

20. When the price of sugar decreases by 10%, a man can buy 1 kg more for ₹ 270, what is the original price of sugar per kg? (with respect to the original price, no profit or loss is made)

Soln:  $\frac{P_1}{P_2} = \frac{Q_2}{Q_1}$  (constant)

$$P_1 \propto \frac{1}{Q_1} \quad Q_2 = x + 1$$

$$\text{Let, } P_1 = 100 \quad P_2 = 90$$

$$\frac{100}{90} = \frac{x+1}{x}$$

$$100x = 90x + 90$$

$$10x = 90$$

$$x = 9$$

+1kg

9kg → 270  
1kg → 30  
10kg ← 270

21. The cost of an apple is twice that of banana & the cost of banana is 25% less than pineapple. If the cost of each type of fruit is increased by 10%. Find the percentage increase in the cost of 4 bananas, 2 apples & 3 pineapples.

Soln: Let pineapple → 180  $\xrightarrow{+10\%}$  180 + 18 = 198  
 banana → 75  $\xrightarrow{+10\%}$  75 + 7.5 = 82.5  
 apple → 150  $\xrightarrow{+10\%}$  150 + 15 = 165

old price      new price

$$4b + 2a + 3p$$

$$4b + 2a + 3p = 4 \times 82.5 + 2 \times 165 + 3 \times 110$$

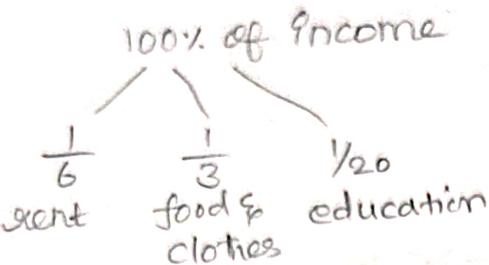
$$330 + 330 + 330 = 990$$

$$= \frac{990 - 900}{900} \times 100\%$$

$$= \frac{90}{900} = 10\%$$

22. A person spends 16.66% of his income on house rent, 40% of the remaining on food & clothes and 10% on further remaining on education. He deposited the ~~remaining~~ amount in the bank. Find the ratio of his total income to expenditure.

Soln:-



$$\text{Expenditure} = \frac{1}{6} + \frac{1}{3} + \frac{1}{20}$$

$$= \frac{10 + 20 + 3}{60} = \frac{33}{60}$$

$$= \frac{11}{20}$$

$$16.66 \rightarrow \frac{1}{6}$$

$$\frac{1}{6} \times \frac{1}{3} = \frac{1}{18}$$

$$1 - \left[ \frac{1}{6} + \frac{1}{3} \right] = 1 - \left[ \frac{3}{6} \right]$$

$$= \frac{1}{2}$$

$$\frac{1}{2} \times \frac{10}{100} = \frac{1}{20}$$

To food & clothes he spent  $\frac{1}{3}$  of his income i.e.  $\frac{1}{3}$  of  $\frac{1}{20}$  of his income.

Income : Expenditure  $= \frac{20}{11}$   
 Income  $= 2000$  rs. Remaining most will be  $\frac{11}{20}$  of  $\frac{1}{20}$  of his income.

23. A man spends  $\frac{1}{5}$  of his total income on travelling 20% of the remaining on food then he donates ₹120 still left with ₹1400. Find his income.

Soln:-

$$\text{let income} = x$$

$$\boxed{\text{Income} = 2000}$$

$$\frac{190}{150} = \frac{10}{80}$$

$$\frac{190}{8} = \frac{10}{8}$$

$$10x = 190$$

$$100x = 1900$$

$$\frac{1900}{95} = \frac{20}{1}$$

$$20x = 95$$

$$x = 20$$

$$100x = 2000$$

In an examination a student must secure 40% of the marks to pass it. A student who got 220 marks fails by 20 marks. What is the maximum marks of examination?

