## \#\#\#ANSWERS\#\#\#

1. Ans. D.

No. of employees in each category are:

| Year | A | B | C | D | E | F |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2019 | 800 | 240 | 400 | 600 | 1080 | 880 |
| 2020 | 1100 | 500 | 550 | 450 | 1350 | 1050 |

Cross check the options we get that total strength of C \& D remains same.
$C=400+600=1000$
$D=450+550=1000$
2. Ans. B.

Percentage increase $=\frac{\text { No of employee (in 2020-2019) }}{\text { No of employee in 2019 }} \times 100$

| Year | A | B | C | D | E | F |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 2019 | 800 | 240 | 400 | 600 | 1080 | 880 |
| 2020 | 1100 | 500 | 550 | 450 | 1350 | 1050 |
| \% Increase | 37.5 | 108.33 | 37.5 | 25 | 25 | 19.32 |

Comparing the \% increase of all categories we find that maximum increase is of B i.e. 108.33\%
3. Ans. B.

Percentage increase $=\frac{\text { No of employee (in 2020-2019) }}{\text { No of employee in 2019 }} \times 100=\frac{1350-1080}{1080} \times 100$
= $25 \%$

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4. Ans. D.

| Year | A | B | C | D | E | F |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 2019 | 800 | 240 | 400 | 600 | 1080 | 880 |
| 2020 | 1100 | 500 | 550 | 450 | 1350 | 1050 |
| \% Increase | 37.5 | 108.33 | 37.5 | 25 | 25 | 19.32 |

On observation from the table, we find that category A\&D both have $37.5 \%$ increase.
So, option D is correct.
5. Ans. B.

Total car production in 2014 $=300+200+500=1000$
Total car production in $2018=700+500+800=2000$
Percentage increase $=\frac{(2000-1000)}{1000} \times 100$
= $100 \%$
So correct option is B
6. Ans. A.

Percentage increase $=\frac{\text { No of car (in next year- previous year) }}{\text { No of car in previous year }} \times 100$

| Year | 2014 | 2015 | 2016 | 2017 | 2018 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $X$ | 300 | 400 | 500 | 600 | 700 |
| $\%$ increase |  | $33 \%$ | $25 \%$ | $20 \%$ | $16.66 \%$ |
| Y | 200 | 300 | 400 | 500 | 500 |
| $\%$ increase |  | $50 \%$ | $33 \%$ | $25 \%$ | $0 \%$ |
| $Z$ | 500 | 500 | 600 | 700 | 800 |
| \% increase |  | $0 \%$ | $20 \%$ | $16.66 \%$ | $14.28 \%$ |

the percentage increase in production of cars over the previous year's production greater than $20 \%=5$ times
7. Ans. D.

Percentage increase $=$
$\left(\frac{\text { Total No of car (in next year- previous year) }}{\text { Total No of car in previous year }}\right) \times 100$

| Year | 2014 | 2015 | 2016 | 2017 | 2018 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Total | 1000 | 1200 | 1500 | 1800 | 2000 |
| \% increase |  | $20 \%$ | $25 \%$ | $20 \%$ | $11.11 \%$ |

Minimum is for year 2018 i.e 11.11\%
8. Ans. A.

Percentage increase $=\frac{\text { Total No of car (in next year- previous year) }}{\text { Total No of car in previous year }} \times 100$

| Year | 2014 | 2015 | 2016 | 2017 | 2018 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Total | 1000 | 1200 | 1500 | 1800 | 2000 |
| \% increase |  | $20 \%$ | $25 \%$ | $20 \%$ | $11.11 \%$ |

Minimum is for year 2018 i.e 11.11\%
9. Ans. D.

Let the consecutive numbers be $x, x+1, x+2, x+3, x+4$
product is equal to one of these integers is only possible when one number is zero.
Zero can be at any of the five places so possible sequence that can be made is 5 .
10. Ans. A.

For minimum sequence is $-4,-3,-2,-1,0$
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$P=-4$
For maximum sequence is $0,1,2,3,4$
$\mathrm{Q}=4$
Arithmetic mean $=(-4+4) / 2=0$
Option A is correct.
11. Ans. B.

Given root will satisfy the equation,
9
$\frac{9}{4} a-6 a+15=0$
$9 a-24+60=0$
$15 \mathrm{a}=60$
$\mathrm{a}=4$
Putting the value of a in equation we get
$4 x^{2}-16 x+15=0$
Sum of root $=-b / a$
Product of root $=c / a$
$\alpha+\beta=16 / 4=4$
$\alpha . \beta=15 / 4$
$\alpha^{2}+\beta^{2}=(\alpha+\beta)^{2}-2 \alpha . \beta$
$=16-2 \times(15 / 4)=17 / 2$
Option B is correct.
12. Ans. D.

$$
\begin{aligned}
& x y=10 x+y \\
& x y=8 \\
& y=\frac{8}{x} \\
& 10 x+y+63=10 y+x \\
& 9 x-9 y=-63 \\
& 9 x-9 \times \frac{8}{x}=-63 \\
& 9 x^{2}+63 x-72=0 \\
& (9 x-9)(x+8)=0 \\
& x=-8,1 \\
& y=-1,8
\end{aligned}
$$

so the number is 18
sum of the digit is $1+8=9$
13. Ans. C.

Speed of boat $=30 \mathrm{kmph}$
Speed of stream $=\mathrm{skmph}$
Downstream speed $=(30+s)$
upstream speed $=(30-s)$
according to question
total time $=9 / 2$
time taken upstream+ downstream $=9 / 2$
$\frac{60}{(30+s)}+\frac{60}{(30-s)}=\frac{9}{2}$
$\frac{1800-60 s+1800+60 s}{30^{2}-s^{2}}=\frac{9}{2}$
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$\mathrm{s}^{2}=100$
$\mathrm{s}=10 \mathrm{kmph}$
14. Ans. B.

Present age of father $=x$
Present age of all children $=x$
After 10 years
Age of father $=x+10$
Age of all children $=x+(4 \times 10)=x+40$
According to question,
$1.6(x+10)=x+40$
$1.6 x+16=x+40$
$0.6 \mathrm{x}=24$
$X=40 y e a r$
Present age of father $=40$ year
15. Ans. C.

Let, Numerator $=x$
Denominator $=y$
$x+y=10$.
equation 1
$\frac{x+3}{y-1}=1$
$x+3=y-1$
$x-y=-4$
$y-x=4$
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Correct option is C
16. Ans. A.

