boat upstream is 20 km/hr. If the speed of the stream is 3 km/hr, then what is the speed of the boat downstream?

(a) 26 km/hr (b) 25 km/hr
(c) 23 km/hr (d) 22 km/hr

(OSSC CHSL 2023)

11. If a boat goes 7 km upstream in 42 minutes and the speed of the stream is 3 kmph, find the speed of the boat in still water.

(a) 4.2 km/hr (b) 9 km/hr
(c) 13 km/hr (d) 21 km/hr

(OSSC CHSL 2024)

12. A boat takes 90 minutes less to travel 36 miles downstream than to travel the same distance upstream. If the speed of the boat in still water is 10 mph, the speed of the stream is:
(a) 2 mph (b) 2.5 mph (c) 3 mph (d) 4 mph
(OSSC CTSRE 2022)
13. A man can row 7.5 km an hour in still water and he finds that it takes him twice as long to row down the river. The rate of the stream is:
(a) 2.4 km/hr (b) 3.4 km/hr
(c) 2.5 km/hr (d) 3.5 km/hr
(OSSC CTSRE 2024)
14. Alankar goes 4 km against the current of a stream in 1 hour and 2 km along the current in 15 min. How long will it take him to go 7 km in stationary water?
(a) 1 hour 15 min (b) 1 hour 20 min
(c) 1 hour 10 min (d) 1 hour 5 min
(OSSC CTSRE 2024)
15. A man goes downstream with a boat to some destination and returns upstream to the starting place in 5 hours. If the speed of the boat in still water and the stream are 10 km/hr and 4 km/hr respectively, then what is the distance of the destination from the starting place?
(a) 16 km (b) 18 km (c) 21 km (d) 25 km
(OSSC CPGL 2024)
16. A boat can travel with a speed of 15 km/hr in still water. If the speed of the stream is 2 km/hr, find the time taken by the boat to go 85 km downstream.
(a) 2 hrs (b) 3 hrs (c) 4 hrs (d) 5 hrs
(OSSC ESI 2023)
17. A boat covers a distance of 30 km in 2.5 hours running downstream while returning it covers the same distance in 3.75 hours. What is the speed of the boat in still water?
(a) 14 km/hr (b) 16 km/hr
(c) 18 km/hr (d) None of these
(OSSC Steno 2024)
18. A boat running upstream takes 8 hours 48 minutes to cover a certain distance, while it takes 4 hours to cover the same distance running downstream.

What is the ratio between the speed of the boat and speed of the water current?

- (a) 9 : 5 (b) 3 : 7 (c) 7 : 3 (d) 8 : 3

(OSSC CGL 2022 Mains)

19. A man's speed with the water current is 15 km/hour and the speed of the water current is 2.5 km/hour. Then, the man's speed against the water current (in km / hr) is:
(a) 12 (b) 24 (c) 18 (d) 10
(OSSC CGL 2022 Mains)
20. A boat covers a certain distance downstream in 1 hour, while it comes back in 1.5 hours. If the speed of the stream is 3 km/hour, then the speed of the boat in still water is:
(a) 15 km/hr (b) 14 km/hr
(c) 13 km/hr (d) 12 km/hr
(OSSC CGL Mains 2023)

ANSWER KEY

01. (b) 02. (b) 03. (b) 04. (b) 05. (c)
06. (c) 07. (b) 08. (d) 09. (c) 10. (a)
11. (c) 12. (a) 13. (c) 14. (c) 15. (c)
16. (d) 17. (d) 18. (d) 19. (d) 20. (a)

SOLUTION

1. Speed of Upstream = $150/30 = 5$ km/hr
Speed of Downstream = $217/31 = 7$ km/hr
Speed of Boat in Still Water = $\frac{up+down}{2} = \frac{5+7}{2} = 6$ km/hr
2. Speed of Downstream = $261/29 = 9$ km/hr
Speed of Upstream = $196/28 = 7$ km/hr
Speed of Water = $\frac{down-up}{2} = \frac{9-7}{2} = 1$ km/hr
3. Let the distance be x.
 $\frac{x}{40.5+13.5} + \frac{x}{40.5-13.5} = 90$ mins
 $\frac{x}{54} + \frac{x}{27} = \frac{3}{2}h$
 $\frac{x}{27} \left(\frac{1}{2} + 1 \right) = \frac{3}{2}$
x = 27 km

