

Ti's All About A(P)ttitude!

## WORK SHEETS

## Quantitative Aptitude

This book consists of work sheets of the quantitative topics. These sheets will make sure that you have very solid concepts of each of these topics. The stress should be on understanding of the concepts rather than just solving of the questions.

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## Numbers - Miscellaneous

1. Find the number of zeros at the end of the product of the first hundred prime numbers.
2. Find the number of zeros at the end of the product of the first hundred natural numbers.
3. Find the number of zeros at the end of the product of the first five hundred natural numbers.
4. Find the highest power of ten that can divide 500 ! Completely.
5. Find the highest power of 2 that can divide 80 ! Completely.
6. Find the highest power of 8 that can divide 150 ! Completely.
7. Find the highest power of 6 that can divide 100 ! Completely.
8. Find the highest power of 24 that can divide 120 ! Completely.
9. Find the highest power of 105 that can divide 100 ! Completely.
10. If the product of all the odd numbers less than 100 is multiplied by 1024 , how many zeros will be there at the end of the product?
11. Find the summation of the series

$$
\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\frac{1}{20}+
$$

$$
+\frac{1}{600}
$$

12. Find the summation of the series $\frac{3}{4}+\frac{5}{36}+\frac{7}{144}+\frac{9}{400}+\ldots \ldots \ldots \ldots \ldots \ldots \ldots+\frac{19}{8100}$
13. Find the summation of the series

$$
\frac{1}{\sqrt{1}+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\cdots \ldots \ldots \ldots \ldots+\frac{1}{\sqrt{99}+\sqrt{100}}
$$

14. Find the summation $\sqrt{6+\sqrt{6+\sqrt{6+\sqrt{6+\sqrt{6+\cdots \ldots \ldots \infty}}}}}$
15. Find the summation $1 \times 1!+2 \times 2!+3 \times 3!\ldots \ldots \ldots \ldots \ldots \ldots \ldots+10 \times 10$ !

## Numbers - Power Cycle

1. Find the last digit of $122^{120}$.
2. Find the last digit of $786^{111}$.
3. Find the last digit of $444^{120} \times 999^{127}$.
4. Find the last digit of $78^{172}$.
5. Find the last digit of $73^{123} \times 88^{421}$.
6. Find the last digit of $42^{333} \times 87^{555}$.
7. Find the last digit of $222{ }^{1234567}$
8. Find the last digit of $787^{139}$.
9. Find the last digit of $123^{155} \times 458^{758}$.
10. Find the last digit of $88^{144}$
11. Find the last digit of $111^{111} \times 222^{222} \times 333^{333} \times \ldots \ldots \ldots \ldots \ldots \ldots . .$.
12. Find the last non- zero digit of $3170^{48}$
13. Find the last digit of $22^{111!}$

## Numbers - Divisibility Rules

1. What should be the value of $X$ so that $56879234 X 2$ is Divisible by 8 where $X$ is a digit?
2. What should be the value of $X$ so that $9842783 \times 24321$ is Divisible by 9 where $X$ is a digit?
3. What should be the value of $X$ so that $7432 X 43581$ is Divisible by 11 where $X$ is a digit?
4. What should be the values of $X$ \& $Y$ so that $4823 X 32485 Y$ is Divisible by 72 where $X$ \& $Y$ are digits?
5. What should be the values of $X$ \& $Y$ so that $42859 \times 34574 Y$ is Divisible by 55 where $X$ \& $Y$ are digits?
6. What should be the values of $X$ \& $Y$ so that $74284 X 32458$ Y is Divisible by 45 where $X$ \& $Y$ are digits?
7. What should be the values of $X$ \& $Y$ so that $42859 X 34574 Y$ is Divisible by 55 where $X$ \& $Y$ are digits?

## Numbers - Remainder Theorem

1. Find the remainder when $2^{120}$ is divided by 7 .
2. Find the remainder when $3^{172}$ is divided by 8 .
3. Find the remainder when $2^{225}$ is divided by 15 .
4. Find the remainder when $3^{215}$ is divided by 26 .
5. Find the remainder when $2^{228}$ is divided by 31
6. Find the remainder when $2^{120}$ is divided by 9 .
7. Find the remainder when $2^{123}$ is divided by 9 .
8. Find the remainder when $2^{133}$ is divided by 9 .
9. Find the remainder when $3^{178}$ is divided by 28 .
10. Find the remainder when $2^{237}$ is divided by 33 .
11. Find the remainder when $4^{24}$ is divided by 6 .
12. Find the remainder when $72^{122}$ is divided by 56 .
13. Find the remainder when $2^{100}$ is divided by 25 .
14. Find the remainder when $\left(6!^{7!}\right)^{\mathbf{1 0 0}}$ is divided by 13 .
15. Find the remainder when $7^{159}$ is divided by 5 .
16. Find the last 2 digits of $7^{48}$.
17. Find the remainder when $1187 \times 1188 \times 1189$ is divided by 37 .

## Numbers - Squares and Square Root

1. Find the square root of 2916 .
2. Find the square root of 3969 .
3. Find the lowest number that should be added or subtracted to 15980 to make it a perfect square.
4. Find the lowest number that should be added or subtracted to 143890 to make it a perfect square.
5. Find the lowest 6 digit perfect square.
6. Find the highest 6 digit perfect square.
7. Find the square root of 500 up to 2 decimal points.
8. Find the lowest number by which 7168 be multiplied or divided to make it a perfect square.
9. Find the lowest number by which 43200 be multiplied or divided to make it a perfect square.
10. Find the cube root of 9261 .
11. The memory occupied by a program of size N bytes is given by $\sqrt{100 \mathrm{~N}}$. If the size of the program is increased by $1 \%$, find the percentage change in the memory occupied by the program.
12. A son asked his father when his father was born. The father replied, "In a certain year in $20^{\text {th }}$ century his age was equal to the square root of that year". Find when he was born.
13. Aishwarya is having certain number of diamonds. If she divides them amongst the brothers Salman and Vivek, the difference between the square of the two numbers is 48 times the difference of the two numbers. Find the total number of diamonds she is having.
14. Gurukant went to a wholesale cloth market. He bought two different varieties of cloth for total less than Rs. 1000 he bought as many meters of each type as was the cost in rupees per meter of that type. Find the total quantity of cloth he bought if the difference in the total amount spent on each type was Rs. 215.
15. Malika is having certain number of sons and each of her son has as many brothers as sons. Find her age it's a number between 50 and 70 which is equal to the total number of sons and grandsons she is having.

Funny Facts:

| $1^{2}=1$ | $3^{2}=9$ | $6^{2}=36$ | $9^{2}=81$ |  |  |
| :--- | :--- | :--- | :--- | :---: | :---: |
| $11^{2}=121$ | $33^{2}=1089$ | $66^{2}=4356$ | $99^{2}=9801$ |  |  |
| $111^{2}=12321$ | $333^{2}=110889$ | $666^{2}=443556$ | $999^{2}=998001$ |  |  |
| $1111^{2}=1234321$ | $3333^{2}=11108889$ | $6666^{2}=44435556$ | $9999^{2}=99980001$ |  |  |
| 8 |  |  | Pankaj Gandhi's Academy/ work Sheets |  |  |

## Numbers - L.C.M and H.C.F

1. Find the LCM of $12,15,18,20$ and 24.
2. Find the lowest perfect square which is divisible by $16,24,27,30,36$ and 45 .
3. Find the lowest number which when divided by $9,15,18,24$ and 32 always gives the same remainder 5.
4. Find the lowest 5 digit number which when divided by $15,25,35$ and 45 always gives the same remainder 5 .
5. Find the highest 5 digit number which when divided by 14, 21, 35, 42 and 63 always gives the same remainder 1.
6. Find the lowest number which when divided by $3,5,7$ and 9 gives the same remainder 1 but when divided by 11 gives 0 remainder.
7. There are certain number of students in the class, when they are arranged in the rows of $16,18,24,25$ and 30 each time four persons are left but when they are arranged in a row of 11 three persons are left behind. Find the minimum number of students present.
8. Find the lowest number which when divided by $3,4,5,6,7$ gives the remainders $2,3,4$, 5 , and 6 respectively.
9. There are 4 persons A, B, C, D running around a circular track of circumference 2400 meters with the speeds of $50 \mathrm{~m} / \mathrm{s}, 70 \mathrm{~m} / \mathrm{s}, 90 \mathrm{~m} / \mathrm{s}$, and $130 \mathrm{~m} / \mathrm{s}$ respectively. If all the 4 start at the same time from the same starting point, find after how much time all the 4 will be together for the first time.
a) At the same starting point all the 4 are going in the same direction.
b) At the same starting point if $A, C, D$ are going in clockwise direction while $B$ in anticlockwise direction.
c) If all the 4 are going in the same direction.
d) If $A, C, D$ are going in clockwise direction while $B$ in anti-clockwise direction.
10. The summation of two numbers is 144 and the HCF is 24 . Find the two numbers.
11. The LCM of two numbers is 385 and the summation of two numbers is 132 . Find the two numbers.
12. The LCM of two numbers is 42 times their HCF. The difference of the two numbers is 275 . Find the two numbers if the summation of LCM and HCF is 1075.
13. There are three different flavour of cakes weighing $3.6 \mathrm{~kg}, 4.5 \mathrm{~kg}$ and 7.2 kg resp. they are to be distributed among maximum number of persons such that each person gets maximum possible quantity of cake without mixing the two different flavours. find the number of persons needed?
14. Find the HCF of 780,1495 and 1755.
15. Find the highest number that can divide 270, 445 and 730 giving the remainders 6,5 and 4 respectively.
16. Find the highest number that can divide 1481, 2361 and 2845 giving the same remainder.
17. There are 3 numbers $3^{4 *} 5^{2 *} 2^{3}, 3^{2 *} 5^{3} * 7^{2}$ and $N$. Find $N$ if the LCM of the three numbers is $3^{5 *} 5^{3 *} 2^{5 *} 7^{4}$ and there HCF is $3^{2 *} 5^{1}$.
18. Find the minimum number of square tiles needed for flooring a room of size 7.83 m * 5.94 m .

## Numbers - Simplification (Surds \& Indices)

## 1. Simplify :

(i) $(27)^{\frac{2}{3}}$
(ii) $(1024)^{-\frac{4}{5}}$
(iii) $(0.00032)^{\frac{3}{5}}$
(iv) $(16)^{0.25}$
(v) $8^{0.75} \times 32^{0.35}$
(vi) $27^{\frac{1}{3}} \times 81^{\frac{3}{4}}$
(vii) $3^{9.75} \times 3^{7.75} \div 27^{4.5}$
(viii) $16^{3.75} \times 8^{3.5} \div 4^{10.25}$
(ix) $81^{3 / 4} \times 16^{4 / 3} \div 4^{2 / 3}$
(x) $6^{12} \div 3^{10} \times 8^{2 / 3} \div 3^{2}$

## 2. Simplify

(i) $6 \sqrt{3}-3 \sqrt{12}+2 \sqrt{75}$
(ii) $\sqrt[4]{81}+8 \sqrt[3]{216}-15 \sqrt[5]{32}-\sqrt{225}$
3. Find the value of $\frac{7^{2 / 3} \times \sqrt[3]{7^{7}}}{\sqrt[3]{7^{6}}}$
4. Find the value of $\left[5\left(8^{1 / 3}+27^{1 / 3}\right)^{3}\right]^{1 / 4}$ ?
5. Find the value of $\frac{\left\{(125)^{0.17} \times(625)^{0.06}\right\}}{\left\{(5)^{0.07} \times(25)^{0.09}\right\}}$ ?
6. Find the value of $\frac{5^{n}+5^{(n-1)}}{5^{(n+1)}-5^{n}}$ ?
7. Find the value of $x \times y$, if $5^{(x-3)} \times 3^{(y+1)}=2025$
8. Which of the value is greatest $2^{1 / 2}, 3^{1 / 3}, 4^{1 / 4}, 6^{1 / 6}$ ?
9. Arrange the following in order of their magnitude
(i) $\sqrt[4]{10}, \sqrt[3]{6}, \sqrt{3}$
(ii) $\sqrt[3]{2}, \sqrt[4]{3}, \sqrt[6]{5}$
10. If $x+\frac{1}{x}=8$ then find the value of $x^{2}+\frac{1}{x^{2}} ?$
11. If $x-\frac{1}{x}=12$ then find the value of $x^{2}+\frac{1}{x^{2}}$ ?
12. If $x+\frac{1}{x}=5$ then find the value of $x^{3}+\frac{1}{x^{3}}$ ?
13. If $x-\frac{1}{x}=8$ then find the value of $x^{3}-\frac{1}{x^{3}}$ ?
14. Find the value of $\frac{4 \times 686-729}{98 \times 2+14 \times 9+81}$ ?
15. Find the value of $\frac{2197 \times 64+216 \times 27}{2704-52 \times 18+36 \times 9}$ ?
16. If $x=y^{a}, y=z^{b}$ and $z=x^{c}$ then find the value of abc?
17. If $x=\frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$ then find $x^{2}-8 x=$ ?
18. Find the value of $\frac{\sqrt{7}}{\sqrt{16+6 \sqrt{7}}-\sqrt{16-6 \sqrt{7}}}$ ?

## Percentage

| $1 / 2 \times 100=50 \%$ | $1 / 11 \times 100=9.09 \%$ | $1 / 20 \times 100=5 \%$ |
| :--- | :--- | :--- |
| $1 / 3 \times 100=33.33 \%$ | $1 / 12 \times 100=8.33 \%$ | $2 / 9 \times 100=22.22 \%$ |
| $1 / 4 \times 100=25 \%$ | $1 / 13 \times 100=7.69 \%$ | $2 / 11 \times 100=18.18 \%$ |
| $1 / 5 \times 100=20 \%$ | $1 / 14 \times 100=7.14 \%$ | $3 / 11 \times 100=27.27 \%$ |
| $1 / 6 \times 100=16.66 \%$ | $1 / 15 \times 100=6.66 \%$ | $2 / 7 \times 100=28.56 \%$ |
| $1 / 7 \times 100=14.28 \%$ | $1 / 16 \times 100=6.25 \%$ | $3 / 8 \times 100=37.5 \%$ |
| $1 / 8 \times 100=12.5 \%$ | $1 / 17 \times 100=5.88 \%$ | $5 / 8 \times 100=62.5 \%$ |
| $1 / 9 \times 100=11.11 \%$ | $1 / 18 \times 100=5.55 \%$ | $7 / 8 \times 100=87.5 \%$ |
| $1 / 10 \times 100=10 \%$ | $1 / 19 \times 100=5.26 \%$ | $1 \times 100=100 \%$ |

X is what \% of $\mathrm{Y}=\frac{X}{Y} \times \mathbf{1 0 0}$
X is how much \% more or less than $\mathrm{Y}=\frac{(\text { Bigger }- \text { Smaller })}{Y} \times 100$

1. The price of an article is reduced by $25 \%$. If the new price is Rs.960. Find the original price.
2. The price of an article is increased by $33 \frac{1}{3} \%$. If the new price is Rs.960. Find the original price.
3. The price of an article is first increased by $25 \%$ and then reduced by $33.33 \%$. If the final price is Rs. 1200. Find the original price.
4. A shopkeeper first increased the price by $16.66 \%$ and then again by $22.22 \%$. If the final price is Rs. 1540. Find the original price.
5. The price of an article is first increased by $20 \%$ and then reduced by $25 \%$. Find the final price is how much percent more or less than the original.
6. Mr. Motabhai spends $25 \%$ of his income on food and $20 \%$ of the remaining on house rent. If at the end he is left out with Rs. 24000 . Find his income.
7. A person spends $25 \%$ of his income on house rent, of the remaining $33.33 \%$ on food and of the remaining $16.66 \%$ on clothes and $28.56 \%$ of the remaining on shopping and of the remaining $12.5 \%$ on charity. And the remaining Rs. 14000 he saves. Find his income.
8. The price of sugar is reduced by $25 \%$.By what $\%$ the consumption should be increased so that the expenditure remains the same.
9. The price of sugar is increased by $20 \%$.By what $\%$ the consumption should be reduced so that the expenditure remains the same.
10. A reduction of $25 \%$ in the price of oranges enables a person to buy 10 dozen more oranges for the same amount of Rs. 600 . Find the price per orange after reduction.
11. An increase of $20 \%$ in the price of oranges enables a person to buy 15 dozen less oranges for the same amount of Rs. 1800. Find the price per orange after increase.
12. A reduction of $25 \%$ in the price of sugar enables a person to buy 15 kg more sugar for the same amount. Find how many kg of sugar he will be able to buy if the price is increased by $25 \%$ instead of reduction.
13. The base of a triangle is increased by $20 \%$ while the height is reduced by $10 \%$. Find the $\%$ change in the area of triangle.
14. The length of a rectangle is reduced by $25 \%$ and the breadth is increased by $20 \%$. Find the \% change in the area of rectangle.
15. A reduction of $20 \%$ in the price of movie ticket resulted in $50 \%$ increase in the number of tickets sold. Find the \% change in the total amount collected.
16. A reduction of $25 \%$ in the price of movie ticket resulted in $80 \%$ increase in the total amount collected. Find the \% change in the number of tickets sold.
17. The population of a city is increased by $20 \%$ in the first year and in the next year it is reduced by $20 \%$. Find the total \% change in the population in two years.
18. In an election contested between the two, a person getting support of $56 \%$ of the voters won the election by 14400 votes. Find the total number of voters.
19. In an election contested between the two, $20 \%$ of the voters did not participate in the voting. Out of the votes polled the person getting support of $55 \%$ won the election by 7200 votes. Find the number of voters on the voting list.
20. In a zoo the ratio of male monkeys to female monkeys is $5: 6$ and the ratio of male monkeys who smoke to the female monkeys who smoke is $3: 4$. If $40 \%$ of the male monkeys smoke find what $\%$ of the total monkeys in the zoo smoke.
21. A class has a strength of 120 out of which $60 \%$ are boys. Find how many boys should be taken out from the class so that the remaining class contains $60 \%$ girls.
22. There is a fish pond containing 200 fish out of which $80 \%$ are guppies. Find how many guppies should be taken out so that the remaining fish pond contains $50 \%$ guppies.
23. Fresh grapes contain $90 \%$ water when they are dried they turn into resins containing $20 \%$ water. Find how many kg of resins can be obtained from 20 kg of fresh grapes.
24. Fresh potato contain $99 \%$ water when they are dried they contain $98 \%$ water. Find how many kg of potato will be obtained after drying 100 kg of fresh potato.

