

Shortcuts in Mathematics

**Are you writing
CAT, CET, GRE, GMAT
or any similar
competitive test?**

**Then this book is
for
you.**

Jayant Pai



How to make the best of this book?

Dear Student,

This is an attempt to do a little “de-schooling”. Yes, you have read it right! In our school and college days, we were always advised to start any sum with 1, 100 or X. The intention of setting an examination paper was to test your knowledge of the subject and whether you can write logically correct steps. Any competitive exam, however, is a different ball game. Here you are expected to arrive at the correct answer in the fastest possible way; hence starting with 1, 100 or X could be disastrous !!! Let me demonstrate this. Imagine a problem where a person spends 1/3 of his income on food and 1/7 of the remaining on rent; the question is what fraction of his income does he save? If you start with 1, 100 or X, it requires setting up an equation and doing all the necessary calculations. But as per the L.C.M method, which this book will help you master, no calculations are required. Just assume the income as Rs.21. He spends 1/3 on food, so Rs.7 gone. The balance is Rs.14, one seventh of which goes towards rent so another Rs.2 gone. What he saves is $21 - 7 - 2 = 12$ which is $12/21$ of his income, that is, $4/7$. We can do this sum orally without any calculation!!

So are you ready to start now? Solve the first 50 practice questions in about 75 minutes. Check the answers and then proceed to look at the solutions to understand how the L.C.M. method can help you solve these problems more easily. Now that you have mastered this technique, proceed to take 5 tests, each with 10 sums. The time limit for each of these tests is 15 minutes. Once again, check the answers and then proceed to view the solutions.

You should not take more than half a day to finish this book. This book will certainly change your attitude towards mathematics in competitive examinations. If you are still not confident, you are most welcome to contact me, either by email or on the phone. You can even meet me with a prior appointment.

Jayant Pai

PRACTICE EXAMPLES

1. One half of the student body at Shriram College study French and one-third of the others study Spanish. The remaining 300 do not study any foreign language. How many students are there in Shriram College?
a) 360 b) 550 c) 900 d) 1,350 e) 1,800
2. Ms. Sharma owned $\frac{5}{8}$ of an interest in a house. She sold $\frac{1}{5}$ of her interest, at cost for Rs.1,000. What was the total value of the house?
a) Rs.3000 b) Rs.4000 c) Rs.5,000
d) Rs.6,000 e) Rs.8,000
3. Of Ashok's salary, $\frac{1}{10}$ is spent for clothing, and $\frac{1}{3}$ for food and for rent. What part of the salary is left for other expenditure and savings?
a) $\frac{17}{30}$ b) $\frac{3}{5}$ c) $\frac{19}{30}$ d) $\frac{2}{3}$ e) $\frac{7}{10}$
4. A man leaves his estate to his wife and two sons. If the wife receives $\frac{1}{3}$ of the estate and each son receives $\frac{1}{2}$ of the remainder, find the value of the entire estate if each son receives Rs.4,000 as his share.
a) Rs.6,000 b) Rs.12,000 c) Rs.16,000
d) Rs.18,000 e) Rs.24,000
5. In a graduating class with the same number of boys and girls, $\frac{1}{8}$ of the girls and $\frac{5}{6}$ of the boys are honor students. What part of the class consists of boys who are not honor students?
a) $\frac{1}{12}$ b) $\frac{1}{6}$ c) $\frac{7}{48}$ d) $\frac{13}{48}$ e) $\frac{35}{48}$
6. When the price of an article is reduced by $\frac{2}{7}$ of its former value, the number of articles sold is increased to $\frac{21}{10}$ of the original number. The present daily receipts are what fraction of the former?
a) $\frac{3}{5}$ b) $1\frac{1}{2}$ c) $1\frac{2}{3}$ d) $2\frac{2}{5}$ e) $2\frac{1}{2}$
7. A paints $\frac{1}{4}$ of a barn, and B paints $\frac{1}{8}$ of the remainder. What fraction of the barn is left unpainted?
a) $\frac{1}{32}$ b) $\frac{11}{32}$ c) $\frac{21}{32}$ d) $\frac{29}{32}$ e) $\frac{31}{32}$
8. If $\frac{2}{3}$ of the workers in a factory go on vacation in July and $\frac{1}{2}$ of the remainder take their vacation in August, what fraction of the workers take their vacation at other times of the year?
a) $\frac{1}{4}$ b) $\frac{1}{6}$ c) $\frac{1}{32}$ d) $\frac{2}{5}$
e) None of these
9. Each year a car depreciates a certain fraction of its value. During the first year it depreciates $\frac{1}{3}$ of its value, during the second year it depreciates $\frac{1}{4}$ of its value, and during the third year it depreciates $\frac{1}{5}$ of its value. What fraction of its original value is the value of a car at the end of the third year?
a) $\frac{2}{5}$ b) $\frac{3}{8}$ c) $\frac{1}{5}$ d) $\frac{3}{4}$
e) None of these
10. Mr. A averages 12 television service calls per day and Mr. B averages 16

service calls per day. If Mr. A's average charge is $\frac{3}{2}$ as much as that of Mr. B, who earns Rs.7,200 per year, the annual earnings of Mr. A are

- a) Rs.3,600 b) Rs.6,400 c) Rs.7,200
- d) Rs.8,100 e) Rs.14,400

11. A man can do a job in 8 days, and his son can do it in 12 days. How long would it take them to do the job if they worked together?

- a) 4.8 b) 5 c) 10 d) 15 e) 20

12. A and B can paint a barn in 3 days. A can do it alone in 5 days. How many days would it take B to do this job alone?

- a) 0.2 b) 3.2 c) 5.0 d) 6.4 e) 7.5

13. A machine can cut some wood in 6 minutes and a man using a hand saw can do it in 18 minutes. After 4 minutes there is a power shortage and the wood must be cut by the hand saw. How many minutes must the man work to complete the task?

- a) 2 b) 6 c) 12 d) 14 e) 18

14. Mr. Verma can do a job in 10 days. A helper joins him after 3 days, and together they work for 4 days to complete the task. How many days would it take the helper to do the job alone?

- a) 3 b) $5\frac{5}{7}$ c) 6 d) 7 e) $13\frac{1}{3}$

15. Three pipes are used to fill a pool with water. One pipe alone can fill the pool in 9 hours. Another can fill it in 6 hours. The third can fill it in 3 hours. How many minutes will it take to fill this pool if all three pipes are used simultaneously?

- a) 1.63 b) 11 c) 54 d) 56.4 e) 98

16. The secretary of a club can address envelopes for mailing in 40 minutes. Her younger brother, who could do the entire job alone in 1 hour, assists her. How long, in minutes, would it take to address the envelopes if both work?

- a) 0.04 b) 0.4 c) 8 d) 24 e) 50

17. Mr. Ashok can do a job in 45 minutes, while his son would require 2 hours to do the work. How long would it take to complete this task if Mr. Ashok was assisted by his son?

- a) 18 min. b) 33 min. c) 35 min. d) 1 hr. 21 min. e) 1 hr. 31 min.

18. Mr. Fast, who works twice as fast as Mr. Slocum receives an hourly rate of pay $1\frac{1}{2}$ times as much as Mr. Slocum. An efficiency expert calculates that an article produced by Mr. Fast has a labor cost of Rs.12.

What is the labor cost in rupees of an article produced by Mr. Slocum?

- a) 12 b) 15 c) 16 d) 18 e) 20

19. Mr. S works twice as fast as Mr. L and three times as fast as Mr. P. If Mr. P can complete a job in 12 hours what part of the job can Mr. L do in 6 hours?

- a) $\frac{1}{4}$ b) $\frac{1}{2}$ c) $\frac{3}{4}$ d) $\frac{5}{8}$ e) $\frac{7}{9}$

20. In one half the time, A can produce three times as much work as B. B can do in twice the time $\frac{1}{3}$ as much work as C. If C does a job in 1 hour, how many hours will it take A to do the same job?

- a) 1 b) 21 c) $\frac{3}{2}$ d) 3 e) $\frac{1}{2}$

21. Snowwhite Paint Co. contracts to paint three houses. A can paint a house in 6 days, while B would take 8 days and C would take 12 days. After 8 days, A goes on vacation and B begins to work for a period of 6 days. How many days will it take C to complete the contract?
- a) 8 b) 9 c) 10 d) 11 e) 12
22. A straight pipe 1 yard in length was marked off in fourths and also in thirds. If the pipe was then cut into separate pieces at each of these markings, which of the following gives all the different lengths of the pieces, in fractions of a yard? (1 yard = 36 inches)
- a) $\frac{1}{6}$ and $\frac{1}{4}$ only b) $\frac{1}{4}$ and $\frac{1}{3}$ only c) $\frac{1}{6}$, $\frac{1}{4}$ and $\frac{1}{3}$
d) $\frac{1}{12}$, $\frac{1}{6}$ and $\frac{1}{4}$ e) $\frac{1}{12}$, $\frac{1}{6}$ and $\frac{1}{3}$
23. Last year, the annual premium on a certain hospitalization insurance policy was Rs.408, and the policy paid 80% of any hospital expenses incurred. If the amount paid by the insurance policy last year was equal to the annual premium plus the amount of hospital expenses not paid by the policy, what was the total amount of hospital expenses last year?
- a) Rs.850.00 b) Rs.680.00 c) Rs.640.00
d) Rs.510.00 e) Rs.326.40
24. A college basketball team has won 60 percent of its games, with 15 games remaining on the season's schedule. If the team is to win at least 60 percent of its scheduled games for the entire season, at most how many, of the remaining games can the team lose?
- a) 6 b) 7 c) 8 d) 9 e) 10
25. For 1979, the average home-heating cost in the central region of Country R was the same as the average cost for the entire country. For 1980, the average cost of the central region increased by \$260 per home, an increase of 25 percent over 1979. If, for 1980, the average cost for the entire country increased 22 percent, what was the average increase in cost per home for Country R?
- a) \$57.20 b) \$65.00 c) \$228.80 d) \$317.20
e) \$325.00
26. A school supply store sells only one kind of desk and one kind of chair, at a uniform cost per desk or per chair. If the total cost of 3 desks and 1 chair is twice that of 1 desk and 3 chairs, then the total cost of 4 desks and 1 chair is how many times that of 1 desk and 4 chairs?
- a) 5 b) 3 c) $8/3$ d) $5/2$ e) $7/3$
27. Cars X and Y were travelling together on a straight road at a constant speed of 55 miles per hour when car X stopped for 5 minutes. If car Y continued to travel at 55 miles per hour, how many minutes from the time that car X resumed travelling did it take car X traveling at 60 miles per hour to catch up with car Y? (Assume that the time for car X to slow down and speed up was negligible).
- a) 5 b) 30 c) 45 d) 55 e) 60
28. The shaded portion of the rectangular lot shown alongside represents a flower bed. If the area of the bed is 24 square yards and $x = y + 2$, then z equals
- a) $\sqrt{13}$ b) $2\sqrt{13}$ c) 6

