Mock Test - 11

1.(A) $\dfrac{\sqrt{7}}{\sqrt{16+6\sqrt{7}}-\sqrt{16-6\sqrt{7}}}$

$\Rightarrow \dfrac{\sqrt{7}}{\sqrt{(3+\sqrt{7})^2}-\sqrt{(3-\sqrt{7})^2}}$

$\Rightarrow \dfrac{\sqrt{7}}{3+\sqrt{7}-3+\sqrt{7}} \Rightarrow \dfrac{\sqrt{7}}{2\sqrt{7}} = \dfrac{1}{2}$

2.(C) $\sqrt{5}$, $\sqrt[3]{4}$, $\sqrt[5]{2}$, $\sqrt[7]{3}$

L.C.M. of 2,3,5, and 7 = 210

$\sqrt{5} = \sqrt[2\times105]{5^{105}} = \sqrt[210]{5^{105}}$

$\sqrt[3]{4} = \sqrt[3\times70]{4^{70}} = \sqrt[210]{4^{70}}$

$\sqrt[5]{2} = \sqrt[5\times42]{2^{42}} = \sqrt[210]{2^{42}}$

$\sqrt[7]{3} = \sqrt[7\times30]{3^{30}} = \sqrt[210]{3^{10}}$

Largest number = $\sqrt[210]{5^{105}} = \sqrt{5}$ Ans.

3.(C) Let the digit at Ten's place = z

N = 100x + 10z + y

N – 100x – y = 10z

N – 100x – y is divisible by 10.

4.(A) $m = n^2 - n$

$m = n(n-1)$

$m^2 - 2m = m(m-2)$

$= n(n-1) \times (n^2 - n - 2)$

$= n(n-1)(n-2) \times (n+1)$

Now, for n = 3

$m^2 - 2m = (3-1)(3+1)(3-2)$

$= 24$

$m^2 - 2m$ is divisible by 24. Ans.

5.(D) Let the two digits number be 10x + y.

two digits number in reverse order

= 10y + x

According to question,

$\Rightarrow 10 \times 2x + \dfrac{y}{2} = 10y + x$

$\Rightarrow 20x - x = 10y - \dfrac{y}{2}$

$\Rightarrow 19x = \dfrac{19y}{2}$

$\Rightarrow \dfrac{x}{y} = \dfrac{1}{2}$

Unit's digit is two times the ten's digits. Ans.

6.(C) Let P & Q be any number say, P = 17, Q = 9.

Again, let divisor = 5

Clearly, $r_1 \Rightarrow$ 5) 17 (3
−15
2

$\Rightarrow r_1 = 2$

Also,
5) 9 (1
−5
4

$\Rightarrow r_2 = 4$

P + Q = 26

5) 26 (5
−25
1

$r_3 = 1$

Divisor = 5 = $R_1 + R_2 - R_3$

5 = 2 + 4 – 1 = 5 Ans.

7.(B) Let the two digits number be A & B

According to question,

35% of A + B = 120% of B

$\Rightarrow$ 35 A = 20 B

$\Rightarrow \dfrac{A}{B} = \dfrac{20}{35} = \dfrac{4}{7} \Rightarrow 4:7$

8.(D) Let the five numbers be x, y, z, u, and v.

According to question,

$\Rightarrow x + y + z + 6 = u + v$ .....(1)

$\Rightarrow x + y + z = 2u\,v$ .....(2)

From (1) & (2)

$2u + 6 = u + v$

$v - u = 6$

Neither u nor v can be calculated with the help of the above relation

$\therefore$ Data inadequate. Cases could be many.

9.(C) Number of different ways in which 4 boys & 2 girls can be seated.

= 6! = 720

When two girls seat together,

No. of arrangements = 5! × 2 = 240

No. of arrangements when girls do not seat together = 720 – 240 = 480. Ans.

10.(B) Let the cost of 1 orange = Rs. x

Let the cost of 1 apple = Rs. 1.75x

Now,

$\Rightarrow \dfrac{40}{1.75x} + \dfrac{16}{x} = 14$

$\Rightarrow 40 + 16 \times 1.75 = 14 \times 1.75 \times x.$

$\Rightarrow 40 + 28 = 24.5x$

$\Rightarrow x = \text{Rs.}\dfrac{68}{24.5}$

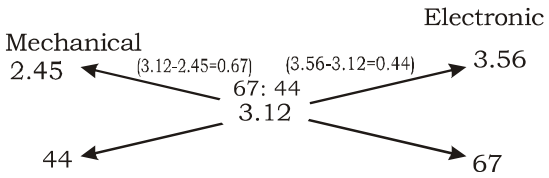
cost of 1 apple $= \dfrac{1.75 \times 68}{24.5}$

No. of apples $= \frac{40 \times 24.5}{17.5 \times 68}$

$= 8.24$

$= 8$ (approx.) (B)

11. (B)



Atleast 67 electronic graduates should be there to fulfill the conditions given in the question.

12. (C) Cost of painting on Monday = Rs. x
Cost of painting on Tuesday = Rs. x + 3y
Cost of painting on Wednesday = Rs. x + 2y
Cost of painting on Thursday = Rs. x + y
Cost of painting on Friday = Rs. x + 2y

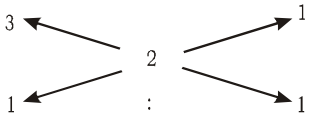
Average daily earning $= \frac{5x+8y}{5}$

$= x+\frac{8}{5}y$ Ans.

13. (B)

	Sugar	Water		Sugar		Water
1st Solution	15	85	⇒	3	:	17
2nd Solution	5	95		1	:	19
Desired Solution				1	:	9

By Allegation:-



∴ 20 ltr of 1st solution must be mixed with equal quantity of 2nd solution to make sugar 10% in total mixture
∴ 20 ltr. Ans.

14. (A)

Milk	Water		
1	2	→	3 × 4
1	3	→	4 × 3

∴ 4 : 8
3 : 9
7 : 17

15. (A) $S_n = \frac{a(r^n-1)}{r-1}$

a = first term
r = Common ratio
n = Number of terms
t^n = last term

$1022 = \frac{2\left(2^n-1\right)}{2-1}$

$511 = 2^n - 1$
$2^n = 512$
$2^n = 2^{10}$
∴ n = 10 Ans.

16.(C)
Largest 3 digit numbers divisible by 7 = 994
Smallest 3 digit number divisible by 7 = 105

umber of terms $= \frac{994-105}{7}+1$

$= 127 + 1 = 128$

Sum $= \frac{n}{2}$[first term + last term]

$= \frac{128}{2}[994 + 105]$

⇒ 70336 Ans.