## Interest

1. A certain amount of money is deposited for five years at $16 \%$ per annum rate of interest and the person gets twice the interest of what he gets on Rs. 64000 deposited for 3 years at $24 \%$ rate of interest. Find the amount deposited.
2. A person deposited a certain amount of money at a certain rate of interest for 3 years and received certain amount of interest. Had he deposited the same money for the same time period at 2.5 \% higher rate of interest he would have received Rs. 6600 more as the interest. Find the amount deposited.
3. A person owes Rs. 672 one year hence but if he wants to settle the account only after 5 months how much should he pay if the rate of interest is $12 \%$ per annum.
4. A certain amount of money deposited at a certain rate of interest amounts to Rs. 1120 at the end of 4 years and to Rs. 1200 at the end of 5 years. Find the amount deposited and the rate of interest.
5. A certain amount of money deposited at a certain rate of interest amounts to Rs. 2080 at the end of 2.5 years and to Rs. 2368 at the end of 4 years. Find the principle and the rate of interest.
6. A certain amount of money deposited at a certain rate of interest doubles itself in 6 years. Find the rate of simple interest.
7. A person took a loan Rs. 900 and paid it back in 10 monthly instalment of Rs. 100 each. Find the rate of simple interest.
8. A person deposited Rs. 50 per month for 5 years. Find the total amount he will get back at the end of 5 years if the rate of simple interest is $18 \%$ per annum.
9. A person deposited Rs. 60000 at the rate of $20 \%$ per annum to be compounded annually. Find the total amount he will get back at the end of 3 years .
10. A person deposited certain amount of money for 1 year at the rate of $10 \%$ per annum simple interest but if the interest is compounded half yearly then he gets Rs. 25 more as the interest. Find the amount deposited.
11. The simple interest on a certain amount deposited for 2 years is Rs. 480 but if it is compounded annually it comes out to Rs. 499.2 . Find the principle and the rate of interest.
12. A certain amount of money deposited at a certain rate of interest amounts to Rs. 103680 at the end of 3 years and to Rs. 124416 at the end of 4 years. Find the rate of compound interest.
13. A certain amount of money deposited at a certain rate of compound interest triples itself in 6 years. Find in how many years it will become 9 times.
14. A person took a loan of Rs. 3000 and paid it back in 3 equal annual instalments. Find the amount of each instalment if the rate of interest is $20 \%$ per annum.

## Stocks and Shares

1. A person bought $10 \%$ stock of a company at Rs. 90 . Find his gain \%.
(a) $10 \%$
(b) $9 \%$
(c) $11.11 \%$
(d) $9.09 \%$
2. A person bought $8 \%$ stock of a company as such a price that he gets a return of $10 \%$ of his investment. Find the market value of the share.
(a) 120
(b) 80
(c) 75
(d) 125
3. A person bought $12 \%$ stock of the company at a premium of Rs. 25 . Find his return on investment \%.
(a) $10 \%$
(b) $8 \%$
(c) $9.6 \%$
(d) $8.4 \%$
4. A person bought $8 \%$ stock of a company at a discount of Rs. 10 such that he gets a return of $10 \%$ on his investment. Find the face value of the share.
(a) Rs. 40
(b) Rs. 50
(c) Rs. 90
(d) None of these
5. Which of the following is a better investment :
(a) $10 \%$ stock of a company at Rs. 90
(b) $9 \%$ stock of a company at Rs. 75 but with a tax of $10 \%$
(c) $12 \%$ stock of a company at Rs. 120
(d) $7.5 \%$ stock of a company at Rs. 75 .
6. A person bought $12 \%$ stock of a company at Rs. 129. Find his gain at end of the year if in all he invested Rs. 15,600 (Brokerage being 1\%)
(a) Rs. 1560
(b) Rs. 1872
(c)Rs. 1440
(d) 1320
7. A person invested total 12000 Rs. A part of it in $9 \%$ stocks at Rs. 75. And the remaining in $12 \%$ stock at Rs. 125 . Find the amount invested in $12 \%$ stock. If the at the end of the year his income was Rs. 1260.
(a) 4500
(b) 7500
(c) 6000
(d) 8000

## Profit \& Loss

1. A person bought certain number of oranges at the rate of 3 for Rs. 4 and sold them at the rate of 2 for Rs. 3. Find his profit / loss percentage.
2. A person bought certain number of oranges at the rate of 4 for Rs. 5 and sold them at the rate of 3 for Rs. 4. Find his profit/ loss percentage.
3. A person bought certain number of oranges at the rate of 2 for Rs. 3 and an equal number at the rate of 3 for Rs. 4 sold them at the rate of 4 for Rs. 7. Find his profit /loss percentage.
4. A person bought 30 dozens of eggs at the rate of Rs. 2.5 per egg and in the transportation 30 eggs broke he sold the remaining at the rate of Rs. 45 per dozen. Find his total profit / loss percentage.
5. The selling price of 15 articles is equal to cost price of 18 articles. Find its profit / loss percentage.
6. The selling price of 39 articles is equal to cost price of 36 articles. Find its profit/loss percentage.
7. A person sold 12 chocolates for a rupee and made a loss of $25 \%$. Find how many chocolates should he sell for a rupee to make a profit of $50 \%$.
8. A person sold 20 chocolates for a rupee and made a profit of $25 \%$. Find how many chocolates should he sell for a rupee to make a profit of $100 \%$.
9. A person sold 20 chocolates for a rupee and made a loss of $25 \%$. Find what will be the profitloss percentage if he sells 12 chocolates for a rupee.
10. A person sells his goods at the cost price but he gives only 900 gms for a kg . Find his gain \%.
11. A person sells his goods at the cost price but he gives only 800 gms for a kg . Find his gain \%.
12. A shopkeeper sells his goods at $20 \%$ profit but to make extra profit he gives only 800 grams for a kg. Find his total profit percentage.
13. A shopkeeper sells his goods at $10 \%$ loss but to cover up the loss he gives only 750 grams for a kg. Find his total profit /loss percentage.
14. A person sold two articles at the same selling price of Rs. 1200 each. One at the profit of $20 \%$ and the other at loss of $20 \%$. Find his total profit /loss percentage.
15. A person sold two articles at the same selling price of Rs. 660 each. One at the profit of $25 \%$ and the other at loss of $25 \%$. Find his total profit /loss percentage.
16. A person bought a table and a chair together and he sold them together for Rs. 210. The table at the profit of $10 \%$ and the chair at the loss of $10 \%$. Find the cost price of each if he made a profit of $5 \%$ in the whole transaction.
17. A person bought a donkey and a monkey together and he sold them together for Rs. 7200. The donkey at the profit of $30 \%$ and the monkey at the loss of $20 \%$. Find the cost price of each if he made a profit of $20 \%$ in the whole transaction.
18. A person bought a horse and carriage together for Rs. 15200. He sold the horse at the profit of $32 \%$ and the carriage at the loss of $23 \%$. Find the cost price of each if the selling price of both is same.
19. A person bought an article and sold it a profit of $20 \%$, if he had bought it at a price $20 \%$ less than the original cost price and sold it at a price Rs. 150 less than the original selling price he would have made a profit of $25 \%$. Find the original cost price of the article.
20. A person bought an article and sold it at a profit of $25 \%$, if he had bought it at a price 10 \% less than the original cost price and sold it at a price Rs. 130 more than the original selling price he would have made a profit of $50 \%$. Find the original cost price of the article.
21. A person sold an article at the loss of $8 \%$ if he had sold it for Rs. 132 more he would have made a profit of $14 \%$. Find the cost price of the article.
22. A person sold an article at the loss of $15 \%$ if he had sold it for Rs. 180 more he would have made a profit of $9 \%$. Find at what price he should sell the article to make a profit of $20 \%$.
23. A shopkeeper cheats both buyer as well as seller by $20 \%$ using the false weights. Find his total gain percentage.
24. A shopkeeper cheats the buyer by $25 \%$ and the seller by $50 \%$ using the false weights. Find his total gain percentage.
25. A shopkeeper sold an article at a discount of $20 \%$ and still made a profit of $20 \%$. What will be the profit \% if he does not give any discount?
26. A shopkeeper sold an article at a discount of $25 \%$ and still made a profit of $50 \%$. What will be the profit \% if he gives 50 \% discount?
27. A person sells books at a discount of $20 \%$ on the mark price and he gives 1 book free on every 11 books bought and still make a profit of $10 \%$. Find at what $\%$ above the cost price is the marked price?

## Alligation and Mixture

1. Find the ratio of quantities in which two varieties of sugar costing Rs. 20.5 per kg and Rs. 24.8 per kg must be mixed so that the resulting mixture costs Rs. 22.8 per kg .
2. Find how many kg of sugar costing Rs. 16.8 per kg must be mixed with 144 kg of sugar costing Rs. 22.2 per kg so that the resulting mixture costs Rs. 19.2 per kg.
3. Find how many kg of sugar costing Rs. 21.6 per kg must be mixed with 345 kg of sugar costing Rs. 27.2 per kg so that the resulting mixture costs Rs. 23.9 per kg.
4. Find the ratio of quantities in which two varieties of sugar costing Rs. 19.6 per kg and Rs. 25.4 per kg must be mixed so that by selling the mixture at Rs. 24.2 per kg the shopkeeper makes a profit of $10 \%$.
5. Find how many kg of sugar costing Rs. 26.2 per kg must be mixed with 224 kg of sugar costing Rs. 33.6 per kg so that by selling the mixture at Rs. 34.8 per kg the shopkeeper makes a profit of $20 \%$.
6. There are two varieties of coffee costing Rs. 20 per kg and Rs. 30 per kg . Find how many kg of each type must be mixed to get a 40 kg mixture which by selling at Rs. 32 per kg the shopkeeper makes a profit of $33.33 \%$.
7. A milkman bought certain quantity of milk and added certain quantity of water into it and sold the mixture at the cost price of milk and made a profit of $25 \%$. Find the ratio of water as to milk in the mixture and the percent water present in the mixture.
8. A milkman bought certain quantity of milk and added certain quantity of water into it and sold the mixture at the cost price of milk and made a profit of $20 \%$. Find the ratio of water as to milk in the mixture and the percent water present in the mixture.
9. Find the ratio of quantities in which $20 \%$ concentrated beer must be mixed with $40 \%$ concentrated vodka to get a cocktail of $32 \%$ concentration.
10. Find the ratio of quantities in which the contents of the two jars $A$ and $B$ containing milk and water in the ratio $3: 5$ and $7: 5$ respectively must be mixed so that the resulting mixture contains equal quantity of milk and water.
11. Find the ratio of quantities in which the contents of the two jars $A$ and $B$ containing spirit and alcohol in the ratio $3: 5$ and $3: 1$ respectively must be mixed so that the resulting mixture contains $60 \%$ spirit.
12. Find how many kg of sugar must be added to 200 kg of $30 \%$ concentrated sugar solution to increase the concentration to $50 \%$.
13. Find how many kg of salt must be added to 120 kg of $24 \%$ concentrated salt solution to increase the concentration to $40 \%$.
14. Find how many kg of water must be added to 225 kg of $30 \%$ concentrated sugar solution to get the concentration reduced to $25 \%$.
15. From a jar containing mixture of two liquids $A$ and $B$ in the ratio $5: 7,14$ ltr is taken out and is replaced by 14 ltr of liquid $A$ now the ratio becomes $7: 5$. Find the total quantity of liquid present in the jar and the quantity of liquid $A$ present originally.
16. From a jar containing mixture of two liquids $A$ and $B$ in the ratio $3: 5$, 16 Itr is taken out and is replaced by 16 ltr of liquid A now the ratio becomes $7: 5$. Find the total quantity of liquid present in the jar and the quantity of liquid $A$ present originally.
17. From a jar full of wine 12 ltr is taken out and is replaced by water and from the jar again 12 Itr is taken out and replaced by water. Now the ratio of wine as to water in the jar becomes 9:16. Find the quantity of wine present originally and at the end.
18. From a jar full of wine 20 ltr is taken out and is replaced by water and the process is repeated twice more now the jar contains $48.8 \%$ water. Find the total quantity of wine present initially and at the end.
19. From a jar containing 200 ltr of milk, 20 Itr is taken out and replaced by water and the process is repeated twice more. Find the total quantity of milk present at the end.
20. A person bought a table and a chair together and he sold them together for Rs. 660. The table at $20 \%$ profit and the chair at $10 \%$ loss. Find the cost of each if he made a profit of $10 \%$ in the whole transaction.
21. A person bought 252 kg of rice. He sold a part of it at $16 \%$ profit and the remaining at $12 \%$ loss. Find the quantity he sold at $16 \%$ profit if he made a profit of $10 \%$ by selling the whole rice.
22. A bag contains 400 coins of 25 ps and 50 ps . Find the number of coins of each type present in the bag if the bag contains Rs. 136.
23. A person covered a journey of 200 km in total 8 hrs partly by cycle at $20 \mathrm{~km} / \mathrm{hr}$ and the remaining by car at $40 \mathrm{~km} / \mathrm{hr}$. Find the distance travelled by each.
24. An aptitude test was conducted in three different sections the average score of sections A, B and C were 80,72 , and 82 respectively. While the combined average section A and $B$ was 77 and the combined average section of $B$ and $C$ was 76 . Find the combined average of all the three section.
25. A person can buy 20 sparrows for a Rupee, a pigeon for a Rupee and a peacock for 5 Rs Find the number of birds of each type he needs to buy if he wants to buy total 100 birds for 100 Rupees so that he buys atleast one bird of each type
26. A person bought total 100 shares of three different companies for total Rs. 10,000. Find the number of shares of each company he bought if the cost of the shares was Rs.5, Rs. 200 and Rs. 300 respectively.
27. A person bought total 500 stamps for total Rs. 500 . Find the number of stamps of each type he bought if the cost of each was Rs. 3 , Rs. 2 and Rs. 0.48 respectively. if number of 2 Rs stamps is more than number of 3 Rs stamps.
28. Bhimsen got a 50 ltr barrel of vodka on the first day. He drank 1 ltr and replaced it by water. The next day, he drank 2 ltr and replaced it by water and continued in this manner till last $50^{\text {th }}$ day on which he drank the whole barrel. Find the total quantity of


## Time and Work

1. 3 persons $A, B$ and $C$ can complete a certain work in 10 days, 12 days and 15 days respectively. Find in how many days all the 3 together will complete the same work.
2. 2 persons $A$ and $B$ can complete a certain work in 20 days and 30 days respectively. Both of them started to work together, after how many days A should be stopped from working so that B completes the remaining work in 5 days.
3. 2 persons $A$ and $B$ can complete a certain work in 36 days and 45 days respectively. Both of them started to work together, after how many days A should be stopped from working so that B completes the remaining work in 9 days.
4. 2 persons $A$ and $B$ can complete a certain work in 15 days and 20 days respectively. Both of them started to work together, after how many days A should be stopped from working so that the total work gets completed in 12 days.
5. 2 persons $A$ and $B$ can complete a certain work in 30 days and 45 days respectively. Both of them started to work together, after how many days B should be stopped from working so that the total work gets completed in 20 days.
6. 3 persons $A, B, C$ can complete a certain work in 10 days, 12 and 15 days respectively. All of them started to work together but A left after 2 days and $B$ left 3 days before the completion of the work. Find in how many days the work was completed.
7. A completes a certain work in 20 days working 9 hr a day while B complete the same work in 15 days working 8 hr a day. Find in how days both of them working together 6 hr a day will complete the same work.
8. $A$ and $B$ together complete a certain work in 20 days while $B$ and $C$ together complete the same work in 30 days and $C$ and $A$ together complete the same work in 24 days. Find in how many days all of them together and each of them alone will complete the same work.
9. A and B together complete a certain work in 40 days while B and C together complete the same work in 30 days and $C$ and $A$ together complete the same work in 24 days. Find in how many days all of them together and each of them alone will complete the same work.
10. $A$ and $B$ together complete a certain work in 20 days while $B$ and $C$ together complete the same work in 30 days. First A alone worked for 10 days and left the work then B alone worked for 16 days and left the work then C alone worked for 18 days and the work was completed. Find in how many days all the 3 together and each of them alone completes the same work.
11. A is twice as efficient as $B$ and completes a certain work in 12 days less than $B$. Find in how many days both of them together will complete the same work.
12. $A$ is twice as efficient as $B$ and $B$ is 3 times more efficient than $C$. Working together all of them complete the same work in 16 days. Find in how days each of them alone will complete the same work.
13. A does thrice the work done by $B$, in twice the time required by $B$. If both of them together complete a certain work in 24 days. Find in how many days each of them alone completes the same work.
14. 2 persons $A$ and $B$ complete a certain work in 24 days and 36 days respectively. If they work for 1 day each on alternate days with A starting on the first day. Find in how many days the work will be completed.
15. Three persons A, B and C can complete a certain work in 24 days, 36 days and 45 days respectively. If they work for 1 day each in the sequence of $A, B, C$. Find in how many days the work will be completed.
16. Three persons A, B and C can complete a certain work in 20 days, 30 days and 40 days respectively. All of them working together completed the same work. Find the share of each in the total amount of Rs. 6500.
17. Two persons $A$ and $B$ complete a same work in 20 days and 30 days respectively but with the help of $3^{\text {rd }}$ person C they completed the same work in 10 days. Find the share of each in the total amount of Rs. 15000.
18. Three persons A, B, and C can complete a certain work in 20 days, 30 days and 40 days respectively. First $A$ and $B$ started to work together but after 4 days $C$ replaced $A$. After 4 more days a new person $D$ replaces $B$ and in 4 more days the work was completed. Find the share of each in the total amount of Rs. 30000.