- d) 8 e) 10
29. In Township K, $\frac{1}{5}$ of the housing units are equipped with cable television. If $\frac{1}{10}$ of the housing units, including $\frac{1}{3}$ of those that are equipped with cable television are equipped with videocassette recorders, what fraction of the housing units has neither cable television nor videocassette recorders?
a) $\frac{23}{30}$ b) $\frac{11}{15}$ c) $\frac{7}{10}$ d) $\frac{1}{6}$ e) $\frac{2}{15}$
30. In a certain community, 39,285 more apartments were converted to condominiums and sold in 1981 than in 1980. If this was a 30 percent increase, how many apartments were converted and sold in 1981?
a) 11,786 b) 51,070 c) 91,665 d) 130,950
e) 170,235
31. A tank containing 50.6 gallons of water is emptied at a constant rate during a single day beginning at 8.00 a.m. At 10.00 a.m. there are 27.5 gallons remaining. How many gallons were in the tank at 9.20 a.m.?
a) 12.1 b) 13.90 c) 27.1 d) 32.3 e) 35.2
32. The opening price of a certain stock that opened at Rs.20 per share on January 2, 2005, increased at a rate between 9.8 percent and 10.2 percent per year each year for the next 4 years. Which of the following could have been the opening price, in Rs. per share, of this stock on January 2, 2009?
a) 22 b) $24\frac{1}{4}$ c) $26\frac{5}{8}$ d) $29\frac{1}{4}$ e) 30
33. In a company of 1,700 employees, the daily absence during a flu epidemic ranged from 13 percent to 42 percent. The difference between the greatest and the least number of employees present during the epidemic was what percentage of the number of employees of the company?
a) 13% b) 29% c) 33% d) 45% e) 71%
34. A certain savings bank pays interest at an annual rate of 6 percent, compounded semiannually. To the nearest 10 paise, how much interest will this bank pay on Rs.300 for one year?
a) Rs.37.10 b) Rs.37.00 c) Rs.18.40 d) Rs.18.30
e) Rs.18.20
35. One-fourth of a solution that was 10 percent sugar by weight was replaced by a second solution, resulting in a solution that was 16 percent sugar by weight. The second solution was what percent sugar by weight?
a) 34% b) 24% c) 22% d) 18% e) 8.5%
36. A, L and K pooled funds to buy a gift for a friend. A contributed Rs.2 less than $\frac{1}{3}$ of the cost of the gift and L contributed Rs.2 more than $\frac{1}{4}$ of the cost. If K contributed the remaining Rs.15, what was the cost of the gift?
a) Rs.24 b) Rs.33 c) Rs.36 d) Rs.43 e) Rs.45
37. A bus trip of 450 miles would have taken 1 hour less if the average speed S for the trip had been greater by 5 miles per hour. What was the average speed S, in miles per hour, for the trip?
a) 10 b) 40 c) 45 d) 50 e) 55
38. M and N are positive integers that have remainders of 1 and 3, respectively, when divided by 6. Which of the following could NOT be a possible value of M + N?

- a) 86 b) 52 c) 34 d) 28 e) 10
39. Machines A, B and C working together, but independently, at their respective constant rates can do a certain job in $1 \frac{1}{2}$ hours. If A alone can do the job in 5 hours, and B alone can do the job in 3 hours, in how many hours can C alone do the job?
a) $1 \frac{1}{5}$ b) $2 \frac{1}{7}$ c) 3 d) 5 e) $7 \frac{1}{2}$
40. If $R = 1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27}$ and $S = 1 + \frac{R}{3}$, then S exceeds R by
a) $\frac{1}{3}$ b) $\frac{1}{6}$ c) $\frac{1}{9}$ d) $\frac{1}{27}$ e) $\frac{1}{81}$
41. One-fifth of the light switches produced by a certain factory are defective. Four-fifths of the defective switches are rejected and $\frac{1}{20}$ of the non-defective switches are rejected by mistake. If all the switches not rejected are sold, what percent of the switches sold by the factory are defective?
a) 4% b) 5% c) 6.25% d) 11% e) 16%
42. If an organization were to sell 'n' tickets for a theater production, the total revenue from ticket sales would be 20 percent greater than the total cost of production. If the organization actually sold all but 5 percent of the 'n' tickets, the total revenue from tickets sales was what percent greater than the total cost of production?
a) 4% b) 10% c) 14% d) 15% e) 18%
43. Part of Rs.40,000 was invested at 8 percent per annum and the remaining part at 9.5 percent per annum. If the total annual income from these two investments was Rs.3,425, how much was invested at 8 percent?
a) Rs.31,250 b) Rs.25,000 c) Rs.15,000
d) Rs.8,750 e) Rs.1,500
44. Water runs into a pool at the rate of 1 kiloliter every 5 seconds and simultaneously runs out at the rate of 1 kiloliter every 14 seconds. The pool filling at a rate of 1 kiloliter every
a) 6 seconds b) $7 \frac{5}{7}$ seconds c) $7 \frac{7}{9}$ seconds
d) 9 seconds e) 19 seconds
45. On a certain tour, half of the men are married, and the wives of $9/10$ of them are also on the tour. If there are 3 more women on the tour than men, what is the least possible number of people who could be on the tour?
a) 19 b) 22 c) 23 d) 43 e) 52
46. Three businessmen wish to invest in a new company. Each man is willing to pay one-third of the total investment. After careful calculations, they realize that each of them would pay Rs.7,200 less if they could find two more equal investors. How much is the total investment in the new business?
a) Rs.64,000 b) Rs.54,000 c) Rs.21,600
d) Rs.5,400 e) cannot be determined
47. Machine A can do a certain job in 8 hours. Machine B can do the same job in 10 hours. Machine C can do the same job in 12 hours. All three machines start the job at 9.00 a.m. Machine A breaks down at 11.00 a.m. and the other two machines finish the job. Approximately, at what time will the job be finished?

- a) 12.00 noon b) 12.30 p.m. c) 1.00 p.m.
d) 1.30 p.m. e) 2.00 p.m.
48. A bar of gold with dimensions 12 inches by 18 inches by 15 inches is melted down and reformed into a bar of different dimensions. All of the following are possible dimensions of the new gold bar EXCEPT:
- a) 10 inches by 15 inches by 22 inches
b) 12 inches by 10 inches by 27 inches
c) 6 inches by 18 inches by 30 inches
d) 24 inches by 27 inches by 5 inches
e) 9 inches by 24 inches by 15 inches
49. A milliner bought a job of hats, $\frac{1}{4}$ of which were brown. The milliner sold $\frac{2}{3}$ of the hats including $\frac{4}{5}$ of the brown hats. What fraction of the unsold hats were brown?
- a) $\frac{1}{60}$ b) $\frac{2}{15}$ c) $\frac{3}{20}$ d) $\frac{3}{5}$ e) $\frac{3}{4}$
50. In $\triangle ABC$, $AB = 6$, $BC = 4$ and $AC = 3$. What kind of a triangle is it?
- a) right and scalene b) obtuse and scalene c) acute and scalene
d) right and isosceles e) obtuse and isosceles

Answers To Practice Examples

No.	Ans.								
1	c	11	a	21	d	31	e	41	b
2	e	12	e	22	d	32	d	42	c
3	a	13	b	23	b	33	b	43	c
4	b	14	e	24	a	34	d	44	c
5	a	15	e	25	c	35	a	45	d
6	b	16	d	26	e	36	c	46	b
7	c	17	b	27	d	37	c	47	c
8	b	18	c	28	e	38	a	48	a
9	a	19	c	29	a	39	e	49	c
10	d	20	a	30	e	40	e	50	b

SOLUTIONS TO PRACTICE EXAMPLES

1. The best way to solve this problem is to start with the L.C.M. of numbers involved. The numbers involved are $\frac{1}{2}$ and $\frac{1}{3}$. So take 6 as a starting number since it is the L.C.M. of 2 and 3. Let's assume that there are 6 students in Shriram College. Half the students study French, which means 3 students study French. One-third of the others study Spanish, which means 1 studies Spanish.

So out of 6 students, 4 students study some foreign language and 2 study none. But in the actual example, 300 students do not study any language. As 2 goes into 6, 300 goes into 900, there must be 900 students in the college. This problem can be solved orally. Please stay away from going into equations like

$$\begin{array}{r} x - \underline{x} + \underline{\underline{x}} = 300 \\ \quad 2 \quad 3 \quad 2 \end{array}$$

2. The L.C.M. of 8 and 5 is 40, so let the cost of Mrs. Sharma's house be Rs.40. She owns $\frac{5}{8}$ th of the interest in the house, so it is equivalent to Rs.25. She sold $\frac{1}{5}$ th of her interest so she must get Rs.5, but actually as per the problem she gets Rs.1000. Therefore, the cost of the house must be 8 times which is Rs.8,000. [5 goes into 40, Rs.1,000 will go into Rs.8,000]
3. Assume that Ashok's salary is Rs.30 and he spends Rs.3 on clothing and Rs.10 on food and rent. He manages to save 17 out of 30 and the answer is $\frac{17}{30}$.
4. The fractions involved are $\frac{1}{3}$ and $\frac{1}{2}$. Assume that a man leaves his estate equivalent to Rs.6. His wife gets Rs.2, each son gets Rs.2. Since in the problem each son gets Rs.4,000, the father must have left an estate equivalent to Rs.12,000. [2 goes into 6, Rs.4,000 will go into Rs.12,000]
5. The L.C.M. of 8 and 6 is 24, so let the strength of the class be 24 with 12 boys and 12 girls. Since $\frac{5}{6}$ th of the boys are honors students, $\frac{1}{6}$ th of the boys are not honors students. That means 2 boys are not honors students and they form $\frac{2}{24}$, i.e. $\frac{1}{12}$ th of the class.
6. Since the price of an article is reduced by $\frac{2}{7}$, we assume that the cost of the article is Rs.7 and the price is reduced by 2 to make the new price Rs.5. Similarly, we assume that the number of articles initially sold is 10 and the number of articles now being sold is 21. It means that the earlier collection was 7×10 and the new collection is 5×21 . So the ratio required is $\frac{21 \times 5}{10 \times 7} = \frac{3}{2}$.

