Simple Equations - Solution

Data Sufficiency

1)

What is the value of x if x and y are consecutive positive even integers

Statement 1)

(x-y) X 2 =4

- ⇨ x-y=2

Which is anyways true since x and y are consecutive positive even integers

Two unknowns one equation

Therefore statement 1) alone cannot determine x and y

Statement 2)

(x+y) X 2 < 100

- ⇨ x + y < 50

Let x=2a

- ⇨ y=2a + 2
- ⇨ 2a + 2a + 2< 50
- ⇨ 4a + 2 < 50
- ⇨ a < 12

This again does not uniquely finds x since 'a' cannot be between 1 and 11

Therefore statement 2) alone cannot determine x and y

Since statement 1 did not provide any additional information while statement 2 cannot answer the question therefore both statements together cannot answer the question

Hence choice (d)

2)

What is profit percentage?

Statement 1)

Let C.P. = x

Therefore x=80% of S.P.

- ⇨ 0.8 S.P. = x
- ⇨ S.P. = x/0.8
- ⇨ S.P. = 1.25 x

Therefore Profit = 1.25x –x

- ⇨ Profit = 0.25x
- ⇨ Profit % = $\frac{0.25x}{x}$ X 100
- ⇨ Profit % = 25%

Therefore statement 1 alone can answer the question

Hence choice (a)

3)

What is the price of Banana

Statement 1)

Let price of banana= b

Let price of orange= o

Therefore 14b + 35o=84

Therefore statement 1 cannot find the price of Banana uniquely

Statement 2)

Let price of banana=b

If price is reduced by 50% i.e. ½ b

Then new price becomes 0.5b

1 banana in Rs. $\frac{12}{48} = \frac{1}{4}$ at price 0.5b

Therefore 0.5b= $\frac{1}{4}$

Therefore b = $\frac{1}{2}$

Therefore price of banana = Rs. ½

Hence can be answered by statement 2 alone

Hence choice (b)

4) How old is Sachin in 1997 ?

Statement 1)

Anil's age is prime number in 1998 and Sachin is 11 years younger to him

Since there can be multiple prime numbers therefore Anil's age cannot be uniquely determined hence Sachin's age is also not possible to tell

Therefore Sachin's age cannot be answered uniquely by statement 1

Statement 2)

Anil's age was prime number in 1996

Since there is no data regarding Sachin's age therefore statement 2 alone is not enough to answer the question

Using statement 1) and statement 2) together

We get the data that Anil's age was a prime number in both 1996 and 1998, hence Anil's age in 1996 and 1998 is pair of continuous primes like 11,13 or 17,19 or 29,31 etc. Therefore its not possible to find Anil's age uniquely and hence not possible to find Sachin's age uniquely too using statement 1 and statement 2

Choice (d)

5) What is the value of x and y

Statement 1)

$3x + 2y=45$

Two unknowns one equation

Therefore statement 1) alone cannot determine x and y

Statement 2)

$10.5x + 7y=157.5$

Two unknowns one equation

Therefore statement 2) alone cannot determine x and y

Taking Statement 1) and Statement 2) Together

3x + 2y=45 ------------------------------(1)

10.5x + 7y=157.5 ----------------------(2)

On dividing eqn (2) by 3.5 we get

3x + 2y=45, which is equivalent to eqn (1)

eqn (1) and eqn (2) are equivalent hence

we cannot find x and y using statement 1 and statement 2

choice (d)

6) What is the speed of car?

Statement 1)

Let speed of car = c

Let speed of motorcycle=m

Given: c-m=10

Two unknowns one equation

Therefore statement 1) alone cannot determine c

Statement 2)

Let speed of car = c

Let speed of motorcycle=m

Given: Distance travelled = 100 km

Therefore Time taken by car = 100/c

Time taken by motorcycle = 100/m

Given: Motorcycle takes two hours more than car

- ⇨ $\frac{100}{m}-\frac{100}{c}=2$
- ⇨ $\frac{1}{m}-\frac{1}{c}=\frac{2}{100}$

Two unknowns one equation

Therefore statement 2) alone cannot determine c

Using statement 1) and statement 2) together

c-m=10 ---------------------(1)

$\frac{1}{m}-\frac{1}{c}=\frac{2}{100}$ ---------------------(2)

Two equations two unknowns therefore m and c can be found using statement 1 and statement 2

Hence choice (c)

7)

What is the cost price of the chair?

Statement 1)

Let the C.P. of the chair = x

Given Profit on chair = 15 %

- ⇨ S.P. of chair = x + x X $\frac{15}{100}$ (S.P. = C.P. + Profit)
- ⇨ S.P. of chair = x + 0.15x
- ⇨ S.P. of chair = 1.15x

Let the C.P. of the table = y

Given Profit on table = 20 %

- ⇨ S.P. of table = y + y X $\frac{20}{100}$ (S.P. = C.P. + Profit)
- ⇨ S.P. of table = y + 0.2y
- ⇨ S.P. of table = 1.2y

Statement 1 gives us no additional information so statement 1 alone cannot find the cost of chair

Statement 2)

Let the C.P. of the chair = x

Given Increase in C.P. = 10%

⇨ New C.P. of chair = x + $\frac{10}{100}$ x

⇨ New C.P. of chair = 1.1 x

Let the C.P. of the table = y

Given Increase in C.P. = 20%

⇨ New C.P. of table = y + $\frac{20}{100}$ y

⇨ New C.P. of table = 1.2 y

Given Decrease in profit = Rs. 20

Decrease in profit is due to increase in C.P.

⇨ Decrease in profit=Increase in C.P.