## Pipes and Cisterns

1. There are 3 pipes $A, B, C$ attached to a tank. Pipe $A$ alone can fill the tank completely in 30 minutes, pipe $B$ alone can fill the same tank in 45 minutes, while pipe $C$ alone can empty the full tank in 20 minutes. If all the pipes are open together when the tank is completely empty find in how much time the tank will be completely filled.
2. There are 3 pipes $A, B, C$ attached to a tank. Pipe $A$ alone can fill the tank completely in 36 minutes, pipe $B$ alone can fill the same tank in 45 minutes, while pipe $C$ alone can empty the full tank in 15 minutes. First pipes $A$ and $B$ are open when the tank is completely empty and when the tank is half filled pipe $C$ is also opened. Find in how much time the tank will be completely filled or emptied.
3. There are two pipes $A$ and $B$ attached to a tank which can fill the tank completely in 36 minutes and 60 minutes respectively. Both of them are open together when the tank is completely empty, find after how much time pipe A should be closed so that B can fill the remaining tank in 18 minutes.
4. A pipe alone can fill the tank completely in 12 hr but because of a leak at the bottom of the tank it requires 15 hr to fill the same. Find in how much time the leak alone will completely empty the full tank.
5. A pipe alone can fill the tank completely in 4 hr but because of a leak at the bottom of the tank it requires 10 hr to fill the same Find in how much time the leak alone will completely empty the full tank.
6. Two pipes $A$ and $B$ can fill a tank completely in 4 hr and 6 hr respectively. Both are open together but because of a leak at the bottom of the tank it requires 36 minutes more than it should have required. Find in how much time the leak alone will empty the full tank.
7. There are 3 pipes A, B, C attached to a tank. Pipe A alone can fill the tank completely in 20 minutes, pipe $B$ alone can fill the same tank in 30 minutes, while pipe $C$ is a waste pipe. A person opened only pipe A and B when the tank was completely empty and returned back when the tank should have been completely filled but he found out that that pipe $C$ was left open accidently Now he closes pipe $C$ and $A$ and $B$ fill the remaining tank in 4 minutes. Find in how much time pipe $C$ alone will completely empty the full tank.
8. There are 3 pipes A, B, C attached to a tank which together can fill a tank completely in 15 hr . All of them are open together, but after 10 hr pipe $C$ is closed now $A$ and $B$ filled the remaining tank in 8 hr . Find in how much time pipe C alone will completely fill the same tank.
9. A pipe alone can fill a tank completely in 12 hr but because of a leak of 30 litres $/$ minute it requires 16 hr to fill the same. Find the capacity of the tank.
10. There are 3 pipes $A, B, C$ attached to a tank. Pipe $A$ alone can fill the tank completely in 30 minutes, pipe $B$ alone can fill the same tank in 45 minutes, while pipe $C$ empties 20 litres/minute. If all the 3 pipes are open together when the tank is completely empty the tank gets completely filled in 3 hr . Find the capacity of the tank.
11. There are 2 pipes attached to a tank which can fill the tank completely in 20 hr and 30 hrs respectively. Both of them are open together but because of a leak of 10 litres /minute at half the height of the tank it requires 24 hrs to completely fill the tank. Find the capacity of the tank.
12. A monkey is climbing the pole 100 meters high. Every alternate minute it goes up by 20 meters and the next minute it comes down by 15 meters. Find in how many minutes it will reach the top for the first time.
13. A monkey is climbing the pole 84 meters high. Every alternate minute it goes up by 12 meters and the next minute it comes down by 5 meters. Find in how many minutes it will reach the top for the first time.
14. There are 3 pipes $A, B, C$ attached to a tank. Pipe $A$ alone can fill the tank completely in 60 minutes while pipe $B$ alone can fill the same tank in 90 minutes, while pipe $C$ alone can empty the full tank in 45 minutes. If all the 3 pipes are kept open for 1 minute each in the sequence of $A, B, C$. Find in how much time the tank will be completely filled for the first time.


## Chain Rule

1. 12 men working together 8 hr a day complete a certain work in 45 days. Find in how many days will 27 men working together 10 hr a day complete the same work.
2. 91 men working together 9 hr a day built a wall 143 meters long, 75 meters high and 60 meter broad in 72 days. Find in how many days will 56 men working together 12 hr a day built a wall 64 meters long, 55 meters high and 100 meters broad.
3. 20 men or 30 women working together 9 hr a day complete a certain work in 64 days. Find in how many days will 12 men and 6 women working together 12 hr a day will complete the same work.
4. 3 men or 4 women or 6 children can complete a certain work in 27 days working 8 hr a day. Find in how days will 1 man, 1 woman and 1 child working together 12 hr a day will complete the same work.
5. 12 men and 20 women working together 8 hr a day complete a certain work in 90 days while 24 men and 10 women working together 12 hr a day complete the same work in 48 days. Find in how many days will 9 men and 9 women working together 10 hr a day complete the same work.
6. 20 men and 8 women working together 9 hr a day complete a certain work in 120 days while 16 men and 12 women working together 12 hr a day complete the same work in 81 days. Find in how many days will 30 men and 15 women working together 9 hr a day complete twice the same work.
7. A contractor undertook to complete the work in 120 days and he employed 144 men each working 9 hr a day but at the end of 90 days only half the work was completed. How many extra men should be employed now to complete the work on time each man now working 12 hr a day?
8. 10 spiders working 10 hr a day spin 10 webs in 10 days. Find how many webs will be spun by 25 spiders working 12 hr a day in 100 days.
9. 8 monkeys eat 8 bananas in 8 days. Find in how many days will 3 monkeys eat 3 bananas.
10. A garrison of 5000 soldiers had food provisions for 40 days given at the rate of 600 grams per person per day but at the end of 10 days some extra soldiers joined now the food per person per day is reduced to 500 grams and the food lasts for 24 more days. Find the number of extra soldiers joining the camp.
11. A contractor undertook to complete a certain work in 40 days and employed 100 men but at the end of 25 days 25 extra men joined and the work was completed 1 day before the scheduled. Find by how many days he would have been late had there been no extra men.
12. A contractor undertook to complete a certain work in 44 days and employed 60 men but at the end of 25 days 20 extra men joined and the work was completed 1 day before the scheduled. Find by how many days he would have been late had there been no extra men.
13. 20 engines working 8 hr a day consume 600 litres of petrol in 36 days. Find how much petrol will be consumed by 30 engines working 10 hr a day in 32 days given that 5 engine of latter type consume as much petrol as 4 engines of former type.


## Speed Time and Distance (Part 1)

1. Walking at a speed $25 \%$ more than the usual a person reaches the office 8 minutes earlier. Find the time required usually.
2. Walking at a speed $20 \%$ less than the usual a person reaches the office 15 minutes late. Find the time required usually.
3. A person covered a certain distance from home to office with the speed of $20 \mathrm{~km} / \mathrm{hr}$ and reached 10 minutes late. If he had traveled the same distance with the speed of 30 $\mathrm{km} / \mathrm{hr}$ he would have reached 20 minutes earlier. Find the distance to be travelled and the speed by which he should travel the distance to reach on time.
4. 2 friends meet sometime in the morning and decided to have lunch together at the same place at 12 in the afternoon but one of them had to go to a certain place. If he goes and comes back with the speed of $10 \mathrm{~km} / \mathrm{hr}$ he is late by 1 hr but if he travels the same distance with the speed of $15 \mathrm{~km} / \mathrm{hr}$ he reaches 1 hr early. Find the distance to be travelled and the speed by which he should travel the distance to reach on time.
5. Amitabh went from Mumbai to Goa with the speed $60 \mathrm{~km} / \mathrm{hr}$ and came back with the speed of $90 \mathrm{~km} / \mathrm{hr}$. Find his average speed for the entire journey.
6. A person covered 4 rounds around a circular track with the speeds of $10 \mathrm{~km} / \mathrm{hr}, 20$ $\mathrm{km} / \mathrm{hr}, 30 \mathrm{~km} / \mathrm{hr}$ and $40 \mathrm{~km} / \mathrm{hr}$ respectively. Find his average speed for the whole journey.
7. A train's speed is $54 \mathrm{~km} / \mathrm{hr}$ without stoppage and $45 \mathrm{~km} / \mathrm{hr}$ with stoppage. Find for how much time in an hour the train stops.
8. A person started his morning walk at 6 am. First he went a certain distance on level ground with the speed $4 \mathrm{~km} / \mathrm{hr}$, then he went certain distance uphill with the speed 3 $\mathrm{km} / \mathrm{hr}$ and then certain distance downhill with the speed $6 \mathrm{~km} / \mathrm{hr}$. He then turned back and returned to the starting point at 12 in the afternoon. Find the total distance travelled by him.
9. A bus started from Pune towards Mumbai. It crossed a Rickshaw going in the same direction at 10 am . The bus reached Mumbai at 12:30 pm and after waiting there for 1 hr it started its return journey and met the same rickshaw at 2 pm . Find at what time the rickshaw will reach Mumbai.
10. A train is travelling from Pune towards Mumbai. After travelling for 2 hrs it developed a technical problem and travelled the remaining distance with the reduced speed of $3 / 4^{\text {th }}$ of the original and reached 30 minutes late than the usual time. Had the train reduced the speed 30 km further on, it would have reached 10 minutes sooner. Find the distance between Mumbai and Pune.
11. A person finishes off with his office work every day at a fixed time. His driver starts from his home everyday at a fixed time such that he reaches the office exactly when his boss finishes off with the work. One day he finished off his work one hr earlier, knowing the fact the driver would have started on his routine time, he started walking towards home. On his way he met the driver in between and reached the home 20 minutes earlier than the routine time. Find for how much time he was walking.

## Speed Time Distance (Part 2)

1. There are 2 stations Mumbai and Pune 800 km apart. A train started from Mumbai at 6 am. with a speed $120 \mathrm{~km} / \mathrm{hr}$. And another train started from Pune at the same time with a speed $80 \mathrm{~km} / \mathrm{hr}$. Find at what time and at what distance from Mumbai the two trains will meet.
2. There are 2 stations Mumbai and Pune 640 km apart. A train started from Mumbai at 6 am. with a speed $90 \mathrm{~km} / \mathrm{hr}$. And another train started from Pune at the same time with a speed $60 \mathrm{~km} / \mathrm{hr}$. Find at what time and at what distance from Mumbai the two trains will meet.
3. There are 2 stations Mumbai and Pune 1000 km apart. A train started from Mumbai at 6 am. with a speed $60 \mathrm{~km} / \mathrm{hr}$. And another train started from Pune at 7 am with a speed 90 $\mathrm{km} / \mathrm{hr}$. Find at what time and at what distance from Mumbai the two trains will meet.
4. There are 2 stations Mumbai and Pune 630 km apart. A train started from Mumbai at 6:45 a.m. with a speed $100 \mathrm{~km} / \mathrm{hr}$. And another train started from Pune at $8: 15 \mathrm{am}$ with a speed $60 \mathrm{~km} / \mathrm{hr}$. Find at what time and at what distance from Mumbai the two trains will meet.
5. There are 2 stations Nagpur and Kanpur 2400 km apart. A train $X$ started from Nagpur towards Kanpur with the speed of $200 \mathrm{~km} / \mathrm{hr}$ and at the same time train Y started from Kanpur towards Nagpur with the speed of $400 \mathrm{~km} / \mathrm{hr}$ and at the same time a bird sitting on the top of train X started flying towards $Y$ with the speed of $1200 \mathrm{~km} / \mathrm{hr}$. The moment it meets train Y it turns back and now the moment it meets train X again turns back and continues to ferry in between till finally gets crushed between the 2 trains. Find
a) The total distance traveled by the bird in whole process.
b) The distance traveled by the bird when it meets train $Y$ for the first time.
c) The total distance traveled by the bird when it meets train $X$ for the first time after start.
6. A train starts from Pune towards Nagpur at 6 am and reaches Nagpur at 9 am. While a train starts from Nagpur at 7 am and reaches Pune at 9 am . Find at what time will the two trains meet?
7. A train starts from Pune towards Nagpur at 6 am and reaches Nagpur at 10 am . While a train starts from Nagpur at 7 am and reaches Pune at 10:30 am. Find at what time the two trains will meet.
8. A train $X$ starts from Pune towards Mumbai and at the same time a train $Y$ starts from Mumbai towards Pune and they meet somewhere in between. After meeting train $X$ needs 4 hrs to reach the destination and train $Y$ needs 9 hrs to reach destination. Find the ratio of their speeds.
9. A train started from Mumbai towards Pune at 12 noon and another train started from Pune towards Mumbai at 2 pm . The two of them meet at 4:05 pm and continue and reach their destination at the same time. Find at what time did they reach the destination.

## Speed, Time and Distance (Part 3)

1. A train started from Pune towards Nagpur at 6 am with the speed of $60 \mathrm{~km} / \mathrm{hr}$ and another train started from Pune towards Nagpur at 7 am with the speed of $75 \mathrm{~km} / \mathrm{hr}$. Find at what time and at what distance from Pune will the two trains meet?
2. A train started from Pune towards Nagpur at 6.40 am with the speed of $60 \mathrm{~km} / \mathrm{hr}$ and another train started from Pune towards Nagpur at 8.20 am with the speed of $90 \mathrm{~km} / \mathrm{hr}$. Find at what time and at what distance from Pune will the two trains meet?
3. A ship started a journey and when it had already travelled 180 km a plane started in the same direction as that of the ship with a speed 10 times that of ship. Find the distance travelled by plane to catch the ship.
4. A policeman saw a thief 100 meters away. The same moment the thief saw the policeman and started running away. For every 3 steps of policeman the thief takes 5 steps while in 2 steps policeman covers 5 meters. In 3 steps the thief covers 4 meters. Find in how many steps the policeman will catch the thief.
5. A policeman saw a thief 350 meters away. The same moment the thief saw the policeman and started running away. For every 5 steps of policeman the thief takes 8 steps while in 3 steps policeman covers 5 meters. In 4 steps the thief covers 3 meters. Find in how many steps the policeman will catch the thief.
6. A policeman saw a thief, 50 of policeman's steps ahead the same moment the thief saw the policeman and started running away. For every 3 steps of policeman the thief takes 7 steps while 2 steps of policeman are equal to 5 steps of thief. Find in how many steps the policeman will catch the thief.
7. A train of length 600 meters crosses a man standing on the platform in 24 seconds while it crosses the complete platform in 1.5 minutes. Find the length of the platform.
8. There are two trains of length 200 meters and 400 meters respectively. They cross each other completely in 15 sec while going in opposite direction and in 1.25 minutes while going in the same direction. Find the speeds of the two trains.
9. A train of length 600 meters crossed a man going in the same direction with the speed of $12 \mathrm{~km} / \mathrm{hr}$ in 45 seconds. While the same train crossed another man coming in the opposite direction on bike in 20 sec . Find the speed of the other man.
10. 2 trains of same length crossed an electric pole in 10 sec and 15 sec respectively. Find in how much time the 2 trains will cross each other completely.
a) While going in the same direction
b) While going in the opposite direction.
11. There are 2 trains running on the parallel tracks with the speed of $42 \mathrm{~km} / \mathrm{hr}$ and 60 $\mathrm{km} / \mathrm{hr}$ respectively in the same direction. A person sitting in the faster train crossed the slower train completely in 1.2 min . Find the length of the slower train.

## Speed Time and Distance - 4

## Boats and Streams

1. A boat covers 3 km in 5 min while going upstream and 600 m in 24 sec while going downstream. Find the speed of boat in still water and the rate of stream.
2. A boat covers 800 m in 2 min while going upstream and 3 km in 4 min while going downstream. Find the speed of boat in still water and the velocity of water.
3. A person went certain distance upstream and returned back to the starting point and noticed that it requires thrice to go than to come back. Find the speed of boat in still water, If the speed of water is $12 \mathrm{~km} / \mathrm{hr}$.
4. A person went certain distance upstream and returned back to the starting point and noticed that it requires 4 times more time to go than to come back. Find the speed of boat in still water, If the speed of water is $20 \mathrm{~km} / \mathrm{hr}$.
5. A person went 24 km upstream and returned back to the starting point in 6 hr . Find the speed of boat in still water, if the speed of water is $3 \mathrm{~km} / \mathrm{hr}$.
6. A person went 36 km upstream and returned back to the starting point in 6 hr 24 min . Find the speed of boat in still water, if the speed of water is $3 \mathrm{~km} / \mathrm{hr}$.
7. A person 24 km upstream and 36 km downstream in 6 hr 20 min . But while coming back he needed 7 hr . Find the speed of boat in still water, speed of water, speed upstream and downstream speed.
8. A person is walking down an escalator going downward, he walks down 20 steps and reaches the bottom in 30 sec ,but if he runs down 30 steps, he reaches the bottom in 24 sec . Find the number of steps visible when the escalator is not moving.
9. A person is walking down an escalator going downwards and he reaches the bottom in 3 min but if he goes up the same escalator going downwards he requires 5 minutes to reach the top. Find in how much time he will reach the bottom.
(a) When the escalator is not moving.
(b) When he is standing

Given that the person's speed remains the same while going up and down.