Please note if they had stated that the price is reduced by $\frac{3}{19}$ th we would have started with the initial price as Rs.19 and new price as Rs.16. This is the easiest way to get out of fraction and make sure you handle only integers.

7. Many a time it makes sense that you are guided by the choices given. Please note that all the choices have 32 as denominator so they strongly suggest that you start with 32 sq. ft. of painting as the starting number. A painted 8 sq. ft. and B painted $\frac{1}{8}$ th of the remaining, that is, 3 sq. ft. So together A and B finished 11 sq. ft.; 21 sq. ft. is the balance and the answer is $\frac{21}{32}$.
8. Start with the number of employees as 6 and you will get the answer.
9. Since the fractions involved are $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$ let us start with the L.C.M of 3, 4 and 5 which is 60. Assume that the cost of the car is Rs.60. It depreciates by $\frac{1}{3}$ rd i.e. Rs.20, so the new price is Rs.40. This gets depreciated by $\frac{1}{4}$ th i.e. Rs.10, so the new price is Rs.30. In the final year, the car depreciates at the rate of $\frac{1}{5}$ th which is Rs.6 indicating that the new price is Rs.24. So the ratio required is $\frac{24}{60}$ or $\frac{2}{5}$.
10. In this problem the key lies in assuming A's service charge as Rs.3 and B's as Rs.2. You can easily verify that Mr. A's daily collection is Rs.36 and that of

Mr. B is Rs.32. Therefore, at the end of the year, if Mr. B's total earnings are Rs.7,200, A must certainly be earning Rs.8,100.

11. We have solved many such problems by starting with the statement that if a man does a job in 8 days, he will do $\frac{1}{8}$ th of the job in 1 day. For work problems, please avoid this method. This method requires handling of fractions which is very difficult. The L.C.M. method would ensure that you do not handle fractions till the very end. For this problem, take the L.C.M of 8 and 12 which is 24. So assume the job to be done as 24 shirts to be stitched. A man can do this job in 8 days, so his output is 3 shirts per day. His son can do the same job in 12 days, so his efficiency is 2 shirts per day. When they work together, they produce 5 shirts per day and hence will be able to finish the job in $\frac{24}{5}$, i.e. 4.8 days.
12. A good starting point would be a 15 sq. ft. painting job. A and B together can finish the job in 3 days, so their output must be 5 sq. ft. per day. A alone can finish 15 sq. ft. in 5 days, hence his output must be 3 sq. ft. per day. It clearly indicates that B's output must be 2 sq. ft. per day. Hence if B were to do the job on his own, he will take $\frac{15}{2}$, i.e. 7.5 days.
13. The L.C.M of 6, 18, and 4 is 36, so assume that the wooden log has a cross-section of 36 inches \times 36 inches. This log can be cut by the machine in 6 minutes and hence the machine's speed is 6 inches per minute. Before a power cut, the machine could cut 6×4 , i.e. 24 inches of wood. The remaining job is 12 inches which will be done by the man using a handsaw in 6 minutes as they have indicated that the entire job can be finished by the man in 18 minutes. [Man's speed is $36/18 = 2$ inches per minute.]
14. Many a time instead of L.C.M you can take multiples of L.C.M or simply multiply the number involved in the problem. In this problem, the numbers involved are 10, 3 and 4. Multiply all of them to get 120 shirts to be stitched as a starting number. Mr. Verma can stitch 120 shirts in 10 days and hence his output is 12 shirts per day. He works alone for 3 days to produce 3×12 shirts before a helper joins. Together they finish the balance requirement of $120 - 36 = 84$ in 4 days indicating an output of 21 shirts per day. But out of this 21, Mr. Verma is producing 12 shirts per day; therefore, the helper must be producing 9 shirts per day. So the next time, if the helper has to do the job of 120 shirts, he will be able to finish it in $\frac{120}{9}$, i.e. $13\frac{1}{3}$ rd days.
15. Consider the capacity of the pool as 18 liters, as the L.C.M of 9, 6 and 3 is 18. When all the pipes are on they are filling the tank at the rate of 2 liters, 3 liters and 6 liters per hour. So in all 11 liters per hour are being filled in the tank with a capacity 18 liters. So it will take $\frac{18}{11} \times 60$ minutes which is 98.
16. Start with the job work of 120 envelopes to be mailed as it is the L.C.M of 40 and 60.
17. Let the starting number be 360 letters to be mailed as it is the L.C.M of 45 minutes and 120 minutes. The job is finished together in 33 minutes.
18. Since Mr. Fast works twice as fast as Slocum, it is safe to assume that he makes 2 shirts per hour, whereas Mr. Slocum does 1 shirt per hour. Mr. Fast is paid $\frac{3}{2}$ times as much as Slocum. So let us assume the hourly rate of Slocum is

Rs.2 and that of Mr. Fast, Rs. 3. Based on these two statements, we can say that Mr. Fast produces 2 shirts at the cost of Rs.3 in one hour and hence the labor cost is Rs.1.5 per shirt. Similarly, the labor cost of Mr. Slocum is Rs.2 because he is able to produce 1 shirt per hour at the cost of Rs.2. But the problem says that the labor cost of Mr. Fast is Rs.12. Hence, proportionately, the labor cost of Mr. Slocum must be Rs.16. [If 1.5 equals 12 then 2 equals 16]

19. The problem involves numbers like twice, thrice and twelve hours so a good starting number would be 12 shirts done by Mr. P in twelve hours. The following table would be useful

Step 2	Step 3	Step 1
S	L	P
36 Shirts	18 Shirts	12 Shirts
12 hrs.	12 hrs.	12 hrs.

We can see that Mr. L does 9 shirts in 6 hours and since the job is twelve shirts to be stitched, Mr. L would be in a position to finish $\frac{3}{4}$ th of the job in 6 hours.

20. In this problem the numbers involved are half, 3 times, twice and $\frac{1}{3}$ rd, so a good starting number could be 3 or a multiple of 3. Let us assume that the job is twelve shirts to be stitched and Carol does it in one hour. Based on the information given, construct the following table.

Step 3	Step 2	Step 1
A	B	C
Output	12 shirts	4 shirts
Time	1 hr.	2 hrs.

From the table above you can see that A takes 1 hour to complete 12 shirts which is the job. Hence whatever may be the job, the efficiency of A and C is the same.

21. Since the numbers involved are 6, 8 and 12, a good number to start with will be 24. So assume that there are 3 houses each requiring 24 sq. ft. painting and hence the total job is 72 sq. ft. Make the following table.

	Days to Finish	Output / day
A	6	$24/6 = 4$
B	8	$24/8 = 3$
C	12	$24/12 = 2$

Since A works for 8 days he will finish $8 \times 4 = 32$ sq. ft. then B takes over and he works for 6 days finishing $6 \times 3 = 18$ sq. ft. After B leaves, C takes over and he has to finish the remaining job which is $72 - 32 - 18 = 22$. It will take C 11 days to finish the job since his daily output is 2.

22. If we start with 1 yard, we will have to handle lots of fractions, instead it makes sense that we start with 36 because 1 yard = 36 inches. The statement

says that it is marked in fourths. So the marks would be on 9 inches, 18 inches and 27 inches. This will ensure that the straight pipe is marked into four equal parts. It is also marked in thirds, so the marks would be on 12 inches and 24 inches. This will ensure that the pipe is marked into 3 equal parts. The following diagram will illustrate it better.

0	9	18	27	36	$1\frac{1}{4}$ th
$1/3^{\text{rd}}$	0	12	24	36	

Now when the pipe is cut on the markings, we will get two pieces of 3 inches, two pieces of 6 inches and 2 pieces of 9 inches. If we convert these pieces into fractions of a yard the answer would be $\frac{1}{12}$, $\frac{1}{6}$ and $\frac{1}{4}$.

23. $408 + 0.2x = 0.8x$. Just think over this equation. It states that 408 is the premium paid by the customer plus he has to pay 20% of the bill x , as the insurance policy will cover only 80% of the bill x . Solve to get the answer.
24. There are many problems which actually do not require any calculation. This is a typical example. The college basketball team has won 60% of the matches so far and has to win 60% of the matches overall. Hence, it implies the team can afford to lose 40% of the balance matches which is 40% of 15=6.
25. This is one more example of how to avoid calculation if you pay some attention to the details given rather than getting into it headlong. Since in year 1979, the average home heating cost in both the regions being the same and if Rs.260 = 25%, the increase of 22% must be less than 260 and pretty close to it. Look at the choices and you will realize that C is the only option. No calculation whatsoever is required.
26. Our school and college grooming almost forces us to start these kinds of problems with a starting statement like let there be x number of desks and y number of chairs. Please do not do this. Desks and Chairs would be more than happy if they are called D and C respectively. We save lot of time which we otherwise waste in assigning xs and ys and then decoding them once we get the answer. So hence forth if you come across problems where men, women and children are involved, just call them M, W and C respectively rather than x , y , z . Based on the information given we can setup the equation as follows : $3D + C = 2(D + 3C)$ On solving we get $D = 5C$. Now here at this point let us say Chair cost Rs.1 and hence Desk cost Rs.5. The required answer is $\frac{7}{3}$.
27. Problems dealing with speed become unnecessarily complicated due to muddled thinking. In these kinds of problems, just hold the vehicle which has gone ahead stationary and this distance traveled by the first vehicle is wiped out by the incremental speed of the second vehicle. In this problem, Car x has stopped for 5 minutes and during this period Car y has gone ahead by $5/60 \times 55$ miles. Just imagine after 5 minutes, Car x starts and proceeds at a speed of 55 miles per hour. In this case, Car x will never be able to catch up with Car y since both have the same speed. It is incremental speed of $60 - 55 = 5$ which is responsible for wiping out the distance. So the time taken will be

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{5}{5} \times 55 \text{ hr}$$

$$\begin{aligned}
 \text{Speed} &= \frac{60}{5} \\
 &= \frac{55}{60} \text{ hr} \\
 &= \frac{55}{60} \times 60 \text{ min} \\
 &= 55 \text{ min}
 \end{aligned}$$

28. As per the diagram $\frac{1}{2}xy = 24$ so $xy = 48$. Since they have stated x and y differ by 2, think of 2 factors of 48 which differ by 2.