17.(A)

	Sita	:	Neeta	:	Ramesh
For 1st 6 months	45000 × 6				
For next 6 months	45000 × 6		80000 × 6		
For next 12 months	45000 × 12		80000 × 12		120000 × 12
	270				
	270		480		
	540	:	960	:	1440
	1080		1440		1440
	3	:	4	:	4

18.(B)

A	B	C	D
15 × 4	12 × 2	18 × 6	16 × 5
60	24	108	80

A's share of rent = Rs. 1020 = 60 unit

∴ 108 units $= \frac{1020}{60} \times 108$

C's rent = 1836 Rs. Ans.

19.(B)

Difference between C.I. and S.I. for 3ys / Difference between C.I. & S.I. for 2 yrs

$= \frac{P\left[\frac{r^3}{100^3}+\frac{3r^3}{100^2}\right]}{\frac{Pr^2}{100^2}}$

$= \frac{\frac{Pr^2}{100^2}\left[\frac{r}{100}+3\right]}{\frac{Pr^2}{100^2}}$

$\Rightarrow \quad \frac{25}{8} = \frac{r}{100} + 3$

$\therefore \quad \frac{1}{8} = \frac{r}{100}$

$\Rightarrow r = 12.5\%$

$= 12\frac{1}{2}\%$ Ans.

20.(C) $\frac{PR_1T_1}{100} = \frac{PR_2T_2}{100}$

$8n = 7\left(n - \frac{1}{2}\right)$

$\Rightarrow \quad n = 3.5$

ATQ,

$\frac{P \times 8 \times 3.5}{100} + P = 2560$

$\Rightarrow$ P = 2000 Ans.

21.(A) $P = \frac{100 \times S.I.}{R \times T}$

$= \frac{900 \times 100}{3 \times 6}$ = Rs. 5000 Ans.

Now:-

C.I. - S.I. = $P\left[\frac{r^3}{100^3} + \frac{3r^2}{100^2}\right]$

$= 5000\left[\frac{6^3}{100^3} + \frac{3 \times 6^2}{100^2}\right]$

= Rs. 55

22.(A) $a = \sqrt{2} \quad r = \sqrt{2}$

$S_{10} = \frac{a\left(r^n - 1\right)}{r - 1} \Rightarrow \frac{\sqrt{2}\left(\sqrt{2}^{10} - 1\right)}{\sqrt{2} - 1}$

$= \frac{\sqrt{2}(31)}{\sqrt{2} - 1} \times \frac{\sqrt{2} + 1}{\sqrt{2} + 1}$

$\Rightarrow \frac{\sqrt{2}(31)(\sqrt{2} + 1)}{1} \Rightarrow 31\left(2 + \sqrt{2}\right)$

23.(A)

Let 'a' & 'b' be the two numbers

We have, $\sqrt{ab} = \frac{4}{5}\left(\frac{a+b}{2}\right)$

$\Rightarrow 5\sqrt{ab} = 2(a + b)$

Squaring both sides

$25\,ab = 4a^2 + 8ab + 4b^2$

$\Rightarrow 4x^2 - 17ab + 4b^2 = 0$

the factors of which are $(a - 4b)(4a - b) = 0$

Hence,

(i) $a - 4b = 0 \Rightarrow \frac{a}{b} = \frac{4}{1}$

(ii) $4a - b = 0 \Rightarrow \frac{a}{b} = \frac{1}{4}$

$\therefore$ a : b = 1 : 4 Ans.

24.(A) Relative speed = (60 + 6) km/hr

$= 66 \times \frac{5}{18} = \frac{55}{3} m/\sec.$

Distance = 110 m

$\therefore$ Time = $\frac{110}{55} \times 3$ = 6 sec. Ans

25(A) S.P. of scooter at Abhishek's shop

= Rs. [90% of 28000]

= Rs. 25,200

S.P. of Bhanu's shop

= Rs.[88% of 20,000 + 92% of 8000]

= Rs. [17,600 + 7360]

= Rs. [24, 960]

Required Difference = Rs. [25,200 – 24,960]

= Rs. 240

26(A) Let C.P of each Camera = Rs. 100

1st Case		2nd Case
Rs. 12 @ 20% Profit & Rs. 8 @ 10% profit		All @ 15% Profit
Rs. 1200 @ 20% of profit & Rs. 800 @ 10% profit		
Profit Rs. 240	Rs. 80	
Total Rs. 320		Rs. 300
Diff. Rs. 20	but Actual diff =	Rs. 36

$\therefore$ Actual C.P. = $\frac{36}{20} \times 100$ = Rs. 180 /each

27(A) Let x litres of water added to the solution.

According to question:-

4% of (10 + x) = 1

$\therefore \quad x = \frac{100}{4} - 10$

= 15 litres Ans.

28(B) Let the total number of workers = x

According to question:-

20% of 75% of x + 80% of 25% of x = 126

$\Rightarrow \quad \frac{20 \times 75 \times x}{100 \times 100} + \frac{80 \times 25 \times x}{10 \times 100} = 126$

$\therefore \quad x = \frac{126 \times 100 \times 100}{(1500 + 2000)}$

= Rs. 360 Ans.

29. (B) Let single ticket = Rs. x

Return ticket = Rs. $\frac{5x}{4}$

105% of $\frac{5x}{4}$ = 84

$x = \frac{84\times4\times4}{5\times105}$ = Rs. 64

30 (D) Ratio of the students in the states A & C appearing for exam in 1998
= 3 : 6 = 1 : 2
As the increment in the next year is same for the student of both the states.
∴ The no. of students who appeared in the state A in 1998 are = any one of them – 3, 6, 9, 12 etc.
∴ Data inadequate. Ans.

31(C) Let the no. of children be *n*.

No. of note books each child have = $\frac{1}{8}$n

ATQ,

$\frac{1}{2}$n × 16 = n × $\frac{1}{8}$n

$8n = \frac{n^2}{8}$

n = 64

No. of note books distributed

= 64 × $\frac{1}{8}$ × 64 = 512 Ans.

32. Data Insufficient

33. Total Price of component = Rs. 50,000
Expected rejection = 5% = Rs. 2,500
Remaining = Rs. 47,500 = C.P. + 25% Profit
C.P. = Rs. 38,000
But, 50% goods rejected, so he was paid 50% of 50,000 i.e. Rs. 25,000
So, Loss = Rs. 38000 – Rs. 25,000
= Rs. 13,000 Ans.