Soln: Pass % = 40%. If profit or loss % is given

Soln:-

$$\text{Marks scored} = 220$$

$$= \frac{220}{100} \rightarrow \frac{10}{4}$$

$$100\% \Rightarrow 600$$

$$\text{Max mark} = 600$$

25. If a student scores 43% of the marks then he will be failed by 72 marks. but when he scores 57% of the marks he will be passed by 40 marks. Find the pass mark percentage.

Soln:

$$\frac{43}{100}x + 72 = \frac{57}{100}x - 40$$

$$43x + 7200 = 57x - 4000$$

$$14x = 11200$$

$$x = 800$$

$$\text{Pass mark} = \frac{43}{100} \times 800 + 72$$

$$= 344 + 72$$

$$= 416 \frac{52}{208}$$

$$\text{Pass \%} = \frac{416}{800} \times 100 = 52\%$$

26. In an election between two candidates, the winner scored 58% of the total votes, and wins by a majority of 2400 votes. How many votes did the loser get?

Soln:-

$$\text{Winner \%} = 58\%$$

$$\text{Winner - Loser} = 2400$$

$$\frac{58}{100}x - \frac{42}{100}x = 2400$$

$$\frac{16x}{100} = 2400$$

$$x = \frac{240000}{16}$$

$$15000 \times \frac{42}{100}$$

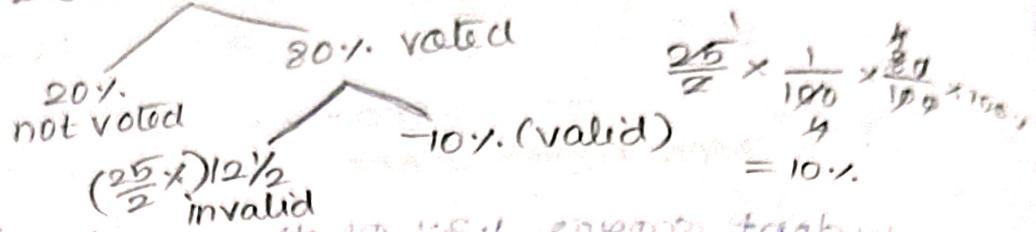
$$\text{Loser vote} = \underline{\underline{6300}}$$

$$\begin{array}{r} 150 \times 42 \\ \hline 300 \\ 60 \\ \hline 6300 \end{array}$$

27. In an election 20% of the voters did not vote. 10% of votes are declared invalid and winner gets 60% of valid votes & won the election by 4200 votes. Find the number of votes in the voting list.

Soln:-

Election voter list



and 10% are not counted for valid voters  
and for V.T. 80% valid voters  
winner =  $\frac{1}{2} \times 10\% = 10\%$  - 4200  
and 10% of 80% =  $\frac{1}{2} \times 28\% = 14\%$

$$4 - \text{winner} - \text{loser} = \frac{4200}{14} = 300$$

$$1\text{y.} = 300$$

$$100\text{x} = 30000$$

28. In a rectangle length is 3 times of that of breadth. If the length & breadth of the rectangle are increased by 30% & 10% respectively. Then find the % change in its perimeter.

Soln:-

$$\text{length} = 3b$$

$$\text{let } b = 20$$

$$l = 3(20) = 60$$

$$P = 2(l+b)$$

$$= 2(20+60)$$

$$l' = 60 + 18 = 78$$

$$b' = 22$$

$$P' = 2(l' + b')$$

$$= 2(100)$$

present, let  $b = 200$  and let  $l = 600$  no. of people are 160  
so increase in  $b = 20$  &  $l = 60$  so increase in  $b = 10\%$  &  $l = 30\%$

$$= \frac{200 - 160}{160} \times 100 = \frac{40}{160} \times 100 = 25\%$$

$$= 25\%$$

29. The population of a village was 9800. In a year, the males increased by 8% & females by 5%. The population becomes 10458. What was the no. of males present in the village before increase?