The only option is 8 and 6.

By Pythagoras theorem

$$z^2 = x^2 + y^2 \text{ we get } z = 10$$

29. This problem becomes very easy if you start with the L.C.M of 3, 5 and 10 which is 30. So assume in the township K there are 30 houses.

Cable T.V. Video Cassette Recorder

$$4 \quad 2 \quad 1$$

From the Venn diagram above you can very easily see that the answer is $\frac{23}{30}$. This is how it is. $1/5^{\text{th}}$ of 30 houses have cable T.V. $1/10^{\text{th}}$ of 30 = 3 have video cassette recorders. But these three houses include $1/3^{\text{rd}}$ of the houses having cable T.V. which is equal to $1/3^{\text{rd}}$ of 6 = 2. In other words, out of 30 houses 7 houses have something, therefore 23 houses have nothing.

30. This is one more example of how numbers could be threatening, but they can be totally bypassed to hit upon the correct answer. 39,285 which is almost close to 40,000 indicates the number of more apartments converted into condominiums and sold in 1981 as compared to 1980 which is an increase of 30%. It simply means that 30% is equivalent to 40,000 and they have asked the number of condominiums sold in 1981 which must be equivalent to 130%. Since 130 is 4 times 30 plus some number, the actual answer also has to be 4 times 40,000 plus some number. The only option is 'e'. You can notice that no calculation is involved.
31. The total quantity drained from 8.00 a.m. to 10.00 a.m. i.e. in a time period of 120 minutes is $50.6 - 27.5 = 23.1$ liters. At 9.20 p.m. i.e. after 80 minutes from the beginning $\frac{2}{3}$ of 23.1 liters of water must have been drained and $1/3$ remaining must be inside the tank. So the equation is

$$27.5 + \frac{1}{3} \times 23.1 = 35.2$$

3

32. In this problem, since the share of the price increased at a rate between 9.8% and 10.2%, it is safe to assume that the price increased by 10%. You can use the formulae or better still apply simple calculations as follows.

$$\begin{array}{r}
 20.00 \\
 \text{1}^{\text{st}} \text{ year increase} \quad \underline{2.00} \\
 \hline
 22.00
 \end{array}$$

2 nd year increase	<u>2.20</u>
	24.20
3 rd year increase	<u>2.42</u>
	26.62
4 th year increase	<u>2.66</u>
	29.28

So the answer is d.

33. In this problem you are tempted to calculate a lot of numbers, but just think that the answer is $42 - 13 = 29\%$. That's it.

34. At the beginning 300

In 6 months	Rs.9 as interest
In next 6 months	Rs.9 as interest + 27 paise as interest on Rs.9 which becomes the principal for this period
Total	318.27 to the nearest 10 paise, 18.30 as interest for the whole year compounded semi-annually

In these kind of problems, halve the interest rate if it is compounded semi-annually.

35. Use usual allegation method for this problem, but it is important that we start with the right number. Since they have stated $\frac{1}{4}$ th of the solution is replaced, it makes sense to think that we have a vessel with a 4 liter capacity filled only up to 3 liters and 1 liter is added. If the problem states that $\frac{3}{17}$ th of the solution is replaced, assume a vessel with a capacity of 17 liters filled up to 14 liters and 3 liters are added. By assuming the right number we come out of fraction and enter into whole numbers.

$$3 \text{ liters } 10\% \qquad \qquad 1 \text{ litre } x\%$$

$$16\%$$

$$3(16 - 10) = 1(x - 16)$$

$$\therefore x = 34\%$$

36. Start with the cost of the gift equal to $12x$ since the numbers involved are $\frac{1}{4}$ th and $\frac{1}{3}$ rd.

$$\text{A's contribution} \quad 4x - 2$$

$$\text{L's contribution} \quad 3x + 2$$

$$\text{K's contribution} \quad \text{Rs.15}$$

$$\text{Cost of the gift} \quad 12x$$

$12x = (4x - 2) + (3x + 2) + 15$, on solving this equation you get $x=3$ and hence the cost of the gift is 36.

37. For these kinds of problems don't get into equation of the form.

$$\frac{450}{S} - \frac{450}{S+5} = 1$$

It is much easier to solve it orally. Can you think of two divisors of 450 which differ by 5? The only answer is 45 and 50. It means that when the bus was being driven at 45 miles per hour, it took 10 hours and when the speed was increased to 50, it took 9 hours which is 1 hr less than the earlier time. Now you can design problems on your own too. If the distance is 720 kilometers, an increase of 10 kilometers per hour will save the time by 1 hour. The answer is 80 and 90 kilometers per hour.

38. This is a typical problem involving quotient and remainder. Based on the data given, you can write the following equations.

$$M = 6x + 1 \text{ and } N = 6y + 3, \text{ where } x \text{ and } y \text{ are integers.}$$

$$\text{So } M + N = 6(x + y) + 4$$

$$\text{So } \frac{M + N - 4}{6} = (x + y)$$

The above statement implies that if M and N are integers which when divided by 6 leave remainders 1 and 3 respectively, then their sum less than 4 must be completely divisible by 6. If you substitute the values you can see $(10 - 4)$, $(28 - 4)$, $(34 - 4)$ and $(52 - 4)$ are all divisible by 6, but $86 - 4 = 82$ is not and hence that is the answer.

39. Since the numbers involved are $1\frac{1}{2}$, 5 and 3 a good beginning number would be 30 shirts to be stitched as the job. Based on the data given we can see A, B and C together stitch 20 shirts in 1 hour. A and B, alone, can each stitch 6 and 10 shirts respectively. It implies that C can stitch 4 shirts per hour. So if C were to do the job alone, he would take $\frac{30}{4} = 7.5$ hours.

40. This problem indicates denominators of 1, 3, 9 and 27 almost forcing you to take the L.C.M and the common denominator, but please avoid this. The following steps will show how without any calculation you can get the correct answer.

$$\begin{aligned} S - R &= 1 + \frac{R - R}{3} \\ &= 1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81} - \frac{1}{3} + \frac{1}{9} + \frac{1}{27} \\ &= \frac{1}{81} \end{aligned}$$

41. The following number tree will show how to tackle this problem.

100

Defective 1/5

4/5 Good

20 Defective

80 Good

4/5

1/5 19/20

1/20

16 Rejected 4 accepted 76 Accepted 4 rejected
Going to packing

$$\begin{aligned}\% \text{ of Defective} &= \frac{4}{80} \\ &= 5\%\end{aligned}$$

42. If the production cost is $100x$, then the organization would realize $120x$ if they can succeed in selling the entire 'n' tickets. Since they sell 5% less, they will realize 5% of $120x$, i.e. $6x$ less. In other words, for production cost of $100x$ they will realize $114x$ which is 14% profit.
43. Here you are tempted to start with an equation
- $$\frac{8x}{100} + \frac{9.5}{100}(40,000 - x) = 3425$$
- Please don't do this; there is a shortcut with the help of which you can solve similar problems orally and very fast. Just assume that the entire sum of 40,000 is placed at 8% return; then the person would get 3,200 by way of annual income, but he receives $3425 - 3200 = 225$ extra. In order to get Rs.1.5 extra this person has to place Rs.100 not at 8%, but at 9.5%. Since he got Rs.225 extra he must have placed $\frac{225}{1.5} \times 100 = \text{Rs.15,000}$ @ 9.5%. So the answer is Rs.15,000/-.
44. In this question they describe what happens in 5 seconds and 14 seconds so it makes sense to take the L.C.M of 5 and 14 to find out what happens in 70 seconds. Since water runs into the pool at the rate of 1 kiloliter every 5 seconds, 14 kiloliters will go in the pool in 70 seconds. At the same time $\frac{70}{14} = 5$ kiloliters of water would be drained in 70 seconds. In other words, effectively $14 - 5 = 9$ kiloliters are getting accumulated in 70 seconds so the pool is getting filled at the rate of 1 kiloliter per $\frac{70}{9}$ seconds, i.e. $7\frac{7}{9}$ seconds.
45. The important point here is the denominator of the fraction $\frac{3}{10}$. Since the problem talks in terms of minimum and we want to come out of the fraction at the earliest, we assume let there be 10 married men. Anything other than this number, except multiples of 10, would create a situation where we have fractions of wives, which is not possible. Now the number of married men is half the total men so they are 20 in all. Since women exceed men by 3, we have 23 women and the total strength of the people on the tour is 43. If they had stated $\frac{3}{17}$ th of the wives were present we could have started with 17 married men.
46. The data clearly indicates that $15x$ is the investment required to start the business. Since there were 3 persons, each one would have paid $5x$. With the induction of 2 more persons, the contribution goes to $3x$ indicating $2x$ as the net saving equal to Rs.7,200. So the total investment required must be $7200 \times \frac{15}{2} = \text{Rs.54,000}$.
47. Take the L.C.M of 8, 10 and 12 which is 120 as the starting point for the given job. So the output of A, B and C will be 15, 12 and 10 units respectively. If they work together, they will produce 37 units in 1 hour. Between 9 a.m. and 11 a.m. A, B and C will finish $37 \times 2 = 74$ units with 46 units yet to be done. If machine A breaks down, this job would be finished by B and C together in

roughly 2 hours as B and C together produce 22 units in 1 hour. So the job is likely to get over just beyond 1 o'clock.