Unique solution condition
$\frac{\mathrm{a} 1}{\mathrm{a} 2} \neq \frac{\mathrm{b} 1}{\mathrm{~b} 2}$
$\frac{7}{k} \neq \frac{\mathrm{k}}{7}$
To hold this equation true
$\mathrm{k} \neq 7$
Option A is correct.
17. Ans. A.
$\mathrm{A}=\mathrm{p}\left(1+\frac{\mathrm{r}}{100}\right)^{\mathrm{t}}$
$2 \mathrm{P}=\mathrm{P}\left(1+\frac{\mathrm{r}}{100}\right)^{5}$
$2^{1 / 5}=\left(1+\frac{\mathrm{r}}{100}\right)$
Second condition
$\mathrm{A}=\mathrm{p}\left(1+\frac{\mathrm{r}}{100}\right)^{\mathrm{t}}$
$4 \mathrm{P}=\mathrm{P}\left(1+\frac{\mathrm{r}}{100}\right)^{\mathrm{t}}$
$2^{2}=\left(1+\frac{\mathrm{r}}{100}\right)^{\mathrm{t}}$
$2^{2}=2^{\mathrm{t} / 5}$
compairing
$2=\frac{\mathrm{t}}{5}$
$\mathrm{t}=10 \mathrm{year}$

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18. Ans. B.
$\theta=\left[\frac{11}{2} \mathrm{~m}-30 \mathrm{~h}\right]$
both are coinciding so $\theta=0$
$\left[\frac{11}{2} m-30 h\right]=0$
$\left[\frac{11}{2} m-30 \times 3\right]=0$
$\mathrm{m}=16 \frac{4}{11}$
Lies between 16-17 minute.
19. Ans. C.

Efficiency of Sheela $=1 / 2$
Efficiency of Meena $=2 / 3$
Their combined efficiency $=1 / 2+2 / 3$
$=7 / 6$
Together, they take stitch $7 / 6$ suit in a day.
Time taken to stitch 30 suits $=30 \times 7 / 6$
$=35$ days
20. Ans. D.
$(2 x-3 y)^{3}=7^{3}$
$8 \mathrm{x}^{3}-27 \mathrm{y}^{3}-18 \mathrm{xy}(2 \mathrm{x}-3 \mathrm{y})=343$
$8 x^{3}-27 \mathrm{y}^{3}-36 \mathrm{x}^{2} \mathrm{y}+54 \mathrm{xy}^{3}=343$
$8 x^{3}-27 y^{3}-36 x^{2} y+54 x y^{3}-343=0$
$8 x^{3}-27 y^{3}-36 x^{2} y+54 x^{3}-343+3=0+38 x^{3}-27 y^{3}-36 x^{2} y+54 x^{3}-340=3$ option D is correct.
21. Ans. A.

According to the questions
$\mathrm{p} \alpha \mathrm{q}$
$\mathrm{p} \alpha \frac{1}{\mathrm{r}^{2}}$
$\mathrm{p}=\frac{\mathrm{kq}}{\mathrm{r}^{2}}$
Now q increase by $20 \%$ so new value of q

$$
\begin{aligned}
q_{1} & =q+q \times \frac{20}{100} \\
& =q+0.2 q \\
q_{1} & =1.2 q
\end{aligned}
$$

Now $r$ is decreasing by $20 \%$
So new value of $r$

$$
\begin{aligned}
r_{1} & =r-0.2 r \\
& =0.8 r
\end{aligned}
$$

Now new value of $p$

$$
\begin{aligned}
p_{1} & =\frac{k q_{1}}{r_{1}^{2}} \\
& =\frac{k(1.2 q)}{(0.8 r)^{2}} \\
& =\frac{k \times 12 \times q \times 100}{8 \times 8 \times 10 \times r^{2}} \\
& =\frac{15 k q}{8 r^{2}}
\end{aligned}
$$

Now percentage change in $p$

$$
\begin{aligned}
\% P & =\frac{p_{1}-p}{p} \times 100 \\
& =\frac{\frac{15}{8} p-p}{p} \times 100 \\
& =\frac{7}{8} \times 100 \\
& =87.5 \%
\end{aligned}
$$

22. Ans. C.
$500 x-100(30-x)=11400$
$500 x-3000+100 x=11400$
$600 x=14400$
$x=24$

Correct option is C.
23. Ans. C.
C.P. $x+y=750$
$y=750-x$
S.P.

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chair $=x\left(1+\frac{5}{100}\right)=\frac{21}{20} \mathrm{x}$
table $=x\left(1+\frac{20}{100}\right)=\frac{6}{5} y$
total $=\frac{21 \mathrm{x}}{20}+\frac{6 \mathrm{y}}{5}=\frac{21 \mathrm{x}+24 \mathrm{y}}{20}$
$=\frac{21 \mathrm{x}+24(750-\mathrm{x})}{20}=\frac{-3 \mathrm{x}+18000}{20}$
gain $\%=\frac{\mathrm{SP}-\mathrm{CP}}{\mathrm{CP}} \times 100$
$16=\frac{\frac{-3 x+18000}{20}-750}{750} \times 100$
$3 \mathrm{x}=3000-2400$
$3 \mathrm{x}=600$
$\mathrm{x}=200, \mathrm{y}=550$
cost of table $=550$
24. Ans. C.

According to question
$\frac{\mathrm{D}}{3 \times 60}+\frac{\mathrm{D}}{3 \times 50}+\frac{\mathrm{D}}{3 \times 40}=\frac{\mathrm{D}}{2 \times 60}+\frac{\mathrm{D}}{2 \times 40}-\frac{4}{60}$
$\frac{\mathrm{D}}{3}\left[\frac{10+12+15}{60}\right]=\left[\frac{2 \mathrm{D}+3 \mathrm{D}}{24}\right]-\frac{4}{6}$
$\frac{74 \mathrm{D}-74 \mathrm{D}}{360}=\frac{-4}{6}$
$\frac{\mathrm{D}}{360}=\frac{4}{6}$
$\mathrm{D}=240 \mathrm{~km}$
25. Ans. B.

Saving are as follows:

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2000,3000,4000,5000,6000......
The sequence is following arithmetic progression
$a=2000, d=1000, n=$ ?
Sum $=\frac{\mathrm{n}}{2}[2 \mathrm{a}+(\mathrm{n}-1) \mathrm{d}]$
$170000=\frac{n}{2}[2 \times 2000+(n-1) 1000]$
$340=4 n+n^{2}-n$
$\mathrm{n}^{2}+3 \mathrm{n}-340=0$
$(\mathrm{n}+20)(\mathrm{n}-17)=0$
$\mathrm{n}=-20,17$
Neglect negative value. We get 17 as the answer.
In 17 year the given saving will be done.
26. Ans. A.

slant height $=I=\sqrt{5 x^{2}}=x \sqrt{5}$
volume of cone $=\frac{1}{3} \pi r^{2} h=\frac{1}{3} \pi x^{2}(2 x)=\frac{2}{3} \pi x^{3}$

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volume of semisphere $=\frac{2}{3} \pi r^{3}=\frac{2}{3} \pi x^{3}$
volume of solid $=\frac{2}{3} \pi x^{3}+\frac{2}{3} \pi x^{3}=\frac{4}{3} \pi x^{3}$
The volume of the solid is equal to that of a sphere of radius $x$
27. Ans. C.

slant height $=I=\sqrt{5 x^{2}}=x \sqrt{5}$
Surface area of cone $=\pi x^{2} \sqrt{5}$
Surface area of semisphere $=2 \pi r^{2}$
total surface area of solid $=\pi x^{2}(2+2.24)=13.31 \mathrm{x}^{2}$
28. Ans. D.

Volume of the solid $=\frac{2 \pi}{3}(x)^{3}+\frac{\pi}{3}(x)^{2}(2 x)=\frac{4 \pi}{3} x^{3}$
The volume left in the cylinder = internal volume of cylinder - volume of solid.
$=\pi(x)^{2}(3 x)-\frac{4 \pi}{3} x^{3}$
$=3 \pi x^{3}-\frac{4 \pi}{3} x^{3}$
$=\frac{5 \pi}{3} x^{3}$
$=5.24 \mathrm{x}^{3}$
29. Ans. A.