4. up down

Time: 2 : 1

Speed 1 : 2

Speed of boat : Speed of stream

$$= \frac{2+1}{2} : \frac{2-1}{2} = 3 : 1$$

5. Speed of Downstream = $12/2 = 6$ km/hr
 Speed of Upstream = $10/2 = 5$ km/hr
 Speed of stream = $\frac{\text{down}-\text{up}}{2} = \frac{6-5}{2} = 0.5$ km/hr
6. Speed of Upstream = 2 km/hr
 Speed of Downstream = 1 km/10 mins
 = 6 km/hr
 Speed of Boat in Still Water = $\frac{\text{up}+\text{down}}{2} = \frac{6+2}{2} = 4$ km/hr
 Time taken by boat to go 5 km in stationary water
 = $5/4$ hours = 1 hour 15 mins
7. Let the distance speed of the stream be x.
 ATQ, $\frac{30}{15+S} + \frac{30}{15-S} = 4.5$ hrs
 Go through option , put $S = 5$ km/hr
 $\frac{30}{15+5} + \frac{30}{15-5} = 1.5 + 3 = 4.5$ hrs
8. $T = \frac{105}{9+1.5} + \frac{105}{9-1.5} = 10 + 14 = 24$ hrs
9. Required time = $\frac{68}{13+4} = 4$ hrs
10. Speed of downstream = Speed of upstream + 2 × speed of stream
 = $20 + 2 \times 3 = 26$ km/hr
11. Speed of upstream = $\frac{7}{42} \times 60 = 10$ km/hr
 Speed of boat in still water = speed of upstream + speed of stream = $10 + 3 = 13$ km/hr
12. $\frac{36}{10-x} - \frac{36}{10+x} = 3.5$ hrs
 Go through option (a), put $x = 2$ mph
 $\frac{36}{10-2} + \frac{36}{10+2} = \frac{36}{8} + \frac{36}{12} = 4.5 - 3 = 1.5$ hrs
13. up down

Time: 2 : 1

Speed 1 : 2

Speed of boat : Speed of stream

$$= \frac{2+1}{2} : \frac{2-1}{2} = 3 : 1$$

3 units = 7.5 km/hr 1 unit = 2.5 km/hr

14. Speed of downstream = $\frac{2}{15} \times 60 = 8$ km/hr

Speed of upstream = $\frac{4}{1} = 4$ km/hr

Speed of Boat in Still Water = $\frac{\text{up}+\text{down}}{2} = \frac{4+8}{2} = 6$ km/hr

Time taken by boat to go 7 km in stationary water = $7/6$ hours

= 1 hour 10 mins

15. Let the distance be x.

$$\frac{x}{10+4} + \frac{x}{10-4} = 5 \text{ hrs} \quad \frac{x}{14} + \frac{x}{6} = 5$$

$$x \left(\frac{14+6}{14 \times 6} \right) = 5 \quad X = 21 \text{ km}$$

16. Time = $\frac{85}{15+2} = 5$ hrs

17. Speed of downstream = $\frac{30}{5} \times 2 = 12$ km/hr

Speed of upstream = $\frac{30}{15} \times 4 = 8$ km/hr

Speed of Boat in Still Water = $\frac{\text{up}+\text{down}}{2} = \frac{8+12}{2} = 10$ km/hr

18. up down

Time: 8h 48 mins : 1

$\frac{44}{5}$: 4

11 : 5

Speed: 5 : 11

Speed of boat : Speed of stream

$$= \frac{11+5}{2} : \frac{11-5}{2} = 8 : 3$$

19. Speed of upstream = Speed of downstream - 2 × speed of current

$$= 15 - 2 \times 2.5 = 10 \text{ km/hr}$$

20. up down

Time: 3/2 : 1

3 : 2

Speed 2 : 3

Speed of boat : Speed of stream

$$= \frac{3+2}{2} : \frac{3-2}{2} = 5 : 1$$

1 units = 3 km/hr

5 unit = $5 \times 3 = 15$ km/hr

Term used in race:

Dead Heat: A dead heat is a situation when all participants reach the finishing point at the same time.

Head Start: When a racer gets a start ahead of the starting point.

Statement used in race:

- In a race of 1 km, A beats B by 100 meter.



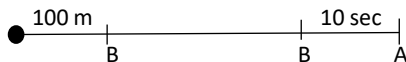
At same time, A covers 1000 m & B covers 900 m

- In a race of 1 km, A beats B by 10 sec.



A covers 1000 m in t sec & B covers 1000 m in $(t + 10)$ sec

- In a race of 1 km, A gives B a start of 100 m and still win by 10 sec.