soln:-

$$P = 9800$$

$$P' = 10458$$

$$\begin{array}{r} 10458 \\ - 9800 \\ \hline 658 \end{array}$$

$$8\% \text{ of males} + 5\% \text{ of fem} = 658$$

$$\frac{8}{100} x + \frac{5}{100} (9800 - x) = 658$$

$$\frac{2}{25} x + \frac{1}{20} (9800 - x) = 658$$

$$\frac{2x}{25} + \frac{9800}{20} - \frac{x}{20} = 658$$

$$\frac{8x + 49000 - 5x}{20} = 658$$

$$\begin{array}{r} 98 \times 5 \\ 490 \\ \hline 581500 \\ - 49000 \\ \hline 16800 \end{array}$$

$$3x + 49000 - 5x = 13000$$

$$-2x = -6000$$

$$x = 3000$$

30. A student multiplied a number  $\frac{3}{5}$  instead of  $\frac{5}{3}$ . What is the % error in the calculation?

soln:-

$$\Rightarrow \frac{\frac{5}{3}x - \frac{3}{5}x}{\frac{5}{3}x} \times 100\%$$

$$= \frac{x \left( \frac{25-9}{15} \right)}{\frac{5}{3}x} \times 100\%$$

$$= \frac{16}{15} \times \frac{3}{5} \times 100\% = \frac{16}{25} \times 100 = 64\%$$

31. A salesman is allowed 12% commission on the sales made by him, and bonus of 1% on the sales over ₹ 15000. If the total earnings of the salesman is ₹ 7650 find the total sales made by him.

Soln:-

$$\begin{array}{ccc}
 & x & \\
 15000 & & x - 15000 \\
 12\% & & 12\% + 1\%
 \end{array}$$

$$\frac{12}{100} \times 15000 + \frac{13}{100} \times (x - 15000) = 7650$$

$$\frac{180000 + 13x - 195000}{100} = 7600$$

$$\frac{13x - 15000}{100} = 7600$$

$$13x - 15000 = 760000$$

$$13x = 760000 + 15000$$

$$13x = 775000$$

$$x = \frac{775000}{13}$$

$$x = 50000$$

32. A sales man is allowed 8.5% commission on total sales and 2.5% bonus on the sales over ₹ 20,000. If the bonus received is ₹ 2250 then find the total earnings of the salesman including bonus.

Soln:-

Concept of Calendar has relation with BII 7.6

- \* smallest unit of any year is a day
- \* leap year  $\rightarrow$  366 days  $\rightarrow$  52 weeks + 2 odd days
- \* non-leap year  $\rightarrow$  365 days  $\rightarrow$  52 weeks + 1 odd days
- \* odd days  $\rightarrow$  No. of days left over after converting the given no. of days into weeks

\* Every century year is not a leap year, but,

\* Every 4<sup>th</sup> century year is a leap year.

100, 200, 300, 500, 600, 1300, 1900, ...  $\rightarrow$  Not leap year  
 400, 800, 1200, 1600, 2000, ...  $\rightarrow$  leap year

\* No. of odd days for 100 years.

$\Rightarrow$  24 leap years

$$\begin{array}{r} 17 \\ 7 \longdiv{124} \\ \hline 54 \end{array}$$

$\Rightarrow$  76 Non-leap years

$$24 \times 2 + 76 \times 1 = 124$$

100 years - 5 odd day - 500 - 900  $\frac{5}{5}$   $\rightarrow$  odd days

200 years - 3 odd day - 600 - 1000  $\frac{4}{5}$   $\rightarrow$  odd days

300 years - 1 odd day for 100 years  $\rightarrow$  300  $\frac{1}{5}$   $\rightarrow$  odd days

400 years - 0 odd day - 800 - 1200  $\rightarrow$  0  $\rightarrow$  odd days

	Sun	Monday	Tues	Wedn	Thurs	Fri	Sat
0	1	2	3	4	5	6	7

How many odd days are present in 1900 years?

Ans: 1

What is the number of odd days in 2025 years?