34.(D) 10 M + 15 W = 6 days
∴ 60 M + 90 W = 1 days ..... (i)
100 M = 1 day ..... (ii)
60 M + 90 W = 100M
4M = 9 W

∴ IM = $\frac{9}{4}$W

10 M = $\frac{45}{2}$W

$\frac{45}{2}$W + 15 W = 6 days

or, $\frac{75}{2}$ W = 6 days

1 W = Rs. 225 days

35.(D) Suppose women take x hrs to complete the work.
Then child will complete in (x + 15) hrs.
According to question,

$\frac{18}{x+15}$work + $\left(\frac{6}{x}\right)$work = $\frac{3}{5}$

$\frac{18x+6(x+15)}{x(x+15)} = \frac{3}{5}$

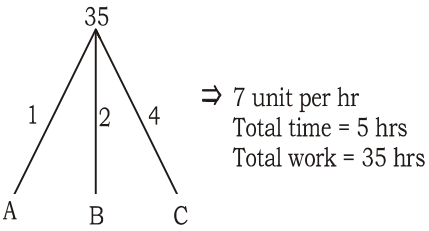
$3x^2 + 45x = 90x + 30x + 450$
$x^2 – 30x + 5x + 180 = 0$
$x(x – 30) + 5(x – 30) = 0$
$(x + 5)(x – 30) = 0$
$x = 30$

1 work is completed by a women in 30 hrs.

∴ $\frac{2}{5}$ work is completed by a women in $\frac{2}{5}\times 30$

= 12 hrs. Ans

36.(C)



⇒ 7 unit per hr
Total time = 5 hrs
Total work = 35 hrs

∴ Time taken by A alone = 35 hrs Ans.

37.(D) Let the speed of boat = x m/sec
and speed of water = y m/sec
Speed downstream = (x + y) m/sec
Speed upstream = (x – y) m/sec
Thus,

$\frac{20}{x-y} + \frac{20}{x+y}$ = 4 min 40 seconds

= $4\frac{2}{3}$min

But here we must have speed of water to calculate speed of boat
Hence, data inadequate. Ans.

38.(A) Total Pipe = 6
1 outlet pipe takes = 6 hr.
1 Inlet pipe takes = 9 hr.
Tank is filled in only 9 hour which means the efficiency of one inlet pipe is utilized and rest became neutral which is possible only in one case
3 inlet pipes = 2 outlet pipes
∴ total inlet pipe = 4 Ans.

39.(D) Speed ratio = 6 : 5
& Speed of Train is 20% faster than the car.
Let, the time taken = t min
According to question:-

$6(t - 12.5) = 5t$

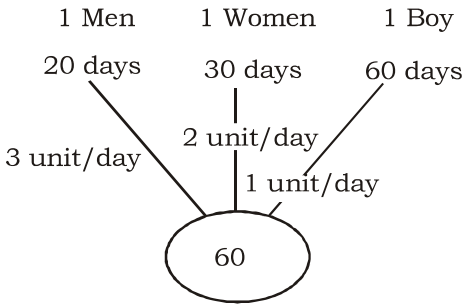
$\Rightarrow \quad t = 6 \times \frac{12.5}{10} = 75$ min

$t = 1\frac{1}{4}$ hr.

Speed of car $= \frac{75}{t} = \frac{75}{\frac{5}{4}}$

$S_c = 60$ km/hr Ans.

40.(D)



20 M = 30 W = 60 B
2 M = 3 W = 6 B
Now, 2 M + 8 W + x B $\rightarrow$ 2 day $\rightarrow$ 60 units
Thus, 2 M + 8 W + x B $\rightarrow$ 1 day $\rightarrow$ 30 units
$2 \times 3 + 8 \times 2 + x \times 1 = 30$
$6 + 18 + x = 30$
$x = (30 - 22) = 8$ boys

41.(A) $4A = 6B$

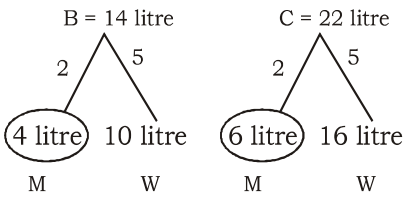
$\frac{A}{B} = \frac{B}{C} \qquad \frac{B}{C} = \frac{11}{6}$

$\frac{A}{B} = \frac{6}{4} \times \frac{11}{11} = \frac{66}{44}$

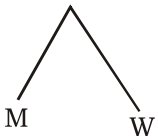
$\frac{B}{C} = \frac{11}{6} \times \frac{4}{4} = \frac{44}{24}$

$= A : B : C$
$= 66 : 44 : 24$
$= 33 : 22 : 12$

42. (B) A $\rightarrow$ B 100% pure milk
B $\rightarrow$ 2 : 5
C $\rightarrow$ 3 : 8

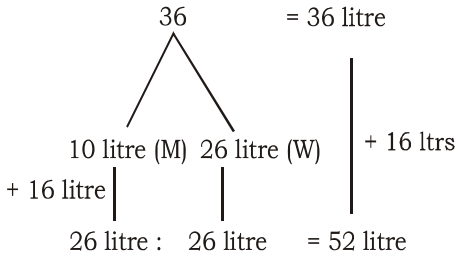


Now, B + C = 36 litre = (14 + 22) litre



(4 + 6 litre) (10 litre + 16 litre)
10 litre 26 litre

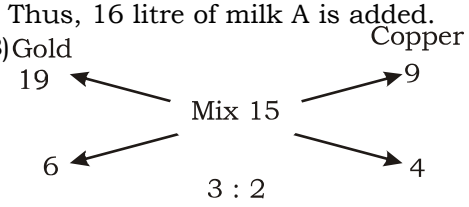
Now, to make M : W = 1 : 1



1 : 1

Thus, 16 litre of milk A is added.

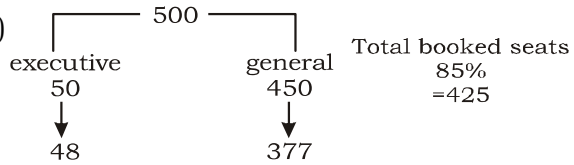
43.(B)



44.(C) Let the population be x.
According to question,
100% of x + 15% of x = 45 million (Jan, 2006)
In Jan 2005 :

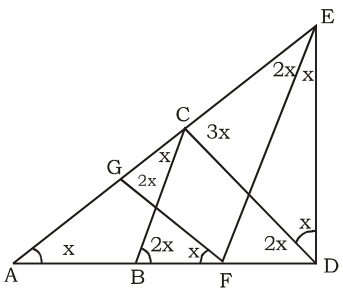
$\therefore x = \frac{45}{115} \times 100$ million = 39 million

45.(A)



Vacant seats = 73

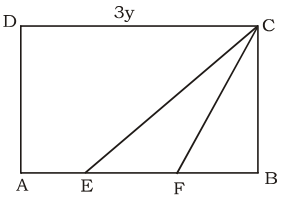
46.(D)