Area of segment $=\frac{1}{2} r^{2}\left[\frac{\pi}{180} \times \theta-\sin \theta\right]$
$=\frac{1}{2}(2.1)^{2}[1.23]$
$=2.708$
$=2.71 \mathrm{~cm}^{2}$
30. Ans. D.

Area of major segment= whole circle- area of minor segment.
$=\pi r^{2}-2.71$
$=\pi(2.1)^{2}-2.71$
$=11.14 \mathrm{~cm}^{2}$
31. Ans. C.

Suppose radis of circle with centre is $a, b, c$
$a+b=6, b+c=8, c+a=10$
$2(a+b+c)=6+8+10$
$2(a+b+c)=24$
$a+b+c=12$

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32. Ans. D.

$\mathrm{AE}=\frac{\mathrm{AC} \times \mathrm{AB}}{\mathrm{CB}}=\frac{8 \times 6}{10}=4.8$
33. Ans. C.

$\mathrm{a}+\mathrm{b}+\mathrm{c}=12$
$a+10=12$
$\mathrm{a}=2, \mathrm{~b}=4, \mathrm{c}=6$
Area of sector $P=\pi r^{2} \frac{90}{360}=\pi 2^{2} \times \frac{90}{360}=\pi \mathrm{cm}^{2}$
statement 1 is correct
Area of sector $\mathrm{Q}=\pi r^{2} \frac{\theta_{1}}{360}=\pi 4^{2} \times \frac{\theta_{1}}{360}$
Area of sector $R=\pi r^{2} \frac{\theta_{2}}{360}=\pi 6^{2} \times \frac{\theta_{2}}{360}$ $\left(\pi 4^{2} \times \frac{\theta_{1}}{360}\right)+\left(\pi 6^{2} \times \frac{\theta_{2}}{360}\right)$

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$=\frac{2}{5}\left(\theta_{1}+\theta_{2}\right) \pi \quad\left(\theta_{1}+\theta_{2}\right)=90$
$=\frac{2}{5} \times 90 \pi$
$=36 \pi \mathrm{~cm}^{2}$
statement 2 is correct.
Both the statement are correct.
34. Ans. B.


Draw AE $\perp B C$
In a triangle AEB and Triangle AEC, we have
$A B=A C$
$A E=A E$ and $\angle B=\angle C$ because $A B=A C$
$\therefore \triangle \mathrm{AEB} \cong \triangle \mathrm{AEC}$
$\Rightarrow \mathrm{BE}=\mathrm{CE}$
Since $\triangle A E D$ and $\triangle A B E$ are right-angled triangles at $E$.

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Therefore,

$$
\begin{aligned}
A D^{2} & =A E^{2}+D E^{2} \text { and } A B^{2}=A E^{2}+B E^{2} \\
A B^{2}-A D^{2} & =B E^{2}-D E^{2} \\
& =(B E+D E)(B E-D E) \\
& =C D \times B D
\end{aligned}
$$

We can write $A B=A C$
Then
$\mathrm{AC}^{2}-\mathrm{AD}^{2}=\mathrm{CD} \times \mathrm{BD}$
35. Ans. A.

By putting the given values in equation
$\mathrm{AB}^{2}-\mathrm{AD}^{2}=\mathrm{AD} \times \mathrm{BD}$
$A B^{2}-5^{2}=4 \times 6$
$A B^{2}=24+25=49$
$A B=7 \mathrm{~cm}$
36. Ans. B.

As given in the questions
$A B=1.6 \mathrm{~cm}$
$B Q=B C / 2=6.3 / 2=3.15$
Now

$$
\begin{aligned}
A B^{2}+4 B Q^{2} & =(1.6)^{2}+4(3.15)^{2} \\
& =2.56+4 \times 9.9225 \\
& =42.25
\end{aligned}
$$

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37. Ans. C.


In triangle ABQ
$A B^{2}+B Q^{2}=A Q^{2}$
In triangle PBC
$\mathrm{PB}^{2}+\mathrm{BC}^{2}=\mathrm{PC}^{2}$
Adding both the above equation
$\mathrm{AB}^{2}+\mathrm{BQ}^{2}+\mathrm{PB}^{2}+\mathrm{BC}^{2}=\mathrm{AQ}^{2}+\mathrm{PC}^{2}$
$\mathrm{AC}^{2}+\mathrm{PQ}^{2}=\mathrm{AQ}^{2}+\mathrm{PC}^{2}$
By using mid point theorem
$P Q=0.5 \quad A C$
$A C^{2}+(0.5 A C)^{2}=A Q^{2}+P C^{2}$
$\mathrm{AQ}^{2}+\mathrm{PC}^{2}=1.25 \mathrm{AC}^{2}$
38. Ans. B.

4(CP2-AQ $\left.{ }^{2}\right)$
$=4\left(\mathrm{~PB}^{2}+\mathrm{BC}^{2}-\mathrm{AB}^{2}-\mathrm{BQ}^{2}\right)$
$=4\left(\left(\frac{\mathrm{AB}}{2}\right)^{2}+\mathrm{BC}^{2}-\mathrm{AB}^{2}-\left(\frac{\mathrm{BC}}{2}\right)^{2}\right)$
$=4\left(\frac{3 \mathrm{BC}^{2}-3 \mathrm{AB}^{2}}{4}\right)$
$=3(39.69-2.56)$
$=3 \times 37.13$
$=111.39$
39. Ans. C.


Triangle AOP is isosceles triangle, so angle opposite to equal side will be equal.
Sum of all three angle of triangle $=180$
$\angle \mathrm{OAP}+\angle \mathrm{APO}+\angle \mathrm{POA}=180^{\circ}$
Since, $\angle O A P=\angle A P O$
$2 \angle O A P=180^{\circ}-90^{\circ}$
$\angle O A P=45^{\circ}$
So, Angle BAP $=45$
40. Ans. C.


Angle subtended by chord is double to the angle subtended on circumference.
Angle subtended by chord AP on $\mathrm{O}=90$ degree
Angle subtended by chord AP on $\mathrm{Q}=45$ degree
41. Ans. B.

As we know the radius of circum-circle of a right-angled triangle is half of the hypotenuse So hypotenuse of the right angle triangle $=2^{\times}$radius of circum-circle of a right-angled triangle is $=2 \times 10=20 \mathrm{~cm}$

$$
\text { area }=\frac{1}{2} \times 8 \times 20=80 \mathrm{~cm}
$$

42. Ans. C.


$$
\begin{aligned}
& \pi r^{2}+\pi(9-r)^{2}=41 \pi \\
& r^{2}+81+r^{2}-18 r=41 \\
& 2 r^{2}-18 r+40=0 \\
& r^{2}-9 r+20=0 \\
& (r-5)(r-4)=0 \\
& r=4,5 \\
& \text { diameter }=8,10
\end{aligned}
$$

Difference of diameter $=10-8=2 \mathrm{~cm}$
43. Ans. D.

