Solutions – Medium Test

١. (b) : Only possibility is if ١٩٥٠ is divided by a multiple of ١٣، because the other glasses have a capacity that is not a multiple of ١٣.
Hence ١٢٠٩ is the only choice.

Alternative method:
As the glasses filled by same fractions،

$$\frac{a}{٧٥٠} = \frac{b}{١٩٥٠} = \frac{c}{٦٠٠} = \frac{a + b + c}{٧٥٠ + ١٩٥٠ + ٦٠٠}$$

$a + b + c = ٢٠٤٦ \quad \therefore \frac{b}{١٩٥٠} = \frac{٢٠٤٦}{٣٣٠٠}$

b = ١٢٠٩ litres

٢. (a) : We can see that men، women & children are in the ratio $\frac{١٢}{٦}، \frac{١٥}{٥}، \frac{١٦}{٤}$ or ٢ : ٣ : ٤. Number of men، women & children = ١٠، ١٥، ٢٠. Now if each man gets ٦a، we have ١٠ × ٦a + ١٥ × ٥a + ٢٠ × ٤a = ١٧٢٠ or a = ٨. So، the answers are Rs. ٤٨، ٤٠، ٣٢.

٣. (d) : Total expenses = (٣٥٪ of ٧٥٠٠) + ٧١٢ + ١٨٨٠ + ٢٧٢ + ٤٠٠ + ٧٥ = ٦٠٢٤
Total receipts = ٧٥٠٠ Total profit = ٧٥٠٠ − ٦٠٢٤ = ١٤٧٦

$٪ \text{ profit} = \left(\frac{١٤٧٦}{٦٠٢٤}\right) \times ١٠٠ = ٢٤.٥٪$

٤. (c) : Slope of given line = $-\frac{٢}{٣}$ perpendicular line has slope = $\frac{٢}{٣}$

Now c = −٣ (given)

Putting in general equation y = mx + c
٢y = ٣x ⇒ ٣x − ٢y = ٦

٥. (a) : Let A(٤ ، ٣)، B(٦، −٢)، C(−١١، −٣) be the vertices of triangle ABC
AB٢ = (٦ − ٤)٢ + (−٢ −٣)٢ = ٢٩
BC٢ = (−١١ −٦)٢ + (−٣ − (−٢))٢ = ٢٩٠
AC٢ = (−١١ −٤)٢ + (−٣ −٣)٢ = ٢٦١
As AB٢ + AC٢ = BC٢
ABC is a right-angled triangle.

٦. (b) : ar١٠ × ar١٧ × ar١٩ = ar٢٧ × ar٤
a٣r٤٦ = a٢r٣١
ar١٥ = ١
So، ١٦th term is ١.

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

$\frac{٤}{٣}pR^{٣} = \frac{٤}{٣}p(٣^٣ + ٤^٣ + ٥^٣)$
$R^٣ = ٢١٦ \Rightarrow R = ٦$
Total surface area of ٣ spheres
$= ٤p(٣^٢ + ٤^٢ + ٥^٢) = 4p \times ٥٠ = ٢٠٠p \, cm^٢$
Surface area of the recast sphere $= ٤\pi(٦^٢) = ١٤٤\pi$

٪reduction in area $= \frac{(٢٠٠p - ١٤٤p)}{٢٠٠p} \times ١٠٠٪ = ٢٨٪$

٨. (c) : The distances covered by them are in the ratio ٣ : ٥ and difference is ٣٠ m. This means ٥x − ٣x = ٣٠ or ٢x = ٣٠ or x = ١٥ m Therefore، the total distance covered is equal to ١٢٠ m. Their speeds are also in the ratio ٣ : ٥. Since the speed of the first person is ٦ m/s، the speed of the second person will be ١٠ m/s and he has to cover a distance of ٤٥ m.

Therefore time taken $= \frac{٤٥}{١٠} = ٤.٥$ seconds

٩. (d) :

	A	B
I	٥x	٣x
II	٤y	٧y

٥x + ٤y = ٢٥٣ ..... (١)
٣x + ٧y = ١٦١ ..... (٢)
On solving equations (١) & (٢)، we get
x = ٤٩ and y = ٢.
Hence، type I Alloy = ٣٩٢ kg، and Type II Alloy = ٢٢ kg

١٠. (b) : ٤٠٠ students × ٨٠ days = ٢٤٠ students × d days
$d = \frac{٤٠٠}{٣} = ١٣٣.٣٣$ days
The food was to last ٨٠ more days but now it is lasting ٥٣.٣٣ days more.