$\because$ AG = GF,
Let $\angle GAF = \angle AGF = x$
Now, ext angle $\angle FGE = 2x$
$\Rightarrow \angle FGE = \angle FEG = 2x$
$\because$ AB = BC
$\angle CAB = \angle ACB = x$
Now, ext angle $\angle CBD = 2x$
In Δ ADE,
$x + 3x + 3x = 180°$

$x = \frac{180°}{7} = 25°$ (Approx.) Ans

47.(B)



Let BC = x, FB = y = EF = AE

$\therefore$ CD = 3y

Now:-

$$ar(\Delta CBF) = \frac{1}{2}xy$$

or, $$ar(\Delta CBE) = \frac{1}{2} x \times 2y = xy$$

$\therefore$ $$ar(\Delta CEF) = xy - \frac{1}{2}xy$$

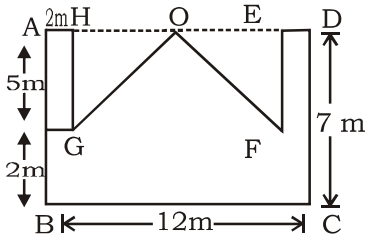
$$= \frac{1}{2}xy$$

Now:-

Area of rectangle = 3xy

$\therefore$ $$\frac{ar(\Delta CEF)}{ar(\square ABCD)} = \frac{1 \times xy}{2 \times 3xy} = 1 : 6$$ Ans.

48.(A)



Give AB = 7 m & BG = 2m

Thus, AG = 5 m

AH = 2m (given)

Thus, HE = AD – AH – ED

= 12 – 2 – 2 = 8 m

and OH = 4 m

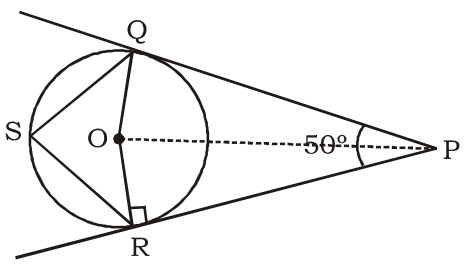
Area of required figure

$$= (l \times b) - 2\left(\frac{1}{2} \times b \times h\right)$$

$$= 12 \times 7 - 2 \times \frac{1}{2} \times 5 \times 4$$

$$= 64 \text{ m}^2.$$

49.(B)



Direct method:-

$$\angle QSR = 90° - \frac{1}{2}\angle QPR$$

$$= 90° - \frac{1}{2} \times 50$$

So,

$\angle QSR$ = 65° Ans.

50.(A) Area = $\frac{1}{2}$ × sum of || sides × height

$$35 = \frac{1}{2} \times 14 \times h$$

Height = 5 cm

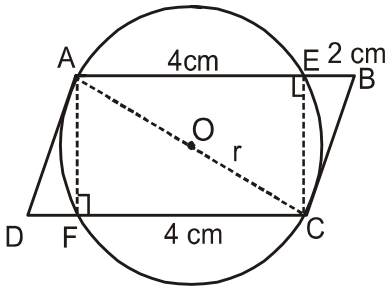
In ΔDFC,

$DC^2 = DF^2 + FC^2$

$DC^2 = 5^2 + 2^2$

$DC^2 = 29$ $\therefore$ $DC = \sqrt{29}$

51.(B)



Join AF & EC

Clearly, $\angle AFC = \angle AEC$

(angle on a semi-circle)

= 90°

$\angle AFC \cong \angle AEC$ (RHS)

Thus, AF = EC

And, $\Delta AFD \cong \Delta CEB$ (RHS)

$\therefore$ FD = EB = 2 cm

52.(B) $ar(\Delta AXB) = \frac{1}{2}$ (area of parallelogram) ..(i)

[$\because$ Having same base]

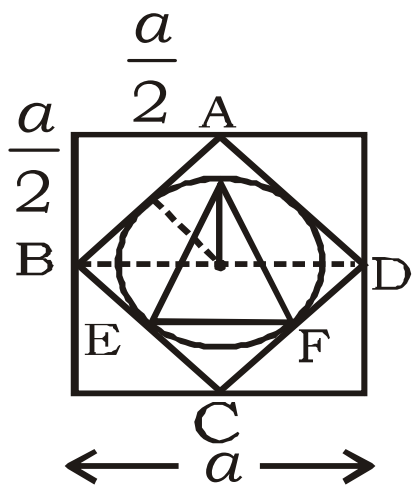
Similarly,

$ar(\Delta BFC) = \frac{1}{2}$ (area of parallelogram) ..(ii)

From (i) and (ii),

$ar(\Delta AXB) = ar(\Delta BFC)$ Ans.

53.(A)



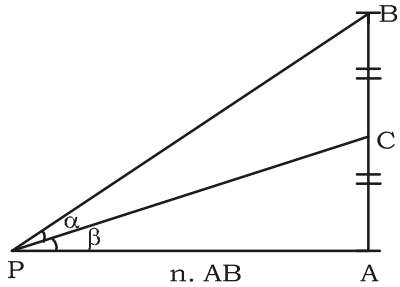
BD = a, EF = $\frac{a}{2}$

[$\because$ EF || BD and EF = $\frac{1}{2}$BD]

$\therefore$ Area of equilateral (ΔEGF) = $\frac{\sqrt{3}}{4}\left(\frac{a}{2}\right)^2$

= $\frac{\sqrt{3}a^2}{16}$ Ans.

54.(A)



AP = n AB

Now:-

$\tan\beta = \frac{\frac{AB}{2}}{AP} = \frac{\frac{AB}{2}}{n.AB} = \frac{1}{2n}$ ... (i)

Now:-

$\Rightarrow \tan(\alpha+\beta) = \frac{AB}{AP} = \frac{AB}{n.AB} = \frac{1}{n}$

$\Rightarrow \frac{\tan\alpha+\tan\beta}{1-\tan\alpha.\tan\beta} = \frac{1}{n}$

$\Rightarrow \frac{\tan\alpha+\frac{1}{2n}}{1-\tan\alpha.\frac{1}{2n}} = \frac{1}{n}$

$\Rightarrow \frac{2n\tan\alpha+1}{2n-\tan\alpha} = \frac{1}{n}$

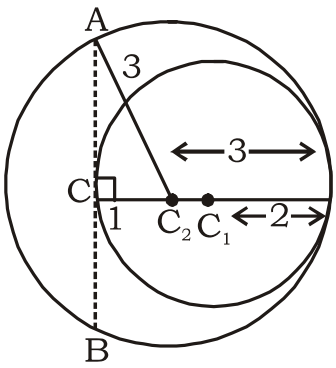
$\Rightarrow 2n^2\tan\alpha+n = 2n-\tan\alpha$

$\Rightarrow 2n^2\tan\alpha+\tan\alpha = 2n-n$

$\Rightarrow \tan\alpha[2n^2+1] = n$

$\therefore \tan\alpha = \frac{n}{2n^2+1}$ Ans.