48. Don't get into the hassle of calculation. If you see the dimensions of the original bar as well as possible dimensions you can very easily see that $10 \times 15 \times 22$ is not possible because this choice involves a prime number 11 which is not there in the original dimensions of the bar i.e. $12 \times 18 \times 15$. (The original bar as well as the new bars has dimensions in integers.)
49. Please start with the number 60 as it is the L.C.M. of 4, 3 and 5. The milliner has 15 hats of brown color out of which he sold $\frac{4}{5}$ th i.e. 12 hats in the lot of $\frac{2}{3}$ rd of the total which is 40. So the milliner is now left with 20 hats in which 3 are brown. The answer is $\frac{3}{20}$.
50. I have taken this problem based on geometry just to indicate how calculations can be avoided where you are tempted to use formulae. Just imagine if ABC were a right-angled triangle with BC and AC as the legs, then the hypotenuse AB will be 5. But in the given data it is 6, which means ΔABC must be obtuse and scalene.

Test – 1

1. A trader who has a certain amount with him goes to the market. He can buy 50 kg of potatoes or 40 kg of onions. He retains 10% of the amount for tempo and octroi charges and buys 16 kg of onions and of the balance he purchases potatoes. How many kilograms of potatoes he can purchase ?
a) 36 b) 40 c) 25 d) 20
2. After three successive equal percentage rise in the salary the sum of 100 rupees turned into 148 rupees and 15 paise. Find the percentage rise in the salary.
a) 14% b) 22% c) 66% d) 82% e) 77%
3. A, B, C enter into a partnership. A contributes one-third of the whole capital while B contributes as much as A and C together contribute. If the profit at the end of the year is Rs.60,000, how much would each receive?
a) 30,000, 20,000, 10,000 b) 20,000, 30,000, 10,000
c) 25,000, 20,000, 15,000 d) 22,000, 14,000, 28, 000 e) None of these
4. Ashok starts from Mumbai at 10.00 a.m. for Pune which is 200 km away. His friend Madhav departs from Pune 10.00 a.m. to reach Mumbai. Ashok travels at an average speed of 70 kms/hr and does not stop anywhere until he arrives at Pune. Madhav travels at an average speed of 60 km/hr, but has to stop for 20 minutes at Lonavala, which is 60 kms away from Pune enroute to Mumbai. How far approximately from Mumbai they are likely to cross each other?
a) 100 b) 112 c) 116 d) 118
5. Three vessels having volumes in the ratio of 3:2:1 are full of a mixture of milk and water. In the first vessel, ratio of milk and water is 2:3, in second, 3:7 and in third, 1:4. If the liquid in all the three vessels were mixed in a bigger container, what is the resulting ratio of milk and water?

- a) 1:2 b) 5:7 c) 7:11 d) 7:5
e) None of these
6. A woman invested Rs.60,000 in two separate ventures, a fast-food franchise and Laundromat. The yearly return on the fast-food franchise was 6 percent, and the yearly return on the Laundromat was 10 percent. If the total return for the year on her investments was Rs.4,200, how much did the woman invest in the Laundromat?
a) Rs.45,000 b) Rs.15,000 c) Rs.6,000
d) Rs.4,800 e) Rs.3,600
7. A certain number of trucks were required to transport 30 tons of rubble from the demolition site to filling site. However, it was found that since each truck could take 0.5 tons of cargo less, another 10 trucks were needed. How many trucks were initially planned to be used?
a) 10 b) 15 c) 20 d) 25 e) 30
8. A contractor employs 400 men to build a bund. They finish $\frac{2}{5}$ of the work in 10 weeks. Then rain sets in and not only does the work remain suspended for 6 weeks but also half of the work already done is washed away. After the rain, when the work is resumed, only 80 men turn up. The total time in which the contractor is able to complete the remaining work assuming that there are no further disruptions in the schedule is
a) 50 b) 60 c) 80 d) 106
e) None of these
9. Two typists of varying skills can do a job in 10 minutes if they work together. If the first typist typed alone for 5 minutes and then the second typist typed alone for 10 minutes, they would be left with $\frac{1}{5}$ of the whole work remained undone. How many minutes would it take the slower typist to complete the typing job working alone?
a) 10 minutes b) 15 minutes c) 12 minutes
d) 20 minutes e) 25 minutes
10. There are two candles each of the same initial length. The first candle can burn for 24 hours, while the second candle can burn for 16 hours. Both of them are lit at the same time. After sometime, it was found that one of the candles was twice as long as the second. For how long had the candles been burning?
a) 6 hours b) 8 hours c) 10 hours d) 12 hours

Test – 2

- Fresh fish contain 80% water by weight while dried fish contain 20% water by weight. What is the weight of dry fish available from 20 kg of fresh fish?
a) 2 kg b) 3 kg c) 4 kg d) 5 kg
- Of the adult population in London, 30% of men and 20% of women are married. What percentage of the total population of adults is married (assume that no man marries more than one woman and vice versa)?
a) 33.33% b) 32.14% c) 31.1% d) 24%

3. Rs.6000 is distributed among A, B and C such that A gets $\frac{2}{3}$ rd of what B and C together get and C gets $\frac{1}{2}$ of what A and B together get. Find C's share.
 a) Rs.1200 b) Rs.2000 c) Rs.1800 d) Rs.1300
4. After receiving two successive raises, Ashok's salary became equal to $\frac{15}{8}$ times of his initial salary. By how much percent was the salary raised the first time if the second raise was twice as high (in percent) as the first?
 a) 15% b) 20% c) 25% d) 30% e) 33.33%
5. An engineer undertakes a project to build a road 15 km long in 450 days and employs 30 men for the purpose. After 100 days, he finds only 2.5 km of the road has been completed. Find the (approx.) number of extra men he must employ to finish the work in time.
 a) 10 b) 13 c) 18 d) 20 e) None of these
6. A company sells two products, L and M. Last year, seventy percent of the units sold were product L, and the price of product L was 25 percent greater than the price of product M. Approximately what percent of the total revenue the company received last year was from the sale of product L?
 a) 15% b) 25% c) 35% d) 65% e) 74%
7. A team of miners planned to mine 3600 tons of ore during a certain number of days. Due to technical difficulties in one-fourth of the planned number of days, the team was able to achieve an output of 30 tons of ore less than the planned output. To make up for this, the team overachieved for the rest of the days by 60 tons. The end result was that the team completed the task 10 days ahead of time. How many tons of ore did the team initially plan to ore per day?
 a) 50 tons b) 90 tons c) 150 tons d) 200 tons
 e) 250 tons
8. The weight of three heaps of gold are in the ratio 3:4:5. By what fractions of themselves must the first two be increased so that the ratio of the weights may be changed to 5:4:3?
 a) $\frac{16}{9}, \frac{2}{3}$ b) $\frac{48}{50}, \frac{4}{5}$ c) $\frac{48}{50}, \frac{3}{5}$ d) $\frac{24}{50}, \frac{3}{7}$ e) None of these
9. The cistern has four inlets. Through the first three inlets, the cistern can be filled in 12 minutes; through the second, the third and the fourth inlet, it can be filled in 15 minutes; and through the first and the fourth inlet, in 20 minutes. How much time will it take all the four inlets to fill up the dam?
 a) 8 min b) 10 min c) 12 min d) None of these
10. A and B together can do a piece of work in 12 days, while B and C together can do in 16 days. After A has been working at it for 5 days, and B for 7 days, C finished it in 13 days. In how many days could each do the work by himself?
 a) 48, 16, 24 b) 10, 16, 24 c) 16, 48, 24
 d) 16, 24, 48

Test – 3

1. After allowing a discount of 12.5% a trader still makes a gain of 40%. At what per cent above the cost price does he mark his goods?

- a) 45% b) 60% c) 25% d) None of these
2. A dishonest trader marks up the price of his goods by 20% and gives a discount of 10% to the customer. He also uses a 900 gram weight instead of a 1 kilogram weight. Find the percentage profit due to this cheating.
 a) 8% b) 12% c) 20% d) 16% e) None of these
3. What one man can do in a day a woman can do in 2 days. A child does one-third the work in a day as a woman. If an estate-owner hires 78 pairs of hands, men, women and children in the ratio 6:5:2 and pays them in all Rs.2,226 at the end of days work, what must the daily wages of a child be, if the wages are proportional to the amount of work done?
 a) Rs.14 b) Rs.5 c) Rs.20 d) Rs.7
4. A is 50% more than B, C is $\frac{1}{4}$ th of A and D is 40% more than C. Now, each of A, B, C and D is increased by 20%. Find what per cent of B is D (after the increase)?
 a) 52.5% b) 160% c) 175% d) 176%
 e) None of these
5. There is a leak in the bottom of a tank. This leak can empty a full tank in 10 hours. When the tank is full, a tap is opened into the tank which admits 12 liters per hour and the tank is now emptied in 15 hours. What is the capacity of the tank?
 a) 288 liters b) 360 liters c) 144 liters
 d) cannot be determined
6. In the square besides, $12w = 3x = 4y$. What fractional part of the square is shaded?
 a) $\frac{2}{3}$ b) $\frac{14}{25}$ c) $\frac{5}{9}$
 d) $\frac{11}{25}$ e) $\frac{3}{7}$
7. On an average, three liters of milk and one liter of water are needed to be mixed to make 1 kg of Milkmaid of type A, and 4 liters of milk and 3 liters of water are needed to be mixed to make 1 kg of Milkmaid of type B. How many kilograms of each type of Milkmaid was manufactured if it is known that 150 liters of milk and 90 liters of water were used?
 a) 20 of type A and 30 of type B
 b) 30 of type A and 20 of type B
 c) 18 of type A and 24 of type B
 d) 30 of type A and 15 of type B
 e) None of these
8. A is thrice as good a workman as B and therefore is able to finish the job in 50 days less than A. In how many days will they finish the job working together?
 a) 22.5 days b) 11.5 days c) 18.75 days
 d) 20 days
9. To do a certain piece of work B would take three times as long as A and C together, and C twice as long as A and B together. The three men by their united exertions can complete the work in 10 days. How long would each take by himself?

