Math Practice Set – 3 By Alok Sir

1. **So, $mx^3 + 4x^2 + 6x + 2$ is zero for x = – 2**
$m(-2)^3 + 4*(-2)^2 + 6*(-2) + 2 = 0$
$-8m + 16 - 12 + 2 = 0$
$-8m = -6$
$m = (3/4)$.

2. **$x + 4/5x = 2$**
$\Rightarrow 5x^2 + 4 = 10x$
$\Rightarrow 40x/(10x^2 + 8) = 40x/2(5x^2 + 4) = 40x/20x = 2$

3. **$(\tan\theta + \cot\theta)^2 = 16$**
$\tan^2\theta + \cot^2\theta + 2\tan\theta\cot\theta = 16$
$\tan^2\theta + \cot^2\theta = 14$

4. **diameter = 280 m. So, radius = 280/2 = 140 m**
The area of the lane =
$\pi(140 + 7)^2 - \pi(140)^2$
$= \pi(147^2 - 140^2) = \pi(21609 - 19600) = 22/7 \times 2009 = 6314$
Thus, required amount = $6314 \times 2 = 12628$

5. **Let, the value of each instalment be Rs.x.**
Then, $x/(1 + 20/100) + x/(1 + 20/100)^2 = 7150$
Or, $5x/6 + 25x/36 = 7150$
Or,$(30x + 25x)/36 = 7150$
Or, $55x = 7150 \times 36$
Or, $x = 4680$

6. **secQ = 5n**
$\Rightarrow n = \sec Q/5$
$\tan Q = 5/n$
$\Rightarrow 1/n = \tan Q/5$
$5(n^2 - 1/n^2) = 5[\sec^2 Q/25 - \tan^2 Q/25]$
$= 5 \times 1/25 = 1/5$

7. **x/2 = y/7 = z/9 = k (let)**
Then, $x = 2k, = 7k, z = 9k$
then, $(x + y + z)^2/xz$
$= (2k + 7k + 9k)^2/18k^2$
$= 324k^2/18k^2 = 18$

8. **$(x + 1/x)^2 = x^2 + 1/x^2 + 2 = x^2 + 1/x^2 - 2 + 4$**
$= (x - 1/x)^2 + 4 = 20$
So, $x + 1/x = \sqrt{20} = 2\sqrt{5}$

9. **$\because \angle$ BOC = 136°**
$\Rightarrow \angle BAC = 1/2\ \angle BOC = 68°$
In cvclic nuadrilateral ABCD,
$\angle BAC + \angle BDC = 180°$
$\Rightarrow \angle BDC = 180° - 68° = 112°$

10. **We know sin(90° – A) = cos A**
Therefore, $\sin^2 10° + \sin^2 20° + \sin^2 30° + .. + \sin^2 90°$
$= \sin^2 10° + \sin^2 20° + \sin^2 30° + \sin^2 40° + \cos^2 40° + \cos^2 30° + \cos^2 20° + \cos^2 10° + \sin^2 90°$
$= (\sin^2 10° + \cos^2 10°) + (\sin^2 20° + \cos^2 20°) + (\sin^2 30° + \cos^2 30°) + (\sin^2 40° + \cos^2 40°) + \sin^2 90°$
$= 1 + 1 + 1 + 1 + 1 = 5$

11. **Clearly, the two will meet when they cover a distance of 2352 m together.**
Theire relative speed = (10.6 + 9) = 19.6 km/h
=> To cover 19.6 km, they take 1 hour.
=> To cover 2352 m, they take = (2352 * 60)/(19.6 * 1000)
= 7.2 minutes.

