

## DETAILED EXPLANATIONS

1. (b)

Since ' 6 ' and ' 7 ' have been used in the product of 53 and 22 , the numbers have to be using base ' 8 ' or ' 9 '.

If we try with base ' 8 ',(53) $=8 \times 5+3=(43)_{10}$

$$
(22)_{8}=8 \times 2+2=(18)_{10}
$$

$$
43 \times 18=(774)_{10}
$$

whereas,

$$
(1276)_{8}=512 \times 1+64 \times 2+8 \times 7+6=(702)_{10} \text { which is NOT }=774
$$

If we try with base ' 9 ',(53) $9=9 \times 5+3=(48)_{10}$

$$
(22)_{9}=9 \times 2+2=(20)_{10}
$$

$$
48 \times 20=(960)_{10}
$$

whereas,

$$
(1276)_{9}=729 \times 1+81 \times 2+9 \times 7+6=(960)_{10}
$$

Converting $(4371)_{9}=4 \times(729)+3 \times(81)+7 \times(9)+1=3223$.
2. (d)

Being opposite in degree of measure, Sip is small quantities and gulp is take in large quantity. Similarly for drizzle and rain!
3. (d)

Since $\quad\left(x-\frac{1}{x}\right)=3\left(x-\frac{1}{x}\right)^{2}=x^{2}+\frac{1}{x^{2}}-2=9$ leading to $x^{2}+\frac{1}{x^{2}}=11$

$$
\left(x^{3}-\frac{1}{x^{3}}\right)=\left(x-\frac{1}{x}\right)\left(x^{2}+\frac{1}{x^{2}}+1\right)=3 \times 12=36
$$

4. (b)

$$
\text { Let, } \begin{aligned}
\text { Jyoti's age } & =x \\
\text { Jyoti's mother's age } & =6 x \\
\therefore \quad 3(x+5) & =6 x \\
3 x+15 & =6 x \\
3 x & =15 \\
x & =5
\end{aligned}
$$

5. (d)

Let the original price be Rs. $x$
$\therefore(100-r) \%$ of $(100+r) \%$ of $x=1$

$$
\begin{aligned}
\frac{(100-r)}{100} \times \frac{(100+r)}{100} \times x & =1 \\
x & =\frac{100 \times 100}{(100-r)(100+r)}=\frac{10000}{\left(10000-r^{2}\right)}
\end{aligned}
$$

## Alternative :

Let original price $=$ Rs $x$
After $r \%$ increase, price $=(100+r) \%$ of $x$

$$
=\frac{(100+r) x}{1000}
$$

New price after $r \%$ decrease,

$$
\begin{aligned}
& \qquad=(100-r) \% \text { of }\left[\frac{(100+r) x}{100}\right] \\
& \\
& =\frac{(100-r)(100+r)}{100 \times 100} x=1 \text { (given) } \\
& \text { Hence, } \quad x=\frac{100 \times 100}{(100-r)(100+r)}
\end{aligned}
$$

6. (c)
L.C.M of $5,6,7,8=840$
$\therefore$ Required number is of the form $840 k+3$
Least value of $k$ for which $(840 k+3)$ is divisible by 9 is $k=2$.
$\therefore \quad$ Required number $=840 \times 2+3=1683$
7. (b)

$$
\begin{array}{ll}
71-5=66 ; & 66+9=75 ; \\
70+9=79 ; & 74+9=83 \\
75-5=70 ; & 79-5=74
\end{array}
$$

8. (c)

One clock shows 10 pm (on 21st Jan, 2010)
One clock gains $=2 \mathrm{~min}$
Other clock loses $=5 \mathrm{~min}$
Time period between 10 pm and $4 \mathrm{pm}=18 \mathrm{hrs}$
$\therefore \quad$ Required difference $=(2 \times 18+5 \times 18) \mathrm{min}=126 \mathrm{~min}$
9. (b)

$$
\begin{aligned}
P & =\text { Rs. } 600 \\
A & =\text { Rs. } 720 \\
T & =4 \text { years } \\
R & =? \\
R & =\frac{\text { S.I. } \times 100}{P \times T}=\frac{120 \times 100}{600 \times 4}=5 \%
\end{aligned}
$$