## Races

1. A beats $B$ by 100 m in a 500 m race while $B$ beats $C$ by 25 m in a 200 m race. Find in a race of 500 m between A and C , who will be the winner and by how many meters?
2. In a 100 m race $A$ betas $B$ by 25 m , while in a 200 m race $C$ beats $B$ by 20 meters. And in a 500 meters race $D$ beats $C$ by 100 meters. Find in 1 km race between $A$ and D, who will be the winner and by how many meters?
3. In a 100 meters race A beats $B$ by 10 m . If in the same race A starts from 10 m behind the starting point, find who will be the winner and by how many meters?

## Ratio and Proportion

1. The ratio of incomes of 2 persons $A$ and $B$ is $5: 7$, If the summation of their incomes is Rs. 156000 . Find the difference of their incomes.
2. Divide Rs. 18200 amongst 3 persons $A$, B, C such that $A$ gets $5 / 9^{\text {th }}$ of what $B$ and $C$ together gets and $B$ gets $6 / 7^{\text {th }}$ of what $A$ and $C$ together get.
3. A bag contains total 1200 coins of 25 paisa, 50 paisa and 1 rupee. If the number of coins is in the ratio $6: 5: 4$. Find the total amount present in the bag.
4. A bag contains total Rs 2400 , in the form of $25 \mathrm{ps}, 50 \mathrm{ps}$ and 1 rupee coins. If the total amount present of each type is in the ratio 3:5:4. Find the total number of coins present in the bag.
5. A bag contains total Rs. 666, in the form of 20 paisa, 50 paisa and 1 rupee coins. If the number of coins is in the ratio $5: 4: 3$. Find the total number of coins present in the bag.
6. Divide Rs. 4650 amongst 3 persons $A, B$, and $C$ such that 2 times of what $A$ gets, 3 times of what $B$ gets and 5 times of what $C$ gets all are equal.
7. Divide Rs. 1500 amongst 3 persons $A, B$, and $C$ such that $1 / 3^{\text {rd }}$ of what $A$ gets is equal to $1 / 4^{\text {th }}$ of what $B$ gets is equal to $1 / 5^{\text {th }}$ of what $C$ gets.
8. A person travelled a total distance of 1880 km partly by cycle, bus and train in total 25 hr. such that 3 times the distance travelled by cycle is equal to 4 times the distance travelled by bus is equal to 5 times the distance travelled by train and $2 / 5^{\text {th }}$ of the time travelled by cycle is equal to $1 / 4^{\text {th }}$ of the time travelled by bus is equal to $1 / 6^{\text {th }}$ of the time travelled by train. Find the speed of each.
9. The ratio of incomes of 3 persons $A, B$ and $C$ is $5: 6: 8$ and their expenditures are in the ratio $6: 5: 4$. If A saves Rs. 3000 . After spending $80 \%$ of his income, find the income of each.
10. The ratio of income of 2 persons $A$ and $B$ is $4: 5$ while their expenditures are in the ratio $5: 4$ and their savings are in the ratio $1: 2$. Find the income of each if they together save Rs. 9000.
11. The ratio of 3 numbers is $6: 7: 8$. If all the 3 numbers are increased by 8 , the ratio becomes 7:8:9. Find the original numbers.
12. A person scored marks in the ratio $6: 7: 8: 9: 10$ in an exam of 5 papers of equal mark. If overall he got $60 \%$ marks in the exam find in how many subjects he got more than 50\% marks.
13. A person scored marks in the ratio $5: 6: 7: 8: 9: 10$ in an exam of 6 papers of equal mark. If overall he got $60 \%$ marks in the exam find in how many subjects he got more than $75 \%$ marks.
14. 3 persons went on a safari during the night time they decided to have dinner together. First had 3 cakes with him and the second had 5 cakes with him while the third had nothing but being true friends they shared the cakes equally among themselves but the third person wanted to compensate them with the 8 gold coins that he had. Find how many coins each of them should get?

## Partnership

1. 3 friends A, B, C started a business by investing Rs. 20,000 , Rs. 30,000 and Rs. 40,000 respectively. Find the profit share of each in the total profit of Rs. 45,000 at the end of the year.
2. A started a business by investing Rs. 60,000, at the end of 4 months $B$ joined with the investment of Rs. 75,000. Find the share of each in the total profit of Rs. $1,43,000$ at the end of the year.
3. A started a business by investing Rs. 35,000 , at the end of 5 months $B$ joined the business. Find the amount invested by B if at the end of the year the profit share of each was equal.
4. Two persons $A$ and $B$ started a business by investing Rs. 60,000 and Rs. 45,000 after 4 months a new person $C$ joined and after some time $B$ left the business. Find the amount invested by $C$ and after how many months did $B$ leave the business if at the end of the year the profit were in the ratio $3: 2: 1$.
5. 3 persons A, B, C started a business by investing Rs. 20,000 each. At the end of 5 months A reduced his capital by Rs. 4000, B reduced his capital by Rs.5000, and C increased his capital by Rs. 5000 . Find the share of each in the total profit of Rs. 69200 at the end of the year.
6. 4 persons $A, B, C$ and $D$ started a business. $A$ invested $1 / 3^{\text {rd }}$ of the capital for the complete time period of 12 months, B invested $1 / 4^{\text {th }}$ of the capital for 10 months, C invested $1 / 6^{\text {th }}$ of the capital for the complete 1 year and $D$ invested the rest for 9 months. Find the share of each in the total profit of Rs. 6450 at the end of the year.
7. 3 persons A, B, C started a business by investing Rs. 40,000 , Rs.50,000 and Rs. 60,000 respectively with A being the working partner and first getting $25 \%$ of the profits for managing the business. Find the share of each at the end of a year if the profit share of $A$ is Rs. 18000 more than the profit share of $C$.
8. Question of the day:

4 friends Abhishek, Salman , Hrithik and John rented a pasture for Rs. 1,36,200. Abhishek grazed 300 cows for 5 months, Salman grazed 100 elephants for 6 months, Hrithik had 500 donkeys for 5 months and John had 400 horses for 6 months. Find the share of each friend if each cow eats twice that of a donkey, 5 horses eat as much as 2 elephants and 2 horses eat as much as 3 donkeys.

## Ages

1. The ratio of ages of 3 persons $A, B, C, 6$ years back was $5: 6: 7$. Find the present age of each if the summation of their present ages is 144 years.
2. The father's age is twice of the son's age while 4 years back mother's age was twice of the son's age. Find the present age of each if the summation of their present ages is 81 years.
3. 5 years back the father's age was thrice of the son's age while 5 years from today the son's age will be half of the father's age. Find the percent age of each.
4. 5 years back the grandfather was 5 times as old as the grandson and 4 years from today the father will be twice as old as his son. Find the present age of each if the summation of their present ages is 128 years.
5. The father is as many weeks old as the son is in days while the grandfather is as many years old as the grandson is in months. Find the present age of each if the summation of the ages is 140 years.
6. A is now 5 times as old as $B$, but 7 years from now, $A$ will be 3 times as old as he will be then. How old is A now?
7. In year 1930 the grandfather was as many years old as the last two digits of his year of birth and the same was true for the grandson. Find the summation of their ages in 1930.
8. Amitabh got married in year 1972 and his son Abhishek was born when Amitabh's age was $1 / 59^{\text {th }}$ of his year of birth. Find in which year was Abhishek born.
9. A person spent $1 / 7^{\text {th }}$ of his life as child, $1 / 6^{\text {th }}$ as youth, $1 / 12^{\text {th }}$ as eligible bachelor and 5 years after his successful marriage his son Krish was born who was elected as prime minister, 4 years back when his age was half of the man's present age. Find the man's present age.
10. A person is twice as old as his son was when the person was as old as the son is right now. Find the present age of each if the summation of their present ages is 112 years.
11. A logic wizard Mr. Braino went to his friends a math genius Dr. Math's place after a long time and during the conversation he asked his friend about the ages of his three children. Dr. Math's in order to check his friend's capabilities rather than answering directly told him that the product of their ages was 36 . Unable to get the answer Mr. Braino asked for more clues and the friend told him that the summation of their ages was equal to his door number. Mr. Braino still failed to get the answer and requested for some more hints. Dr. Math on that said that his youngest son Sam is as old as his girlfriend Tina. And there came the quick reply from Mr. Braino. Find the ages of the three children.

## Averages

1. A batsman had a certain averages for first 16 innings. In the $17^{\text {th }}$ he scored 89 runs thereby increasing the average by 3 runs per inning. Find new average.
2. A batsman had a certain averages for first 22 innings in the next he scored 100 runs thereby increasing the average by 2 runs per inning. Find new average.
3. A batsman had a certain averages for first 12 innings in the $13^{\text {th }}$. He scored 0 runs thereby reducing the average by 5 runs per inning. Find new average.
4. A person has a average score of 70 marks for the first 4 papers in an exam of 5 papers how much he should score in the $5^{\text {th }}$ to increase the average to 75 .
5. From a class of certain number of students a person of weight 80 kg is taken out and is replaced by a person of weight 112 kg . Thereby increasing the average weight of the class by $1 / 4 \mathrm{~kg}$. Find the number of students in the class.
6. From a class of certain number of students a person of height 6 feet 3 inches is taken out and is replaced by a person of height 5 feet 2 inches. Thereby reducing the average height of the class by $1 / 3$ inches. Find the number of students in the class.
7. The average of the temperatures on Monday, Tuesday, Wednesday and Thursday is 40 degree while the average of the temperatures on Tuesday, Wednesday, Thursday and Friday is 45 degree. Find the average of the temperatures on all the 5 days if the average of the temperatures on Monday and Friday is 36 degrees.
8. The average temperature of days from Monday to Wednesday is 37 degree and that of from Tuesday to Thursday is 34 degree. The temperature of Thursday is $4 / 5^{\text {th }}$ of Monday. Then what is the temperature of Thursday.
9. The average age of 32 students in a class is 14 years but when teacher is included the average gets increased by 1.5 years. Find the age of teacher.
10. The average age of boys in the class is 18 years while the average age of girls is 22 years. Find the ratio of number of boys to girls in the class if the average age of the whole class is 20.5 years.
11. There are 11 numbers the average of the first 6 is 13.5 while the average of the last 6 is 16.2 years. Find the average of all the 11 numbers if the middle number is 9.9
12. The average age of a family of 6 persons without grandfather is 45 years but when grandfather is included the average becomes 54 years. Find the present age of grandfather.
13. The average age of a family of 6 persons 4 years back was 42 years if 2 years from today the grandfather dies the average age of the family will get reduced 32 years. Find the present age of the grandfather.
14. The average age of a family of 6 persons 5 years back was 40 years if 2 years from today a baby is born and 3 year further on another baby is born and the grandfather dies, the average age of the family will get reduced 32 years. Find the present age of the grandfather.

## Clocks

1. Find how many times in a day the hands of a clock meet.
2. The hands of a clock are meeting after every 65 minutes. Find how much does the clock gain / loose in one hour.
3. The hands of a clock are meeting after every 72 minutes. Find how much does the clock gain / loose in one complete day.
4. Find the angle between the minute hand and the hour hand of the clock at 7:30.
5. Find the angle between the minute hand and the hour hand of the clock at 4:48.
6. Find at what time between $1: 00$ and $2: 00$, the hands of clock will be together.
7. Find at what time between $7: 00$ and $8: 00$, the hands of clock will be together.
8. Find at what time between $4: 00$ and $5: 00$, the hands of clock will be in the same straight line but not together.
9. Find at what time between 7:00 and 8:00, the hands of clock will be in the same straight line but not together.
10. Find at what time between $3: 00$ and $4: 00$, the hands of clock will be at right angle.
11. Find at what time between $5: 30$ and $6: 00$, the hands of clock will be at right angle.
12. Find at what time between $4: 00$ and $4: 30$, the hands of clock will be 10 minutes apart.
13. A clock which is gaining uniformly is 12 minutes behind the normal time at $8: 00 \mathrm{am}$ Monday and the same clock is 9 minutes ahead of the normal time the next Monday at 8:00 am. Find at which day and at what time it was showing the correct time.
14. A clock which is losing uniformly is 12 minutes ahead the normal time at 8 : 00 am . Monday and the same clock is 15 minutes behind the normal time the next Monday at 8 $: 00 \mathrm{pm}$. Find at which day and at what time it was showing the correct time.
15. A clock gains 5 sec in 2 min . It is set right at $6: 00 \mathrm{am}$. Find what will be the actual time when the clock shows $6: 30 \mathrm{pm}$. The same day.
16. A gong clock takes 30 sec to strike 5 O'clock. Find in how much time it will strike 10 O'clock.
17. A gong clock strikes with an interval of 1 sec . Find in how much time it will strike the whole day.
18. 50 minutes ago it was 4 times as many minutes past 3 O'clock as it is to 6 O'clock right now. Find the present time.
19. Abhishek's watch gains 2 minutes per hour. Aishwarya's watch runs on time and Salman's watch looses 3 minutes per hour. If all them set their watches together after how many days all the watches will show the same time for the first time.
20. A person went out between 5:00 and 6:00 and came back between 6:00 and 7:00 and noticed that the hands of clock had exactly interchanged the positions. Find at what time he went out and at what time he came back.

## Clocks: Important points to remember

> The hands of a clock meet after every 720/11 min i.e. $655 / 11$ mins. If for any given clock they meet before that then the clock is running faster (gaining time). If they take more than $655 / 11$ mins then the clock is running slower (loosing time).
$>$ The hands of a clock are together 22 times in a day.
$>$ The hands of a clock are in straight line but not together 22 times in a day.
$>$ The hands of a clock are at right angles 44 times in a day.
$>$ The angle between the hands of clock at $\mathrm{H}: \mathrm{M}$ ( H hours and M minutes) is

$$
\theta=30 H-\frac{11}{2} M
$$

The positive value of $\theta$ signifies hour hand is ahead of minute hand.
The negative value of $\theta$ signifies hour hand is behind the minute hand.
When we say, A gong clock strikes 4 O'clock in 12 sec . The meaning is at 4 o'clock there are four gongs and the time interval between the first gong and the fourth gong is 12 sec. So in a simple way there are 3 intervals at 4 O'clock, 5 intervals at 6 o'clcok, 9 intervals at 10 O'clock.

Q: A gong clock strikes 4 o'clock in 10 sec in how much time will it strike 10 O'clock?
Ans: At 4' clcok there are four gongs and the time interval between $1^{\text {st }}$ gong and $4^{\text {th }}$ gong is 10 sec . So if 3 intervals are of 10 sec then at 10 o'clock there are going to be 9 intervals for which it will need 30 sec .
$>$ The two watches will show same time if the difference between them is either 0 or multiples of 12 hrs .

Q: Husband's watch gains 2 min per hour and wife's watch loses 3 min per hour, If they set together their watches at 6:00 am Monday on which day they will show the same time?

Ans: When the actual time is 60 min, husband's watch will show 62 min and wife's watch will show 57 min . So in one hours time the difference between the time shown is 5 min In 1 hr the difference is 5 min , in 144 hours difference will be $12 \mathrm{hrs}(720 \mathrm{~min}$ ) So the watches will show the same time after 144 hrs i.e. 6 days i.e. on Sunday 6:00 am.

## Calendars

1. If on $10^{\text {th }}$ July 2013 it was Tuesday, what will be the day on $10^{\text {th }}$ July 2028.
2. If on $1^{\text {st }}$ Jan 2012 it was Sunday, what will be the day on $1^{\text {st }}$ Jan 2047.
3. If on $1^{\text {st }}$ Jan 2012 it was Sunday, what will be the day on $15^{\text {th }}$ Aug 2047.
4. If on $15^{\text {th }}$ July 2013 it was Monday, what will be the day on $31^{\text {st }}$ Dec 2099.
5. If on $15^{\text {th }}$ July 2013 it was Monday, what was the day on $18^{\text {th }}$ Oct 1976.
6. If on $15^{\text {th }}$ July 2013 it was Monday, what will be the day on $15^{\text {th }}$ July 2113.
7. If on $15^{\text {th }}$ July 2013 it was Monday, what will be the day on $15^{\text {th }}$ July 2413 .
8. What was the day on $15^{\text {th }}$ July 2013.
9. What was the day on $15^{\text {th }}$ August 1947.
10. Which is the first year after 2013 that will have same calendar as that of 2013.
(The two calendars are same when each date of both of the years matches with the day on that date)
11. Which is the first year after 2012 that will have same calendar as that of 2012.