12. **Let CP be C.**
MP = 1.2 C
SP = 1.2 × 0.9 C = 1.08 C = 1879.2
=> C = Rs. 1740
Now new SP = 1513.8
Loss % = (1740 – 1513.8)/1740 × 100 = 13%

13. **Let the original price of sugar = Rs. *x* per kg**
Reduced price of sugar = 80% of x = Rs. 4x/5 per kg
$36/(4x/5) - 36/x = 1/2$
$\Rightarrow 45/x - 36/x = 1/2$
$\Rightarrow 9/x = 1/2$
$\Rightarrow x$ = Rs.18 per kg

14. **Work done by 12 males in 18 days = work done by 12 females in 24 days**
$\Rightarrow 12M \times 18 = 12F \times 24$
$\Rightarrow 3M = 4F$
Therefore 10 males + 8 females = 10 M + 8 F
$= 10M + 6M(\because 3M = 4F)$
$= 16M$
We need to find work done by 16 M-
Now 12 males do work in 18 days then 16 males do the same work in 'd' days
Use formula, $M_1D_1 = M_2D_2$
$\Rightarrow 12 \times 18 = 16 \times D$
$\Rightarrow D = 27/2$
$\Rightarrow D = 13\ 1/2$

15. **We know that**
AO/OD = OC/OB
$3/(x - 5) = (x - 3)/(3x - 19)$
$\Rightarrow 9x - 57 = x^2 - 8x + 15$
$\Rightarrow x^2 - 17x + 72 = 0$
$\Rightarrow (x - 8)(x - 9) = 0$
$\Rightarrow x = 8$ or 9

16. **CP of 1 lock = Rs. 34/8**
SP of 1 lock = Rs. 57/12
Gain = 57/12 – 34/8 = (114 – 102)/24 = 1/2
Gain percent = 100 × (1/2)/(34/8) = 400/34 = 11.76%

17. **Area of rhombus = $0.5*d_1*d_2$ (d1, d2 are the length of the diagonals)**
$\Rightarrow 120 = 0.5*d_1*d_2$
$\Rightarrow d_2 = 10$(as d1 = 24)
=> Now AC = 24, Therefore AO=12
=> BD = 10, Therefore BO = 5
=> In right angled triangle AOB

$\Rightarrow AO^2 + BO^2 = AB^2$

$\Rightarrow 12^2 + 5^2 = AB^2$

$\Rightarrow AB = 13$

18. **In a ΔABC,**

$AB^2 + AC^2 = BC^2$ ...(i)

ΔABC is a right angled triangle and

$\angle BAC = 90°$

And $BC = \sqrt{2}\, AB$ ...(ii)

From eqs. (i) and (ii),

$AB^2 + AC^2 = 2AB^2$

$\Rightarrow AC^2 = AB^2 \Rightarrow AC = AB$

$\Rightarrow \Delta ABC$ is an isosceles triangle.

Hence, $\angle ABC = \angle ACB = 45°$

19. **Sum of the temperature for the first three days = 22 * 3 = 66°C**

Sum of the temperature for the next three days = 24 * 3 = 72°C

Total temperature for the whole week = 23.5 * 7 = 164.5°C

Last day temperature = (164.5 – 66 – 72)° = 26.5°C

20. **Total number of employees in the year is 1999 = 345,**

2000 = 442

2001 = 708

2002 = 750

2003 = 821

2004 = 825

Clearly figure of 2001 is more than the double figure of the year 1999

21. **The required percentage:**

1999 = 150/345 × 100 = 43.48%

2000 = 225/442 × 100 = 50.90%

2001 = 450/708 × 100 = 63.56%

2002 = 470/750 × 100 = 62.67%

2003 = 500/821 × 100 = 60.90%

2004 = 505/825 × 100 = 61.21 %

Clearly the number of employees working in the production department exceeds 60% of the total strength in the year 2001,2002, 2003 and 2004

22. **Total number of employees in corporate department = 50 + 45 + 30 + 32 + 35 + 40 = 232**

Total number of employees in marketing department = 25 + 40 + 65 + 73 + 80 + 75 = 358

Required % = 232/358 × 100 = 64.80%

23. **As can be seen, only marketing department had less than 10% of the employees through all the years.**

24. $\tan A = \dfrac{1-\cos B}{\sin B} = \dfrac{2\sin^2(B/2)}{2\sin(B/2)\cos(B/2)} = \dfrac{\sin(B/2)}{\cos(B/2)}$

= tan (B/2)

So, A = B/2 and 2A = B

so tan(2A) = tanB

25. **Let 7 years ago, ages of P and Q are 4x and 5x,**

(4x + 7 + 7)/(5x + 7 + 7) = 5/6

24x + 84 = 25x + 70

x = 14

Hence, Q's present age = 5*14 + 7 = 77yr