A covers 1000 m in t sec & B covers 900 m in $(t + 10)$ sec

Circular Track

Let L m be the length of the circular track and a m/sec and b m/sec be speeds of A and B respectively.

- Meet first time each other after $\frac{L}{(a+b)}$ sec $\rightarrow$ Opposite direction
 $\frac{L}{(a-b)}$ sec $\rightarrow$ Same direction
- Meet each other at the starting point after $\text{LCM}\left(\frac{L}{a}, \frac{L}{b}\right)$ sec

When three persons A, B and C are running around a circular track of length L meters with speed a m/sec, b m/sec and c m/sec respectively in the same direction, then they meet each other at any point on the track after

$$\text{LCM}\left(\frac{L}{(a-b)}, \frac{L}{(b-c)}\right)$$

EXERCISE

- In 100 m race, A covers the distance in 36 seconds, B in 45 seconds and C in 48 seconds. If same speed is maintained in a race of 1600 m, B will beat C in the said race of 1600 m by:
(a) 80 m (b) 75 m (c) 100 m (d) 85 m
(OSSC CGL 2022)
- In a 100 meter race, P covers the distance in 36 seconds and Q covers in 45 seconds. In this race P beats Q by:
(a) 9 meters (b) 20 meters
(c) 22.5 meters (d) 25 meters
(OSSC CGL 2023 & CHSL 2022)
- In a 200 m race A beats B by 35 m or 7 seconds. A's time over the course is:
(a) 40 sec (b) 47 sec (c) 33 sec (d) 35 sec
(OSSC CGL Spl. 2023)
- Alok and Bipul take part in 200 m race. Alok runs at 8 kmph. Alok gives Bipul a start of 8 m and still beats him by 18 seconds. The speed of Bipul is:
(a) 8.15 kmph (b) 5.14 kmph
(c) 4.25 kmph (d) 6.4 kmph
(OSSC CTSRE 2022)
- In a 500 meters race, the ratio of the speed of the two participants P and Q is 3:4. If P has a start of 140 meters, then P wins by:
(a) 180 meters (b) 176 meters
(c) 164 meters (d) 158 meters
(OSSC CTSRE 2023)
- In a 400 m race, the ratio of the speed of two contestants A and B is 3:4. A has a start of 160 m. Then, A wins by:
(a) 60 m (b) 40 m (c) 20 m (d) 80 m
(OSSC Accountant 2023)
- Anand, Binod and Chandan start at the same time in the same direction to run around a circular stadium. Anand completes a round in 252 seconds, Binod in 308 seconds and Chandan in 198 seconds, all starting at the same point. After what time, will they all be again at the starting point together for the first time?
(a) 26 minutes and 18 seconds
(b) 42 minutes and 36 seconds
(c) 45 minutes
(d) 46 minutes and 12 seconds
(OSSC Accountant 2023)
- In a race of 200 m, A can beat B by 30 m and C by 15 m. In a race of 3700 m, C will beat B by:
(a) 100 m (b) 200 m (c) 300 m (d) 400 m
(OSS ESI 2023)

9. In a 100 m race, Ajay beats Bijay by 10 m and Suraj by 13 m. In a race of 180 m, Bijay will beat Suraj by:

(a) 5.4 m (b) 4.5 m (c) 5 m (d) 6 m

(OSSC Steno 2023 & ATO 2017)

SOLUTION

1. Ratio of Time A, B, and C

$$= 36 : 45 : 48 = 12 : 15 : 16$$

$$\text{Ratio of Speed} = \left(\frac{1}{12} : \frac{1}{15} : \frac{1}{16} \right) \times 240$$

$$= 20 : 16 : 15$$

$$\text{Ratio of Distance} = 20 : 16 : 15$$

$$\text{Distance travelled by A} = 20 \text{ units} = 1600 \text{ m}$$

$$1 \text{ unit} = 80 \text{ m}$$

$$\text{B will beat in } 16 - 15 = 1 \text{ unit} = 80 \text{ m}$$

- 2.
- | | P | Q |
|-------------------|----|----|
| Ratio of Time | 36 | 45 |
| Ratio of Speed | 45 | 36 |
| Ratio of Distance | 5 | 4 |

$$\text{ATQ, } 5 \text{ units} = 100 \text{ m}$$

$$\text{Difference} = 1 \text{ unit} = 20 \text{ m}$$

3. Speed of B = $35/7 = 5 \text{ m/sec}$
 Time taken by B to complete the race
 $= 200 \text{ m} / 5 \text{ m/sec} = 40 \text{ sec}$
 A's time = $40 - 7 = 33 \text{ sec}$