## Inequalities (Quadratic Equation)

1. $x^{2}-7 x+12=0$
2. $x^{2}+12 x+27=0$
3. $x^{2}-8 x-33=0$
4. $x^{2}+7 x-60=0$
5. $x^{2}+9 x+20=0$
6. $x^{2}-17 x+72=0$
7. $x^{2}-x-30=0$
8. $x^{2}+10 x-75=0$
9. $2 x^{2}-10 x+12=0$
10. $3 x^{2}+25 x+48=0$
11. $4 x^{2}-20 x-56=0$
12. $5 x^{2}+11 x-36=0$

Question No (1-17) : In the following questions two statements are given mark the answer

1) if $x \leq y$
2) if $x \geq y$
3) if $x<y$
4) if $x>y$
5) if $x=y$ or no relation can be established between $x$ and $y$
1. I. $x^{2}-11 x+28=0$
2. I. $x^{2}+15 x+54=0$
3. I. $x^{2}-x-72=0$
4. I. $3 x^{2}-21 x+36=0$
5. I. $2 x^{2}-9 x-45=0$
6. I. $9 x^{2}-75 x+24=0$
7. I. $4 x^{2}-30 x+36=0$
8. I. $13 x^{2}+18 x+156=0$
9. I. $7 x^{2}-8 x-36=0$
10. I. $x^{3}=1331$
11. I. $x^{2}=144$
12. I. $x^{2}=361$
13. I. $x^{3}=2744$
II. $y^{2}-11 y+30=0$
II. $y^{2}+14 y+48=0$
II. $y^{2}+2 y-48=0$
II. $4 y^{2}+18 y+18=0$
II. $7 y^{2}+2 y-24=0$
II. $8 y^{2}-36 y+36=0$
II. $3 y^{2}-19 y+28=0$
II. $9 y^{2}-19 y+133=0$
II. $5 y^{2}+7 y-18=0$
II. $y^{2}=121$
II. $y^{3}=729$
II. $y^{2}=529$
II. $y^{2}=361$

## Set Theory

1. In a class $60 \%$ of the students failed in Math and $70 \%$ failed in English. If $10 \%$ passed in both, find how many percent failed in both.
2. In a class $42 \%$ of the students failed in Math and $60 \%$ passed in English. If $16 \%$ failed in both, find how many percent passed in both.
3. In a class $58 \%$ of the students passed in Marathi and $35 \%$ failed in English if $12 \%$ failed in both, find how many percent passed in both.
4. In a class $38 \%$ students play cricket, $45 \%$ play hockey while $30 \%$ play neither of these. If 143 students play both, Find the total number of students in the class.
5. In a class every student either drinks Tea or Coffee, 25 students drink Tea, 42 students drink Coffee while 12 students drink both. Find the total number of students in the class.
6. In a class every student either drinks Tea or Coffee, 28 students drink Tea, 22 students drink Coffee only while 8 students drink both. Find the total number of students in the class.
7. In a class 24 students play cricket, 38 play hockey, and 15 play both and 24 play neither. Find the total number of students in the class.
8. In a class of 1000 students 325 students drink milk, 450 drink tea and 400 drink Coffee. 220 drink both milk and tea, 270 drink both tea and coffee and 180 drink both coffee and milk. Find how many students do not drink any of these three if 150 students drink all the three.
9. In a class of 800 students 320 students speak Marathi, 275 speak Hindi and 400 speak English. 160 speak both Marathi and Hindi, 120 speak both Hindi and English and 180 speak both English and Marathi. Find how many students speak all the three if 180 do not speak any of these three.
10. In a class of 1200 students, 560 have car, 450 have bike while 700 have scooter, 240 have only car and bike, 120 have only bike and scooter and 220 have only scooter and car. Find how many students have all the three if 180 students do not have any of these three.
11. In a class $75 \%$ students have Ferrari, $80 \%$ have Mercedes, $85 \%$ have BMW and $90 \%$ have scooter. Find the minimum and the maximum percentage of people that have all the four.
12. In a class of 1000 married couples, $2 / 3^{\text {rd }}$ of the husbands heavier than wives are taller also and $3 / 4^{\text {th }}$ of the husbands taller than their wives are heavier also. Find how many husbands are both heavier and taller than their wives if 120 wives are both heavier and taller than their husbands.

## Arithmetic Progression

1. A person deposited Rs. 50 on the first day in a bank, Rs. 70 on the next, Rs. 90 on the third and continued in this manner for 100 days. Find the total amount deposited at the end of 100 days.
2. Find the summation of all the 3 digit numbers divisible by 8 .
3. Find the summation of all the 3 digit numbers divisible by 12 .
4. Find the summation of all the 3 digit numbers divisible by both 16 and 12
5. Find the summation of all the 3 digit numbers divisible by 9 but not by 15 .
6. Find how many numbers between 400 and 600 (both included) are divisible by 6 .
7. Find how many numbers between 200 and 800 (both included) are divisible by either 9 or 12.
8. Find how many numbers between 100 and 300 (both included) are neither divisible by 3 nor by 7 .
9. A couple decided to travel a north country side so they decide to travel a minimum amount on car the first day and the second and subsequent days a distance of additional 20 miles to previous day. If they travelled a total amount of 1080 miles in 9 days. Find the distance travelled on $4^{\text {th }}$ day.
10. Two friends A and B joined Infosys on $1^{\text {st }}$ January 2001 at a monthly salary of Rs. 2000. A on the condition of increase of Rs. 300 after every year and B on the condition of increase of Rs. 200 after every six months. Find the difference in the total salary earned by the two when they leave the company together on $31^{\text {st }}$ December 2010.
11. There are 101 stones kept in a straight line each at a distance of 20 m . A person is standing besides the middle stone and is supposed to collect all the stones besides the middle stone but is allowed to carry only one stone at a time. Find the minimum distance travelled by him to collect all the stones besides middle stone.
12. The summation of $12^{\text {th }}, 17^{\text {th }}$ and $9^{\text {th }}$ term of an arithmetic progression is equal to the summation of $6^{\text {th }}$ and $21^{\text {st }}$ term of the same progression. Find which term is equal to zero.
13. A person named Mr. Casanova has 3 girlfriends and their ages are in an arithmetic progression. Find their ages if product of their ages is 10098.

## Geometric Progression

1. Find the summation of a series $1+2+4+8+$ 1024
2. Find the summation of a series $1+3+9+27+$ 6561
3. Find the summation of a series $1+\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+\cdots \ldots \ldots+\frac{1}{6561}$
4. Find the summation of a series $4+44+444+4444+$ $\qquad$ up to 10 terms.
5. A square of side 200 cm is drawn. The mid points of the 4 sides are joined to form another square. The mid points of the sides of the new square formed are again joined to form another square and the process is continued till it can't be repeated further more.
Find (a) Summation of the areas of all the squares formed.
(b) Summation of perimeters of all squares formed.
6. An equilateral triangle of side 60 cm is drawn the mid-points of the 3 sides are joined to form another equilateral triangle. The midpoints of the sides of the new triangle formed are again joined to form another triangle and the process is continued till we get a fine dot.
Find (a) Summation of the areas of all triangles formed.
(b) Summation of the perimeter of all triangles formed.
7. A ball is dropped from a height of 800 meters, every time it touches ground it bounces back to $3 / 4^{\text {th }}$ of the height from which it had fallen. Find the total distance travelled by the ball before coming to the rest.
8. There are 3 numbers in a geometric progression. The product of the 3 is 1728 while their summation is 38 . Find the smallest of the 3 numbers.
9. A person is having total Rs. 1023 with him. He wants to distribute them in minimum number of bags such that he should be able to give any amount from Rs. 1 to Rs. 1023 just by the combination of bags. Find the minimum number of bags required.
10. Mr. Champakbhai has a grocery shop he has to weigh 31 kg of rice but he is having only one weight of 1 kg . Find the minimum number of times he will be required to use the balance to do so.
11. Mr. Mewalal decided to start selling sugar. He wants to have minimum number of weights such that he should be able to weigh any quantity from 1 kg to 121 kg only in the multiplies of a kg only by using the balance once. Find the minimum number of weight s required.

## Permutation \& Combination

1. Out of 4 different boys and 3 different girls in how many different ways a group of 3 persons can be formed such that
(a) Exactly 1 boy is selected
(b) Exactly 2 boys are selected
(c) Exactly 3 boys are selected
(d) At least 1 boy is selected
2. There are 7 boys and 6 girls. In how many different ways a group of 7 persons can be formed such that
(a) At least 1 boy is selected
(b) At least 2 boys are selected
(c) At least 1 girl is selected
(d) At least 2 girls are selected
3. At a party every person shook hand with all the other persons exactly once, find the number of people present for the party if the total number of handshakes were 66.
4. In a class every person sent a greeting card to all the other persons exactly once, find the total number of students in the class if the total number of greeting cards sent was 210.
5. There are 12 co-planer points out of which 5 are co - linear and no other 3 are co linear. Find how many triangles can be formed using these points as vertices.
6. There are 10 co-planer points out of which 4 are co - linear and no other 3 are co linear. Find how many straight lines can be drawn passing through 2 or more than 2 of these points.
7. How many rectangles and squares are there on a chess board?
8. How many different 2 digit numbers can be formed
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
9. How many different 4 digit numbers can be formed
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
10. How many different 5 digit numbers can be formed using the digits $0,1,2,3,8,9$
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
11. How many different 4 digit numbers can be formed using the digits $0,2,3,5,7,8$ such that the first digit is even and the last digit is odd.
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
12. How many different 5 digit numbers can be formed using the digits $0,1,3,5,8,9$ such that the first digit is 3 and the last digit is not 8 .
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
13. How many different numbers between 2000 and 8000 (both included) can be formed using the digits $0,1,2,5,7,8,9$
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
14. How many different 5 digit numbers divisible by 5 can be formed using the digits $0,1,2$, 3, 5, 7, 9.
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
15. How many different 4 digit numbers divisible by 5 can be formed using the digits $0,1,3$, 5, 7, 9
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
16. How many different 5 digit even numbers can be formed using the digits $0,1,2,4,5,6$, 8
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
17. How many different 5 digit numbers divisible by 25 can be formed using the digits 0,1 , 2, 3, 5, 7, 9
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
18. How many different 5 digit numbers divisible by 4 can be formed using the digits $0,1,2$, 4, 5, 6, 8
(a) Repetition of the digits is allowed.
(b) Repetition of the digits is not allowed.
19. Find the summation of all the 4 digit numbers that can be formed using the digits $1,2,3$, 4. Repetition of the digits being not allowed.
20. Find in how many different ways the letters of the word PUNE can be rearranged?
21. Find in how many different ways, the letters of the word AAHA can be rearranged?
22. Find in how many different ways the letters of the word POONA can be rearranged?
23. Find in how many different ways four persons Salman, Aishwarya, Abhishek and Vivek can be arranged on four chairs such that
(a) Salman and Aishwayra always sit beside each other.
(b) Salman, Aishwarya and Vivek all the three besides each other with Aishwayra in between the two of them.
24. Find in how many different ways the letters of the word AHMEDABAD can be rearranged such that
(a) ..............................
(b) All the vowels are together
(c) All the consonants are together
(d) All the vowels and all the consonants are together
(e) The middle letter is H .
(f) The middle letter is A
(g) The first letter is A and the last letter is D.
(h) The first and the last letter both are vowels.
(i) The first and the last letters are consonants.
(j) No two vowels and no two consonants are together.
25. If all the five letter words that can be formed using the alphabets $\mathrm{A}, \mathrm{E}, \mathrm{I}, \mathrm{O}, \mathrm{U}$ are arranged in a dictionary what will be the rank of word OIEAU?
26. If all the six letter words that can be formed using the alphabets $D, O, N, K, E, Y$ are arranged in a dictionary what will be the rank of word ODNEKY?
27. In how many different ways 2 identical white and 3 identical green balls can be arranged in a straight line such that no two white balls are together?
28. In how many different ways 7 identical white and 12 identical green balls can be arranged in a straight line such that no two white balls are together?
29. There are 10 chairs on which six boys and four girls are to be arranged
(a) in how many ways that can be done so that no two girls are together?
(b) in how many ways that can be done so that no two girls are together, If out of six boys there is a pair of identical twins then what will be the answer?
30. In how many different ways 4 different letters can be put in 4 different envelopes such that
(a) An envelope cannot contain more than 1 letter
(b) An envelope can contain more than 1 letter
(c) Exactly 3 letters should be placed in their respective envelopes.
(d) Exactly 2 letters should be placed in right envelopes.
(e) Exactly 1 letters should be placed in its respective envelope.
31. There are 4 rings of different styles, In how many different ways they can be worn in 5 fingers such that
(a) Only 1 ring can be worn in 1 finger.
(b) More than 1 ring can be worn in 1 finger.


## Probability

1. Two coins are tossed, find the probability
(a) Exactly 1 coin shows head.
(b) Both show head
(c) Both show tail.
2. Four coins are tossed, find the probability
(a) Exactly 1 coin shows head
(b) Exactly 2 coins show head
(c) Exactly 3 coins show head
(d) Exactly 4 coins show head
(e) At least 1 coin show head
3. The probability that it rains on any particular day is $1 / 3$, find the probability that out of 5 consecutive days it will rain on
(a) Exactly 3 days
(b) At least 1 day
4. The probability that a ship completes its journey safely is 0.9 . Find the probability that out of 5 ships that started the journey together, at least 4 will complete the journey safely.
5. The probabilities that 3 people Spiderman, Superman and Batman can hit a target are 0.6, 0.5 and 0.75 respectively. If all of them independently try to hit the target. Find the probability
(a) Exactly 1 of them will hit the target.
(b) Exactly 2 of them will hit the target.
(c) Exactly 3 of them will hit the target.
(d) At least one of them will hit the target.
6. Two dices are rolled together. Find the probability that the sum of the numbers is more than 9
7. Three dices are rolled together. Find the probability that the sum of the numbers is more than 7
8. Three dices are rolled together. Find the probability
(a) All the 3 show the same number.
(b) All the 3 show the different number.
(c) Exactly 2 of them show the same number.
9. A card is taken out from a pack of cards. Find the probability either it's a card of heart or a king card.
10. Two cards are taken out from a pack of cards. Find the probability that both are kings.
11. Two cards are taken out from a pack of cards. Find the probability that both are of same suits.
12. Three cards are taken out from a pack of cards. Find the probability that all of them are of different suit.
13. There are two jars A and B. Jar A contains 10 red and 15 white balls, while jar B contains 12 red, 8 white and 5 green balls.
(a) A jar is randomly selected and a ball is taken out from that jar. Find the probability that it is green in colour.
(b) A jar is randomly selected and a ball is randomly taken out from that jar. Find the probability that it is white in colour.
(c) A ball is taken out from jar A and another ball is taken out from jar B. Find the probability that both are of same colour.
(d) A ball is taken out from jar A and is put in jar B, now a ball is selected from jar B and is put back in jar A and finally a ball is taken out from jar A. Find the probability that final taken out ball is green in colour.
14. A four digit number is randomly selected. Find the probability it is divisible by (a) 4 (b) 11
15. A four digit number is randomly selected. Find the probability that it's all the four digits are different and it does not contain digit 7 .
16. A box contains 10 bulbs out of which 4 are defective. Three bulbs are taken out of the box and put in three sockets and the buttons are switched on. Find the probability such that
(a) All the three bulbs will be glowing
(b) The room will be lighted.
17.A speaks truth $80 \%$ of the times and B speaks truth $60 \%$ of the times. Find the probability that at any given moment they will contradict each other.
17. In a car factory only two colours of car are manufactured, black and white. Any car being black or white the probability is same. Find the probability that the three consecutive cars will be of same colour.
18. What is the probability that a non leap year has 53 Mondays.
19. What is the probability that a leap year has 53 Tuesdays.

## Points To Remember:

$\mathbf{p}$ : is the probability a thing will give desired result in one attempt (e.g. A fair coin in a toss, showing head the probability is $1 / 2$ )
$\mathbf{q}$ : is the probability a thing will not give desired result in one attempt (e.g. A fair coin in a toss, not showing head the probability is $1 / 2$ )

If a thing is done " $n$ " times what is the probability it will give the desired result " r " times Probability $={ }^{n} C_{r}{ }^{*} P^{r} * q^{(n-n)}$

So, the probability that a fair coin when tossed 5 times will show head exactly 2 times is, ${ }^{5} \mathrm{C}_{2} *\left(\frac{1}{2}\right)^{2}{ }^{*}\left(\frac{1}{2}\right)^{3}$
E.g. the probability that a person can hit a target successfully is $1 / 4$
so the probability that he will not be successful is $3 / 4$
If he takes 4 attempts whats the probability he will be successful in 3 attempts
${ }^{4} \mathrm{C}_{3} *\left(\frac{1}{4}\right)^{3} *\left(\frac{3}{4}\right)^{1}$
If he takes 5 attempts whats the probability he will be successful in exactly 2 attempts ${ }^{5} \mathrm{C}_{2} *\left(\frac{1}{4}\right)^{2} *\left(\frac{3}{4}\right)^{3}$

## Approximate Calculations - 1

1. 24 is what percent of 192 ?
2. 13 is what percent of 104 ?
3. What is 22 percent of 3760 ?
4. What percent of 1213 is 376 ?
5. 187 is what percent of 32 ?
6. 3612 is what percent of 21312 ?
7. 2871 is what percent of 10327 ?
8. What percent of 6123 is 1000 ?
9. Find 48 percent of 6187 ?


