

Solutions – Medium Test

1. (b) : Only possibility is if 1950 is divided by a multiple of 13, because the other glasses have a capacity that is not a multiple of 13.
Hence 1209 is the only choice.

Alternative method:

As the glasses filled by same fractions,

$$\frac{a}{750} = \frac{b}{1950} = \frac{c}{600} = \frac{a+b+c}{750+1950+600}$$

$$a+b+c=2046 \therefore \frac{b}{1950} = \frac{2046}{3300}$$

$$b = 1209 \text{ litres}$$

2. (a) : We can see that men, women & children are in the ratio = $\frac{12}{6}, \frac{15}{5}, \frac{16}{4}$, or 2: 3: 4. Number of men, women & children = 10, 15, 20. Now if each man gets $6a$, we have $10 \times 6a + 15 \times 5a + 20 \times 4a = 1720$ or $a = 8$. So, the answers are Rs. 48, 40, 32.

3. (d) : Total expenses = (35% of 7500) + 712 + 1880 + 272 + 400 + 75 = 6024
Total receipts = 7500 Total profit = 7500 – 6024 = 1476

$$\% \text{ profit} = \frac{1476}{6024} \times 100 = 24.5\%$$

4. (c) : Slope of given line = $-\frac{2}{3}$ perpendicular line has slope = $\frac{2}{3}$

Now $c = -3$ (given)

Putting in general equation $y = mx + c$

$$2y = 3x \Rightarrow 3x - 2y = 6$$

5. (a) : Let $A(4, 3)$, $B(6, -2)$, $C(-11, -3)$ be the vertices of triangle ABC .

$$AB^2 = (6-4)^2 + (-2-3)^2 = 29$$

$$BC^2 = (-11-6)^2 + [-3-(-2)]^2 = 290$$

$$AC^2 = (-11-4)^2 + [(-3-3)]^2 = 261$$

$$\text{As } AB^2 + AC^2 = BC^2$$

ABC is a right-angled triangle.

6. (b) : $ar^{10} \times ar^{17} \times ar^{19} = ar^{27} \times ar^4$

$$a^3 r^{46} = a^2 r^{31}$$

$$ar^{15} = 1$$

So, 16th term is 1.

7. (c) : Let R be the radius of the recast sphere

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi(3^3 + 4^3 + 5^3)$$

$$R^3 = 216 \Rightarrow R = 6$$

Total surface area of 3 spheres

$$= 4\pi(3^2 + 4^2 + 5^2) = 4\pi \cdot 50 = 200\pi \text{ cm}^2$$

$$\text{Surface area of the recast sphere} = 4\pi(6^2) = 144\pi$$

$$\% \text{ reduction in area} = \frac{(200\pi - 144\pi)}{200\pi} \cdot 100\% = 28\%$$

8. (c) : The distances covered by them are in the ratio 3:5 and difference is 30 m. This means
 $5x - 3x = 30$ or $2x = 30$ or $x = 15$ m
 Therefore, the total distance covered is equal to 120 m. Their speeds are also in the ratio 3 : 5.
 Since the speed of the first person is 6 m/s, the speed of the second person will be 10 m/s and he has to cover a distance of 45 m.

$$\text{Therefore time taken} = \frac{45}{10} = 4.5 \text{ seconds}$$

9. (d) :

	<i>A</i>	<i>B</i>
I	$5x$	$3x$
II	$4y$	$7y$

$$5x + 4y = 253 \quad \dots (1)$$

$$3x + 7y = 161 \quad \dots (2)$$

On solving equations (1) & (2), we get

$$x = 49 \text{ and } y = 2.$$

Hence, type I Alloy = 392 kg, and Type II Alloy = 22 kg

10. (b) : $400 \text{ students} \times 80 \text{ days} = 240 \text{ students} \times d \text{ days}$

$$d = \frac{400}{3} = 133.33 \text{ days}$$

The food was to last 80 more days but now it is lasting 53.33 days more.