Area of square with side ' $\mathrm{a}^{\prime}$ : $\mathrm{P}=\mathrm{a}^{2}$
Area of square with side ${ }^{\prime} a^{2}{ }^{\prime}: Q=2 a^{2}$
$\frac{\mathrm{P}}{\mathrm{Q}}=\frac{\mathrm{a}^{2}}{2 \mathrm{a}^{2}}=\frac{1}{2}$
Option D is correct.
44. Ans. A.

Area of rhombus $=1 / 2$ (product of diagonals of rhombus)
Area of rhombus $=\frac{1}{2} \mathrm{pq}$
$336=\frac{1}{2} \times 48 \times \mathrm{q}$
$\mathrm{q}=14$
diagonals bisect each other equally and at right angle.
They will form a right angle triangle with hypotenus as side of rhombus.
$\mathrm{s}=\sqrt{48^{2}+14^{2}}$
$\mathrm{s}=50$
perimeter of rhombus $=4 \mathrm{~s}=4 \times 50=200 \mathrm{~cm}$
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45. Ans. C.

60 minute is equivalent to 360 degree.
So 20 minute is equivalent to 120 degree.
part of Area of circle covered
$=\pi r^{2}\left(\frac{120}{360}\right)$
$=\frac{22}{7} \times 21^{2} \times \frac{1}{3}$
$=462 \mathrm{~cm}^{2}$
46. Ans. C.


From the floor part we will find out diagonal of floor i.e. $d$
$\mathrm{d}=\sqrt{21^{2}+16^{2}}$
$\mathrm{d}=\sqrt{697}$
As shown in figure, a right-angle triangle is formed with hypotenus as 29 base as d and height as h
$h^{2}=\sqrt{29^{2}}-697$
$h^{2}=144$
$\mathrm{h}=12 \mathrm{~m}$
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47. Ans. C.
volume of semi- hemisphere $=\frac{2}{3} \pi r^{3}=\frac{2}{3} \pi 18^{3}$
volume of cylinder $=\pi r^{2} h=\pi \times 3^{2} \times 4$
number of cylinder required $=\frac{\text { volume of semi hemisphere }}{\text { volume of cylinder }}$
$=\frac{\frac{2}{3} \pi 18^{3}}{\pi \times 3^{2} \times 4}=108$
number of bottles required $=108$
48. Ans. A.

Volume of spherical shell=
$=\frac{4}{3} \pi\left[\mathrm{R}^{3}-\mathrm{r}^{3}\right]$
$=\frac{4}{3} \times \frac{22}{7} \times\left(6^{3}-3^{3}\right)$
$=792 \mathrm{~cm}^{3}$
Mass $=$ volume $\times$ density
Mass $=792 \times 7=5544 \mathrm{~g}$
49. Ans. A.

volume of solid $=\frac{1}{3} \pi r^{2} h+\frac{2}{3} \pi r^{3}$
$=\left(\frac{1}{3} \times \frac{22}{7} \times 7^{2} \times 16\right)+\left(\frac{2}{3} \times \frac{22}{7} \times 7^{3}\right)$
$=1540 \mathrm{~cm}^{3}$
50. Ans. C.

volume of a cube $=a^{3}=343$
$a=7$
cuboid formed after joining 3 cube will have length $=3 a$, breadth $=a$, height $=a$
surface area of cuboid $=2(7 \times 7)+4(7 \times 21)$
$=686 \mathrm{~cm}^{2}$
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51. Ans. A.


Total surface area $=$
(area of 5 sides of cube+curved surface area of semihemisphere + shaded area as shown in figure)
$=\left(5 \times 14^{2}\right)+\left(2 \pi \times 7^{2}\right)+\left[14^{2}-\pi \times 7^{2}\right]$
$=1329.86 \mathrm{~cm}^{2}$
which is equals to $1330 \mathrm{~cm}^{2}$
Option A is correct.
52. Ans. A.
volume of cuboid $=21 \times 11 \times 7=1617 \mathrm{~cm}^{3}$
volume of a silver coin $=\pi r^{2} h=\pi \times 1.75^{2} \times 0.4=3.85 \mathrm{~cm}^{3}$
number of coins required $=\frac{1617}{3.85}=420$
correct option is option A.
53. Ans. B.


Slant height $=\sqrt{63^{2}+16^{2}}=64.99=65 \mathrm{~cm}$
54. Ans. A.
height $=6 \mathrm{~cm}$
radius $=8 \mathrm{~cm}$
slant height $=\sqrt{8^{2}+6^{2}}=10 \mathrm{~cm}$
Total surface area
$=\pi r l+\pi r^{2}$
$=(\pi \times 8 \times 10)+(\pi \times 64)$
$=452 \mathrm{~cm}^{2}$
55. Ans. A.

Volume of solid
$=$ volume of (bigger cylinder + smaller cylinder)
$=\pi \mathrm{R}^{2} \mathrm{H}+\pi r^{2} h$
$=\pi\left(7^{2} \times 20+3.5^{2} \times 10\right)$
$=3465 \mathrm{~cm}^{3}$
Mass $=$ volume $\times$ density
$=\frac{3465}{10^{6}} \times 10000=34.65 \mathrm{~kg}$
56. Ans. C.
$\cos ^{3} \theta+\sec ^{3} \theta$
$=\cos ^{3} \theta+\frac{1}{\cos ^{3} \theta}$
let $\cos \theta=x$
$\mathrm{x}+\frac{1}{\mathrm{x}}$
$x+\frac{1}{x} \geq 2$ (ALWAYS)
So minimum value equals to 2
57. Ans. A.
$14 \sin ^{2} \theta+10 \cos ^{2} \theta=11$
$14 \sin ^{2} \theta+10\left(1-\sin ^{2} \theta\right)=11$
$14 \sin ^{2} \theta+10-10 \sin ^{2} \theta=11$
$4 \sin ^{2} \theta=1$
$\sin \theta= \pm \frac{1}{2}$
$\theta$ lies between 0 to $\frac{\pi}{2}$
so $\theta=30$
$\tan 30+\cot 30=\tan 30+\frac{1}{\tan 30}$
$=\frac{\tan ^{2} 30+1}{\tan 30}$
$=\frac{\left(\frac{1}{\sqrt{3}}\right)^{2}+1}{\left(\frac{1}{\sqrt{3}}\right)}=\frac{4}{\sqrt{3}}$
58. Ans. C.
$\frac{\left(\sin ^{3} \theta+\cos ^{3} \theta\right)(\sin \theta-\cos \theta)+\left(\sin ^{3} \theta-\cos ^{3} \theta\right)(\sin \theta+\cos \theta)}{\sin ^{2} \theta-\cos ^{2} \theta}$
$=\frac{2 \sin ^{4} \theta-2 \cos ^{4} \theta}{\sin ^{2} \theta-\cos ^{2} \theta}$
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$$
\begin{aligned}
& =\frac{2\left[\left(\sin ^{2} \theta\right)^{2}-\left(\cos ^{2} \theta\right)^{2}\right.}{\sin ^{2} \theta-\cos ^{2} \theta} \\
& =\frac{2\left(\sin ^{2} \theta+\cos ^{2} \theta\right)\left(\sin ^{2} \theta-\cos ^{2} \theta\right)}{\left(\sin ^{2} \theta-\cos ^{2} \theta\right)} \\
& =2\left(\sin ^{2} \theta+\cos ^{2} \theta\right) \\
& =2 \times 1 \\
& =2
\end{aligned}
$$