4. Time taken by Alok to complete the race = $\frac{200}{8} \times \frac{18}{5}$
 $= 90 \text{ seconds}$

$$\text{Time taken by Bipul to cover } (200 - 8) \text{ meters} = 90 + 18 = 108 \text{ seconds}$$

$$\text{Speed of B} = \frac{192}{108} \times \frac{18}{5} = 6.4 \text{ km/hr}$$

5. Distance Covered by P = $500 - 140 = 360 \text{ m}$

$$\text{Speed/Distance Ratio} = 3 : 4$$

$$3 \text{ units} = 360 \text{ m}$$

$$1 \text{ unit} = 120 \text{ m}$$

$$4 \text{ units} = 4 \times 120 = 320 \text{ m}$$

$$\text{P wins by } 500 - 480 = 20 \text{ m.}$$

6. Distance Covered by A = $400 - 160 = 240 \text{ m}$

$$\text{Speed/Distance Ratio} = 3 : 4$$

$$3 \text{ units} = 240 \text{ m} \quad 1 \text{ unit} = 80 \text{ m}$$

$$4 \text{ units} = 4 \times 80 = 320 \text{ m}$$

$$\text{A wins by } 400 - 320 = 80 \text{ m.}$$

7. LCM of 252, 308, 198

$$= 4 \times 9 \times 7 \times 11 \text{ seconds}$$

$$= \frac{4 \times 9 \times 7 \times 11}{60} = \frac{3 \times 7 \times 11}{5} = \frac{231}{5} \text{ mins}$$

$$= 46 \frac{1}{5} = 46 \text{ mins } 12 \text{ seconds}$$

- 8.
- | | A | B | C |
|-----------|-------------------|-----|-----|
| Distance: | 200 | 170 | 185 |
| | 40 | 34 | 37 |
| | 37 units = 3700 m | | |
| | 3 units = 300 m | | |

- 9.
- | | A | B | C |
|------------------|-----|---------------|----|
| Distance: | 100 | 90 | 87 |
| 90 units = 180 m | | 3 units = 6 m | |

1. A gardener plants 17956 trees in such a way that there are as rows as there are trees in a row. The number of trees in a row. The number of trees in a row are:
(a) 134 (b) 136 (c) 144 (d) 154
(OSSC CGL Mains 2024-25)
2. We have a 50 ft piece of rope. If it takes one second to cut into a 1-foot piece, how long it take to cut the entire rope into one-foot pieces?
(a) 48 seconds (B) 49 seconds
(C) 50 seconds (D) 51 seconds
(OSSC CHSL 2023)
3. A farmer built a fence around his square plot. He used 27 fence pole on each side of the square. How many poles did he need altogether?
(A) 106 (B) 104 (C) 108 (D) 105
(OSSC CGL SPL 2023)
4. In a garden, there are 10 rows and 12 columns of mango trees. The distance between the two trees is 2 metres and a distance of 1 metre is left from all sides of the boundary of the garden. What is the length of the garden?
(A) 24 meters (B) 32 meters
(C) 16 meters (D) 42 meters
(OSSC CGL Mains 2022)
5. In a family, each daughter has the same number of brothers as she has sister and each son has twice as many sister as he has brothers. How many sons are there in the family?
(A) 2 (B) 3 (C) 4 (D) 5
(OSSC CGL PRE 2022)
6. A bird shooter was asked how many birds he had in the bag. He replied that there were all sparrows but six, all pigeons but six, and all ducks but six. How many birds he had in the bag in all?
(A) 9 (B) 18 (C) 27 (D) 36
(OSSC CGL PRE 2022)
7. A certain number of horses and an equal number of men are going somewhere. Half of the owners are on their horses' back while remaining are walking along their horses. If the number of legs walking along on the ground is 70, how many horses are there?
(A) 10 (B) 12 (C) 14 (D) 16
(OSSC CGL SPL 2023)
8. A scooter has 2 tyres and one stepney (i.e. a total of 3 tyres). Each tyre can run upto a maximum of 5 km. What is the longest distance, which can be covered by the Scooter?
(A) 5 km (B) 7.5 km (C) 10 km (D) None of these
(OSSC CGL PRE 2022)
9. The price of 10 chairs is equal to that of 4 tables. The price of 15 chairs and 2 tables together is Rs. 4000. The total price of 12 chairs and 3 tables is:
(a) Rs. 3500 (b) Rs. 3750
(c) Rs. 3840 (d) Rs. 3900
(OSSC CGL 2022 and CGL SPL 2023)
10. A certain number of tennis balls were purchased for Rs. 450. Five more balls could have been purchased for the same amount if each ball was cheaper by Rs. 15. The amount of balls purchased was:
(a) 6 (b) 8 (c) 10 (d) 12
(OSSC CGL Mains 2024-25)
11. Cost price of an apple is Rs. 7 each whereas a mango cost Rs.5 each. A man spends a total of Rs. 38 on these fruits. The number of apples that he purchased were:
(A) 2 (B) 3 (C) 4 (D) Data inadequate
(OSSC CHSL 2023)
12. Sami decided to give Kachori to her friends on her birthday. If she gives 3 Kachoris to each friend, one friend will get only 1 Kachori. Also, if she gives 2 kachoris to each friends, she will left with 13 Kachoris. How many friends are there?
(A) 12 (B) 15 (C) 17 (D) 16
(OSSC CGL PRE 2022)
13. In a class, $\frac{3}{5}$ of the students are girls and rest are boys. If $\frac{2}{9}$ of the girls and $\frac{1}{4}$ of the boys are absent, what part of the total number of students is present?
(a) $\frac{17}{25}$ (b) $\frac{18}{49}$ (c) $\frac{23}{30}$ (d) $\frac{23}{36}$
(OSSC CGL Mains 2024-25)
14. Arun has 13 boxes of chocolates with him, with an average of 17 chocolates per box. If each box has at least 11 chocolates and no two boxes have equal number of chocolates, then what would be