At 7\% rate,

$$
\begin{aligned}
\text { S.I. } & =\frac{600 \times 7 \times 4}{100}=168 \\
A & =600+168=768
\end{aligned}
$$

10. (b)

We have

$$
\frac{2 x}{1+\frac{1}{\frac{(1-x)+x}{1-x}}}=1
$$

$$
\begin{aligned}
\frac{2 x}{1+(1-x)} & =1 \\
2 x & =1+1-x \\
x & =\frac{2}{3}
\end{aligned}
$$

11. (b)


A very simple question!
Using the property that the length of a tangents from an external point to thsame circle are equal in length, we can write

$$
\begin{aligned}
B S & =B R ; \\
C R & =C Q ; \\
D Q & =D P ; \\
A P & =A S \\
A B+B C+C D+D A & =17+(B R+R C)+9+(P D+P A) \\
& =26+(B S+S A)+(C Q+D Q)
\end{aligned}
$$

(replacing $B R$ with $B S$; $A P$ with $A S ; D P$ with $D Q$ and $C R$ with $C Q$ being equal )

$$
=26+17+9=52 \mathrm{~cm}
$$

12. (d)
'd' i.e. 34

$$
N=126!-125!=(125!) \times(126-1)=125 \times 125!
$$

The number of zeros at the end of $N$ is dependent on the number of times ' 5 ' comes in the expansion of 125 ! which is equal to INTEGER value of $\frac{125}{5}+\frac{25}{5}+\frac{5}{5}=25+5+1=31$ PLUS 3 more $5^{\prime}$ 's since $125=5^{3}$ which gives total number of 5 's as $31+3=34$ which is the number of Zeros at the end of $N$.
13. (c)

When we want to paint the surfaces of the cube, we are working with the total surface area of all 6 faces. In case of cube of 125 cc volume, each side is 5 cm long. This means that 2 liters of paint is required to cover an area of $6 \times(5 \times 5)=150$ square cm .
In the second case, the total surface area to be covered is the total surface area of 125 cubes each with a volume of 1 cc i.e. a cube with each side 1 cm long. Total area to be painted in this case is $125 \times(1 \times 1)=750$ square cm . Additional area to be painted is $750-150=600$ square cm which is 4 times the earlier area. This means that we need $4 \times 2$ liters $=8$ liters as additional quantity of paint required to be used i.e. option (c).
14. (d)

If $B$ is the number of boys and $G$ is the number of girls in the class, we can write a linear equation based on the given data
i.e.

$$
\begin{aligned}
71 B+83 G & =80 \times(B+G) \\
G & =3 B
\end{aligned}
$$

i.e.
i.e. the number of girls is 3 times the number of boys in the class.

Observation: Since the average is closer to the score of girls than the score of boys, we can eliminate option ' $b$ ' and ' $c$ '.
15. (a)

$$
\begin{array}{lrl}
\text { Given } & A B|\mid D E \\
\Rightarrow & \angle B & =\angle D \\
\text { and } & \angle A & =\angle E \\
\therefore & \triangle A B C & \sim \Delta E D C
\end{array} \quad(A A A \text { similarity) })
$$

$$
\text { Area of } \triangle A B C=\frac{1}{2} \times 2 \times 1.6=1.6 \mathrm{~cm}^{2}
$$

$$
\text { Area of } \triangle E D C=\frac{1}{2} \times 7 \times 5.6=19.6 \mathrm{~cm}^{2}
$$

$\therefore$ Sum of areas of $\triangle A B C$ and $\triangle E D C=21.2 \mathrm{~cm}^{2}$
16. (a)

Let the mileage of Jagan's car be $n \mathrm{~km} /$ liter of petrol when driven in the city and $(n+3) \mathrm{km} /$ liter when driven on the highway. Translating the given information in to an equation, we can write

Hence we can say that Jagan's car runs $11 \mathrm{~km} /$ liter in the city.
17. (c)