## Approximate Calculations - 2

1. $12.58 \%$ of $\sqrt{394} \times 11.11 \%$ of 145 is
a) 40
b) 50
c) 30
d) 80
2. $34 \%$ of $3582-18 \%$ of 2198 is
a) 790
b) 640
c) 930
d) 540
3. $\sqrt{657} \times \sqrt{437} \div \sqrt{164}$ is
a) 56
b) 40
c) 28
d) 32
4. $3145-17 \%$ of $3800+35 \%$ of 1850 is
a) 3140
b) 2760
c) 2990
d) 3560
5. $29.96 \%$ of $7214+16 \%$ of $3598-6.5 \%$ of 14396 is
a) 1800
b) 1500
c) 3000
d) 7200
6. $67 \%$ of $9231-14.2 \%$ of 12745 is
a) 4400
b) 5000
c) 3500
d) 7000
7. $16.2 \times ? \times 25.3=10000$
a) 35
b) 30
c) 25
d) 20
8. $\sqrt{\frac{0.576 \times 193.6 \times 210.25}{12.1 \times 0.064 \times 2.25 \times 0.90}}$
a) 159
b) 123
c) 210
d) 235
9. $24.1 \times 12.9 \times ? \div 9.9=15592$
a) 498
b) 434
c) 388
d) 586
10. $36.71 \%$ of $3892-19 \%$ of $1295+27 \%$ of ? $=1720$
a) 1480
b) 2680
c) 1590
d) 1990
11. $\frac{36^{3}+17^{3}}{1296-612+289}$
a) 79
b) 53
c) 100
d) 19
12. $\frac{51.2 \times 270-375 \times 9}{28.8 \times 20+360+25 \times 9}$
a) 21
b) 9
c) 30
d) 0
13. $112+223+334+445+556+667+778+889+1000$
a) 4960
b) 6060
c) 3580
d) 5560
14. $77 \times 11 \div 12.2 \times 0.8 \div 0.69$
a) 99
b) 49
c) 71
d) 81

## Data Interpretation - 1

The following table gives the prices of various commodities between 2001 and 2009. answer the questions based on it.

|  | $\mathbf{2 0 0 1}$ | $\mathbf{2 0 0 6}$ | $\mathbf{2 0 0 7}$ | $\mathbf{2 0 0 8}$ |
| :--- | :--- | :--- | :--- | :--- |
| Petrol (1 lit) | 28 | 44 | 48 | 52 |
| LPG (14.2 kg) | 180 | 280 | 300 | 300 |
| Tea (per kg) | 160 | 180 | 190 | 250 |
| Milk (per lit) | 18 | 20 | 23 | 27 |
| Wheat (per kg) | 12 | 18 | 20 | 24 |
| Dal (per kg) | 28 | 45 | 50 | 54 |
| Sugar (per kg) | 16 | 14 | 13 | 22 |
| Groundnutoil (kg) | 48 | 90 | 85 | 90 |
| Thums up (1.5 lit) | 45 | 35 | 35 | 35 |

1. The price of tea in 2006 was how much percent more than the price in 2001.
a) 11.11
b) 12.5
c) 20
d) 9.09
2. The price of petrol in 2008 is how much percent more than the price in 2006.
a) 18.18
b) 22.22
c) 20
d) 25
3. The price of Thums up in 2008 is how much percent less than in 2001.
a) 25
b) 22.22
c) 33.33
d) 28.56
4. The percent increase in the price of LPG in the given time period is how much percent more/less than the percent increase in the price of milk in the given time period.
a) 33.33
b) 16.66
c) 20
d) 22.22
5. Which commodity has shown the highest percent increase in price between 2001-2006.
a) Petrol
b) LPG
c) Groundnut oil
d) Dal
6. Which commodity has shown the highest percent increase in the price between 2007-08
a) Tea
b) Sugar
c) Groundnut oil
d) Dal

The following table gives the share prices of companies answer the questions based on it.

|  | Price on 1 <br> st <br> $\mathbf{2 0 0 1}$ | High | Low | Price on 1 |
| :--- | :--- | :--- | :--- | :--- |
|  | st july 2009 |  |  |  |
| Infosys | 3120 | 5200 | 900 | 1720 |
| ITC | 67 | 240 | 45 | 196 |
| Mcdowell | 32 | 1875 | 28 | 880 |
| Bharti | 45 | 1120 | 18 | 845 |
| L \& T | 210 | 4650 | 170 | 1620 |
| Jindal Steel | 6 | 740 | 4.5 | 276 |
| Archies | 55 | 1000 | 40 | 75 |
| Ranbaxy | 550 | 820 | 145 | 256 |

1. The price of ITC on $1^{\text {st }}$ jan 2001 is how much percent more than the price of Bharti on the same day.
a) 51.2
b) 48.9
c) 46.2
d) 54.7
2. The lowest price of $L$ \& $T$ is how much percent less than the price on $1^{\text {st }}$ jan 2001.
a) 23.5
b) 26.1
c) 21
d) 19
3. The highest price of Infosys is how much percent more than the lowest price of Infosys.
a) 478
b) 522
c) 578
d) 622
4. The highest price of Archies is how much percent more than the highest price of Jindal steel.
a) 33
b) 35
c) 26
d) 39
5. If a person bought 1 share of each company on $1^{\text {st }}$ jan 2001 and sold all of them on $1^{\text {st }}$ july 2009 what will be the gain/loss percentage.
a) 50.2
b) 35.2
C) 43.7
d) 58.2
6. For which company the percentage difference between the lowest and highest price for the given period is lowest.
a) Jindal
b) Ranbaxy
c) Infosys
d) ITC
7. Which company has shown the highest percentage growth in the share price for the given time period.
a) Mcdowell
b) Bharati
c) L \& T
d) Jindal.

For the year ended March 2011, the total television advertising by corporates on Doordarshan (DD) and satellite channels is: (In Seconds)

| Company | DD | Satellite |
| :--- | :--- | :--- |
| Britannia | 20,615 | 57,170 |
| Brooke Bond Lipton | 38,955 | 124,620 |
| Cadbury | 20,830 | 59,540 |
| Coca Cola | 31,775 | 63,595 |
| Colgate | 53,195 | 134,030 |
| Godrej | 47,865 | 136,185 |
| HLL | 287,950 | $1,053,140$ |
| Nestle | 34,285 | $2,13,766$ |
| Pepsi | 41,300 | 54,050 |
| P \& G | 52,665 | $2,17,529$ |

1. The percentage share of television advertising of satellite channel is
a) $64 \%$
b) $77 \%$
c) $86 \%$
d) None of the above
2. What percentage of the total advertising in seconds is accounted by the top three advertisers?
a) $67.8 \%$
b) $65.2 \%$
c) $73.2 \%$
d) $54.5 \%$
3. How much is the advertising time on satellite by HLL greater than the total advertising on satellite by Colgate, nestle and Pepsi put together.
a) 7.2 lac sec
b) 6.5 lac sec
c) 6.1 Vac sec
d) None of the above
4. In the table above, the three lowest advertisers on television accounted for what percentage of the total television advertising in seconds.
a) $7.43 \%$
b) $12.36 \%$
c) $9.24 \%$
d) $15.43 \%$
5. Which company has the largest percentage of its television advertising on satellite channels?
a) Nestle
b) HLL
c) Brooks Bond Lipton
d) Cadbury

The table given below shows the marks scored by individuals in $10^{\text {th }}$. The numbers in the bracket show the maximum possible marks in that subject.

|  | Hindi <br> $\mathbf{( 1 0 0 )}$ | English <br> $\mathbf{( 1 0 0 )}$ | Maths <br> $\mathbf{( 1 5 0 )}$ | Science <br> $\mathbf{( 1 5 0 )}$ | History <br> $\mathbf{( 5 0 )}$ | Geography <br> $\mathbf{( 5 0 )}$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Saurav | 84 | 92 | 132 | 108 | 40 | 44 |
| Sachin | 90 | 96 | 120 | 135 | 32 | 48 |
| Irfan | 72 | 54 | 114 | 126 | 49 | 45 |
| Mahendra | 64 | 75 | 88 | 144 | 36 | 30 |
| Yuvraj | 80 | 96 | 138 | 132 | 31 | 46 |
| Rahul | 75 | 80 | 135 | 120 | 33 | 39 |

1. Deepika is looking for a perfect match the ideal candidate like her should have scored the lowest marks who will be her hero no 1 ?
a) Mahendra
b) Irfan
c) Yuvraj
d) Rahul
2. The marks scored by Sachin in English is how much percent more than the marks scored by Yuvraj in Hindi?
a) 16.66
b) 20
c) 12.5
d) 25
3. The percentage marks scored by Sachin in maths is how much percent more/less than the percent marks scored by Mahendra in science?
a) 16.66
b) 20
c) 16
d) 12.5
4. The percentage marks scored by Saurav in geography is how much percent more/less than the percent marks scored by Rahul in science?
a) 10
b) 8
c) 11.11
d) 9.09
5. If the minimum passing percentage for each subject was 60 how many persons passed in all the subjects?
a) 3
b) 4
c) 5
d) 6
6. Who and for which subject scored the highest percent marks?
a) Mahendra science
b) Irfan history
c) Sachin Eng
d) Yuvraj Eng
7. For which person the difference between the highest percentage marks scored for any subject and the lowest percentage marks scored for any subject the difference is the highest?
a) Mahendra
b) Irfan
c) Yuvraj
d) Rahul
8. For which subject the difference between the highest percentage marks scored by anyone and the lowest percentage marks scored by anyone is the lowest?
a) Science
b) History
c) English
d) Hindi
9. If each person was allowed to repeat a subject of his own choice so as to maximize the score and everyone scored full marks in that subject then who will be the highest scorer after the change?
a) Sachin
b) Saurav
c) Yuvraj
d) Rahul
10. Who has scored different percentage marks for all the subjects?
a) Mahendra
b) Saurav
c) Yuvraj
d) Rahul

## Data Interpretation-2

The following pie charts shows the exports from and imports to India for year 2010. Answer the questions based on it. (All the values in the pie chart are in degrees.)


Total exports from India $=90,000 \mathrm{Cr}$.


1. What is the difference in the amount exports to China and amount of exports to USA.
(a) 4500 Cr
(b) 6000 Cr
(c) 7500 Cr
(d) 3600 Cr
2. The amount of exports to Russia is how much percent more /less than the amount of exports to USA?
(a) $50 \%$
(b) $33.33 \%$
(c) $25 \%$
(d) $40 \%$
3. The amount of exports to China is how much percent more /less than the amount of imports from USA?
(a) $50 \%$
(b) $25 \%$
(c) 0
(d) $20 \%$
4. For which country the trade gap is the highest?
(a) USA
(b) Brazil
(c) Germany
(d) China
5. For which country the ratio of amount of exports to the amount of imports is lowest?
(a) USA
(b) Brazil
(c) Germany
(d) China
6. If out of exports to USA $33.33 \%$ are software exports and out which Infosys contributes 22.22\% what is the amount of exports from Infosys to USA?
(a) 1666 Cr
(b) 1333 Cr
(c) 2222 Cr
(d) 1111 Cr

Refer to the data below and answer the questions that follow. The pie charts shows the exports of the products in the given period.

2012-13 Rs. 53351 crore

## 2011-12 Rs. 44042 crore




1. What was the change in the amount of exports of agriculture and allied products over the 2 years?
(a) Rs. 900 cr
(b) Rs. 1500 cr
(c) Rs. 1300 cr
(d) Rs. 1100 cr
2. If agriculture and allied products and ores and minerals together form primary products, what was the \% change in the exports of primary products over the 2 years?
(a) $7.5 \%$
(b) $-2.6 \%$
(c) $13.5 \%$
(d) $10.6 \%$
3. Which commodity group showed the maximum increase in the amount of exports over the 2 years?
(a) Petroleum products
(b) Ores and minerals
(c) Manufactured goods
(d) Agriculture and allied products
4. By how much amount did the exports of ores and minerals decline over the 2 years?
(a) 246 crore
(b) 156 crores
(c) 68 crores
(d) 16 crores
5. If 'Iron ore' and 'Mica, coal and other ores and minerals' are the 2 constituents of ores and minerals group and Iron ore constitutes 51\% of exports under this group in 2012-13, then what was the amount of Mica, coal and other ores exported for the same year?
(a) 1243 crores
(b) 1045 crores
(c) 2043 crores
(d) 1192 crores

The first pie chart shows the \% share of various companies in the passenger cars segment. The second pie chart shows the break up of various brands of Maruti (values in degrees ). Answer the questions based on the information given.

## Break Up of Maruti Sales



2

Number of Vehicle sold


Total number of vehicles sold $=2.3$ million
All the values are in degree

1. If each Alto sells for Rs. 2.8 lacs. Find the sales amount of Alto.
(a) Rs. 4750 Cr
(b) Rs. 4350 Cr
(c) Rs. 3250 Cr
(d)Rs.3950Cr
2. If the average sells price of each Toyota vehicle is Rs. 6 lacs and that of Honda is 7.5 lacs. The amount of sales of Honda is how much percent more than that of Toyota.
(a) $52.4 \%$
(b) $66.6 \%$
(c) $60.6 \%$
(d) None of these
3. The number of Dezires sold is how much percent more or less than that of WagonR sold?
(a) $19.8 \%$
(b) $24.2 \%$
(c) $25.6 \%$
(d)None of these
4. Out of sales of Tata Motors $20 \%$ is accounted by Nano if Nano sales increase the next year by $80 \%$ What will be the sales of Nano next years?
(a) 87200
(b) 99300
(c) 107600
(d) None of these
5. The number of Toyota vehicles sold is how much percent more or less than the number of Swifts sold?
(a) 38.8\%
(b) $31.6 \%$
(c) $28.6 \%$
(d)None of these
6. If out of others Wolks Wagon accounts for $34 \%$ and out of that Polo accounts for $49 \%$ If average sales price of each Polo is Rs. 3.8 lacs. Find the amount of sales of Polo.
(a) Rs. 1760 Cr
(b) Rs. 2030 Cr
(c) Rs. 2250 Cr
(d)None of these

The recent Economic survey gives alarming signals about the rising cost and the effects of inflation on raising children. The survey says till the time child turns 21 a typical middle class family would have spend roughly Rs. 54.75 lacs. The following pie chart gives the percentage breakup of that amount and the table gives the percentage of amount spend during the different stages of child development.


1. The combined money spent on food, clothing and healthcare is how much percent less than that spent on housing?
(a) $26 \%$
(b) $19 \%$
(c) $21 \%$
(d) $15 \%$
2. The money spent during the childhood(0-12yrs) is what percent of the total money spent till the child achieves the adulthood?
(a) $36.3 \%$
(b) $43.2 \%$
(c) $40.1 \%$
(d) $49.9 \%$
3. If out of the money spent on education, $38.7 \%$ is spent on Engineering what is the amount spent on engineering?
(a) Rs 11.1 lac
(b) Rs. 9.7 lac
(c) Rs. 8.7 lac
(d) Rs12.8 lac
4. If out of the money spent during $0-4$ period $16.8 \%$ is spent on health care then what $\%$ of the total healthcare expenditure till age 21 is spent during age span $0-4$ yrs?
(a) $29.1 \%$
(b) $36.1 \%$
(c) $32.3 \%$
(d) $39.9 \%$
5. If out of the money spent on entertainment $24.8 \%$ is spent during the age $9-12$. What percent of the money spent during 9-12 is spent on entertainment?
(a) $17.1 \%$
(b) $19.9 \%$
(c) $15.4 \%$
(d) $13.3 \%$
6. What is the amount spent on clothing in the age span 17-21 yrs?
(a) Rs 1.11 lac
(b) Rs. 1.68 lac
(c) Rs. 1.3 lac
(d)cannot be determined

## Data Interpretation - 3

The line graph shows the percentage increase ( as compared to previous year )in the profits shown by the three companies from year 2009 to 2013


1. Company $B$ had highest profit in which year ?
a) 2013
b)2009
c) 2012
d) can not be determined
2. If the profit of company $A$ in 2011 was 27.3 lac what was the profit of the company in year 2008
a) 17.7 lac
b) 14 lac
c) 20 lac
d) can not be determined
3. Which company had the highest profit in year 2013 ?
a) Company A
b) company B
c) Company C
d) Can not be determined
4. If in year 2008 all the three companies had same profits which company will have the highest profit in year 2011?
a) Company A
b) company B
c) Company C
d) Can not be determined
5. If in year 2011 the profits of company $A$ and $C$ were Rs 12 lac and Rs 15 lac resp. What will be the difference in their profits in year 2013?
a) 6.05 lac
b) 6.18 lac
c) 7.2 lac
d) Can not be determined

The following line graph shows the \% profit of the companies A, B and C in year 2009 to 2013

$\%$ profit $=(\operatorname{Inc}-\operatorname{Exp}) / \operatorname{Exp} * 100 \quad \%$ Loss $=(\operatorname{Exp}-\operatorname{Inc}) / \operatorname{Exp} * 100$

1. Which company had the highest profit in year 2009?
a) Company A
b) Company B
c) Company C
d) Can not be determined
2. In which year did company B post its highest profit?
a) 2010
b) 2014
c) 2009
d) Can not be determined
3. If in year 2011 Company $A$ and $B$ had same expenditure what was the ratio of their incomes in that year?
a) $23: 24$
b) $24: 23$
c) $3: 4$
d) $4: 3$
4. If in year 2013 company B had income of Rs 18.6 cr and Company A had income of Rs 11.9 cr . What is the difference in their expenditures for the year?
a) 1.5 cr
b) 1.19 cr
c) 2.0 cr
d) can not determined
5. If in 2010 company $A$ and $B$ had the same Incomes what was the ratio of their expenditures in that year.
a) $24: 25$
b) $25: 24$
c) $16: 15$
d) $15: 16$

Mr Chota Buffet is analysing the balance sheets of five companies. Lena corp , Dena Corp , Sona Corp, Mona Corp and Pina Corp. He realised the combined profit of the five companies is Rs 45.9 lac. The sales of Lena is $50 \%$ more than that of Mona. Sales of Sona are $25 \%$ less than that of Pina. The profit of Mona is $20 \%$ of its sales. Pina's profit is $25 \%$ of its sales. Sales of Dena is $100 \%$ more than expenditure of Mona. Profits of Lena and Dena are in the ratio 2:3. The sales of Pina are $50 \%$ more than the expenditure of Mona.the profit of Dena is $20 \%$ more than that of Pina. Sona's Expenditure is $10 \%$ less than Mona's expenditure.