59. Ans. B.

In the triangle $A C D, A D$ and $D C$ are equal, so

$$
\begin{aligned}
& \angle \mathrm{DAC}=\angle \mathrm{DCA}=\mathrm{x} \\
& \angle \mathrm{ADC}=180^{\circ}-2 \mathrm{x}
\end{aligned}
$$

$$
\angle \mathrm{ADC}=90^{\circ}+\angle \mathrm{BCD}
$$

$$
\angle B C D=180^{\circ}-2 x-90^{\circ}=90^{\circ}-2 x
$$

Now,

$$
\angle \mathrm{BCD}+\angle \mathrm{DCA}=60^{\circ}
$$

$$
90^{\circ}-2 x+x=60^{\circ}
$$

$$
x=30^{\circ}
$$

$$
\angle B C D=60^{\circ}-30^{\circ}=30^{\circ}
$$


$\tan 30^{\circ}=\frac{\mathrm{BD}}{\mathrm{BC}}$ and $\tan 60^{\circ}=\frac{\mathrm{AB}}{\mathrm{BC}}$
$\frac{1}{\sqrt{3}}=\frac{B D}{B C}$ and $\sqrt{3}=\frac{10+B D}{B C}$
$\frac{B D}{10+B D}=\frac{1}{3}$
$3 B D=10+B D$
$2 B D=10$
$B D=5$
Height of $A B=10+5=15 \mathrm{~m}$
60. Ans. A.
$=1-\left(-2 \sin ^{2} \theta \cos ^{2} \theta+\sin ^{4} \theta+\cos ^{4} \theta\right)$
$=1-\left(\left(\sin ^{2} \theta\right)^{2}+\left(\cos ^{2} \theta\right)^{2}-2 \sin ^{2} \theta \cos ^{2} \theta\right)$
$=1-\left(\sin ^{2} \theta-\cos ^{2} \theta\right)^{2}$
$=1-(\cos 2 \theta)^{2}$
To get the maximum value $\cos 2 \theta$ have to be minimum, $\min \cos 2 \theta=0$ at $\theta$
$=\pi / 4$
$=1-0$
$=1$
61. Ans. D.


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In triangle AOC,
$\tan 30=\frac{\mathrm{AC}}{1200}$
$\frac{1}{\sqrt{3}}=\frac{\mathrm{AC}}{1200}$
$\mathrm{AC}=693$
$\mathrm{BC}=3000-693=2307$
$\tan \theta=\frac{2307}{1200}=1.922$
$\theta=\tan ^{-1}(1.922)=62.51^{\circ}$
$\theta>60^{\circ}$
So option D is correct.
62. Ans. A.
$\cos ^{2} \theta-3 \cos \theta+2=\sin ^{2} \theta$
$\cos ^{2} \theta-3 \cos \theta+2=1-\cos ^{2} \theta$
$2 \cos ^{2} \theta-3 \cos \theta+1=0$
$2 \cos \theta(\cos \theta-1)-1(\cos \theta-1)=0$
$(\cos \theta-1)(2 \cos \theta-1)=0$
$\cos \theta=1, \frac{1}{2}$
$\theta=60$ (lies between 0 to 90)
$\sin ^{2} 60+\cos ^{2} 60$
$=\left(\frac{\sqrt{3}}{2}\right)^{2}+\frac{1}{2}$
$=\frac{3}{4}+\frac{1}{2}=\frac{5}{4}$
63. Ans. C.
statement1
LHS $=\sin ^{4} \theta-\sin ^{2} \theta$
$=\left(\sin ^{2} \theta\right)^{2}-\sin ^{2} \theta$
$=\left(1-\cos ^{2} \theta\right)^{2}-\left(1-\cos ^{2} \theta\right)$
$=\cos ^{4} \theta-\cos ^{2} \theta$
$=$ RHS
statement 1 is correct.
statement 2
LHS $=\sin ^{4} \theta+\cos ^{4} \theta$
$=\left(\sin ^{2} \theta\right)^{2}+\left(\cos ^{2} \theta\right)^{2}+2 \sin ^{2} \theta \cos ^{2} \theta-2 \sin ^{2} \theta \cos ^{2} \theta$
$=\left(\sin ^{2} \theta+\cos ^{2} \theta\right)^{2}-2 \sin ^{2} \theta \cos ^{2} \theta$
$=1-2 \sin ^{2} \theta \cos ^{2} \theta$
LHS $\neq$ RHS
Statement 2 is incorrect
statement 3
LHS $=\tan ^{4} \theta+\tan ^{2} \theta$
$=\left(\tan ^{2} \theta\right)^{2}+\tan ^{2} \theta$
$=\tan ^{2} \theta\left(\tan ^{2} \theta+1\right)$
$=\left(\sec ^{2} \theta-1\right) \sec ^{2} \theta$
$=\sec ^{4} \theta-\sec ^{2} \theta$
= RHS
statement 3 is correct.
64. Ans. A.
$\sin (90-\theta)=\cos \theta$
$\tan (90-\theta)=\cot \theta$
$\sin 24=\cos 66$
$\sin 66=\cos 24$
$\tan 24=\cot 66$

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$\tan 66=\cot 24$
$=\cos 24 \cos 66-\cos 24 \cos 66+\cot 24 \cot 66-\cot 24 \cot 66$
$=0$ (each term will cancle out each other)
65. Ans. C.
$x^{2}+y^{2}+z^{2}$
$=p^{2} \sin ^{2} A \cos ^{2} B+p^{2} \sin ^{2} A \sin ^{2} B+p^{2} \cos ^{2} A$
$=\mathrm{p}^{2}\left[\sin ^{2} \mathrm{~A}\left(\cos ^{2} \mathrm{~B}+\sin ^{2} \mathrm{~B}\right)+\cos ^{2} \mathrm{~A}\right]$
$=\mathrm{p}^{2}\left(\sin ^{2} \mathrm{~A}+\cos ^{2} \mathrm{~A}\right)$
$=\mathrm{p}^{2}$
66. Ans. A.

$$
\begin{aligned}
& x^{2}-y^{2}=(m \sec A+n \tan A)^{2}-(m \tan A+n \sec A)^{2} \\
& =\left(m^{2} \sec ^{2} A+n^{2} \tan ^{2} A+2 m n \tan A \sec A\right)-\left(m^{2} \tan ^{2} A+n^{2} \sec ^{2} A\right. \\
& \quad \quad+2 m n \tan A \sec A) \\
& =\sec ^{2}\left(m^{2}-n^{2}\right)-\tan ^{2}\left(m^{2}-n^{2}\right) \\
& =\left(m^{2}-n^{2}\right)\left(\sec ^{2} A-\tan ^{2} A\right) \\
& =\left(m^{2}-n^{2}\right) \quad \text { since }\left[\left(\sec ^{2} A-\tan ^{2} A\right)=1\right]
\end{aligned}
$$

67. Ans. D.
$\tan \theta=1$
$\theta=45$
$\sin ^{2} \theta-2 \sin \theta \cos \theta$
$=\left(\frac{1}{\sqrt{2}}\right)^{2}-2 \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}$
$=\frac{1}{2}-1$
$=-\frac{1}{2}$
$32 \mid P a g e$
68. Ans. C.
$\frac{\sin \theta\left(2 \sin ^{2} \theta-1\right)}{\cos \theta\left(1-2 \cos ^{2} \theta\right)}$
$=\frac{\sin \theta(-\cos 2 \theta)}{\cos \theta(-\cos 2 \theta)}$
$=\frac{\sin \theta}{\cos \theta}$
$=\tan \theta$
69. Ans. A.