١١. (d) : Discriminant $= (٢\sqrt{٥})^٢ - ٤(١)(٣) = ٢٠ - ١٢ = ٨$
So، the roots are real and irrational.

١٢. (d) : If D < ٠ roots are imaginary.
i.e. $q^٢ - ٤pr < ٠ \Rightarrow q^٢ < ٤pr$

١٣. (a) : Capacity of the tube
$p(١)^٢(٧ - ١) + \frac{٢}{٣}p(١)^٣ = \frac{٢٠}{٣}p$

١٤. (c) : Let ٢P = ٣Q = ٤R = ٥S = K

Then، P = $\frac{K}{٢}$ ، Q = $\frac{K}{٣}$ ، R = $\frac{K}{٤}$ ، S = $\frac{K}{٥}$

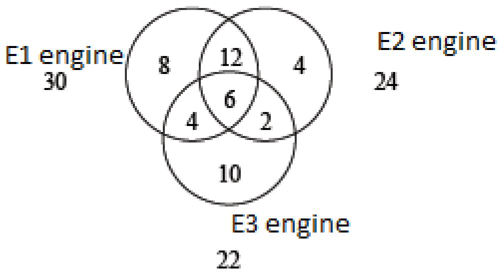
$\frac{K}{٢} + \frac{K}{٣} + = \frac{K}{٤} + \frac{K}{٥} =$ ١٥٤٠

K=١٢٠٠

Therefore. R = ٣٠٠ ، S = ٢٤٠

Difference=٣٠٠ − ٢٤٠ = ٦٠

١٥. (a):



So، cars which have atleast one options
= ٨ + ٤ + ١٠ + ١٢ + ٢ + ٤ + ٦ = ٤٦
Hence، cars with no option = ٥٠ − ٤٦ = ٤

١٦. (c) : ١٠٠! has ٢٤ zeroes.
١٠٠! + ٢٠٠! = ١٠٠! ﵁١ + ١٠١ × ١٠٢ × ... × ٢٠٠ﷺ
Which will again give ٢٤ zeroes at the end.

١٧. (a) : f(x) = x − x٢ + ١
g(x) = x٢ + b + ٣
f(٢) g(١) > ٠
(a − ٤ + ١) (١ + ٦ + ٣) > ٠
(a − ٣) (b + ٤) > ٠

١٨. (b) : Let f(x) = px٢ + qx + k، where p، q and k are integers، and p ≠
∴ f(٠) = k = ١
∴ f(x) = px٢ + qx + ١
= px٢ +qx + k (Differentiate both sides with respect to x)
∴ f'(x) = ٢px + q
For maxima or minima f'(x) = ٠، x = $\frac{-q}{٢p}$
f(x) attains maximum at x = ١
∴ q = − ٢p
f(١) = p + q + ١ = ٣

∴ ١ − p = ٣
∴ p = − ٢
∴ q = ٤
∴ f(x) = − ٢x٢ + ٤x + ١
f(١٠) = − ٢٠٠ + ٤٠ + ١ = − ١٥٩

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

$$\frac{m}{١٥} + \frac{m}{٢٠} + \frac{n}{٣٠} = ١ \quad \text{.....(١)}$$

Out of the total of Rs. ١٨٠٠٠، B gets Rs. ٦٠٠٠ more than C.

i.e.، $\frac{m}{٢٠} - \frac{n}{٣٠} = \frac{٦٠٠٠}{١٨٠٠٠} = \frac{١}{٣} \quad \text{.....(٢)}$

On adding Eqs. (١) and (٢)، we get

$$\frac{m}{١٥} + \frac{٢m}{٢٠} = \frac{٤}{٥} \Rightarrow m = ٨$$

٢٠. (c): Total numberofpassenger is the Rajdhani Express = ١٠ × ٢٠ = ٢٠٠
So، inthe ٩ boggiesthe minimum number of total passengers = ١٢ + ١٣ + ١٤ + ١٥ + ١٦ + ١٧ + ١٨ + ١٩ + ٢٠ = ١٤٤
Hence، the minimumnumber of passenger in one boggie can be (٢٠٠ − ١٤٤) = ٥٦