the maximum possible number of chocolates in any box?

- (A) 23 (B) 25 (C) 28 (D) 30

(OSSC CGL Mains 2022)

15. The average of 7 consecutive integers is 7. The average of the squares of these integers will be:

- (a) 43 (b) 46 (c) 53 (d) 56

(OSSC CGL Mains 2024-25)

16. The mean of 200 items was 50. Later on it was discovered that two items were wrongly read as 92 and 8 instead of 192 and 88. Find out correct mean.

- (a) 40.9 (b) 39.6 (c) 50.9 (d) 52.3

(OSSC CGL Mains 2024-25)

17. The speed of three cars are in the 2 : 3 : 4. What is the ratio among the times taken by these cars to travel the same distance?

- (a) 5 : 3 : 2 (b) 6 : 5 : 2
(c) 6 : 4 : 3 (d) 5 : 4 : 3

(OSSC CGL Mains 2024-25)

18. In an entrance exam, a student has to attempt 250 questions in 4 hours. Out of these 250 questions, 50 questions are on Quantitative Ability (QA). How many minutes should be spent on QA section if his mentor has suggested him that he must spend twice as much time on each QA problem as spent for every other Question?

- (A) 100 (B) 80 (C) 75 (D) 90

(OSSC CGL SPL 2023)

19. There are 500 rooms in a multi-floored hotel. Due to a change in rule, the hotel has to decrease the number of floors by 5. However, the management is able to put 5 more rooms in each floor. Over all, the number of rooms in the hotel decreases by 10%. Originally, the number of floors and the number of rooms in each floor of the hotel was:

- (A) 25 Floors, 20 Rooms (B) 15 Floors, 20 rooms
(C) 20 Floors, 20 Rooms (D) 20 Floor, 25 Rooms

(OSSC CGL Mains 2022)

20. If arithmetic mean and geometric mean of two values are 10 and 8 respectively, then the values are:

- (a) 16, 4 (b) 12, 2 (c) 12, 3 (d) 16, 6

(OSSC CGL Mains 2024-25)

21. If for two numbers, the arithmetic mean is 25 and the Harmonic mean is 9, the Geometric mean of the observations will be:

- (a) 12 (b) 15 (c) 9 (d) 16

(OSSC CGL Mains 2024-25)

22. Two candles of the same height are lighted at the same time. The first is consumed in 7 hours and the second is consumed in 4 hours. Assuming that each candles burn at a constant rate, in how many hours, after being lighted, was the first candle four times the height of the second?