2000 + 25 years  $\rightarrow$  25 odd days  $\rightarrow$  6  $\times$  2 + 19  $\times$  1  $\rightarrow$  13  $\frac{4}{5}$   $\rightarrow$  4 odd days

Ans: 3 odd days

3. Find the number of odd days in 1950 years?

Soln:-

$$\begin{aligned} & \text{1950th A.D. would have } 1950 \times 1 = 1950 \text{ odd days.} \\ & \text{Now } 1950 = 1600 + 350. \text{ Now } 1600 \text{ days } = 450 \text{ weeks} \\ & \text{So, } 1600 \text{ days } = 0 \text{ odd days.} \\ & \text{Now } 350 \text{ days } = 350 \times 1 = 350 \text{ odd days.} \\ & \text{So, } 1950 \text{ days } = 350 \text{ odd days.} \\ & \text{Now, } 1950 = 12 \times 162 + 18. \\ & \text{So, } 1950 \text{ days } = 12 \times 28 \times 1 + 18 \text{ days.} \\ & \text{Now, } 12 \times 28 \times 1 = 336 \text{ days.} \\ & \text{So, } 1950 \text{ days } = 336 + 18 = 354 \text{ days.} \\ & \text{Now, } 354 \text{ days } = 50 \text{ weeks} + 4 \text{ days.} \\ & \text{So, } 1950 \text{ days } = 4 \text{ odd days.} \end{aligned}$$

4. January 1<sup>st</sup>, 2008 was Monday. What was the day of the week lies on January 1<sup>st</sup>, 2010.

Soln:-

Thursday.

5. The calendar year for 2007 will be same for 8 years.

~~a) 2014 b) 2016 c) 2018 d) 2020~~

$\Rightarrow$  calendar year same between 2 years means, the no. of odd days should be 0 between those 2 years.

2007 - 21	2011 - 1	2015 - 21	2019 - 1	2023 - 21	2027 - 1	2031 - 21	2035 - 1
2008 - 2	2012 - 2	2016 - 2					2014 - 0
2009 - 1	2013 - 1	2017 - 1					2015 - 1
2010 - 1	2014 - 1						2016 - 1
							2017 - 1
							2018 - 1

$\Rightarrow$  divide the last two digits of the given year with 4 & if the remainder is 0, then answer is given year + 28, If the remainder is 1, answer is

given year + 6; If the answer is  $2/3$ , the answer is  
given year + 11.

6. What is the maximum difference between any two leap years?

Soln:- Ans - 8

7. How many number of odd days in 163 days?

Soln:-  $\frac{163}{7} \text{ remainder } 2 \frac{3}{7}$   
 $\frac{2}{2} \frac{3}{2} \frac{1}{2} \frac{2}{2}$   
 $\Rightarrow 2 \text{ odd days}$

8. Same calendar months in a year can be

Soln:  
a) Jan, Oct    b) Aug, Dec,    c) Feb, Sep,    d) Apr, July

Ex: 1900 next, first day is 21st  $\frac{1900}{13} = 146$  rem 2  $\frac{20}{4} = 5$  May  
1900 next  $\frac{191}{13} = 146$  rem 2  $\frac{21}{4} = 5$  June

9. The last day of a century year cannot be

Soln:  
a) Monday    b) Thursday    c) Friday    d) Sunday

100  $\rightarrow 5$  (Friday)  
100  $\rightarrow 3$  (Wednesday)    100  $\rightarrow 1$  (Monday)  
100  $\rightarrow 0$  (Sunday)  
100  $\rightarrow 7$  (Tuesday)  
100  $\rightarrow 6$  (Saturday)  
100  $\rightarrow 4$  (Sunday)  
100  $\rightarrow 2$  (Tuesday)  
100  $\rightarrow 1$  (Saturday)  
100  $\rightarrow 0$  (Sunday)  
So 100 cannot be last day of the century year

10. If today is wednesday what would be the day after 198 days?

Soln:-

$$\begin{array}{r} 22 \\ \hline 198 \\ 14 \downarrow \\ \hline 58 \\ 56 \\ \hline 2 \end{array}$$