In triangle $A B C, A+B+C=180$
$\frac{A+B+C}{2}=\frac{180}{2}=90$
$\frac{B+C}{2}=90-\frac{A}{2}$
$\tan \left(\frac{B+C}{2}\right)=\tan \left(90-\frac{A}{2}\right)$
$=\cot \left(\frac{\mathrm{A}}{2}\right)$
$\sin \left(\frac{B+C}{2}\right)=\sin \left(90-\frac{A}{2}\right)=\cos \frac{A}{2}$
Putting the value in the given expression
$=\cot \frac{A}{2}+\cos \frac{A}{2}-\cos \frac{A}{2}-\cot \frac{A}{2}$
$=0$
70. Ans. A.
$\mathrm{AB}^{2}+\mathrm{BC}^{2}=20^{2}$
$\mathrm{AB}+\mathrm{BC}=10(1+\sqrt{3})$
$(A B+B C)^{2}=100(1+\sqrt{3})^{2}$
$\mathrm{AB}^{2}+\mathrm{BC}^{2}+2 \mathrm{AB} \cdot \mathrm{BC}=100(1+3+2 \sqrt{3})$
$400+2 \mathrm{AB} \cdot \mathrm{BC}=100(1+3+2 \sqrt{3})$
$2 \mathrm{AB} \cdot \mathrm{BC}=200 \sqrt{3}$
$\mathrm{AB} \cdot \mathrm{BC}=100 \sqrt{3}$
$\tan \mathrm{A}+\tan \mathrm{C}=\frac{\mathrm{BC}}{\mathrm{AB}}+\frac{\mathrm{AB}}{\mathrm{BC}}$
$=\frac{\mathrm{BC}^{2}+\mathrm{AB}^{2}}{\mathrm{AB} \cdot \mathrm{BC}}$
$=\frac{400}{100 \sqrt{3}}=\frac{4}{\sqrt{3}}$
71. Ans. B.
$5 \mathrm{P}+6 \mathrm{~N}+7 \mathrm{E}=250$
multiplying above equation by 3 both side $15 \mathrm{P}+18 \mathrm{~N}+21 \mathrm{E}=750$ equation 1
$6 \mathrm{P}+4 \mathrm{~N}+2 \mathrm{E}=180$
multiplying above equation by $5 / 2$ both side $15 \mathrm{P}+10 \mathrm{~N}+5 \mathrm{E}=450 \quad$ equation 2
substracting equation 2 from equation 1
we get
$8 \mathrm{~N}+16 \mathrm{E}=300$
divide the above equation by 4
$2 N+4 E=75$
72. Ans. A.
for a zero at the end there should be a product of 2 and 5 . The power of 5 is less than the power of 2 . So we have to find the number of 5 .

We have $1^{50} \times 2^{49} \times 3^{48} \times \ldots \times 50^{1}$
Breaking it into power of 5 and 2.
The terms that contain 5 are $5^{46}, 10^{41}, 15^{36}, 20^{31}, 25^{26}, 30^{21}, 35^{16}, 40^{11}, 45^{6}, 50^{1}$
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Total number of 5 's $=46+41+36+31+2(26)+21+16+11+6+2(1)=262$
So, the number of 0's at the end of the expression $=262$
73. Ans. B.
$\mathrm{x}^{2}-60 \mathrm{x}+899=0$
$\mathrm{x}^{2}-29 \mathrm{x}-31 \mathrm{x}+899=0$
$x(x-29)-31(x-29)=0$
$(x-29)(x-31)=0$
$\mathrm{x}=29,31$
$\mathrm{p}=31, \mathrm{q}=29$
put the values in each option and cross check.
$3 p-2 q-43=0$
$3 \times 31-2 \times 29-43=0$
$0=0$
so option D is correct.
74. Ans. D.
$b^{2}-4 \mathrm{ac} \geq 0$
$16+4 \log _{10} N \geq 0$
$\log _{10} N \geq \frac{-16}{4}$
$\log _{10} N \geq-4$
$\mathrm{N} \geq 10^{-4}$
$\mathrm{N} \geq 0.0004$
75. Ans. D.
$5^{\mathrm{x}-1}=2.5^{\log _{10} 5}$
taking log both side
$\log _{10} 5^{x-1}=\log _{10} 2.5^{\log _{10} 5}$
$(x-1) \log _{10} 5=\log _{10} 5 \times \log _{10} 2.5$
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$x-1=\log _{10} 2.5$
$x=\log _{10} 2.5+1$
$x=\log _{10} 2.5+\log _{10} 10$
$x=\log _{10}(2.5 \times 10)$
$x=\log _{10} 25$
$x=\log _{10} 5^{2}$
$x=2 \log _{10} 5$
76. Ans. C.
$96-(4 a)^{3}+\left(\frac{2}{a^{2}}\right)^{3}-\frac{48}{a^{3}}=\mathrm{t}^{3}$
$(-4 a)^{3}+\left(\frac{2}{\mathrm{a}^{2}}\right)^{3}+3 \times 4 \times 8-\frac{3 \times 2 \times 8}{\mathrm{a}^{3}}=\mathrm{t}^{3}$
$(-4 a)^{3}+\left(\frac{2}{a^{2}}\right)^{3}+3 \times \frac{2}{a^{2}} \times(-4 a)\left(\frac{2}{a^{2}}+(-4 a)\right)=\mathrm{t}^{3}$
by using formula
$(a+b)^{3}=a^{3}+b^{3}+3 a b(a-b)$
$\left(\frac{2}{a^{2}}-4 a\right)^{3}=t^{3}$
cuberoot on both side
$\frac{2}{\mathrm{a}^{2}}-4 \mathrm{a}=\mathrm{t}$
$2-4 \mathrm{a}^{3}=\mathrm{ta}^{2}$
$\mathrm{a}^{2} \mathrm{t}+4 \mathrm{a}^{3}=2$
77. Ans. C.