55.(B)



C_1 = Centre of small circle
C_2 = Centre of bigger circle

AB = 2AC = 2 × $2\sqrt{2}$ = $4\sqrt{2}$

56.(A) $\operatorname{cosec}\theta - \sin\theta$ m and $\sec\theta - \cos\theta$ = n

Now,

m = $\operatorname{cosec}\theta - \sin\theta$

= $\frac{1}{\sin\theta} - \sin\theta$

m = $\frac{\cos^2\theta}{\sin\theta}$

n = $\sec\theta - \cos\theta$

n = $\frac{1-\cos^2\theta}{\cos\theta} = \frac{\sin^2\theta}{\cos\theta}$

$\therefore$ $(m^2n)^{2/3} + (mn^2)^{2/3}$

= $\left(\frac{\cos^4\theta}{\sin^2\theta}\times\frac{\sin^2\theta}{\cos^2\theta}\right)^{2/3} + \left(\frac{\cos^2\theta}{\sin\theta}\times\frac{\sin^4\theta}{\cos^2\theta}\right)^{2/3}$

= $(\cos^3\theta)^{2/3} + (\sin^3\theta)2/3$

= $\sin^2\theta + \cos^2\theta$ = 1 Ans.

57.(A) a $\sec\theta$ + b $\tan\theta$ + c = 0

p $\sec\theta$ + 9 $\tan\theta$ + r = 0

$\Rightarrow \frac{\sec\theta}{br-9c} = \frac{\tan\theta}{cp-ar} = \frac{1}{aq-bp}$

$\Rightarrow \sec\theta = \frac{br-cp}{aq-bp}$

and $\tan\theta = \frac{cp - ar}{aq - bp}$

Now:-

$\sec^2\theta - \tan^2\theta = 1$

$\Rightarrow \left(\frac{br - cq}{aq - cq}\right)^2 - \left(\frac{cp - ar}{aq - bp}\right)^2 = 1$

$\Rightarrow (br - cq)^2 - (cp - ar)^2 = (aq - bp)^2$ Ans.

58.(D) $\frac{\cos^4\alpha}{\cos^2\beta} + \frac{\sin^4\alpha}{\sin^2\beta} = 1$

$\Rightarrow \cos^4\alpha .\sin^2\beta + \sin^4\alpha .\cos^2\beta = \cos^2\beta .\sin^2\beta$

$\Rightarrow \cos^4\alpha (1 - \cos^2\beta) + \cos^2\beta (1 - \cos^2\alpha)^2$

$= \cos^2\beta (1 - \cos^2\beta)$

$\Rightarrow \cos^4\alpha - \cos^4\beta .\cos^2\beta - 2\cos^2\alpha .\cos^2\alpha +$

$\cos^4\alpha .\cos^2\beta = \cos^2\beta - \cos^4\beta$

$\Rightarrow \cos^4\alpha - 2\cos^2\alpha .\cos^2\beta + \cos^4\beta = 0$

$\Rightarrow (\cos^2\alpha - \cos^2\beta)^2 = 0$

$\therefore \cos^2\alpha = \cos^2\beta$

$\Rightarrow 1 - \sin^2\alpha = 1 - \sin^2\beta$

$\Rightarrow \sin^2\alpha = \sin^2\beta$

$\therefore \frac{\cos^4\beta}{\cos^2\alpha} + \frac{\sin^4\beta}{\sin^2\alpha}$

$\Rightarrow \frac{\cos^2\beta\cos^2\alpha}{\cos^2\alpha} + \frac{\sin^2\beta\sin^2\alpha}{\sin^2\alpha}$

$\Rightarrow \cos^2\beta + \sin^2\beta = 1$ Ans.

59.(B) $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos^8\theta}}}$

$= \sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos^2 4\theta - 1)}}}$

$[\because \cos^2\theta = 2\cos^2\theta - 1]$

$= \sqrt{2 + \sqrt{2 + \sqrt{4\cos^8 4\theta}}}$

$= \sqrt{2 + \sqrt{2 + 2\cos 4\theta}}$

$= \sqrt{2 + \sqrt{2 + 2(2\cos^2 2\theta - 1)}}$

$= \sqrt{2 + \sqrt{4\cos^2 2\theta}}$

$= \sqrt{2 + 2\cos 2\theta}$

$= \sqrt{2 + 2(\cos^2\theta - 1)}$

$= \sqrt{4\cos^2\theta} = 2\cos\theta$ Ans.

60.(C) $\cos\theta = \frac{1}{2}\left(a + \frac{1}{a}\right)$

Squaring both sides:-

$\cos^2\theta = \frac{1}{4}\left[\left(a + \frac{1}{a}\right)^2\right]$

$2\cos^2\theta = \frac{1}{2}\left[\left(a + \frac{1}{a}\right)^2\right]$

Substracting 1 from both sides:-

$2\cos^2\theta - 1 = \frac{1}{2}\left[\left(a + \frac{1}{a}\right)^2\right] - 1$

$= \frac{1}{2}\left(a^2 + \frac{1}{a^2} + 2\right) - 1$

$= \frac{1}{2}\left(a^2 + \frac{1}{a^2}\right) + 1 - 1$

LHS: $= \frac{1}{2}\left(a^2 + \frac{1}{a^2}\right)$ Ans.

61.(D) $a = \sin\frac{\pi}{4} = \frac{1}{\sqrt{2}}$

$b = \cos\frac{\pi}{4} = \frac{1}{\sqrt{2}}$

$c = -\operatorname{cosec}\frac{\pi}{4} = -\sqrt{2}$

$a + b + c = \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} - \sqrt{2}$

$= \sqrt{2} - \sqrt{2} = 0$

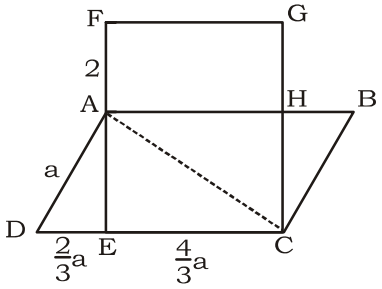
$a^3 + b^3 + c^3 = 3abc \quad [\because a + b + c = 0]$

L.H.S.= 3abc

$= 3.\frac{1}{\sqrt{2}} \cdot \frac{1}{\sqrt{2}}(-\sqrt{2})$

$= \frac{-3}{2}\sqrt{2}$ Ans.