1. What is the sales amount of Dena Corp?
a) 36 lac
b) 48 lac
c) 45 lac
d) 54 lac
2. The profit of Sona corp is how much percent more/less than the profit of Lena corp?
a) $25 \%$
b) $33.33 \%$
c) $20 \%$
d) None of these
3. The top two companies by profits form what percent of the total profits of all the companies?
a) $44.9 \%$
b) $43.1 \%$
c) $51.2 \%$
d) $39.9 \%$
4. The combined profit Lena and Dena is how much \% more than the Combined profit of Sona and Mona
a) $58 \%$
b) $54 \%$
c) $44 \%$
d) $66 \%$
5. The combined expenditure of Lena and Pina is how much less than the total expenditure of other three?
a) 60 lac
b) 48 lac
c) 45 lac
d) None of these

The following bar graph shows the number of units of A, B and C sold by a company over a five year period 2009-2013


1. The number of articles sold of $B$ by company in 2011 is how much percent more/less than that of C sold in 2013.
a) $71.4 \%$
b) $74.4 \%$
c) $78.4 \%$
d) $81.4 \%$
2. The total number of articles of A sold over the time period 2009-13 is how much percent more/less than the total number of articles of B sold over the time period 2009-13?
a) $11 \%$
b) $4 \%$
c) $8 \%$
d) $6 \%$
3. The combined sales of the three articles in 2013 is how much percent more than those in 2009?
a) $26.5 \%$
b) $24.5 \%$
c) $25.5 \%$
d) $27.5 \%$
4. The combined sales of the three products for which two years are nearly equal?
a) $2009 \& 2010$
b) $2012 \& 2013$
c) $2011 \& 2013$
d) $2011 \& 2012$
5. During the given five year period product $B$ contributed nearly what percent of the total sales.
a) $27.2 \%$
b) $33.1 \%$
c) $42.4 \%$
d) $36.5 \%$

## Data Interpretation - 4

Directions 1-6: The table given below shows the unit sales of the TT950 motorcycle in six European countries over a six month period. These motorcycles are imported into each country by a main dealer. Use this information to answer the questions given below.

Motorcycle Sales (Model TT950)

| Country | Jan | Feb | Mar | Apr | May | Jun | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Germany | 34 | 47 | 45 | 54 | 56 | 60 | 296 |
| UK | 40 | 44 | 36 | 47 | 47 | 46 | 260 |
| France | 37 | 32 | 32 | 32 | 34 | 33 | 200 |
| Belgium | 14 | 14 | 14 | 16 | 17 | 14 | 89 |
| Spain | 29 | 29 | 28 | 31 | 29 | 31 | 177 |
| Italy | 22 | 24 | 24 | 26 | 25 | 23 | 144 |
| Total | 176 | 190 | 179 | 206 | 208 | 207 | 1166 |

1. What percentage of the overall total was sold to the German importer?
(a) 22.0
(b) 25.4
(c) 25.8
(d) 24.1
(e) 24.6
2. What percentage of the overall total was sold in May?
(a) 24.1
(b) 25.6
(c) 27.1
(d) 17.9
(e) 20.3
3. Which month showed the biggest increase in total sales from the previous month?
(a) Feb
(b) Mar
(c) Apr
(d) May
(e) Jun
4. What percentage of the monthly total was sold to the biggest importer in February?
(a) 24.7
(b) 23.1
(c) 36.5
(d) 51.1
(e) 15.1
5. What is the average number of units per month imported into Italy over the first four months of the year?
(a) 22
(b) 23
(c) 24
(d) 25
(e) 26
6. What percentage of the total imports is accounted for by the three smallest importers?
(a) 37.1
(b) 14.8
(c) 40.0
(d) 36.6
(e) 35.1

Directions 7-11: The table shows imports for three types of steel over a six month period. Use this information to answer the following questions.

7. Which month showed the largest decrease in total imports over the previous month?
(a) Feb
(b) Mar
(c) Apr
(d) May
(e) June
8. What was the total value of sheet steel (in \$) imported over the 6 month period?
(a) 56,750
(b) 75,300
(c) 55,550
(d) 42,370
(e) 44,750
9. What was the percentage of scrap steel imported in the 6 month period?
(a) 37.5
(b) 35.2
(c) 36.1
(d) 31.2
(e) 38.3
10. What was the difference (in thousands of tons) between coil steel and sheet steel imports in the first three months of the year?
(a) 10
(b) 16
(c) 18
(d) 19
(e) 20
11. What was the approximate ratio of sheet steel and coil steel imports in the first 3 months of the year?
(a) $11: 9$
(b) $8: 9$
(c) $7: 11$
(d) $3: 8$
(e) $7: 4$

Directions 12-16: The table given below shows the number of nanotechnology papers published by leading US universities over a six year period. Use this information to answer the following questions

12. How many papers were published be researchers at Yale in 2002?
(a) 50
(b) 55
(c) 60
(d) 65
(e) 70
13. In what year did researches at Stanford publish most papers?
(a) 2000
(b) 2001
(c) 2002
(d) 2003
(e) 2004
14. In what year did researchers at Duke and Yale first publish the same number of papers?
(a) 2000
(b) 2001
(c) 2002
(d) 2003
(e) 2004
15. In what year did researches at Princeton publish more papers than those at Harvard?
(a) 2000
(b) 2001
(c) 2002
(d) 2003
(e) 2004
16. Which university published the second highest number of papers over the period?
(a)Harvard
(b) Princeton
(c) Yale
(d) Duke
(e) Stanford

Directions 17-21: The pie chart given below shows the percentage of students' in each faculty at North West University and number of non-US students in the Arts faculty. These percentages have been rounded to the nearest whole number. There are a total of 1049 students in the Arts faculty. Use this information to answer the following questions.

17. What percentage of the students in the Arts faculty are non-US students
(a) $14 \%$
(b) $9 \%$
(c) $30 \%$
(d) $11 \%$
(e) $15 \%$
18. How many students are there in the Engineering faculty?
(a) 420
(b) 410
(c) 390
(d) 440
(e) 400
19. How many students are there in the University?
(a) 4650
(b) 4560
(c) 4640
(d) 4450
(e) 4460
20. If six percent of Science students are Asian. How many Asian students are there studying Science?
(a) 48
(b) 66
(c) 120
(d) 57
(e) 43
21. There are 34 European medical students. What percentage of the faculty does this represent?
(a) $14 \%$
(b) $18 \%$
(c) $12 \%$
(d) $16 \%$
(e) $15 \%$

Directions 22-25: The table given below shows the number of people who responded to a survey style of music. Use this information to answer the following questions to the nearest whole percentage.

| Age | $\mathbf{1 5 - 2 0}$ | $\mathbf{2 1 - 3 0}$ | $\mathbf{3 1 +}$ |
| :---: | :---: | :---: | :---: |
| Classical | 6 | 4 | 17 |
| Pop | 7 | 5 | 5 |
| Rock | 6 | 12 | 14 |
| Jazz | 1 | 4 | 11 |
| Blues | 2 | 3 | 15 |
| Hip-Hop | 9 | 3 | 4 |
| Ambient | 2 | 2 | 2 |
|  |  | 33 | 33 |

22. What percentage of respondents under 31, indicated that Blues is their favourite style of music?
(a) 7.1
(b) 7.6
(c) 8.3
(d) 14.1
(e) 7.2
23. What percentage of respondents aged 21-30 indicated a favourite style other than rock music?
(a) $64 \%$
(b) $60 \%$
(c) $75 \%$
(d) $36 \%$
(e) $46 \%$
24. What percentage of the total sample indicated that Jazz is their favourite style of music?
(a) $6 \%$
(b) $8 \%$
(c) $22 \%$
(d) $4 \%$
(e) $11 \%$
25. What percentage of the total sample were aged 21-30?
(a) 31\%
(b) $23 \%$
(c) $25 \%$
(d) $14 \%$
(e) $30 \%$

Directions 26-30: The following pie-chart shows the sources of funds to be collected by the National Highways Authority of India (NHAI) for its Phase II projects. Study the pie-chart and answers the question that follow.
Sources of funds to be arranged by NHAI for Phase II projects (in crores Rs.)

26. Near about $20 \%$ of the funds are to be arranged through :
(a) SPVS
(b) External Assistance
(c) Annuity
(d) Market Borrowing
27. If NHAI could receive a total of Rs. 9695 crores as External Assistance, by what percent (approx) should it increase the Market Borrowing to arrange for the shortage of funds?
(a) $4.5 \%$
(b) $7.5 \%$
(c) $6 \%$
(d) $8 \%$
28. If the toll is to be collected through an outsourced agency by allowing a maximum $10 \%$ commission, how much amount should be permitted to be collected by the outsourced agency, so that the project is supported with Rs. 4910 crores?
(a) Rs. 6213 crores
(b) Rs. 5827 crores
(c) Rs. 5401 crores
(d) Rs. 5316 crores
29. The central angle corresponding to Market Borrowing is
(a) $52^{\circ}$
(b) $137.8^{\circ}$
(c) $187.2^{\circ}$
(d) $192.4^{\circ}$
30. The approximate ratio of the funds to be arranged through Toll and that through Market Borrowing is
(a) $2: 9$
(b) $1: 6$
(c) $3: 11$
(d) $2: 5$

## Geometry

1. A person standing on a top of a building 100 m high looked at a top of the adjoining building making an angle of elevation of $30^{\circ}$ but when the same person looked at the foot of the same adjoining building the angle of depression was $45^{\circ}$. Find the distance between the two buildings and the height of the other building.
2. A person standing on the ground looked at a top of the adjoining building making an angle of elevation of $45^{\circ}$. On walking 500 m towards the building the angle of elevation changes to $60^{\circ}$. Find the height of the building.
3. There are two trees of height 150 m and 200 m on the opposite banks of the river. There is a bird sitting on the top of each of the tree. Both the birds saw a fish in the river at the same time and both of them started flying towards the fish at the same time with the same speed and both of them caught the fish at the same time. Find the distance of the fish from the shorter tree if the distance between the two trees is 250 m .
4. There is a ladder resting against a wall of height 8 m with the top of the ladder coinciding with the top of the wall when the foot of the ladder is moved 2 m away from the wall, the top of the ladder slips down and coincides with the foot of the wall. Find the length of the ladder.
5. An equilateral triangle is drawn and a circle is drawn touching the 3 sides internally and another circle is drawn passing through the 3 vertices of the triangle. Find the ratio of the areas of the 2 circle.
6. A square is drawn and a circle is drawn touching its 4 sides internally and another circle is drawn passing through the 4 vertices of the square. Find the ratio of the areas of the 2 circle.
7. A regular hexagon and a circle are drawn touching all the sides of hexagon internally and another circle is drawn passing through all the vertices of the hexagon. Find the ratio of the areas of the 2 circle.
8. The interior angle of a regular polygon is $135^{\circ}$. Find the number of sides the polygon is having.
9. Find the cost of painting and flooring a rectangular room of length 20 m , breadth 15 m , and height 12 m if the cost of painting is Rs. 25/sq.m and that of flooring is Rs. $50 / \mathrm{sq} . \mathrm{m}$.
10. There is a rectangular tank of length 25 m , breadth 16 m and height 15 m . It is filled up to a height 12 m if $1400 \mathrm{~m}^{3}$ of water is removed what will be height of remaining water in the tank.
11. Find the maximum possible length of a rod that can be fitted in a rectangular box of size $15 \mathrm{~m} \times 10 \mathrm{~m} \times 6 \mathrm{~m}$
12. Find the maximum possible volume of a cylinder that can be formed by folding a rectangular piece of paper of size $44 \mathrm{~m} \times 22 \mathrm{~m}$
13. Find the cost of painting a hollow cylinder that is closed from one of the ends having negligible thickness and radius 7 m from inside as well as outside given that the cost of painting is Rs. $30 / \mathrm{sq} . \mathrm{m}$ and the height of the cylinder is 10 m .
14. There is a circus tent of cylindrical base and conical top of total height 50 m and radius 40 m . Find the cost of cloth required in making the tent if the cost of cloth is Rs. 35/sq.m given that the height of the cylindrical base is 20 m .
15. The height of a cylinder is made half and the radius is doubled. Find the percentage change in the volume of the cylinder.
16. The radius of a cone is tripled and the height is made half. Find the percentage change in the volume of the cone.
17. There is a square plot of size 20 m . There are 4 horses tied at the 4 corners of the square plot with a rope of length 7 m each. Find the area of the plot that cannot be grazed by the horses.
18. There is a rectangular plot of size $20 \mathrm{~m} \times 30 \mathrm{~m}$ surrounded by a 2 m wide path along its outer boundary. Find the cost of levelling the path if the cost is Rs. 20 / sq.m
19. There is a rectangular plot of size $24 \mathrm{~m} \times 20 \mathrm{~m}$. It is surrounded by path along its outer boundary. Find the width of the path if the area of the path is 141 sq.m
20. A bicycle is having the front wheel of radius 3.5 m and the rear wheel of radius 4.5 m . Find how many more revolutions the front wheel had taken than the rear wheel in travelling a distance of 198 m .

## Summary of Formulae

Areas of different plane figures, Surface areas of solids :

| Plane/Solid | Area | Remarks |
| :---: | :---: | :---: |
| Triangle (any) | $1 / 2 \mathrm{bh}$ | b = base, $\mathrm{h}=$ height |
| Right angled triangle | $1 / 2 \mathrm{bh}$ | b = base, $\mathrm{h}=$ height |
| Equilateral triangle | ${ }^{\sqrt{3} / 4} \mathrm{a}^{2}$ | a = any side |
| Isosceles triangle | $b / 4 \sqrt{\left(4 a^{2}-b^{2}\right)}$ | $\mathrm{b}=$ base, $\mathrm{a}=$ any of the two equal sides |
| Quadrilateral (any) | $1 / 2 d\left(p_{1}+p_{2}\right)$ | $d$ = diagonal, $p_{1}, p_{2}$ perpendiculars to diagonals from opposite vertices |
| Square | $\mathrm{a}^{2}$ | a = any side |
| Rectangle | I b | $\mathrm{I}=$ length. $\mathrm{b}=$ breadth |
| Parallelogram | b h | $\text { b = base, } h=\text { height }$ |
| Rhombus | ${ }^{1 / 2} d_{1} d_{2}$ | $\mathrm{d}_{1}, \mathrm{~d}_{2}=$ diagonals |
| Trapezium | $\underline{1 / 2} \mathbf{h}\left(s_{1}+S_{2}\right)$ | $s_{1}, s_{2}=$ parallel sides, $h=$ height |
| Kite | $1 / 2 d_{1} d_{2}$ | $\mathbf{d}_{1}, d_{2}=\text { diagonals }$ |
| Regular Hexagon | ${ }^{3 \sqrt{3} / 2 a^{2}}$ | a = any side |
| Circle | $\pi r^{2}$ | $r=\text { radius }$ |
| Cube |  | a = any edge |
| Circular cylinder | $\pi \mathrm{r}^{2} \mathrm{~h}$ | $\mathrm{r}=$ radius, $\mathrm{h}=$ height |

Volumes and surface areas of different solids:

| Solid | Volume | Surface Area | Remarks |
| :---: | :---: | :---: | :---: |
| Prism |  | $p h+2 b$ | $\mathrm{b}=\text { base area, } \mathrm{h}=\text { height, } \mathrm{p}=$ perimeter of base |
| Cube | $\mathrm{a}^{3}$ | $6 \mathrm{a}^{2}$ | a = any side |
| Rectangular box | Ib h | $2 l h+2 l b+2 b h$ | $\mathrm{l}=$ length, $\mathrm{b}=$ breadth, $\mathrm{h}=$ height |
| Sphere | 4/3 $\pi \mathrm{r}^{3}$ | $4 \pi \mathrm{r}^{2}$ | r = radius |
| Cone | ${ }^{1 / 3} \pi r^{2} h$ | $\pi \mathrm{r}(\mathrm{r}+\mathrm{l})$ | $r=$ radius of base, $h=$ height, $I=$ slant height |
| Circular cylinder | $\pi \mathrm{r}^{2} \mathrm{~h}$ | $2 \pi r(r+h)$ | $\mathrm{r}=$ radius of base, $\mathrm{h}=$ height |