Adding both the equation
$2 B=\frac{x^{2}-8+x^{2}-2 x-4}{x+2}=\frac{2 x^{2}-2 x-12}{x+2}$
$B=\frac{x^{2}-x-6}{x+2}$
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$B=\frac{(x-3)(x+2)}{(x+2)}$
$B=(x-3)$
cross check all the option
option c
$\frac{2 x^{2}-6 x-x+3}{2 x-1}$
$=\frac{2 x(x-3)-1(x-3)}{2 x-1}$
$=\mathrm{x}-3$
78. Ans. C.
$\frac{x^{4}}{\left(x^{2}-y^{2}\right)\left(x^{2}-z^{2}\right)}-\frac{y^{4}}{\left(x^{2}-y^{2}\right)\left(y^{2}-z^{2}\right)}+\frac{z^{4}}{\left(x^{2}-z^{2}\right)\left(y^{2}-z^{2}\right)}$
$=\frac{x^{4}\left(y^{2}-z^{2}\right)-y^{4}\left(x^{2}-z^{2}\right)+z^{4}\left(x^{2}-y^{2}\right)}{\left(y^{2}-z^{2}\right)\left(x^{2}-z^{2}\right)\left(x^{2}-y^{2}\right)}$
$=\frac{x^{4} y^{2}-x^{4} z^{2}-y^{4} x^{2}+y^{4} z^{2}+z^{4} x^{2}-z^{4} y^{2}}{\left(y^{2}-z^{2}\right)\left(x^{2}-z^{2}\right)\left(x^{2}-y^{2}\right)}$
$=\frac{x^{4} y^{2}-x^{2} y^{4}+x^{2} z^{4}-x^{4} z^{2}+y^{4} z^{2}-z^{4} y^{2}}{\left(y^{2}-z^{2}\right)\left(x^{2}-z^{2}\right)\left(x^{2}-y^{2}\right)}$
$=\frac{x^{2} y^{2}\left(x^{2}-y^{2}\right)+z^{4}\left(x^{2}-y^{2}\right)+z^{2}\left(y^{4}-x^{4}\right)}{\left(y^{2}-z^{2}\right)\left(x^{2}-z^{2}\right)\left(x^{2}-y^{2}\right)}$
$=\frac{\left(x^{2}-y^{2}\right)\left[x^{2} y^{2}+z^{4}-z^{2} x^{2}-z^{2} y^{2}\right.}{\left(y^{2}-z^{2}\right)\left(x^{2}-z^{2}\right)\left(x^{2}-y^{2}\right)}$
$=\frac{\left(\mathrm{x}^{2}-\mathrm{y}^{2}\right)\left[\mathrm{x}^{2}\left(\mathrm{y}^{2}-\mathrm{z}^{2}\right)-\mathrm{z}^{2}\left(\mathrm{y}^{2}-\mathrm{z}^{2}\right)\right]}{\left(\mathrm{y}^{2}-\mathrm{z}^{2}\right)\left(\mathrm{x}^{2}-\mathrm{z}^{2}\right)\left(\mathrm{x}^{2}-\mathrm{y}^{2}\right)}$
$=\frac{\left(x^{2}-y^{2}\right)\left(y^{2}-z^{2}\right)\left(x^{2}-z^{2}\right)}{\left(y^{2}-z^{2}\right)\left(x^{2}-z^{2}\right)\left(x^{2}-y^{2}\right)}$
$=1$
79. Ans. B.

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$\frac{b(2 a-b)}{a(6 a-b)}=\frac{1}{6}$
$12 a b-6 b^{2}=6 a^{2}-a b$
$6 a^{2}+6 b^{2}=13 a b$
$\frac{a^{2}+b^{2}}{2 a b}=\frac{13}{12}$
$\frac{a^{2}+2 a b+b^{2}}{a^{2}-2 a b+b^{2}}=\frac{25}{1}$
$\frac{a+b}{a-b}=5$
80. Ans. C.
$\mathrm{x}=\mathrm{k}(\mathrm{b}+\mathrm{c}-\mathrm{a})$
$y=k(b-c-a)$
$\mathrm{z}=\mathrm{k}(\mathrm{a}+\mathrm{b}-\mathrm{c})$
by using formula
$(x-y+z)^{2}=x^{2}+y^{2}+z^{2}-2 x y-2 y z+2 z x$
Now put $x, y, z$
$=k^{2}(b+c-a-b+c+a+a+b-c)^{2}$
$=k^{2}(a+b+c)^{2}$
81. Ans. C.

Let the number is $2 x, 3 x$ and $5 x$.
According to the question,
$(2 \mathrm{x})^{2}+(3 \mathrm{x})^{2}+(5 \mathrm{x})^{2}=1368$
$38 x^{2}=1368$
$\mathrm{x}^{2}=36$
$\mathrm{x}= \pm 6$
By putting the value, the numbers are 12, 18 and 30 .

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Sum of 12,18 and $30=60$
82. Ans. A.
by hit and trail method
suppose $a=2, b=1$
statement 1
$\frac{2^{2}-1^{2}}{2^{2}+1^{2}}>\frac{2-1}{2+1}$
$\frac{3}{5}>\frac{1}{3}$
$\frac{9}{15}>\frac{5}{15}$
true
statement 2
$\frac{2^{3}+1^{3}}{2^{2}+1^{2}}>\frac{2^{2}+1^{2}}{2+1}$
$\frac{9}{5}>\frac{5}{3}$
$\frac{27}{15}>\frac{25}{15}$
true
But condition says only if a>b but vice versa is also true.
$\frac{1^{3}+2^{3}}{1^{2}+2^{2}}>\frac{1^{2}+2^{2}}{1+2}$
$\frac{9}{5}>\frac{5}{3}$
$\frac{27}{15}>\frac{25}{15}$
Hence statement 2 is not correct.
83. Ans. B.

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$$
\begin{aligned}
& \frac{(3 n-1)(2 n+1)}{(3 n+1)(4 n-3)}=\frac{x}{y}=\frac{6}{11} \\
& \frac{6 n^{2}+n-1}{12 n^{2}-5 n-3}=\frac{6}{11} \\
& 66 n^{2}+11 n-11=72 n^{2}-30 n-18 \\
& 6 n^{2}-19 n-7=0 \\
& 6 n^{2}+2 n-21 n-7=0 \\
& (2 n-7)(3 n+1)=0 \\
& n=\frac{7}{2}, \frac{-1}{3} \\
& n=\frac{7}{2}
\end{aligned}
$$

Value will be multiple of $7 / 2$ so next integer value will be 7 .
84. Ans. C.

We have $\frac{a y-b x}{c}=\frac{c x-a z}{b}=\frac{b z-c y}{a}$
$\frac{\mathrm{ay}-\mathrm{bx}}{\mathrm{c}}=\frac{\mathrm{cx}-\mathrm{az}}{\mathrm{b}}$ and $\frac{\mathrm{ay}-\mathrm{bx}}{\mathrm{c}}=\frac{\mathrm{bz}-\mathrm{cy}}{\mathrm{a}}$
So,
$\frac{\mathrm{ay}-\mathrm{bx}}{\mathrm{c}}=\frac{\mathrm{cx}-\mathrm{az}}{\mathrm{b}}$ and $\frac{\mathrm{ay}-\mathrm{bx}}{\mathrm{c}}=\frac{\mathrm{bz}-\mathrm{cy}}{\mathrm{a}}$
$\frac{\mathrm{az}}{\mathrm{b}}=\frac{\mathrm{cx}}{\mathrm{b}}+\frac{\mathrm{bx}}{\mathrm{c}}-\frac{\mathrm{ay}}{\mathrm{c}}$ and $\frac{\mathrm{bz}}{\mathrm{a}}=\frac{\mathrm{ay}-\mathrm{bx}}{\mathrm{c}}+\frac{\mathrm{cy}}{\mathrm{a}}$
$\frac{a z}{b}=\frac{c^{2} x+b^{2} x-a b y}{b c}$ and $\frac{b z}{a}=\frac{a^{2} y-a b x+c^{2} y}{a c}$
$\mathrm{z}=\frac{\mathrm{c}^{2} \mathrm{x}+\mathrm{b}^{2} \mathrm{x}-\mathrm{aby}}{\mathrm{ac}}=\frac{\mathrm{a}^{2} \mathrm{y}-\mathrm{abx}+\mathrm{c}^{2} \mathrm{y}}{\mathrm{bc}}$
$\left(b c^{2}+b^{3}\right) x-a b^{2} y=\left(a^{3}+a c^{2}\right) y-a^{2} b x$
$b x\left(a^{2}+b^{2}+c^{2}\right)=a y\left(a^{2}+b^{2}+c^{2}\right)$
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$b x=a y$
$\frac{x}{a}=\frac{y}{b}$
Similarly, we can get, $\frac{x}{a}=\frac{y}{b}=\frac{z}{c}=k$ (let)
Now, $\frac{\frac{\mathrm{x}+\mathrm{y}+\mathrm{z}}{\mathrm{a}+\mathrm{b}+\mathrm{c}}=\frac{\mathrm{ka}+\mathrm{kb}+\mathrm{kc}}{\mathrm{a}+\mathrm{b}+\mathrm{c}}=\mathrm{k}=\frac{\mathrm{z}}{\mathrm{c}} \mathrm{c} .{ }^{2} .}{}$
SO, both ethe options are correct.
85. Ans. A.