- (a) 2.6 hours (b) 4.5 hours
(c) 3.7 hours (d) 3.5 hours

(OSSC CGL Mains 2024-25)

23. The geometric mean of the series:

1, 3, 9, 27, 3^n is:

- (a) $3^{\frac{n}{3}}$ (b) $3^{\frac{n}{4}}$ (c) $3^{\frac{n}{2}}$ (d) $3^{\frac{n}{5}}$

(OSSC CGL Mains 2024-25)

24. If $a : b = 3 : 4$, then $(7a + 3b) : (7a - 3b)$ is equal to:

- (A) 11 : 3 (B) 9 : 11 (C) 5 : 2 (D) 4 : 3

(OSSC CGL PRE 2023)

25. If 50% of $(x - y)$ is same as the 30% $(x + y)$, then $x : y$ is equal to:

- (a) 1 : 4 (b) 3 : 5 (c) 4 : 1 (d) 5 : 3

(OSSC CGL PRE 2023)

26. If the number $2345x60y$ is exactly divisible by 3 and 5, then, find the maximum value of $x + y$:

- (A) 16 (B) 13 (C) 12 (D) 11

(OSSC CGL PRE 2022)

ANSWER KEY

01. (a) 02. (b) 03. (b) 04. (a) 05. (b) 06. (a)
07. (c) 08. (b) 09. (d) 10. (c) 11. (c) 12. (b)
13. (c) 14. (a) 15. (c) 16. (c) 17. (c) 18. (b)
19. (d) 20. (a) 21. (b) 22. (d) 23. (c) 24. (a)
25. (c) 26. (b)

1. Let the number of rows = x .
Therefore, the number of trees = x
ATQ, $x \cdot x = 17956$
 $x = \sqrt{17956} = 134$
2. When we make 49th cut, we are left with two pieces i.e. 49th and 50th foot. Therefore 49 cut is required.
Each cut takes one seconds. 49 cuts take 49 seconds.
3. Total number of pole required = $4 \times (\text{poles per side} - 1) = 4 \times (27 - 1) = 104$
4. There are 12 trees in a column. So there are 11 spaces.
Length of the boundary = $11 \times 2(\text{tree to tree}) + 2 \times 1$ (left from boundary) = 24
5. D = No. of Daughter and S = No. of Son
Each daughter has the same number of brothers as she has sister.
 $D - 1 = S$
Each son has twice as many sister as he has brothers.
 $D = 2(S - 1)$
 $D = S + 1 = 2S - 2$
 $S = 3$
6. All sparrows but six: Pigeons + Ducks = 6
All pigeons but six: Sparrows + Ducks = 6
All ducks but six: Pigeons + Sparrows = 6
 $2(\text{Sparrows} + \text{Pigeons} + \text{Ducks}) = 6 \times 3 = 18$
Number of birds in the bag = 9
7. Let the number of horses be x .
Therefore, the number of men = x
Half of the owners are on their horses' back.
Number of legs = $\frac{x}{2} \times 4 = 2x$
Half of the owners are walking along their horses.
Number of legs = $\frac{x}{2} \times 2 + \frac{x}{2} \times 4 = 3x$
ATQ, $2x + 3x = 70$
 $x = 14$
8. The scooter has 3 tyres.
Each tyre can run upto a maximum of 5 km
Longest distance covered by the Scooter = $\frac{3 \times 5}{2} = 7.5$ km
9. Chairs = 4 Tables
 $C : T = 2 : 5$
 $15 \text{ chairs} + 2 \text{ tables} = 4000$
 $15 \times 2 + 2 \times 5 = 40 \text{ units} = 4000$
1 unit = 100
 $12 \text{ chairs} + 3 \text{ tables} = 12 \times 2 + 3 \times 5 = 39 \text{ units} = 39 \times 100 = 3900$
10. Number of ball Price
5 15
10 30
15 45
 $10 \times 45 = 15 \times 30 = 450$
Number of ball = 10 & price = 45
11. Let the number of apples and mangoes be x and y respectively.
ATQ, $7x + 5y = 38$
Go through option
Put $x = 2$, $7 \times 2 + 5y = 38$
 $5y = 24$ (Not divisible by 5)
Put $x = 3$, $7 \times 3 + 5y = 38$
 $5y = 17$ (Not divisible by 5)
Put $x = 4$, $7 \times 4 + 5y = 38$
 $5y = 10$ $y = 2$
Option (c) is the correct answer.
12. Let the number of friends be x .
Total number of Kachoris = $3(x - 1) + 1 = 2x + 13$
 $3x - 2 = 2x + 13$
 $x = 15$
13. Total number of students = LCM of 5, 9 & 4 = 180
Number of girls = $\frac{3}{5} \times 180 = 108$
Number of boys = $180 - 108 = 72$
Number of girls absent = $\frac{2}{9} \times 108 = 24$
Number of boys absent = $\frac{1}{4} \times 72 = 18$
Number of student present = $180 - 18 - 24 = 138$
Required fraction = $\frac{138}{180} = \frac{23}{30}$