11. (d) : Discriminant $= (2\sqrt{5})^2 - 4(1)(3) = 20 - 12 = 8$

So, the roots are real and irrational.

12. (d) : If $D < 0$ roots are imaginary.

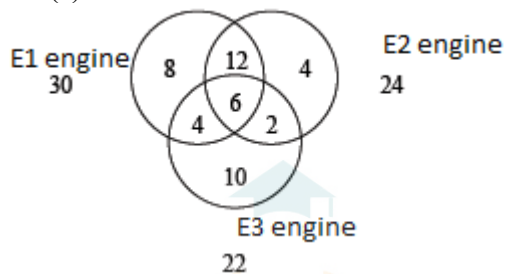
$$\text{i.e. } q^2 - 4pr < 0 \quad \text{P} \quad q^2 < 4pr$$

13. (a) : Capacity of the tube

$$\pi(1)^2(7 - 1) + \frac{2}{3}\pi(1)^3 = \frac{20}{3}\pi$$

14. (c) : Let $2P = 3Q = 4R = 5S = K$
 Then, $P = \frac{K}{2}, Q = \frac{K}{3}, R = \frac{K}{4}, S = \frac{K}{5}$
 $\frac{K}{2} + \frac{K}{3} + \frac{K}{4} + \frac{K}{5} = 1540$
 $K = 1200$
 Therefore, $R = 300, S = 240$
 Difference = $300 - 240 = 60$

15. (a) :



So, cars which have atleast one options
 $= 8 + 4 + 10 + 12 + 2 + 4 + 6 = 46$
 Hence, cars with no option = $50 - 46 = 4$

16. (c) : $100!$ has 24 zeroes.
 $100! + 200! = 100! [1 + 101 \times 102 \times \dots \times 200]$
 Which will again give 24 zeroes at the end.

17. (a) : $f(x) = x - x^2 + 1$
 $g(x) = x^2 + b + 3$
 $f(2)g(1) < 0$
 $(a - 4 + 1)(1 + 6 + 3) < 0$
 $(a - 3)(b + 4) < 0$
18. (b) : Let $f(x) = px^2 + qx + k$, where p, q and k are integers, and $p \neq 0$
 $\therefore f(0) = k = 1$
 $\therefore f(x) = px^2 + qx + 1$
 $= px^2 + qx + k$ (Differentiate both sides with respect to x)
 $\therefore f'(x) = 2px + q$
 For maxima or minima $f'(x) = 0, x = -\frac{q}{2p}$
 $f(x)$ attains maximum at $x = 1$
 $\therefore q = -2p$
 $f(1) = p + q + 1 = 3$

$$\begin{aligned}
\therefore 1 - p &= 3 \\
\therefore p &= -2 \\
\therefore q &= 4 \\
\therefore f(x) &= -2x^2 + 4x + 1 \\
f(10) &= -200 + 40 + 1 = -159
\end{aligned}$$

19. (d) : Let A and B work for m days and C for n days to complete the work. Therefore,

$$\frac{m}{15} + \frac{m}{20} + \frac{n}{30} = 1 \quad \dots (1)$$

Out of the total of Rs. 18000, B gets Rs. 6000 more than C .

$$\text{i.e., } \frac{m}{20} - \frac{n}{30} = \frac{6000}{18000} = \frac{1}{3} \quad \dots (2)$$

On adding Eqs. (1) and (2), we get

$$\frac{m}{15} + \frac{2m}{20} = \frac{4}{5} \Rightarrow m = 8$$

20. (c) : Total number of passenger is the Rajdhani Express = $10 \times 20 = 200$

So, in the 9 boggies the minimum number of total passengers = $12 + 13 + 14 + 15 + 16 + 17 + 18 + 19 + 20 = 144$

Hence, the minimum number of passenger in one boggie can be $(200 - 144) = 56$