- a) 24, 40, 30 b) 40, 24, 30 c) 30, 40, 24
d) 30, 24, 40
10. A certain brand of house paint must be purchased either in quarter liter at Rs.12 each or in liters at Rs.18 each. A painter needs a 3 liter mixture of the paint consisting of 3 parts blue and 2 parts white. What is the least amount of money needed to purchase sufficient quantities of the two colors to make the mixture?
a) Rs.54 b) Rs.60 c) Rs.66 d) Rs.90 e) Rs.144

Test – 4

1. A, B, C and D bought a car for Rs.1,20,000. A paid 50% of the amounts paid by the other three boys, B paid one third of the sum of the amount paid by the other boys; and C paid one fourth of the sum of the amounts paid by the other boys. How much did D have to pay?
a) Rs.15000 b) Rs.13000 c) Rs.17000
d) Rs.26,000
2. A and B are two alloys of tin and copper prepared by mixing metals in proportions 7:3 and 9:11 respectively. If equal quantities of the two alloys are melted to form a third alloy C, the proportion of tin and copper in C will be:
a) 5 : 9 b) 5 : 7 c) 23:17 d) 17:23 e) 7 : 9
3. A house is sold for Rs.1230 at a loss of 18%. What would have been gained or lost per cent if it had been sold for Rs.1600?
a) $4 \frac{1}{4}$ b) $6 \frac{2}{3}$ c) $8 \frac{2}{3}$ d) $10 \frac{1}{2}$
4. In an election of 3 candidates A, B and C, A gets 100% more votes than B. A also beats C by 20,000 votes. If it is known that B get 20 percentage point more votes than C, find the number of voters on the voting list (given 80% of the voters on the voting list voted and no votes were invalid)
a) 50,000 b) 70,000 c) 90,000 d) 1,00,000
e) 1,10,000
5. If 32 cannons, firing 5 rounds in 6 minutes kill 480 men in $1 \frac{1}{4}$ hours, how many cannons firing 7 rounds in 9 minutes will kill 560 men in half an hour?
a) 100 b) 120 c) 140 d) 160 e) 180
6. A certain dairy packing plant has two machines P and Q, that process milk at constant rates of 30 gallons per minute and 45 gallons per minute respectively. A day's run of milk can be processed by machine P operating alone in 6 hours, by machine Q operating alone in 4 hours, or by both machines operating simultaneously in 2.4 hours. If a day's run of milk is processed using machine Q alone for half the time and both machines together for half the time, how many hours does it take to complete the run?
a) 1.5 b) 3.0 c) 3.75 d) 4.2 e) 5.0
7. Find the selling price of goods if two salesmen claim to make 20% profit each, one calculating it on cost price while another on the selling price, the difference in the profits earned being Rs.200 and selling price being same in both the cases?

- a) Rs.2000 b) Rs.1600 c) Rs.2400 d) Rs.5000
e) Rs.6000
8. There are three Taps A, B and C in a tank. They can fill the tank in 10 hrs, 20 hrs and 25 hrs respectively. At first, all of them are opened simultaneously. Then after 1 hour, tap C is closed and A and B are kept running. After the 4th hour, tap A is also closed. The remaining work is done by Tap B alone. Find the percentage of the work done by Tap B by itself.
a) 32% b) 56% c) 75% d) None of these
9. When $\frac{2}{9}$ of the votes on a certain resolution have been counted, $\frac{3}{4}$ of those counted are in favor of the resolution. What fraction of the remaining votes must be against the resolution so that the total count will result in a vote of 2 to 1 against the resolution?
a) $\frac{11}{14}$ b) $\frac{13}{18}$ c) $\frac{4}{7}$ d) $\frac{3}{7}$ e) $\frac{3}{14}$
10. Cyndi invests part of Rs.2,000 in a certificate of deposit that pays simple annual interest of 9% and the remainder in a passbook savings account that pays 5% simple annual interest. If she receives Rs.148 interest in one year how much did she invest in the certificate of deposit?
a) Rs.800 b) Rs.1,000 c) Rs.1,200 d) Rs.1,500
e) Rs.1,800

Test – 5

1. A bought 8 mangoes, 10 bananas and 6 oranges. B bought 25 mangoes, 20 bananas and 12 oranges for an amount which is 2 $\frac{1}{2}$ times what paid by A. What fraction of the total amount paid by A was paid for the mangoes?
a) $\frac{3}{5}$ b) $\frac{4}{9}$ c) $\frac{2}{3}$ d) None of these
2. Divide Rs.680 among A, B and C such that A gets $\frac{2}{3}$ of what B gets and B gets $\frac{1}{4}$ th of what C gets. Now the share of C is?
a) Rs.480 b) Rs. 300 c) Rs.420 d) Rs.360
e) None of these
3. A dishonest dealer marks up the price of his goods by 20% and gives a discount of 10% to the customer. Besides, he also cheats both his supplier and his buyer by 100 grams while buying or selling 1 kilogram. Find the percentage profit earned by the shopkeeper.
a) 20% b) 25% c) 32% d) 27.5% e) None of these
4. A tradesman marks his goods at 25 p.c. above their cost price, and allows purchasers a discount of 12 $\frac{1}{2}$ p.c. for cash. What profit per cent does he make?
a) $9\frac{3}{8}$ b) $6\frac{2}{3}$ c) $8\frac{1}{3}$ d) $4\frac{3}{4}$
5. If a and b each represent a non-zero real number and if $x = \frac{a}{|a|} + \frac{b}{|b|} + \frac{ab}{|ab|}$ then the rest set of all possible values for x is
a) {-3, -2, -1, 1, 2, 3} b) {3, -1, -2} c) {3, -1, -3}
d) {3, -1} e) {3, 1, -1}

6. A dishonest trader, at the time of selling and purchasing, weighs 10% less and 20% more per kilogram respectively. Find the percentage profit earned by treachery. (Assuming he sells at Cost Price)
 a) 30% b) 20% c) 25% d) 33.33%
7. Two taps are running continuously to fill a tank. The 1st tap could have filled it in 7 hours by itself and the second one by itself could have filled it in 42 hours. But the operator failed to realize that there was a leak in the tank from the beginning which caused a delay of one hour in the filling of the tank. Find the time in which the leak would empty a filled tank.
 a) 15 hours b) 20 hours c) 25 hours d) 42 hours

Directions for Questions 8-10: Answer the questions based on the following information.

A on his death bed, keeps half his property for his wife and divides the rest equally among his two sons: B and C. Some years later, B dies, leaving half his property to his widow and half to his brothers C. When C makes his will, he keeps half his property for his widow and the rest he bequeaths to mother. The mother now has Rs. 1,98,000.

8. What was the worth of the total property?
 a) Rs.3,00,000 b) Rs.2,88,000
 c) Rs.3,96,000 d) Rs.3,40,000
9. What was C's final share?
 a) Rs.1,08,000 b) Rs.1,20,000
 c) Rs.1,60,000 d) Rs.1,48,500
10. What was the ratio of the property owned by the widows of B and C, in the end?
 a) 3:2 b) 1:2 c) 1:3 d) 2:3

Answers To Tests

No.	Test 1	Test 2	Test 3	Test 4	Test 5
1	c	d	b	d	b
2	a	d	c	c	a
3	b	b	d	b	c
4	d	c	a	a	a
5	a	b	b	a	d
6	b	e	b	b	d
7	c	b	c	e	d
8	d	a	c	b	b
9	e	b	a	a	a
10	d	c	c	c	d

Solutions To Test – 1

1. Since the numbers involved are 50 & 40 start with $200x$

$$\begin{array}{rcl} \text{Cost of potatoes} = \underline{200x} = 4x, \text{ cost of onions} = \underline{200x} = 5x \\ \qquad\qquad\qquad 50 \qquad\qquad\qquad 40 \end{array}$$

The person retains $10\% = 20x$ for tempo fare and octroi and buys equivalent to $16 \times 5x = 80x$ of onions. That means he is still left with $100x$ from which he can buy 25 kg potatoes.

2. 100 can go into 148 with 3 successive equal rises only if it is 14%. Anything above 14% would shoot off the salary beyond 148.
3. A contributes $\frac{1}{3}$ of the whole capital so he is entitled to have $\frac{1}{3}$ share of the profit which is Rs.60,000 so he is entitled to have Rs.20,000 as a share of profit. B contributes as much as A and C have contributed together, so B must get 50% of Rs.60,000 which is Rs.30,000. C receives the balance which is Rs.10,000.
4. In this problem, a lot of superfluous data has been given about Madhav's journey. The necessary data plainly implies that Ashok started from Mumbai at 10.00 a.m. with a speed of 70 km/hr and Madhav started from Pune at 10.20 a.m. with a speed of 60 km/hr. If you assume they cross each other x hours after 10.00 a.m., then the following equation can be established.

$$70x + 60x - \frac{1}{3} = 200$$

Solve this to get $x = 220/130$ hrs. and hence the meeting point must be $220/130 \times 70$ from A. The answer is approximately 118 km. from A.

5. Let the 3 vessels have capacity of 3 liters, 2 liters and 1 liter respectively. So when these 3 are mixed we will have 6 liters of mixture. The amount of milk in these 6 liters will be

$$\frac{2}{5} \times 3 + \frac{3}{10} \times 2 + \frac{1}{5} \times 1 = 2.$$

So the amount of water must be $6 - 2 = 4$. Hence the ratio of milk to water is 2 to 4 which is 1:2.

6. Use the technique which we have demonstrated earlier rather than set up a complicated equation in terms of x . Assume that the entire amount of Rs.60,000 is put in 6% return; you will get Rs.3600. The woman received not Rs.3600 but Rs.4200, i.e. Rs.600 extra; now please appreciate that in order to get Rs.4 extra ($10\% - 6\%$) she has to shift Rs.100 from an account that gives 6% to one that gives 10%. So in order to get 600 extra she must have shifted $\underline{600} \times 100 = \text{Rs.15000}$.