14. Total number of chocolates = $17 \times 13 = 221$
 ATQ, 12 boxes must contain 11, 12, 13,.....22.

$$11 + 12 + 13 + \dots + 22 = \frac{12}{2} (11 + 22)$$

$$= 6 \times 33 = 198$$

$$\text{Maximum possible number of chocolates} = 221 - 198 = 23$$

15. Average = middle term = 7
 7 integers are 4, 5, 6, 7, 8, 9, 10.

$$\text{Sum of the squares} = \frac{10(10+1)(2 \times 10 + 1)}{6}$$

$$\frac{3(3+1)(2 \times 3 + 1)}{6} = 385 - 14 = 371$$

$$\text{Sum of the squares} = \frac{371}{7} = 53$$

16. Correct - Wrong = $(192 + 88) - (92 + 8) = 180$

$$\text{Correct mean} = 50 + \frac{180}{200} = 50.9$$

17. Speed: 2 : 3 : 4

$$\text{Time: } \left(\frac{1}{2} : \frac{1}{3} : \frac{1}{4} \right) \times 12 = 6 : 4 : 3$$

18. Other questions = $250 - 50 = 200$

$$\text{Time allowed} = 4 \text{ hours} = 240 \text{ minutes}$$

$$\text{ATQ, } 50 \times 2x + 200 \times x = 240$$

$$300x = 240$$

$$x = 0.8 \text{ minutes}$$

$$\text{Time spent on quantitative ability section} = 50 \times 2x = 100 \times 0.8 = 80 \text{ minutes}$$

19. Let the number of floors = x .

$$\text{Let the number of rooms per floor} = y.$$

$$x \cdot y = 500$$

$$\text{Now the number rooms} = 500 - 10\% \text{ of } 500 = 450$$

$$\text{ATQ, } (x - 5)(y + 5) = 450$$

$$\text{Check option (d), } x = 20 \text{ and } y = 25$$

$$x \cdot y = 20 \times 25 = 500$$

$$(20 - 5)(25 + 5) = 450$$

20. Let the two numbers be a and b respectively.

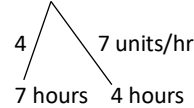
$$\text{ATQ, AM} = \frac{a+b}{2} = 10 \text{ \& GM} = \sqrt{ab} = 8$$

$$a + b = 20 \text{ \& } a \cdot b = 64$$

$$\therefore a = 16 \text{ \& } b = 4$$

21. $\text{GM} = \sqrt{AM \times HM} = \sqrt{25 \times 9} = 15$

22. Let of the train = 28 unit



Let the required time be t .

$$\text{ATQ, } \frac{28-4t}{28-7t} = \frac{4}{1}$$

$$\frac{28-4t-(28-7t)}{28-7t} = \frac{4-1}{1}$$

$$\frac{3t}{28-7t} = \frac{3}{1}$$

$$84 - 21t = 3t$$

$$24t = 84$$

$$t = \frac{84}{24} = 3.5 \text{ hours}$$

23. Series: 1, 3, 9, 27, 3^n

$$3^0, 3^1, 3^2, 3^3, \dots, 3^n$$

$$\text{Number of term} = n + 1, a = 1 \text{ \& } r = 3$$

$$\text{GM} = (3^0 \cdot 3^1 \cdot 3^2 \cdot 3^3 \cdot \dots \cdot 3^n)^{1/(n+1)}$$

$$= (3^{0+1+2+3+\dots+n})^{1/(n+1)}$$

$$= 3^{\frac{n(n+1)}{2(n+1)}} = 3^{\frac{n}{2}}$$

24. $\frac{a}{b} = \frac{3}{4}$

$$\frac{7a}{3b} = \frac{21}{12} = \frac{7}{4}$$

$$\frac{7a+3b}{7a-3b} = \frac{7+4}{7-4} = \frac{11}{3} \text{ (by Componendo \& Dividendo)}$$

25. $50\% (x - y) = 30\% (x + y)$

$$5(x - y) = 3(x + y)$$

$$\frac{x+y}{x-y} = \frac{5}{3}$$

$$\frac{x+y+x-y}{x+y-(x-y)} = \frac{5+3}{5-3} \text{ (by Componendo \& Dividendo)}$$

$$\frac{x}{y} = \frac{8}{2} = \frac{4}{1}$$

26. $2345 \times 60y$ is divisible by 5.