A question on P and C !
The number of handshakes in a room with ' $n$ ' persons present is given by $n *(n-1) / 2$ $276=n *(n-1) / 2$ i.e. $552=n^{*}(n-1)$ which is the product of 2 consecutive integers. The value of ' $n$ ' can be an integer which is close to $\sqrt{552}$ which is between 23 and 24 leading to 24 as the required answer.
18. (b)

$$
\begin{aligned}
P & =\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \frac{6}{5} \times----\frac{99}{98} \times \frac{100}{99}=\frac{100}{2}=50 \\
Q & =\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times-----\frac{98}{99} \times \frac{99}{100}=\frac{1}{100} \\
\frac{P}{Q} & =5000
\end{aligned}
$$

$$
\begin{aligned}
& \frac{42}{n+3}+\frac{77}{n}=10 \\
& \Rightarrow \quad 42 n+77 n+231=10 n^{2}+30 n \\
& \text { or } \quad 10 n^{2}-89 n-231=0 \text { which gives } n=11 \text { or }-2.1
\end{aligned}
$$

19. (a)

The given system of equations can be interpreted as 4 possible pairs of linear equations, namely: $x+3 y=7$ and $2 x+y-10=3$ for $x \geq 0$ and $y \geq 10$ which leads us to get $y=1 / 5$ i.e. NOT VALID $-x+3 y=7$ and $2 x+y-10=3$ for $x \leq 0$ and $y \geq 10$ which leads us to get $y=27 / 7$ i.e. NOT VALID $x+3 y=7$ and $2 x-(y-10)=3$ for $x \geq 0$ and $y \leq 10$ which leads us to get $x=4$ i.e. NOT VALID $-x+3 y=7$ and $2 x-(y-10)=3$ for $x \leq 0$ and $y \leq 10$ which leads us to get $y=7 / 5$ and $x=-14 / 5$ which is the ONLY valid solution.
20. (b)

Let ' $n$ ' be the starting page and ' $m$ ' be the number of missing pages.
Since the page numbers form an AP with ' $n$ ' as the first term, ' $m$ ' as the number of terms and common difference $=1$, we can say that $711=\frac{m}{2} *(2 n+m-1)$
i.e.

$$
1422=m^{*}(2 n+m-1)
$$

Write 1422 as the product of 2 numbers, we can say $1422=2 * 711=6 * 237=18 * 79$ giving us 3 possible pairs for values of $m$ and $n$.
Check for these values one by one, we can identify that the correct combination for starting page number, $\mathrm{n}=31$ and number of missing pages, $\mathrm{m}=18$ i.e. option (b).
Alt: After writing the expression for sum of missing page numbers as
$S=\frac{m^{*}(2 n+m-1)}{2}$. All that is needed to be done, now, is to replace $m$ and $n$ carefully using the (choices) to identify the correct ordered pair.
21. (b)

A 4 O'clock, the hands of the watch are 20 minute spaces apart.
To be in opposite directions, they must be 30 min spaces apart.
$\therefore \quad$ Minute hand will have to gain 50 minute spaces
55 minute spaces are gained in 60 min
50 minute space are gained in $\left(\frac{60}{55} \times 50\right)$ min or $54 \frac{6}{11} \min$
$\therefore \quad$ Required time $=54 \frac{6}{11}$ min past 4
The answer is (b).
22. (d)

Total possible outcomes $={ }^{27} C_{2}$
Favorable outcomes $=$ Selecting any two authors $\times$ Selecting one book of each author

$$
\begin{aligned}
& ={ }^{3} C_{2} \times{ }^{9} C_{1} \times{ }^{9} C_{1} \\
\text { Probability } & =\frac{3 \times 9 \times 9}{27 \times \frac{26}{2}}=\frac{9}{13}
\end{aligned}
$$

23. (b)

$$
\begin{aligned}
\text { Man } \times \text { Day } & =\text { Man } \times \text { Day } \\
20 \times 30 & =600
\end{aligned}
$$

Let workers leave after $x$ days then

$$
\begin{aligned}
20 x+15(35-x) & =600 \\
20 x+525-15 x & =600 \\
5 x & =75 \\
x & =15
\end{aligned}
$$

