Class-10

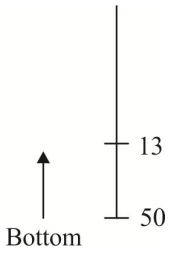
MAT

1.(C) 9 May 2009
Write last 2 digits of year = 09
Divide by 4 and write the quotient = 02
Write the no of year = 06
Write the no of month = 01
Write the date = 09
Add all = 27
Divide by 7 and write the remainder = 6 ODD days
So Day was Saturday

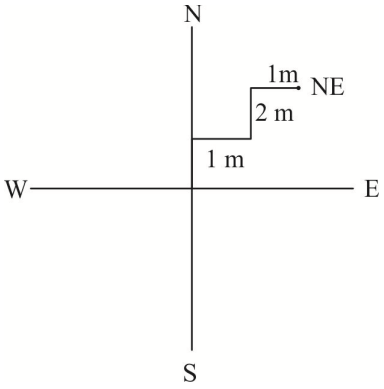
2.(B) $9 + 7 + 6 + 3 = 25$ $\quad 2 + 5 = 7$
$10 + 8 + 7 + 2 = 27$ $\quad 2 + 7 = 9$
$11 + 6 + 5 + 1 = 23$ $\quad 2 + 3 = 5$

3.(C) In one jump, monkey effectively climbs 2m. So it will climb 60 m in 30 jumps. On 31st jump he reaches 63 m.

4.(B) Rank from top = (50 – 13 + 1) = 38



5.(D)



MATH

1.(D) $a = \cos\phi \cot\phi$

$b = \sin\phi \tan\phi$

$a^2 b = \cos^3\phi$

$ab^2 = \sin^3\phi$

$(a^2 b)^{2/3} = (ab^2)^{2/3} = 1$

2.(B) Since, each digit occurs at least twice, we have following possibilities.

1. Three digits occurs twice each. We may choose three digits from {1, 2, 3, 4, 5} in $5c_3$ ways = 10 ways. If each occurs exactly twice, the no of such admissible 6-digits number is

$$\frac{6!}{2!2!2!} \times 10 = 900$$

2. Two digits occur three times each. We can choose 2 digits in 5c2 = 10 ways. Hence, the no of admissible 6 digits no.

$\frac{6!}{3!3!}\times 10 = 200$

3. One digit occurs 4 times and the other twice. We are choosing two digits again, which can be done in 10 ways. The two digits are interchangeable. Hence, the desired number of admissible 6 digit numbers is

$2\times\frac{6!}{4!2!}\times 10 = 300$

4. Finally, all digits are same. There are 5 such numbers.

Thus the total number of admissible number is 900 + 200 + 300 + 5 = 1405

$\Rightarrow$ Value of N = 1405 + 1 = 1406

PHYSICS

1.(B) 2and 3 only

more the liquid contracts relatively on cooling More it will expand on heating relatively

2.(D) Because of high speed bullet won't have sufficient time to change state of inertia of rest of farther points on windowpane.

Chemistry

1.(B) A has boiling point 350 K

B has boiling point 85° K i.e., 85 + 273.15 K $\Rightarrow$ 358.15 K

Since difference in boiling point is less than 25 K; fractional distillation is needed to separate them.

Temperature is highest at bottom of fractionating column.

2.(A) 100 gm of first sample (X) = 25 ml ($\because$ density = 4g/cm^3)

40 % w/v = 40 gm $CaCO_3$ in 100 ml of sample

$\therefore$ 25 ml sample has 10 gm $CaCO_3$

50 ml of second sample (Y) = 100 g ($\because$ density = 2g/cm^3)

20 % w/w = 20 gm $CaCO_3$ in 100 gm of sample

$\therefore$ 50 ml samples has 20 gm $CaCO_3$

$CaCO_3 \longrightarrow CO_2 + CaO$

Moles of CO_2 from X $= \frac{10}{100}$ (same as mole of $CaCO_3$)

Moles of CO_2 from Y $= \frac{20}{100}$

$CO_2 + C \longrightarrow 2CO$

$\frac{10}{100}$ $\frac{0.6}{12}$

$\frac{1}{10}$ $\frac{1}{20}$

So C is limiting reagent.

$\therefore$ $\frac{1}{20}$ × 2 moles of CO will be formed

$\Rightarrow$ Moles of CO = $\frac{1}{10}$

Moles of CO_2 from Y = $\frac{20}{100}$ (same as mole of $CaCO_3$)

$\therefore$ $\frac{n_{CO}}{n_{CO_2}} = \frac{1/10}{1/5} = \frac{1}{2}$