Last digit y must be 0 or 5.

$2345 \times 60y$ is divisible by 3.

$2 + 3 + 4 + 5 + x + 6 + 0 + y = 20 + x + y$ must be divisible by 3

For maximum value of $x + y = 13$

Where $x = 8$ and $y = 5$

No. of Question: 18**Time: 20 minutes**

1. Find the smallest number of five digits which is exactly divisible by 476.
(A) 10376 (B) 10472 (C) 10468 (D) 10486
2. The sum of three prime numbers is 100. If one of them exceeds another by 36, then one of the number is:
(A) 7 (B) 29 (C) 41 (D) 67
3. The number of three-digit numbers which are multiples of 9 are:
(A) 100 (B) 99 (C) 98 (D) 101
4. If the product of three consecutive integers is 120, the sum of the integers:
(A) 9 (B) 12 (C) 14 (D) 15
5. If a number of two digits is k times the sum of its digits, the number is formed by interchanging the digits is the sum of the digits multiplied by:
(A) $k - 1$ (B) $11 - k$ (C) $9 + k$ (D) $10 - k$
6. Five bells begin to toll together and toll respectively at interval of $1\frac{1}{8}$, $1\frac{1}{2}$, $1\frac{3}{8}$, $1\frac{3}{4}$ and $2\frac{1}{4}$ seconds. How many times will the toll together in an hour?
(A) 9 (B) 11 (C) 13 (D) 15
7. If $Z = \frac{x^2}{y}$ and X, Y both are increased in value by 10%, find the percentage change in the value of Z .
(A) 8% (B) 10% (C) 12% (D) 16%
8. If an article is sold for Rs. x , there is loss of 15%. If the same article is sold for Rs. y , there is a profit of 15%. The ratio of $(y - x)$ to $(y + x)$ is:
(A) 3 : 20 (B) 20 : 3 (C) 17 : 23 (D) 20 : 23
9. When the rate of interest in a bank reduced from 2.5% to 2%, a man withdraws Rs. 400 from his deposit. If the annual interest now received by him is Rs. 12.50 less than before, find his original deposit.
(A) Rs. 750 (B) Rs. 800 (C) Rs. 840 (D) Rs. 900
10. A, B and C are boxes containing marbles in the ratio 1 : 2 : 3. Total number of marbles is 60. The above ratio can be changed to 3 : 4 : 5 by transferring:
(A) 2 marbles from A to B and 1 from C to B
(B) 3 marbles from B to C
(C) 4 marbles from C to B
(D) 5 marbles from C to A
11. The average score of a class of boys and girls in an examination is A. The ratio of boys and girls in the class is 3 : 1. If the average score of the boys is $A + 1$, The average score of the girls is:
(A) $A - 1$ (B) $A - 3$ (C) $A + 1$ (D) $A + 3$
12. 2 men and 7 boys can do a piece of work in 14 days; 3 men and 4 boys can do the same in 11 days. Then, 8 men and 6 boys can do three times the amount of this work in:
(A) 18 days (B) 21 days (C) 24 days (D) 34 days
13. Partha goes three equal distances, each of length x km with speed of y km/hr, $3y/5$ km/hr and $2y/5$ km/hr respectively. If the total time taken is 1 hour, then $x : y$ is equal to:
(A) 6 : 13 (B) 6 : 23 (C) 6 : 31 (D) 6 : 37
14. Rimjhim performs $2/15$ of the total journey by rail, $9/20$ by bus and the remaining 10 km on cycle. Her total journey is:
(A) 31 km (B) 38.4 km (C) 32 km (D) 24 km
15. Instead of dividing Rs. 117 among P, Q, R in the ratio $1/2 : 1/3 : 1/4$, by mistake it was divided in the ratio 2 : 3 : 4. Who gained in the transaction?
(A) Only P (B) Only Q (C) Only R (D) Both Q and R
16. X's age 3 years ago was three times the present age of Y. At present, Z's age is twice the age of Y. Also Z is 12 years younger than X. What is the present age of Z.
(A) 15 years (B) 24 years (C) 12 years (D) 18 years
17. X and Y are partners in a business. X contributed $1/3$ of the capital for 9 months and Y received $2/5$ of the profits. For how many months Y's money used in the business?
(A) 2 (B) 3 (C) 4 (D) 5
18. A train passes two bridges of lengths 500m and 250m in 100 seconds and 60 seconds respectively. The length of the train is:
(A) 152m (B) 125m (C) 250m (D) 120m