62.(B)



$\because EF = 3AE = 3\times\frac{\sqrt{5}}{3}a$

EF $= \sqrt{5}\,a$

Area of rectangle $= \frac{4}{3}a \times \sqrt{5}\,a$ ... (i)

Area of parallelogram $= 2ar(\Delta ADC)$

$= 2 \times \frac{1}{2} \times 2a \times \frac{\sqrt{5}}{3}a$

$= \frac{2\sqrt{5}}{3}a^2$ ... (ii)

Required ratio $= \frac{2\sqrt{5}}{3}a^2 : \frac{4\sqrt{5}}{3}a^2$

$= 1 : 2$

63.(B) $x\cos\alpha + y\sin\alpha = P$ and ..... (i)

$x\cos\beta + y\sin\beta = P'$ ..... (ii)

Slope of equation (i):-

$m_1 = -\frac{\cos\alpha}{\sin\alpha}$

Slope of equation (ii):-

$m_2 = \frac{\cos\beta}{\sin\beta}$

Let the angle between line be θ.

Then,

$\Rightarrow \tan\theta = \frac{m_1 - m_2}{1 + m_1 m_2} = \frac{-\frac{\cos\alpha}{\sin\alpha} + \frac{\cos\beta}{\sin\beta}}{1 + \frac{\cos\alpha}{\sin\alpha}\frac{\cos\beta}{\sin\beta}}$

$\therefore \tan\theta = \frac{\sin\alpha\cos\beta - \cos\alpha\sin\beta}{\cos\alpha\cos\beta - \sin\alpha\sin\beta}$

$\Rightarrow \tan\theta = \frac{\sin(\alpha-\beta)}{\cos(\alpha+\beta)}$

$\Rightarrow \tan\theta = \tan(\alpha-\beta)$

$\therefore \theta = \alpha - \beta$

64.(A) By C & D.

$\frac{\sin(x+y)+\sin(x-y)}{\sin(x+y)-\sin(x-y)} = \frac{a+b+a-b}{a+b-a+b}$

$\frac{\sin x\cos y}{\cos x\sin y} = \frac{a}{b}$

$\frac{\tan x}{\tan y} = \frac{a}{b}$ Ans.

65.(B) Putting x = 1

[Always put x = 1 in such questions]

$\therefore$ 2 Ans

66.(A) $\frac{x}{y} + \frac{y}{x} = -1$

$\Rightarrow x^2 + y^2 + xy = 0$ ... (i)

$\Rightarrow 2(x^3 - y^3)$

From (i)

$\Rightarrow 2(x-y)(x^2 + y^2 + xy)$

$\Rightarrow 0$ Ans.

67.(A) $a(a+2) = a + b + c$

$\Rightarrow a + 2 = \frac{a+b+c}{a}$

$b + 2 = \frac{a+b+c}{b}$

$c + 2 = \frac{a+b+c}{c}$

Substituting:-

$\frac{a}{a+b+c} + \frac{b}{a+b+c} + \frac{c}{a+b+c}$

$\Rightarrow \frac{a+b+c}{a+b+c} = 1$ Ans.

68.(D) Multiplying

$a^x.a^y.a^z = (x+y+z)^{x+y+z}$

$a^{(x+y+z)} = (x+y+z)^{x+y+z}$

$\Rightarrow a = x + y + z$

69.(A) $\frac{1}{1+a^2-a} - \frac{1}{1+a^2+a} - \frac{2a}{1+a^2+a^4}$

$\frac{1+a^2+a-1-a^2+a}{(a+a^2)^2 - a^2} - \frac{2a}{1+a^2+a^4}$

$\frac{2a}{1+a^4+a^2} + \frac{2a}{1+a^2+a^4}$

$= 0$ Ans.

70.(A) $\frac{p}{b-c} = \frac{q}{c-a} = \frac{r}{a-b}$

$P = k(b-c)$, $q = k(c-a)$, $r(a-b)$

than, $p + q + r$

$= k(b - c + c - a + a - b)$

$= 0$ Ans.

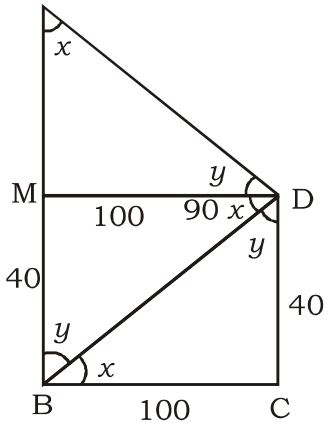
71.(A) $pqr = 1 \quad \therefore p = \frac{1}{qr}$ & $\frac{1}{p} = qr$

$\therefore \frac{1}{1+\frac{1}{qr}+\frac{1}{q}} + \frac{1}{1+q+\frac{1}{r}} + \frac{1}{1+r+qr}$

$= \frac{qr}{qr+q+1} + \frac{r}{qr+r+1} + \frac{1}{qr+r+1}$

$= \frac{qr+r+1}{qr+r+1} = 1$ Ans.

72.(C)



From ΔBDC since $\angle y = 90^\circ - x$

$\therefore \quad \angle ADM = y$

In ΔBDC,

$$\frac{x}{y} = \frac{40}{100} \quad \ldots. (i)$$

In ΔADM,

$$\frac{x}{y} = \frac{100}{AM} \quad \ldots. (ii)$$

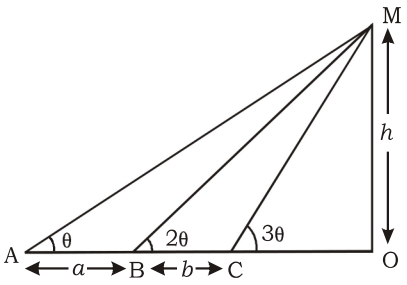
from (i) & (ii),

$$\frac{40}{100} = \frac{100}{AM}$$

AM = 250 m

Now, AB = 250 + 40 = 290 m Ans.

