Practice Set-1 Solution

1. Initial amount of sugar in the solution = 45% of 500 gm = (0.45 × 500) = 225 gm

Let's assume 'x' gm sugar added in order to have 60% solution.

Hence according to the question, ((225 + x)/(500 + x))*100 = 60

=> 225 + x = 0.6(500 + x)

=> 225 + x = 300 + 0.6x

=> 0.4x = 75

=> x = 187.5gm

2. Total such numbers = Numbers divisible by 5 + Numbers divisible by 17 – Numbers divisible by 85

Numbers from 35 to 289 (including both these numbers) which are divisible by 5 =35, 40, 45,....., 285

n = [(285 – 35)/5] + 1 =51

Numbers from 35 to 289 (including both these numbers) which are divisible by 17 =51, 68, 85,....., 289

n = [(289 – 51)/17] + 1 =15

Numbers from 35 to 289 (including both these numbers) which are divisible by 85 = 85,170, 255 = 3

Total numbers from 35 to 289 (including both these numbers) which are divisible by 5 or 17 = 51 + 15 – 3 = 63

3. A polynomial is divisible by x – 3 if its value is zero for x = 3

From option (1)

$4x^3 - 6x^2 - 7x - 5 = 4(3)^3 - 6(3)^2 - 7(3) - 5$

$= 108 - 54 - 21 - 5 = 28$

From option (2)

$2x^3 - 3x^2 - 4x - 9 = 2(3)^3 - 3(3)^2 - 4(3) - 9$

$= 54 - 27 - 12 - 9 = 6$

From option (3)

$x^4 - 8x^2 - x - 7 = (3)^4 - 8(3)^2 - (3) - 7$

$= 81 - 72 - 3 - 7 = -1$

From option (4)

$3x^3 - 6x^2 - 5x - 12 = 3(3)^3 - 6(3)^2 - 5(3) - 12$

$= 81 - 54 - 15 - 12 = 0$

4. $2x - 1/5x = 5 \Rightarrow 10x^2 - 1 = 25x$. [$x \neq 0$]

Now, $1000x^6 - 1 = (10x^2)^3 - 1^3 = (10x^2 - 1)(100x^4 + 10x^2 + 1)$

$= 25x((10x^2)^2 - 2 \times 10x^2 \times 1 + 1^2 + 30x^2)$

$= 25x((10x^2 - 1)2 + 30x^2)$

$= 25x((25x)^2 + 30x^2)$

$= 25x(625x^2 + 30x^2)$

$= 25 \times 655x^3$

$\therefore (1000x^6 - 1)/25x^3 = (25 \times 655x^3)/25x^3 = 655$

5. Length of roll = circumference of cylinder

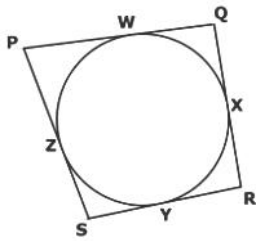
$2\pi r = 66$

$\Rightarrow r = 66 \times 7/(22 \times 2) = 10.5$ cm

Volume of the cylinder = $\pi r^2 h = 22/7 \times 10.5 \times 10.5 \times 25$

$= 8662.5$ cm≥

6. Let W, X, Y and Z be the points at which PQ, QR, RS and SP touch the circle respectively.



PZ = PW = p

SZ = SY = q

QR = QX = r

RX = RY = s

PQ + RS = p + r + s + q = a + b

PS + QR = p + q + r + s = a + b

7. $\sin(90 - (30 - \theta)) - \cos(30 - \theta)$

$= \cos(30 - \theta) - \cos(30 - \theta) = 0$

8. $[\sqrt{x} - (1/\sqrt{x})]^2 = x + 1/x - 2$

$= 5 + 2\sqrt{6} - 2 + 1/(5 + 2\sqrt{6})$

$= 3 + 2\sqrt{6} + (5 - 2\sqrt{6})/(5 - 2\sqrt{6})(5 + 2\sqrt{6})$

$= 3 + 2\sqrt{6} + (5 - 2\sqrt{6})/(25 - 24)$

$= 3 + 2\sqrt{6} + 5 - 2\sqrt{6} = 8$

$\sqrt{x} - (1/\sqrt{x}) = \sqrt{8} = 2\sqrt{2}$

9. Ratish types 24/3 = 8 pages per hour

Shamik types 45/9 = 5 pages per hour

Together they can type 8 + 5 = 13 pages per hour.

So together they will take 351/13 × 1 = 27 hours.

10. $p^2 - 3p + 2 = 0$

$p^2 - 2p - p + 2 = 0$

$p(p - 2) - 1(p - 2) = 0$

$(p - 2)(p - 1) = 0$

p = 2,1

Then, for p = 2, $p^2 - p = 4 - 2 = 2$

and for p = 1, $p^2 - p = 1 - 1 = 0$

11. Let the cost price per gram be Re 1.

CP of 950gm = Rs 950.