Area of rectangle $=375$
$L x B=375$
Factorizing 375 we get $15 \times 25$
Let us cross check as the perimeter of 3 side is given
Let $\mathrm{L}=15$ and $\mathrm{B}=25$
$2 \mathrm{~L}+\mathrm{B}=65$ (given)
$30+25=65$
$55=65$ WRONG
Let $\mathrm{L}=15$ and $\mathrm{B}=25$
$L+2 B=65$
$15+50=65$
$65=65$ correct
Perimeter $=2(1+b)=2(15+25)=80 \mathrm{~m}$

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86. Ans. D.

26381
$\swarrow \searrow$
$23 \quad 1147$


3137
Prime factors are 23,31,37
87. Ans. D.
cross check with the options.
if option is factor than it must satisfy the given equation.
A) $x+14=0$
$x=-14$
$(-15) \times(-16) \times(-18)-90 \neq 0$
not a factor
B) $x-14=0$
$\mathrm{x}=14$
$13 \times 12 \times 10-90 \neq 0$
not a factor
C) $x=6$
$5 \times 4 \times 2-90 \neq 0$
not a factor
D) $x=7$
$6 \times 5 \times 4-90=0$
factor of given equation.
88. Ans. C.

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$(\sqrt{3}-2 \sqrt{5})^{2}$
$=(\sqrt{3})^{2}+(2 \sqrt{5})^{2}-2(\sqrt{3})(2 \sqrt{5})$
$=3+20-4 \sqrt{15}$
$=23-4 \sqrt{15}$
89. Ans. A.
$\frac{37^{1000}}{9}=\frac{(36+1)^{1000}}{9}$
Any power of 1 will be 1 so remainder will be 1 as 36 will be completely divided by 9 .
90. Ans. B.

LCM $+\mathrm{HCF}=536$
LCM - HCF $=296$
Adding both the equation
$2($ LCM $)=832$
LCM $=416$
$\mathrm{HCF}=120$
LCM X HCF = product of two number
$416 \times 120=104 \times$ second number
Second number $=480$
91. Ans. A.
$\frac{\text { men }_{1} \times \text { day }_{1}}{\text { work }_{1}}=\frac{\text { men }_{2} \times \text { day }_{2}}{\text { work }_{2}}$
$\frac{\text { initial men } \times \text { intial time }}{\text { work done in this duration }}=\frac{\text { total men required } \times \text { remaining days }}{\text { remaing work }}$
$\frac{20 \times 5}{1 / 4}=\frac{M \times(10-5)}{3 / 4}$
$M=60$
Additional number of men required $=60-20=40$
92. Ans. B.

Statement 1: product of negative and positive is always negative. Thus contradict in statement 1 and NOT CORRECT.

Statement 2: is incorrect. Equation doesn't hold true always. Only when $\mathrm{x}<-1$
Statement 3: is true.
Statement 4: is incorrect as its not necessary that it will be rational always.
Statement 1,2and 4 are incorrect.
93. Ans. D.
$2 x^{2}+x y-3 y^{2}$
$=2 x^{2}-2 x y+3 x y-3 y^{2}$
$=2 \mathrm{x}(\mathrm{x}-\mathrm{y})+3 \mathrm{y}(\mathrm{x}-\mathrm{y})$
$=(x-y)(2 x+3 y)$
factor are $(2 x+3 y)$
94. Ans. D.
not real roots means $\mathrm{D}<0$
$b^{2}-4 a c<0$ cross check each option

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option A: 256-24>0
option B: $100+8>0$
option C: 64-4 > 0
option D: 81-96 < 0 not real roots
95. Ans. B.
$a x^{2}+b x+c=0$
sum of roots $\alpha+\beta=\frac{-b}{a}=7$
product of roots $\alpha \beta=\frac{\mathrm{c}}{\mathrm{a}}=12$
$\mathrm{a}=1, \mathrm{~b}=-7, \mathrm{c}=12$
equation: $x^{2}-7 x+12=0$
roots are 3,4
new roots are $3 \times 2=6$ and $\frac{4}{2}=2$
sum of roots $\alpha+\beta=\frac{-b}{a}=8$
product of roots $\alpha \beta=\frac{\mathrm{c}}{\mathrm{a}}=12$
$\mathrm{a}=1, \mathrm{~b}=-8, \mathrm{c}=12$
equation: $x^{2}-8 x+12=0$
96. Ans. D.

D $>0$
$b^{2}-4 a c>0$
$\mathrm{k}^{2}-8>0$
$(\mathrm{k}+2 \sqrt{2})(\mathrm{k}-2 \sqrt{2})>0$
$\mathrm{k}<-2 \sqrt{2}$ or $\mathrm{k}>2 \sqrt{2}$
97. Ans. A.
$(1-\beta-\alpha+\alpha \beta)(1-\gamma)$
$1-\beta-\alpha+\alpha \beta-\gamma+\gamma \beta+\alpha \gamma-\alpha \beta \gamma$
$1-(\alpha+\beta+\gamma)+(\alpha \beta+\beta \gamma+\alpha \gamma)-\alpha \beta \gamma$
$1-\alpha \beta \gamma \quad[(\alpha+\beta+\gamma)=(\alpha \beta+\beta \gamma+\alpha \gamma)]$
98. Ans. D.
$\log _{10} M+\log _{10} N=\log _{10} M . N$
$\log _{10} 10=1$
$\log _{10} x^{3}=\log _{10} x^{2}(10)$
$\mathrm{x}^{3}=\mathrm{x}^{2}(10)$
$\mathrm{x}=10$
99. Ans. C.

Prime number so $\mathrm{HCF}=1$
LCM $=2231$
LCM $\times$ HCF=product of two number
$2231 \times 1=$ p.q
(23)(97)=p.q
$\mathrm{P}=97$ and $\mathrm{q}=23$
$p-q=97-23=74$
100. Ans. D.

To get next meet we will find out LCM of $(20,30,35)=420 \mathrm{~min}$
$420 \mathrm{~min}=7$ hour
They we meet again after 7 hour.