4

7. Let the initial number of trucks planned be X . So each truck would have left $\frac{1}{2}$ ton of unpicked rubble, totaling $\frac{1}{2} \times x$ tons to be picked by 10 more trucks which were pressed into service. In other words each truck has a capacity of $\frac{1}{2} \frac{x}{10} = \frac{x}{20}$.

The total number of trucks pressed into service is $x + 10$

$$\text{so } (x + 10) \frac{x}{20} = 30$$

20

$$\therefore x(x + 10) = 600$$

Solve this equation to get $x = 20$.

8. These kinds of problems as we have seen earlier can very easily be solved by comparing the efficiency of the workman in the first operation with that of the efficiency in the second operation, both being equal unless otherwise stated.

Let the amount of work be $5x$. $\frac{2}{5}$ th of $5x = 2x$ is finished by 400 persons in 10 weeks. Because of rain, half of the work is washed away and the second group of 80 persons now has to finish

$x + 3x$ work in y weeks.

So the equation of equating efficiency in both the operations is as follows

$$\frac{2x}{400 \times 10} = \frac{4x}{80 \times y} \quad \text{Solve this to get } y = 100 \text{ weeks.}$$

The answer is 106 weeks.

9. One typist puts in 10 minutes of effort and the other typist stops short of putting in his effort of 10 minutes by 5 minutes. Had he put in those 5 minutes of effort, the job would have been completed, indicating that his 5 minutes of effort is equivalent to $\frac{1}{5}$ th or 20% of the job. This implies that had he put in his full 10 minutes of effort, he would have completed 40% of the job. Hence, he is the slower worker of the two. Now simple calculation will tell you that it takes 10 minutes to do 40% of the job; he will take 25 minutes to do the entire job alone.

10. Based on the numbers indicated, assume that the length of both the candles is 48 inches each. The first one burns in 24 hours, so its speed is 2 inches per hour. The second candle burns in 16 hours, indicating that it burns at a rate of 3 inches per hour. This implies that the length of the remaining part of the first candle would be more than the second one at any given point of time. Assume that the stated condition arises after x hours of burning.

So the equation is $48 - x \times 2 = 2(48 - 3x)$. Solve it to get $x = 12$.

Solutions To Test – 2

1. 20 kg fish contain 80% water, and 20% solid, i.e. 4 kg of solid. But when dried, these 4 kg solid constitute 80%, so the question is how much is 100% now?

$$\therefore 4 \times \frac{100}{80} = 5 \text{ kg}$$

2. Let there be 100 men. 30 men are married and they will have 30 wives. But these 30 women account for 20% of total women strength. Hence there must be $30 \times 5 = 150$ women. So the answer is $\frac{60}{100 + 150} = 24\%$

3. This problem again gives some superfluous information which is not required. C gets half of what A and B get together; this implies that Rs.6,000 will have

to be divided into 3 equal parts, A and B getting 2 parts and C getting 1 part. So C must have got Rs.2,000.

4. Please note that the new salary of $\frac{15}{8}$ amounts to increase of $\frac{7}{8}$ which is $12.5 \times 7 = 87.5\%$ increase. This kind of rate is possible only if the first raise is 25%, and the second raise is 50%. So in the first stage, Rs.100 salary will become Rs.125 and 50% raise of this amounts to Rs.62.50 which when added to Rs.125 makes the new salary Rs.187.50.

5. Use the earlier formulae of comparing efficiency

$$\frac{2.5}{30 \times 100} = \frac{12.5}{x \times 350} .$$

Solve it to get $x = 43$ persons approximately. So the answer is 13 extra men.

6. Based on the data given, assume the price of product M = Rs.4 and that of L is 25% higher = Rs.5. Again assume that the number of units sold of product L be 7 and that of M be 3.

Revenue realization due to sale of M = $4 \times 3 = 12$. The revenue realization due to sale of product L = $5 \times 7 = 35$. So the percentage of the total revenue the company received from the sale of product L is $\frac{35}{35 + 12} = \frac{35}{47} = 74\%$

7. Let the mining operation be planned for $4x$ days and per day anticipated production is y tonnes.

$$\therefore 4x \times y = 3600 \quad y = \frac{900}{x}$$

Now the equation is

$$x(y - 30) + (3x - 10)(y + 60) = 3600 \\ \therefore xy - 30x + 3xy + 180x - 10y - 600 = 3600$$

$$\text{Put } y = \frac{900}{x} \text{ to get } x = 10$$

Hence $y = 90$

8. Let there be 3 heaps of gold weighing 3 kg, 4 kg and 5 kg. So the ratio is 3:4:5. Now gold is added to the first two heaps so as to make the ratio 5:4:3. Let the new weights be $5x$, $4x$ and $3x$ totaling $12x$ kg. In this, the last heap of 5 kg which has remained untouched is equivalent to $3x$ or $\frac{1}{4}$ th of the total weight. Indicating the total weight of all the 3 heaps now is

$4 \times 5 = 20$ kg. The new weight of the first heap is

$$\frac{5x}{2x} \times 20 = 8 \frac{1}{3} \text{ kg. The new weight of the 2nd heap is}$$

$$\frac{4x}{2x} \times 20 = 6 \frac{2}{3} \text{ kg. Now you can easily verify the new ratios}$$

$$\frac{12x}{8 \frac{1}{3}} = 3 \text{ and } \frac{12x}{6 \frac{2}{3}} = 4$$

$$\text{i.e. } \frac{16}{9}, \frac{2}{3} .$$

9. Based on the data given, one can take the capacity of the cistern as 60 liters. Let the first, second, third and fourth inlets be called A, B, C and D respectively. We can establish following equations.

$$\begin{array}{ll} A + B + C = 5 \text{ liters} & \text{Statement I} \\ B + C + D = 4 \text{ liters} & \text{Statement II} \\ A + D = 3 \text{ liters} & \text{Statement III} \end{array}$$

Add II and III to get $A + B + C + 2D = 7$ liters

But A + B + C = 5 liters

$$\therefore 2D = 2 \text{ liters}$$

$$D = 1 \text{ liter}$$

Statement IV

Taking I and IV together $A + B + C + D = 6$ liters. So if all the 4 inlets are on, it will take $\frac{60}{6} = 10$ minutes.

10. Based on the numbers 12 and 16 let the work be $48x$. Since A and B can finish this in 12 days, their output together per day must be $4x$. Similarly that of B and C together will be $3x$.

A has been working at it for 5 days, and B for 7 days and C finishes in 13 days, amounts to saying that A and B worked together for 5 days, B and C together for 2 days and C alone for 11 days. So before C takes on his own alone $5 \times 4x + 2 \times 3x = 26$ units of work must have been done by working in pairs. So C finishes the remaining, i.e. $48x - 26x = 22x$ in 11 days. So the output of C is $2x$, that of B x and A's $3x$. They will finish the job on their own in $48x/3x = 16$ days, $48x/x = 48$ days and $48x/2x = 24$ days respectively. (i.e. A, B, C respectively)

Solutions To Test 3

1. Please note that 12.5% is equivalent to $\frac{1}{8}$. Since 12.5% discount is given, it is much easier to assume that the original price of the goods is $8x$ and he gives x discount to realize $7x$. The problem states that this $7x$ contains 40% profit over his cost price. In other words, $7x = 140$ and $8x = 160$. From these statements, you can easily say that since goods costing Rs.100 were marked Rs.160, you still get 40% profit after giving 12.5% discount.

2. When it comes to problems dealing with buying and selling you will come across lots of readymade formulae. However, it is advisable to understand the concept of profit in a business done honestly and dishonestly which will go a long way in tackling these problems.

Assume that the basic price is 100 which when marked 20% up and discounted 10% will give a realization of 108. (100 going into 120, less 12 to get 108)

If he had done an honest job the percentage profit would have been

$\frac{108 - 100}{100} \times 100 = 8\%$. But since he resorts to dishonest

In practice giving 900 gm instead of 1000 gm, the profit is worked out as

$$\frac{108 - 100 \times \frac{9}{10}}{100 \times \frac{9}{10}} \times 100 = \frac{18}{90} \times 100 = 20\%$$

3. Based on the data given assume that a child, a woman and a man produce x , $3x$ and $6x$ units of work respectively. Since the estate owner had hired 78 persons in the ratio 6:5:1, he must have hired 36 men, 30 women and 12 children. The following equation will help you get x .

$$6x \times 36 + 3x \times 30 + x \times 12 = 2226$$

Solve this to get $x = 7$. So the daily wage of the child is Rs.7.

4. Starting with the right number is the key to solving this problem. Let A be $3x$, B be $2x$ and

$$C = 3x/4$$

$$\text{Hence } D = \frac{1.4}{4} \times \frac{3x}{2x}$$

$$\text{So the answer is } \frac{1.4}{4} \times \frac{3x}{2x} \times 100 = 52.5\%$$

Since both the numbers B and D are increased by 20%, it doesn't make difference to the ratio.

5. Since the numbers involved are 10, 12 and 15 hours, assume that the capacity of the tank is $60x$ liters. The leak can drain this full tank in 10 hours implies that it must be leaking at the rate of $6x$ liters per hour. When the tap was open, the draining operation lasted for 15 hours indicating $15 \times 6x$ liters of water was drained. But this quantity must be equal to $60x$ which is the capacity of the tank plus 12×15 liters of water which were added in those 15 hours. So the equation is $15 \times 6x = 60x + 12 \times 15$ Solve this to get $x = 6$. So the capacity of the tank = $60 \times 6 = 360$ liters.

6. Assume $12w = 3x = 4y = 12$ so $w = 1$, $x = 4$ and $y = 3$. Use this information to get the answer.

$$7. \quad \begin{array}{llll} 3 \text{ milk} & 1 \text{ water} & 4 \text{ milk} & 3 \text{ water} \end{array}$$

$$1 \text{ kg A}$$

$$1 \text{ kg B}$$

Let A kg of type A and B kg of type B are produced

$$\text{So } 3A + 4B = 150$$

$$\& \quad A + 3B = 90$$

Solve to get 18 of A and 24 of B.