SP of 950 gm = CP of 1000 gm = Rs 1000

$\because$ x = 1000 gm and y = 950 gm

Gain percentage = 100 × (1000 – 950)/950 = 100/19%

12. Let the length of the parallel sides be 5L and 7L.

Area = 1/2 (a + b) × h

336 = 1/2 (5L + 7L) × 14

L = 336 × 2/(12 × 14) = 4

Hence, length of required side = 5 × 4 = 20 cm

13. $\tan 1° \tan 2° \tan 3° .... \tan 89°$

$= \tan(90° - 89°)\tan(90° - 88°).....\tan 88° \tan 89°$

$= \cot 89° \cot 88° ... \tan 45° ... \tan 88° \tan 89°$

Since $\cot 89 = 1/\tan 89$, $\cot 89 \times \tan 89 = 1$.

Similarly, $\cot 88 \times \tan 2 = 1$,... $\cot 46 \times \tan 44 = 1$

So, the product = $1 \times \tan 45 = 1$

14. Total age of 35 students of the class = 16 × 35 – 560

Total age of 21 students = 21 × 14= 294

Total age of the remaining 14 students = 560 – 294 = 266
Hence, average age of these 14 students = 266/14 = 19

15. **(100 + G)/(100 + x) = true weight/ false weight**
(100 + G)/110 = 1000/950
Or G = 15(15/19)%

16. **Let the sum be Rs. y.**
Simple interest incurred on Rs.y=(y × r × t)/100
= (y × 4 × 8)/100 = 32y/100
y – 32y/100 = 68y/100
When interest is 68y/100 less, the sum is Rs.y.
When sum is 3400 less, the sum is 340 * y/(68y/100)
= Rs. 5000

17. $(1/\sec^2 27°) + \cos^2 63° + \cot^2 27° - (1/(\cos^2 27° * \operatorname{cosec}^2 63°))$
$= \cos^2 27° + \cos^2 63° + \cot^2 27° - \sin^2 63°/\cos^2 27°$
$= \sin^2 63° + \cos^2 63° + \tan^2 63° - \sin^2 63°/\sin^2 63°$
$= 1 + \tan^2 63° - 1 = \tan^2 63° = \sec^2 63° - 1 = p^2 - 1$

18. **It is given that A : B = 2 : 3 and B : C = 5 : 8**
Combined ratio of A : B : C will be 10 : 15 : 24
Since A + B + C = 98
10x + 15x + 24x = 49x
x = 98/49 = 2
Therefore, A = 20
B = 30 and C = 48.

19. **Angle subtended by the diameter on any part of the circumference = 90°. So, ∠ABC = 90°**
Now, AB : BC = 3 : 4 and AB = 15 cm. So BC = 20cm
Using the Pythagoras Theorem,
$AC = \sqrt{(AB^2 + BC^2)} = \sqrt{(225 + 400)} = 25$ cm
Radius = AC/2 = 12.5 cm

20. **The relative speed of train is 64 – 54 = 10 Km/hr =10 × 5/18 = 25/9 m/s**
In 18 secs the total distance travelled is 18 × 25/9 = 50 m.
Therefore the length of each train is = 50/2 = 25 m.

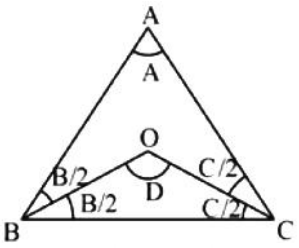
21. The required aggregate= 135 + 126 + 114 + 98 + 64 + 40 = 577

22. **The required marks:**
=123 + 140 + (96 × 150/120) + (110 × 150/120) + (77 × 150/100) + (46 × 150/50)
=123 + 140 + 120 + 137.5 + 115.5 + 138 = 774

23. **The total marks obtained by B = 101 + 133 + 82 + 105 + 92 + 36 = 549**
The total marks obtained by E = 95 + 125 + 87 + 108 + 61 + 42 = 518
Therefore, the required difference = (549 – 518) = 31

24. **Candidate B's percentage in Physics and Music = (82 + 36)/(50 + 120) × 100**
= 118/170 × 100 = 69.41%
Candidate D's percentage in Geography and English = (100 + 95)/(150 + 100) × 100
= 195/250 × 100 = 78%
The required difference = 78 – 69.41 = 8.59%

25.



∠ABC + ∠ACB + ∠BAC = 180°
=> ∠ABC + ∠ACB = 180° – ∠A
=> ∠ BOC + ∠OBC + ∠OCB = 180°
=> ∠ BOC + 1/2 (∠ ABC + ∠ACB) = 180°
=> ∠ BOC + 1/2(180° – ∠A) = 180°
=> ∠ BOC = 90° + 1/2 ∠A