## PUZZLES

1. A person stole certain number of oranges from an orchard and on his back he met 3 guards, to each guard he gave half the number of remaining oranges and half extra orange. At the end he was left with only one orange. Find how many oranges he had stolen?
2. A thief broke into a king's mansion and stole some precious diamonds. While coming back he was stopped by guards and to each guard he gave half the number of diamonds and two extra diamonds. At the end of the fourth guard he was left with nothing. Find number of diamonds he had stolen?
3. There are three different people. A, B, and $C$ each having certain number of chocolates. First A doubled the chocolates of B and C. Then B did the same and finally C did the same. At the end each had equal number of chocolates. Find the number of chocolates each had in the beginning if they together had 72 chocolates.
4. A person is driving a car at a constant speed. After travelling for some time he saw a two digit milestone. After travelling for an hour more he saw another two digit milestone with the same original two digits but in reverse order. After travelling for one more hour he saw another milestone with the same original digits but with a zero in between. Find the speed of the car.
5. The father's age is a two digit number reverse of the son's age. One year back the father's age was twice of the son's age. Find the present age of each.
6. A person went in the bank with a cheque of some rupees and some paise. The cashier by mistake interchanged the values. The person while coming back gave 10 paise to a beggar and the remaining amount is thrice of the original cheque amount. Find the original cheque amount?
7. There is certain quantity of grass present in lawn and it grows at a uniform rate. 60 cows eat the whole grass in 30 days while 30 cows eat it in 80 days.
A. Find in how many days would 20 cows eat the whole grass?
B. Find maximum number of cows that can be fed on the grass for the infinite time period.
8. There are two candles of equal length one of them burns completely in 4 hours while the other burns completely in 8 hours. Both of them are ignited together and are extinguished after some time. The remaining length of one candle is four times the remaining length of other candle. Find for how much time the candles were burning?
9. A car is having five digit number plate. When it is turned upside down numbers still can be read and the new number is 86625 more than the original. Find the original number.
10. A ten digit number is such that the first digit of the number represents the number of times the digit 1 occurs in that number, the second digit is the number of times the digit 2 occurs in that number and so on and the tenth digit is the number of times the digit 0 occurs in the number. Find the ten digit number.
11. There are nine alphabets $A, B, C, D, E, F, G, H, I$ each representing a unique digit from 1 to 9 such that,
$A+B+C+D=D+E+F+G=G+H+I=17$. Find the value of letter $G$ if $D$ is 4 .
12. There are nine alphabets $A, B, C, D, E, F, G, H, I$ each representing a unique digit from 1 to 9 such that,
$A+B+C=C+D+E=E+F+G=G+H+I=13$. Find the value of letter $E$.
13. There are seven alphabets $A, B, C, D, E, F$ AND $G$ each of them represents a unique digit between 1 to 9 such that
$A * B * C=B * D * E=E F^{*} G$. Find the value of $D$
14. One fine day I met my old friend Champaklal on the street with his latest girlfriend I asked him what is her name. He replied, "if you assign each letter a number according to its position in the alphabet system (e.g. A $-1, \mathrm{~B}-2, \ldots \ldots . \mathrm{Z}-26$ ) the product of the letters in her name is equal to the product of JUDGE but has no letter in common with it . Her name does not have any third alphabet ( $\left.3^{\text {rd }}, 13^{\text {th }}, 23^{\text {rd }}\right)$. It is a five lettered word which after interchanging the first and the second letter comes in dictionary order." What is her name?
15. There are nine balls of same size out of which eight balls are of equal weight and one ball is heavier than the others. Provided with a two sided weighing balance, what is the minimum number of times you will be required to use it to sort out the heavier ball.
A. If 13 balls are there and one is heavier than the others what will be the answer.
B. If out of 9 balls 8 are of equal weight and one is heavier/ lighter than the others what will be the answer.
16. There are three boxes each containing 100 balls of different colour. One box contains balls only of white colour. One contains balls only of black colour and the third box contains 50 balls of white colour and 50 balls of black colour. The boxes are closed and three labels are made for these boxes only black, only white and black and white. One label is pasted on each of the boxes such that every box has the wrong label pasted on it. You are supposed to find which box contains what by just opening one of the boxes and taking out just one ball from that box without looking inside the box. How can it be done?
17. There are three boxes one contains gold coins one contains silver coins and the third contains bronze coins. There are three labels pasted on them gold, silver and gold and silver. All the labels are wrong. What is the minimum number of boxes needed to be opened to find out which box contains what?
18. There are three boxes one contains gold coins one contains silver coins and the third contains bronze coins. There are three labels pasted on them gold, silver and gold or silver. All the labels are wrong. What is the minimum number of boxes needed to be opened to find out which box contains what?
19. Four persons Aishwarya, Katrina, Salman and Abhishek went on a jungle safari. During the dark night they came across a river bridge. The time needed by each of them to cross the bridge are 2,5, 1 and 10 minutes respectively. Find in how much time all the four will cross the bridge safely if the bridge can hold only two persons at a time and they have only one torch with them.
In the previous question in how much time will all the four cross the bridge safely if they come back in the morning.
20. There are three bulbs inside a closed room with only one door in such a way that with door closed nothing is visible from outside. The switches of the bulb are outside the room you are standing outside the room and the door is closed. You are supposed to tell which bulb is connected to which switch (once you open the door you cannot use the switches)
21. There are 100 bulbs in a classroom and 100 switches for them. Initially all the switches are off. The first person is asked to change the positions of all the switches(on/off) which are multiples of 1 . Now the second person is asked to change the positions of all the multiples of 2 . The third person is asked to change all the multiples of 3 and so on and the last hundredth person is asked to change the position of all the multiples of 100 . At the end of this process how many bulbs will be on?
22. A book is having total 3333 pages how many times digit 3 is used to number the pages?
23. There is a box containing 3 different colours of socks. There are 10 pairs of identical red color, 18 pairs of identical white color and 9 pairs of identical black colour. And suddenly the power is switched off. Find the minimum number of socks needed to be taken of to be assured of getting a proper pair of
A) Any colour
B) Black colour. (In socks right and left cannot be differentiated)
24. There is a box containing 3 different colours of hand gloves. There are 8 pairs of identical red color, 10 pairs of identical white color and 6 pairs of identical black colour. And suddenly the power is switched off. Find the minimum number of gloves needed to be taken off to be assured of getting a proper pair of
A) Any colour
B) Black colour.
25. There are 1000 bottles of wine arranged for a party. But a mischievous person added poison in one of the bottles. There is just one hour left for the party. The king has some rats which die in one house even if they are given even a slightest of the dose of poison. What is the minimum number of rats needed to find the bottle which contains the poison?
26. The bacteria in a dish double every day. If we start with one bacteria on the first day the dish gets completely filled in 30 days.
A) If we start from one bacteria, in how many days the dish will be half filled.
B) If we start from two bacteria, in how many days it will be completely filled.
C) If there are four bacteria on the first day in how many days the dish will be half filled.
27. There is a two sided weighing pan with sides of unequal length. Four oranges to right side weigh equal to 1 kg to the left side. But when 1 kg weight is kept at the right side it needs 16 oranges to the left side to balance it. Find the weight of each orange
28. Mr. Devdas is a chain smoker and whenever he goes out of stock, from 6 cigarette butts, he makes a new cigarette. Find how any cigarettes he can make out of
A) 36 butts
B) 221 butts
29. In a Cadbury's factory there are 10 machines churning out dairy milk chocolates of 10 gm each suddenly one of the machines goes faulty and starts giving out chocolates of 11 gm . What is the minimum number of times; you will be required to use an electronic balance to find out the faulty machine.
30. Mr. Chunnibhai the diamond king on his death bed decided to distribute his diamonds to his 3 sons. First he called the eldest son and divided his diamonds in 3 equal parts but 1 diamond was left out he gave that remaining diamond to his faithful servant Ramu and one of the parts to the eldest son, then he called his middle son again divided the remaining diamonds in 3 equal parts and one remaining diamond to Ramu and one of three parts to the middle son. Now it was the turn of youngest son and he did the same. Now finally he called all the three sons together divided the diamonds in 3 parts and again the remaining to Ramu and 1 part each to the 3 sons. Find the minimum number of diamonds Chunnibhai had.
31. There are hundred teams participating in a tournament to be played on knock out basis. What is the minimum number of matches required to be played to find out the final winning team.
A) In the question above if a team gets eliminated after losing two matches what will be the answer.
32. There are three persons Pepsi, Fanta \& coke. They always have the dinner together and after the dinner, each one orders either tea or coffee.
A) If Pepsi orders coffee, then Fanta orders the drink that coke orders.
B) If coke orders coffee, then Fanta orders the drink that Pepsi does not order.
C) If Fanta orders tea, then Pepsi orders the drink that Coke orders.

Find who always orders the same drink and which one.
33. Mr. and Mrs. Lovebirds went on their honeymoon to Switzerland. During their stay it rained on some morning and on some evening. Whenever it rained in the morning, they had clear evening and vice versa. But even it happened on some days that it did not rain in the morning as well as in the evening. In all they had 12 clear mornings and6 clear evening. Find for how many days did they stays if it rained on 12 days.
34. There are 2 boys Ranbir and Salman both in the love with same girl Katrina. One fine day Katrina ask them to play a simple game and she will get married to the winner. She keeps 70 chocolates in a bowl and every person is asked to pick 1 or 2 chocolates turn by turn. The person picking up the last chocolate will be the looser of the game. With their love at stake both of them played very intelligently. Find who will be the winner of the game if Ranbir starts the game?
35. Every hr one train named Shatabdi express starts from Pune towards Mumbai. At the same time a train by the same name starts from Mumbai towards Pune. Each of the trains needs 5 hrs to reach the destination. A person starts from Pune at 12 a.m.By the time he reaches Mumbai, how many Shatabdi express coming from Mumbai will he meet?
36. There are two stations Kashmir and kanyakumari. A train named bharat darshan starts from each of the stations towards the other everyday at 9 am and reaches the destination after 3 days at 9.30 am. (e.g a train which starts from Kashmir on Monday at 9 am will reach Kashmir on Thursday at 9.30 am ). a person starts from Kashmir by bharat darshan how many bharat darshans will cross him in the whole journey?
37. A brand new Dunlop tyre can cover a journey of exactly 2400 km . Find minimum number of tyres needed for a Bhrat Darshan journey of 4200 kms by Tata Nano.
38. There are two jars $A$ and $B$. $A$ contains Orange juice and $B$ contains equal quantity of wine. From jar A, some quantity of orange juice is taken out and added to jar B. Now same quantity of wine is taken out from jar $B$ and added to jar $A$. At the end out of quantity of wine in jar A and quantity of orange juice in jar B , which will be more?
39. The father is as many weeks old as the son is in days while the grandfather is as many years old as the grandson is in months. Find the present age of each if the summation of the ages is 140 years.
40. A is now 5 times as old as B, but 7 years from now, A will be 3 times as old as he will be then. How old is A now?
41. In year 1930 the grandfather was as many years old as the last two digits of his year of birth and the same was true for the grandson. Find the summation of their ages in 1930.
42. Amitabh got married in year 1972 and his son Abhishek was born when Amitabh's age was $1 / 59^{\text {th }}$ of his year of birth. Find in which year was Abhishek born.
43. A person spent $1 / 7^{\text {th }}$ of his life as child, $1 / 6^{\text {th }}$ as youth, $1 / 12^{\text {th }}$ as eligible bachelor and 5 years after his successful marriage his son Krish was born who was elected as prime minister, 4 years back when his age was half of the man's present age. Find the man's present age.
44. A person is twice as old as his son was when the person was as old as the son is right now. Find the present age of each if the summation of their present ages is 112 years.
45. A logic wizard Mr. Braino went to his friends a math genius Dr. Math's place after a long time and during the conversation he asked his friend about the ages of his three children. Dr. Math's in order to check his friend's capabilities rather than answering directly told him that the product of their ages was 36 . Unable to get the answer Mr. Braino asked for more clues and the friend told him that the summation of their ages was equal to his door number. Mr. Braino still failed to get the answer and requested for some more hints. Dr. Math on that said that his youngest son Sam is as old as his girlfriend Tina. And there came the quick reply from Mr. Braino. Find the ages of the three children.
46. A gong clock takes 30 sec to strike 5 O'clock. Find in how much time it will strike 10 O'clock.
47. A gong clock strikes with an interval of 1 sec . Find in how much time it will strike the whole day.
48. 50 minutes ago it was 4 times as many minutes past 3 o ' clock as it is to 6 o' clock right now. Find the present time.
49. Abhishek's watch gains 2 minutes per hour. Aishwarya's watch runs on time and Salman's watch looses 3 minutes per hour. If all them set their watches together after how many days all the watches will show the same time for the first time.
50. A person is having total Rs. 1023 with him. He wants to distribute them in minimum number of bags such that he should be able to give any amount from Rs. 1 to Rs. 1023 just by the combination of bags. Find the minimum number of bags required.
51. Mr. Champakbhai has a grocery shop he has to weigh 31 kg of rice but he is having only one weight of 1 kg . Find the minimum number of times he will be required to use the balance to do so.
52. Mr. Mewalal decided to start selling sugar. He wants to have minimum number of weights such that he should be able to weigh any quantity from 1 kg to 1193 kg only in the multiplies of a kg only by using the balance once. Find the minimum number of weights required.
53. Aishwarya is having certain number of diamonds. If she divides them amongst the brothers Salman and Vivek, the difference between the square of the two numbers is 48 times the difference of the two numbers. Find the total number of diamonds she is having.
54. Gurukant went to a wholesale cloth market. He bought two different varieties of cloth for total less than Rs. 1000 he bought as many meters of each type as was the cost in rupees per meter of that type. Find the total quantity of cloth he bought if the difference in the total amount spent on each type was Rs. 215.
55. Malika is having certain number of sons and each of her son has as many brothers as sons. Find her age it's a number between 50 and 70 which is equal to the total number of sons and grandsons she is having.

## Logarithm - 1

## Rules

1. $\log _{a} 1=0$
2. $\log _{a} a=1$
3. $\log _{a} b \times \log _{b} a=1$
4. $\log _{b}(m \times n)=\log _{b} m+\log _{b} n$
5. $\log _{b}\left(\frac{m}{n}\right)=\log _{b} m-\log _{b} n$
6. $\log _{b} m^{n}=n \log _{b} m$
7. $\log _{a} x=\frac{1}{\log _{x} a}$
8. $\log _{a} x=\frac{\log _{b} x}{\log _{b} a}=\log _{b} x \times \log _{a} b$
9. $\log _{b} a=\log _{c} a \times \log _{b} c$
10. $a^{\log _{a} x}=x$
11. $a^{\log _{b} x}=x^{\log _{b} a}$
12. $\log _{a^{n}}(x)=\frac{1}{n} \log _{a} x$
13. $\log _{a^{n}}\left(x^{m}\right)=\frac{m}{n} \log _{a} x$

## Exercise:

1. $\log _{2}\left(\frac{2}{3}\right)+\log _{4}\left(\frac{9}{4}\right)=$ ?
2. $\log _{8} 128=$ ?
3. $\log _{4}\left(\log _{8} 64\right)=\log _{5} x$. Find the value of $x$.
4. $\log _{10} x+\log _{10} 5=2$. Find the value of x .
5. $\log _{3}(5+x)+\log _{8} 8=2^{2}$. Find the value of x .
6. $\log (x+3)+\log (x+5)=\log 35$. Find the value of $x$.
7. $\frac{8\left(\log _{8} 8\right)}{2 \log _{\sqrt{8}} 8}=$ ?
8. $\log _{3^{2}} 5^{4} \times \log _{5^{2}} 3^{4}=$ ?
9. $\log _{3} 27+\log _{2} 4-\log _{5} 25=$ ?
10. $\log _{9} 27-\log _{27} 9=$ ?
11. $\log _{2} x+\log _{4} x+\log _{16} x=\frac{21}{4}$ Find the value of $x$.
12.2 $(\log x)^{2}-\log x-3=0$. Find the value of $x$.
12. $\log _{10} x+\log _{\sqrt{10}} x+\log _{\sqrt[3]{100}} x=27$ Find the value of $x$.
13. $\frac{9}{2} \log _{10} x=27$. Find the value of $x$.
14. $\log _{\sqrt{8}} x=3 \frac{1}{3}$. Find the value of $x$.
15. $\log _{7} \sqrt{7 \sqrt{7 \sqrt{7 \sqrt{7 \ldots \ldots \infty}}}}=$ ?
16. $\frac{1}{2} \log _{10} 25-2 \log _{10} 3+\log _{10} 18=$ ?
17. $\log _{a}(a b)=x$. Find $\log _{b}(a b)=$ ?

## Logarithm - 2

1. $\log _{b} a \log _{c} b \quad \log _{a} c=$ ?
a) 1
b) 2
c) 0
d) 3
2. $\log _{y} x^{3} \cdot \log _{z} y^{3} \cdot \log _{x} z^{3}=$ ?
a) 9
b) 4
c) 27
d) 16
3. $\left(1+\log _{n} m\right) \log _{m n} x=$ ?
a) $\log _{n} x$
b) $\log _{m} x$
C) $\log _{n} m$
d) $\log _{x} n$
4. $\frac{\log _{a} x \cdot \log _{b} x}{\log _{a} x+\log _{b} x}=$ ?
a) $\log _{b} a$
b) $\log _{a} b$
c) $\log _{a b} x$
d) $\log _{x} a b$
5. $\frac{1}{\log _{x y} x y z}+\frac{1}{\log _{y z} x y z}+\frac{1}{\log _{z x} x y z}=$ ?
a) 0
b) 1
c) 2
d) $\log _{x} x y z$
6. The number of solutions of $\log _{2}(x-1)=2 \log _{2}(x-3)$.
a) 2, 5
b) 5
c) 2
d) 1
7. The value of $x$ obtained from equation $4^{\log _{9} 3}+9^{\log _{2} 4}=10^{\log _{x} 83}$ will be
a) 10
b) 100
c) 5
d) 2
8. The identity $\log _{a} n \log _{b} n+\log _{b} n \log _{c} n+\log _{c} n \log _{a} n$ is
a) $\frac{\log _{a} n \log _{b} n \log _{c} n}{\log _{a b c} n}$
b) $\frac{\log _{a b c} n}{\log _{a} n}$
c) $\frac{\log _{b} n}{\log _{a b c} n}$
d) None of these
9. If $x \geq y$ and $y>1$ then the value of the expression $\log _{x}\left(\frac{x}{y}\right)+\log _{y}\left(\frac{y}{x}\right)$ can never be
a) 1
b) -0.5
c) 0
d) 1
10. What is the sum of ' $n$ ' terms in the series: $\log m+\log \left(\frac{m^{2}}{n}\right)+\log \left(\frac{m^{3}}{n^{2}}\right)+\cdots \ldots . . n$ terms
a) $\log \left[\frac{n^{(n-1)}}{m^{(n+1)}}\right]^{n / 2}$
b) $\log \left[\frac{m^{m}}{n^{n}}\right]^{n / 2}$
c) $\log \left[\frac{m^{(1-n)}}{n^{(1-m)}}\right]^{n / 2}$
d) $\log \left[\frac{m^{(1+n)}}{n^{(n-1)}}\right]^{n / 2}$
11. If $\frac{1}{3} \log _{3} M+3 \log _{3} N=1+\log _{0.008} 5$ then
a) $M^{9}=\frac{9}{N}$
b) $N^{9}=\frac{9}{M}$
c) $M^{3}=\frac{3}{N}$
d) $N^{9}=\frac{3}{M}$
12. If $\log _{3} 2, \log _{3}\left(2^{x}-5\right), \log _{3}\left(2^{x}-\frac{7}{2}\right)$ are in arithmetic progression, then the value of $x$ is equal to
a) 5
b) 4
c) 2
d) 3

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