73.(C) Let angle of elevation for A, B & C are θ, 2θ and 3θ. (According to given condition we choose that)



From ΔPAB,

$2\theta = \theta + \angle APB$

$\Rightarrow \angle APB = \theta$

$\therefore \angle PAB = \angle ABP = \theta \Rightarrow AB = BP = a$

Similarly, in ΔBPC, $\angle BPC = \theta$

from ΔOBP, $\sin 2\theta = h/a$

$\Rightarrow h = a \sin 2\theta \Rightarrow h.2a \sin\theta\cos\theta$ ..... (ι)

from ΔPBC, $\dfrac{PB}{\sin(180-30)} = \dfrac{BC}{\sin\theta}$

(by sine rule)

$$\Rightarrow \frac{a}{\sin 3\theta} = \frac{b}{\sin\theta} \Rightarrow \frac{a}{b} = \frac{\sin 3\theta}{\sin\theta}$$

$$\Rightarrow \frac{a}{b} = \frac{3\sin\theta - 4\sin^3\theta}{\sin\theta} = \frac{a}{b} = 3 - 4\sin^2\theta$$

$$\Rightarrow 4\sin^2\theta = 3 - \frac{a}{b} \Rightarrow \sin^2\theta = \frac{3b-a}{4b}$$

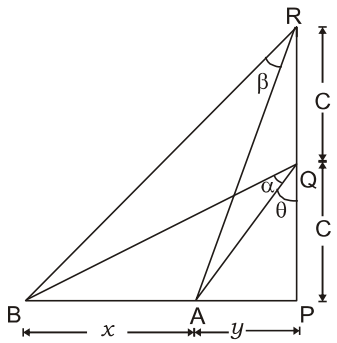
$$\Rightarrow \sin\theta = \sqrt{\frac{3b-a}{4b}} \quad \therefore \cos^2\theta = 1 - \sin^2\theta$$

$$\Rightarrow \cos^2\theta = 1 - \frac{3b-a}{4b} = \frac{a+b}{4b} \Rightarrow \cos\theta = \sqrt{\frac{a+b}{4b}}$$

Putting value of $\sin\theta$ and $\cos\theta$ in (1), we get

$$h = 2a\sqrt{\frac{3b-a}{4b}}\cdot\sqrt{\frac{a+b}{4b}} = \frac{a}{2b}\sqrt{(a+b)(3b-a)}$$

74.(C)



Let the different objects are A and B.

According to question:-

In ΔAPQ,

$$\tan\theta = \frac{y}{c}$$

In ΔAQB,

$$\tan(\theta + \alpha) = \frac{x+y}{c}$$

Now,

$$\tan(\alpha) = \tan[(\alpha+\theta) - \theta]$$

$$= \frac{\tan(\theta+\alpha) - \tan\theta}{1 + \tan(\theta+\alpha)\tan\theta}$$

$$= \frac{\frac{x+y}{c} - \frac{y}{c}}{1 + \left(\frac{x+y}{c}\right)\left(\frac{y}{c}\right)} = \frac{cx}{c^2 + xy + y^2}$$

$$\Rightarrow \tan\alpha = \frac{cx}{c^2 + xy + y^2}$$

$$\therefore \quad \cot\alpha = \frac{c^2 + xy + y^2}{cx}$$

$\Rightarrow$ $cx \cot x = c^2 + xy + y^2$ .... (i)

Similarly,

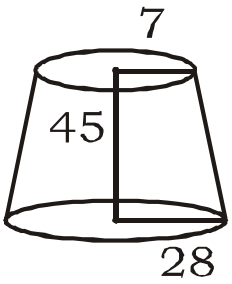
$2cx \cot \beta = (2c)^2 + xy + y^2$ .... (ii)

Substracting (i) from (ii):-

$3c^2 = cx[2\cot\beta - \cot\alpha]$

$\therefore \quad x = \dfrac{3c}{2\cot\beta - \cot\alpha}$ Ans.

75.(A)



$= \dfrac{22}{7} \times \dfrac{45}{3}[(7)^2 + (28)^2 + 28 \times 7]$

$= \dfrac{22}{7} \times \dfrac{45}{3} \times 7[7 + 4\times 28 + 28]$

$= 48510 \text{ cm}^2$

76.(C) Volume = Area of trapezium × height

Area of Trepezium = $\dfrac{1}{2}$ × (sum of parallel sides)× height

$= \dfrac{1}{2} \times 22 \times 8 = 88 \text{ cm}^2$

Now,

Volume = Area of base × Height

$\therefore$ Height = $\dfrac{1056}{88} = 12$ cm

77.(B) Each interior angle = $\dfrac{180(n-2)}{n}$

Each exterior angle = $\dfrac{360}{n}$

ATQ,

$\dfrac{180(n-2)}{n} = 2\left(\dfrac{360}{n}\right)$

$\Rightarrow \quad n = 6$ Ans.

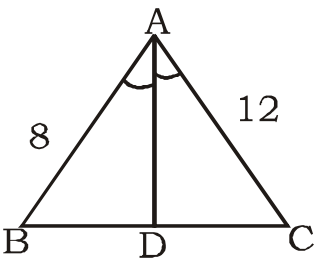
78.(C) Volume of pyramid

$= \dfrac{1}{3}$ × Area of Base × Height

$= \dfrac{1}{3} \times 16 \times 16 \times 12$

$= 1024 \text{ cm}^3$ Ans.

79.(C)



$\dfrac{AB}{AC} = \dfrac{BD}{DC} = \dfrac{8}{12} = 2:3$

80.(*) $\dfrac{y+7+7}{3} = 3, \ \dfrac{x-3+9}{3} = 4$

$\Rightarrow \quad y = -5, x = 6$

$\Rightarrow \quad (x, y) = (6, -5)$

Area = $\left|\dfrac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]\right|$

$= \left|\dfrac{1}{2}\{6(-7+7) - 3(7+5) + 9(-5-7)\}\right|$

$= 72 \text{ unit}^2$.

81.(D) $(a + b + c) = 5$

Squaring both sides:-

$[(a + b + c)]^2 = 25$

$a^2 + b^2 + c^2 + 2(ab + bc + ca) = 25$

$a^2 + b^2 + c^2 = 25 - 20 \ (\because ab + bc + ca = 20)$

$= 5$

Now,

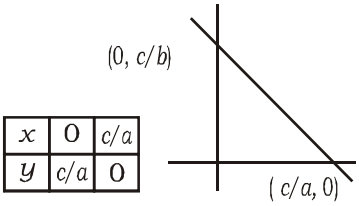
$a^3 + b^3 + c^3 - 3abc$

$= (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

$= 5(5 - 10)$

$= -25$

82.(C)



Area = $\dfrac{1}{2}$ × b × h

$= \dfrac{1}{2} \times \dfrac{c}{b} \times \dfrac{c}{a}$

$= \dfrac{1}{2} \dfrac{c^2}{ab}$

83.(B) Ist 3-digit no. div. by 6 = 102

Last 3-digit no. div. by 11 : 996

AP = 102, ..., 996, (cd = 6)

$99 = 102 + (n - 1)6$

$\Rightarrow$ n = 150 Ans.

84.(C) 6th term = a + 5d
15th term = a + 14d and so on .....
ATQ,
a + 5d + a + 14d = a + 6d + a + 9d + a + 11d
19d = a + 26d
0 = a + 7d
$\Rightarrow$ 8th term Ans.