8. Let the job be J units to be made. Since A is thrice as good a workman as compared to B, let A produce $3x$ units and B produce x units, so we can setup the equation as

$$\frac{J}{x} - \frac{J}{3x} = 50, \text{ Solve this to get J is equal to } 75x.$$

Hence, when both the workers are working together they will produce $3x + x = 4x$ units per day to finish off the job in

$$\frac{75x}{4x} = 18.75 \text{ days.}$$

9. Based on the information we can write following 2 statements.

$$3B = A + C \quad \text{Statement I}$$

$$2C = A + B \quad \text{Statement II}$$

Solve this to get $12A = 20B = 15C = 60x$ (Assumed number is L.C.M of 12, 20 and 15). This will indicate the output of A, B and C as $5x$, $3x$, $4x$ respectively. When A, B, C all work together they will put in $5x + 3x + 4x = 12x$ and finish the job in 10 days. So the total job work must be equal to $120x$. So we can conclude that A will finish the job in $\frac{120x}{5x} = 24$ days, B will finish the job in $\frac{120x}{3x} = 40$ days and C will finish the job in $\frac{120x}{4x} = 30$ days.

10. 3 liters of mixture of paint in the ratio 3 parts blue and 2 parts white is required. So the painter has to purchase

$$\frac{3}{5} \times \frac{3}{5} = \frac{9}{25} \text{ liters of blue paint and } \frac{3}{5} \times \frac{2}{5} = \frac{6}{25} \text{ liters of white}$$

paint. Since it is available in 1 liter and quarter liter packs, it makes sense to purchase 2 liters of blue paint and 1 liter and a quarter liter of white paint. This will ensure minimum wastage. Thus he will purchase 3 one liter cans and 1 quarter liter can. The least amount of money he spends is $18 \times 3 + 12 = 66$.

Solutions To Test – 4

- A paid 50% of the amount paid by 3 other boys. This implies that if Rs.1,20,000 is divided into 3 equal parts; B, C, D paid Rs.80,000 and A paid Rs.40,000. If you extend the same logic you will realize that B paid Rs.30,000, C paid Rs.24,000 and the balance amount of Rs.26,000 must have been paid by D.
- Here $7+3 = 10$ and $9+11 = 20$; hence it makes sense to take 20 kg of both the alloys A and B. So the new alloy C will have a total weight of 40 kg. The amount of tin in C will be $7 \times 2 + 9 = 23$. The amount of copper will be $3 \times 2 + 11 = 17$. So the answer is 23:17.
- Let the cost of the house be $100x$ and it is sold at a loss of 18% to realize $82x$ which is equivalent to Rs.1230. If it were sold for 1600 it will amount to $106\frac{2}{3}^{\text{rd}} x$ so the profit would be $6\frac{2}{3}^{\text{rd}} \%$.
- Let C receive $x\%$ votes and B receive $(x + 20)\%$ votes. Hence A received $2(x + 20)\%$
 $\text{So } x + x + 20 + 2(x + 20) = 100$
 $\therefore x = 10\%$
Hence C got 10%, B got 30% and A got 60% of the votes. But the difference between A and C which is 50% is equivalent to 20,000. Hence, the total number of votes cast will be 40,000. But only 80% of the voters listed in the voters list voted; hence, the total number of voters on the list must be 50,000.
- This question is slightly different from the type of questions that we have solved earlier. Here the efficiency of two types of cannons are different and

their efficiencies are indicated as $\frac{5}{6}$ and $\frac{7}{9}$ respectively. Since the efficiencies are reflected in inputs our equation would be as follows:

$$\frac{480}{32 \times \frac{5}{6} \times 75} = \frac{560}{X \times \frac{7}{9} \times 30} .$$

Solve this to get X, i.e. number of cannons = 100.

6. This is a typical example where some superfluous information is given to mislead you.

Overlook such information. Let's assume that the job is finished in $2x$ hours; so for x hours machine Q alone was running and for the remaining x hours both P and Q were running. So we can setup the equation as follows:

$$45 \text{ gallons} \times 60 \text{ minutes} \times x \text{ hrs} + (45+30) \text{ gallons} \times 60 \text{ minute} \times x \text{ hrs} = 30 \times 60 \text{ minutes} \times 6 \text{ hrs}$$

$$45 \times 60 \times x + 75 \times 60 \times x = 30 \times 60 \times 6$$

Solve this to get $x = 1.5$. So the operation must be running for $2x = 3$ hours.

7. The first salesman calculates 20% profit on cost price; assume that the cost price is $5x$, so the profit is x and the sale price is $6x$. The other salesman works out 20% profit on sales price, so assume that the sale price is $5y$ and the profit is y . We can now setup 2 equations:

$$6x = 5y \text{ and } y - x = 200. \text{ Solve this to get } 6x = 5y = 6000.$$

8. Since the L.C.M. of 10, 20, 25 is 100, we assume that the capacity of the tank is 100 liters. So the hourly input of A, B, C will be 10 liters, 5 liters and 4 liters respectively. For the first hour, all the 3 are open so $10 + 5 + 4 = 19$ liters will be put into the tank. Since after 1 hour, tap C is closed for the next 3 hours, A and B together will put $15 \times 3 = 45$ liters into the tank. After 4 hours, tap A is closed and the remaining volume, i.e. $100 - 19 - 45 = 36$ will be filled by B. In other words, the tap B has filled $5 \times 4 + 36 = 56$ liters or 56% of the tank.

9. The fractions involved are $\frac{2}{9}$ and $\frac{3}{4}$. So assume that there are 36 voters. $\frac{2}{9}$ of 36 have so far voted, which means 8 persons have voted. Among these 8 persons, 6 are in favor of the resolution and 2 are against. Since we want the resolution to be defeated by 2:1, in all 24 voters must vote against the resolution; so 22 of the remaining 28 voters must vote against the resolution. The answer is $22/28 = 11/14$.

10. If Cyndi had put the entire Rs.2000 @ 5% she would have got Rs.100. She got Rs.148. In order to get Rs.4 extra, Cyndi has to shift Rs.100 from the account that gives 5% to the account that gives 9%. Hence in order to get Rs.48 extra she will have to shift $\underline{48} \times 100 = \text{Rs.1200}$ to 9% account.

Solutions To Test – 5

$$1. 8 \text{ Mangoes} + 10 \text{ Bananas} + 6 \text{ Oranges} = 2x$$

$$25 \text{ Mangoes} + 20 \text{ Bananas} + 12 \text{ Oranges} = 5x$$

Notice (20 Bananas and 12 Oranges) is exactly twice of (10 Bananas and 6 Oranges)

Solve these equations to get 9 Mangoes cost x . So 8 Mangoes will cost $\frac{8x}{9}$

So A spent

$$\frac{\underline{8x}}{\underline{9}} = \frac{4}{9}$$

$$2x = 9$$

2. Based on the fraction given, let us assume that C gets $12x$. So B gets $3x$ and A gets $2x$; hence we can setup the equation $12x + 3x + 2x = 680$ to get $x = 40$. So C's share is 480.

3. The dishonest dealer gives 900 gm instead of 1000 gm. Even while buying he had cheated by procuring 1100 gm instead of 1000 gm so the simple calculation would be

$$\frac{108 - 90 \times \frac{10}{11} \times 100}{90 \times \frac{10}{11}}$$

$$= \frac{108 \times \frac{11}{10}}{90 \times 10}$$

$$= (1.32 - 1) \times 100 = 32\%$$

4. Since the tradesman marks his goods at 25% above the cost price, assume that the cost price is $4x$ and the marked price is $5x$. Since he gives discount equivalent to $12 \frac{1}{2}\%$ which is $\frac{1}{8}$ th he would realize $\frac{7}{8}$ th of $5x$ and the percentage margin now would be

$$\frac{5x \times \frac{7}{8} - 4x}{4x} \times 100$$

Solve this to get margin as $9 \frac{3}{8}\%$.

5. Since A and B represent a non-zero real number, they can take either positive or negative values. So four possibilities exist as far as A and B are concerned.

	a	b
case 1	+	+
case 2	-	-
case 3	+	-
case 4	-	+

So now assume $a = +$ or -3 and $b = +$ or -5 to realize that the answer set is 3 and -1 .

6. Since the dishonest shopkeeper cheats by giving 10% less quantity and procuring 20% extra quantity while buying the formulae is as follows

$$\frac{100 - 90 \times \frac{10}{12} \times 100}{90 \times \frac{10}{12}} = \frac{100 \times 12 - 1 \times 100}{90 \times 10} = (1.333 - 1)100 = 33 \frac{1}{3}\%.$$

7. The numbers involved in this problem are 7 and 42 and hence the capacity of the tank can be considered as 42 liters. The first tap fills this tank in 7 hours so the input is 6 liters per hour. The second tap takes 42 hours to fill the tank

so its input must be 1 liter per hour. When both are open they will together fill $6 + 1 = 7$ liters per hour and hence the tank should be filled in 6 hours. Because of the leak, it takes one more hour or equivalent to 7 liters of additional input to fill the tank. Obviously these 7 liters are being drained by the leak over a 7 hour period. So the leak must be draining 1 liter per hour and hence will drain the filled tank in 42 hours.

8 to 10.

In these kinds of problems, it is important that you start with the right number depending upon the information given in the problem. Here the property gets divided among 3 persons so it makes sense that we start with a number like 36 or 72, since both of them are divisible several times by 2 as well as 3. Let's assume that the estate is worth Rs.72. So the widow of A, that is, the mother will get Rs.36 and both B and C will get Rs.18 each. When B dies he will leave Rs.9 to his widow and Rs.9 to his brother C. So now C has got $Rs.18 + Rs.9 = Rs.27$. So when he dies he will leave half of that to his widow Mrs. C, and the rest to his mother Mrs. A. Notice that the mother will have now $Rs.36 + Rs.13.5 = Rs.49.50$. But in the original problem, the mother is left with Rs.1,98,000. Hence Rs.72 which was the starting point as well as equivalent to the value of the estate must be equal to Rs.2,88,000/-.

Now you can work out the solutions for 8 – 10.

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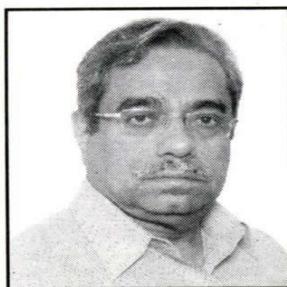
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