$\Rightarrow$  2 odd days

$\Rightarrow$  Friday

11. If 266<sup>th</sup> day of a leap year is Friday, what will be the last day of the same leap year.

Soln:-

$$\begin{array}{r} 366 \\ - 266 \\ \hline 100 \\ \hline 100 \end{array}$$

$$\begin{array}{r} 14 \\ \hline 100 \\ 10 \\ \hline 0 \end{array}$$

$\Rightarrow$  2 odd days

$\Rightarrow$  Sunday

12. 13<sup>th</sup> June 2012 falls on Tuesday, then what is the day on 13<sup>th</sup> June 2004?

Soln:-

$$\begin{array}{r} 2012 \\ - 2004 \\ \hline 8 \end{array}$$

2L GNL

$$(2 \times 2 + 6 \times 1)$$

$$4 + 6 = 10 \times 7 = 3$$

$\Rightarrow$  2 odd days

$\Rightarrow$  Saturday

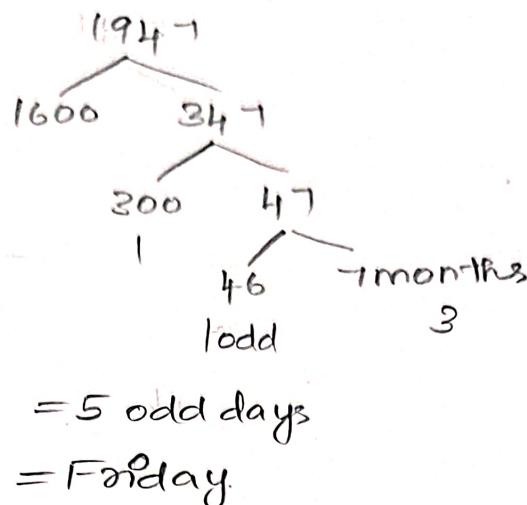
13. If 26<sup>th</sup> May, 2021 falls on saturday. What day of the week falls on 26<sup>th</sup> May 2030?

$$\begin{array}{r} 9 \\ \hline 26 \\ 2L \quad -1NL \end{array}$$

$$(2 \times 2) + (7 \times 1) = 11 \times 7 = 4 \text{ odd days} \Rightarrow \text{Wednesday}$$

calculate on which day we have got independence.  
 15<sup>th</sup> august 1947 falls on?

Sln:



$$\begin{array}{r} 46 \\ 11 \text{ L } 35 \text{ NL } 7 \frac{8}{57} \\ 22 + 35 \\ \hline 56 \end{array}$$

31  
28  
31  
30  
31  
30  
31  
30

$$\begin{array}{r} 32 \\ 21 \text{ L } 15 \frac{227}{21} \\ \hline 14 \end{array}$$

5. How many days does 'K' weeks & 'K' days ~~ave~~ in total?

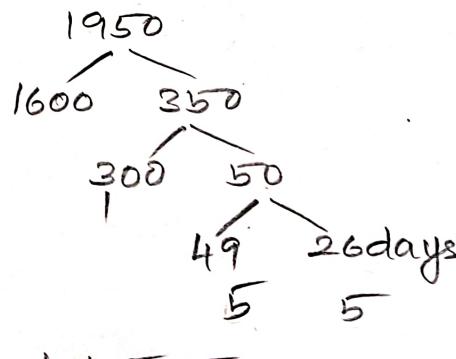
Sln:— a) 7K      b) 8K      c) 9K      d) 10K

'K' weeks + 'K' days

$$\begin{aligned} & 7 \times K + K \\ & 7K + K \\ & \Rightarrow 8K \text{ days} \end{aligned}$$

6. 26<sup>th</sup> Jan 1950

Sln:—



$$\begin{array}{r} 12 \\ 50 \\ \hline 4 \Rightarrow 50 \\ 7 \frac{26}{21} \frac{3}{5} \quad 24 + 37 \\ \hline 4 \end{array}$$

$\Rightarrow 4$  odd days  
 $\Rightarrow$  Thursday.