24. (a)

$$
\begin{aligned}
\text { Average speed } & =\frac{\text { Distance Covered }}{\text { Time Taken }} \\
& =\frac{\frac{D}{3}+\frac{D}{3}+\frac{D}{3}}{\frac{D}{3} \times \frac{1}{20}+\frac{D}{3} \times \frac{1}{10}+\frac{D}{3} \times \frac{1}{60}} \\
& =\frac{3}{\frac{1}{20}+\frac{1}{10}+\frac{1}{60}}=\frac{3}{\frac{3+6+1}{60}} \\
& =\frac{3 \times 60}{10}=18 \mathrm{~km} / \mathrm{h}
\end{aligned}
$$

25. (a)

Suppose he bought $2 \mathrm{~kg}, 4 \mathrm{~kg}$, and 3 kg of three varieties

$$
\begin{aligned}
\text { Cost price of } 9 \mathrm{~kg} & =2 \times 50+4 \times 20+3 \times 30 \\
& =\text { Rs } 270
\end{aligned}
$$

Selling price of $9 \mathrm{~kg}=9 \times 33=$ Rs 297

$$
\therefore \quad \% \text { profit }=\frac{27}{270} \times 100=10 \%
$$

26. (a)

Let the total profit be Rs Z then,

$$
\begin{aligned}
\text { B's share } & =\operatorname{Rs} \frac{2 Z}{3} \\
\text { A's share }^{\prime} & =\operatorname{Rs}\left(Z-\frac{2 Z}{3}\right)=\operatorname{Rs} \frac{Z}{3} \\
\therefore \quad \text { A }: B & =\frac{Z}{3}: \frac{2 Z}{3}=1: 2
\end{aligned}
$$

Let the total capital be Rs $x$ and suppose B's money was used for $x$ months.

Then,

$$
\begin{aligned}
\frac{\frac{1}{4} \times x \times 15}{\frac{3}{4} \times x \times y} & =\frac{1}{2} \\
y & =10
\end{aligned}
$$

Thus, B's money was used for 10 months.
27. (d)

100 years contain 5 odd days
$\therefore$ Last day of $1^{\text {st }}$ century is Friday
200 years contain $5 \times 2=3$ odd days
$\therefore$ Last day of $2^{\text {nd }}$ century is Wednesday
300 years contain $5 \times 3=15=1$ odd day
Last day of $3^{\text {rd }}$ century is Monday
400 years contain odd day
$\therefore$ Last day of $4^{\text {th }}$ century is Sunday
This cycle is repeated
$\therefore$ Last day of century can not be Tuesday, Thursday or Saturday.
28. (b)

$$
\begin{aligned}
\left(1+3+5+7+\ldots .+50^{\text {th }} \text { term }\right) & +\left(\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\frac{1}{20}+\ldots .\right) \\
& =(1+3+5+7+9+\ldots .)+\left(\frac{1}{1 \times 2}+\frac{1}{2 \times 3}+\frac{1}{3 \times 4}+\ldots .\right) \\
& =\frac{50}{2}[2 \times 1+(50-1) \times 2]+\left[\frac{1}{1}-\frac{1}{2}+\frac{1}{2}-\frac{1}{3}+\frac{1}{3}-\frac{1}{4}+\frac{1}{50}-\frac{1}{51}\right] \\
= & 25 \times 100+\left(1-\frac{1}{51}\right)=2500 \frac{50}{51}
\end{aligned}
$$

29. (d)

Suppose the present day of Shyam and Puneet is $X$ and $Y$.
Then,

$$
\begin{align*}
& \frac{X-6}{Y-6}=\frac{6}{5}  \tag{i}\\
& \frac{X+4}{Y+4}=\frac{11}{10} \tag{ii}
\end{align*}
$$

By solving (i) and (ii)

$$
Y=16, X=18
$$

Ratio of their present age

$$
\begin{aligned}
X: Y & \Rightarrow 18: 16 \\
& \Rightarrow 9: 8
\end{aligned}
$$

30. (d)