85.(B) $b^2 = ac$ (G.P.)

$$\frac{a^2 - ac + c^2}{\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}}$$

$$\Rightarrow \frac{a^2 - ac + c^2}{\frac{c^2 - ac + a^2}{a^2c^2}}$$

$$\Rightarrow a^2c^2\left(\frac{a^2 - ac + c^2}{a^2 - ac + c^2}\right)$$

$= b^4$

86.(B) $SP = (a - at^2)$

$$SQ = a + \frac{a}{t^2}$$

$$\frac{1}{SP} + \frac{1}{SQ} = \frac{1}{a + at^2} + \frac{t^2}{at^2 + a}$$

$$= \frac{(1 + t^2)}{a(1 + t^2)} = \frac{1}{a}$$

87.(A) x = 2
Then,
$f(2) = (2)^4 + 2(2)^3 - 3(2)^2 + 2 - 1$
$= 16 + 16 - 12 + 2 - 1$
= 21 Ans.

88. (A) $y = x$
$\Rightarrow x - y = 0$
& $y = x + 3$
$\Rightarrow x - y + 3 = 0$

$$\because \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$\Rightarrow y = x + 3$ & $y = x$ are parallel

89. (*) $3y - x = 6$ (×3)
$5y + 3x = 38$
$9y + 5y = 18 + 38$
14y = 56
$\therefore$ y = 4
$\Rightarrow$ x = 6, y = 4
Required co-ordinate = (6,4)

90.(B)

$$\frac{(7 + \sqrt{5})^2 - (7 - \sqrt{5})^2}{49 - 5}$$

$$\frac{49 + 5 + 14\sqrt{5} - 49 - 5 + 14\sqrt{5}}{44}$$

$$= \frac{7}{11}\sqrt{5} = a + \frac{7}{11}\sqrt{5}b$$

$\therefore$ a = 0 b=1

91.(D) Half male employee promoted from IT deptt.

$$= \frac{13}{100} \times 1200 = 156$$

Total male employee of IT deptt.

$$= \frac{20}{100} \times 2040 = 408$$

$$\text{Required \%} = \frac{156}{408} \times 100 = 38.25\% \sim 38\% \text{ Ans.}$$

92. (*) Total employee (Prod. + Mark.) – Male Employee (Prod. + Mark.)
= 3600(35 + 18)% + 2040 (50 + 10)%
= 1908 – 1224
= 684 Ans.

93.(A) Female worker = Total employee in A/c deptt – Male employee in A/c deptt.
= 20% of 3600 – 5% of 2040

$$= \frac{5 \times 4}{10} [4 \times 90 - 51]$$

= 618 Ans.

94.(D) Required no. of employee

$$= \frac{1200}{3600} \times 100 = 33.3\% \text{ or } 33 \text{ Ans.}$$

95.(B) $\dfrac{\text{No. of employee promoted from HR Deptt.}}{\text{Total no. of worker working in HR Deptt.}} \times 100$

$$= \frac{\frac{11 \times 1200}{100}}{\frac{12 \times 3600}{100}} \times 100$$

$$\Rightarrow \frac{1100}{56} = 30.555 = 30.56 \text{ Ans.}$$

96.(A) $\text{Expenditure} = \dfrac{\text{Income}}{\left[\frac{\text{Profit \%}}{100} + 1\right]}$

ATQ,

$$\frac{I_1}{\frac{35}{100} + 1} = \frac{I_2}{\frac{40}{100} + 1}$$

$$\frac{I_1}{I_2} = \frac{135}{140}$$

$\therefore I_1 : I_2 = 27 : 28$ Ans.

97.(D) Given

(Income – Expenditure = 1.5 lakh)

$\because$ Profit % $= \frac{\text{Income} - \text{Exp}}{\text{Exp}} \times 100$

$= \frac{1.5}{\text{exp}} \times \frac{100}{10} = 40$

$\Rightarrow$ Expenditure = $\frac{15}{4}$ =3.75 lakh Ans.

98.(D) Taking the approx. values

$= \frac{40+45+40+35+30+45}{6}$

≈ 39 (same it is very close to 37)

$\therefore$ It's approx. value can also be seen from graph itself.

99.(D) $\therefore$ Profit % $= \left[\frac{\text{Income}}{\text{Exp.}} - 1\right] \times 100$

Income $= \left[\frac{\text{Profit \%}}{100} + 1\right]$ Exp.

ATQ,

Exp. A $\left[\frac{50}{100} - 1\right]$ = Exp. B $\left[\frac{30}{100} + 1\right]$

$\frac{\text{Exp. A}}{\text{Exp. B}} = \frac{130}{150}$

Exp A : Exp B = 13 : 15 Ans.

100.(D) $\frac{\text{Company A}}{\text{Company B}} = \frac{30}{45}$

Profit :-

Com A : Com B = 2 : 3 Ans.

Mock Test - 11 (Answer Key)

1.	(A)	26.	(A)	51.	(B)	76.	(C)
2.	(C)	27.	(A)	52.	(B)	77.	(B)
3.	(C)	28.	(B)	53.	(A)	78.	(C)
4.	(A)	29.	(B)	54.	(A)	79.	(C)
5.	(D)	30.	(D)	55.	(B)	80.	(*)
6.	(C)	31.	(C)	56.	(A)	81.	(D)
7.	(B)	32.	(D)	57.	(A)	82.	(C)
8.	(D)	33.	(A)	58.	(D)	83.	(B)
9.	(C)	34.	(D)	59.	(B)	84.	(C)
10.	(B)	35.	(D)	60.	(C)	85.	(B)
11.	(B)	36.	(C)	61.	(D)	86.	(B)
12.	(C)	37.	(D)	62.	(B)	87.	(A)
13.	(B)	38.	(A)	63.	(B)	88.	(A)
14.	(A)	39.	(D)	64.	(A)	89.	(*)
15.	(A)	40.	(D)	65.	(B)	90.	(B)
16.	(C)	41.	(A)	66.	(A)	91.	(D)
17.	(A)	42.	(B)	67.	(A)	92.	(*)
18.	(B)	43.	(B)	68.	(D)	93.	(A)
19.	(B)	44.	(C)	69.	(A)	94.	(B)
20.	(C)	45.	(A)	70.	(A)	95.	(B)
21.	(A)	46.	(D)	71.	(A)	96.	(A)
22.	(A)	47.	(B)	72.	(C)	97.	(D)
23.	(A)	48.	(A)	73.	(C)	98.	(D)
24.	(A)	49.	(B)	74.	(C)	99.	(D)
25.	(A)	50.	(A)	75.	(A)	100.	(D)