⇨ 20 = 0.1x + 0.2 y

The above equation has two unknowns but one equation only so statement 2 alone cannot answer the question

Lets combine statement 1 and statement 2 and we get

Old profit = 0.15 x + 0.2y

Decrease in profit = 20 = 0.1x + 0.2y

Again we just have one equation

i.e. 0.1x + 0.2 y =20

We do have old profit = 0.15x + 0.2y but we don’t have anything to equate it to

Therefore again only one equation with two unknowns

Hence statement 1 and statement 2 together are not sufficient to answer our question

Choice (d)

<u>Level 1</u>

1)

Let Length =L

Breadth= B

Height = H

Given: L:B:H= 3:2:1

Lets take

L=3x

B=2x

H=x

Area of 4 Walls=2H(L+B)

= 2x(3x + 2x)

$10x^2$

Now Length is doubled

Therefore new L=3x X 2

=6x

Now Breadth is halved

Therefore new B=2x/2

=x

Now height is halved

Therefore new H=x/2

Therefor Area of 4 Walls=2H(L+B)

= (2x/2) (6x + x)

= $7x^2$

Decrease In Area= $10x^2 - 7x^2$

=$3x^2$

Therefore Decrease In Percentage= (Decrease In Area/Total Area) X100

= $(3x^2/10x^2)$ X 100

= 30 %

Therefore 30 % Decrease- choice (e)

2)

Given: Total Calls To Attend= 1000

Male Operators Calls Per Day = 40

Female Operators Calls Per Day = 50

Male Operator Charges = 250 + 15 X Calls Per Day

= 250 + 15 X 40

= 850

Male Operator Charges = 300 + 10 X Calls Per Day

= 300 + 10 X 50

= 800

We Can Clearly see from above that Female Operator (50 calls for Rs. 800) is more effective than male Operator (40 calls for Rs. 850)

Therefore I would like to employ as many female operators as possible

But Maximum Female Employees available= 12

On Employing All Of Them Number of Calls they attend = 12 X 50 = 600

Number of Calls to be attended In a day = 1000

Therefore remaining calls to be attended by non female operators= 1000-600

=400

For 400 Calls I need male operators

1 male operator 40 Calls

For 400 Calls I need (400/40)=10 male operators

Choice (d)

3)

On January 1

S1 has n members

S2 has n members

At End of 1 Month i.e. On 1st Day of next Month S1 adds b members

Therefore On February 1st S1 has n+b members

By July 2nd 6 Months have passed

Therefore S1 had n + 6b members

At End of 1 Month i.e. On 1st Day of next Month S2 multiplies r members

Therefore On February 1st S1 has nr members

By July 2nd 6 Months have passed

Therefore S1 had nr^6 members

If b= 10.5n , S1 has n+10.5n members

By July 2nd 6 Months have passed

Therefore S1 had n + 6X10.5n=64n members

Since S1 and S2 have same number of members by July 2

Therefore $nr^6=64n$

Therefore $r= \sqrt[6]{64}$

Therefore r= 2.0

Choice (a)

4)

Let total number of gold coins with merchant be x

Now x is divided in two unequal numbers. Let those unequal numbers be a and b

Therefore a+b=x

Also given

$48(a-b)=a^2-b^2$

Therefore a+b=48

Therefore Merchant had 48 Gold Coins

Choice (d)

5)

Lets look at the diagram of string below

|---------long Piece-----------|---middle piece---|-Short piece-|

|----------------------------------40cm-----------------------------|

Let the size of longest piece = x

the size of middle piece = y

the size of shortest piece = z

x+y+z=40-----------------------(1)

Also form the question x=3y ----------(2)

And x-23=z-------------------(3)

Substituting y and z in terms of x in equation (1) we get

x + x/3 + x-23=40

- ⇨ 7x/3=63
- ⇨ X=27

Therefore x= 27 cm Therefore z= x-23=4 cm

Choice (c)

6)

Let the amounts paid by Mayank, Mirza, Little and Jaspal be Ma, Mi , Li and Ja Respectively

Therefore Ma + Mi + Li + Ja=60 ------------(1)

Mayank paid one half of the sum of the amounts paid by the other boys

Therefore Ma= (Mi + Li + Ja)/2

Therefore 2Ma = Mi + Li + Ja -------------(2)

Substituting Mi + Li + Ja=2Ma in (1) we get

Ma + 2Ma=60

Therefore 3Ma=60

Therefore Ma=20

Similarly for Mirza who paid one third of the sum of the amounts paid by the other boys

3Mi = Ma + Li + Ja-------(3)

By (1) and (3)

Mi=15

Same way for Little who paid one fourth of the sum of the amounts paid by the other boys

4Li = Ma + Mi + Ja-----------(4)

By (1) and (4)

Li=12

Therefore Ja= 60 – Mi – Ma – Li

Therefore Ja= 60 -15-20-12=13$

Choice (b)

7)

There are two ways to solve this problem

First Method: (Conventional Long Method)

Lets assume thief has x diamonds at the start

Therefor he gives away (x/2) + 2 diamonds to the first watchman

Therefore Diamonds Left with him = x – ((x/2) + 2)

= (x/2) – 2

He gives away $\frac{(x/2) - 2)}{2} + 2$ diamonds to the Second watchman

Therefore he has ((x/2) – 2) – ($\frac{(x/2) - 2)}{2} + 2$)

= (x/4) -1 -2

= (x/4) – 3 diamonds left with him

He gives away $\frac{(x/4-3)}{2}+2$ diamonds to the Third watchman

Therefore he has (x/4) – 3 – ($\frac{(x/4-3)}{2}+2$) diamonds left with him

Therefore he has (x/8) – 3/2 – 2 diamonds left in the end

(x/8) – 3/2 – 2=1

Therefore (x/8) = 9/2

Therefore x = 36

The above solution was long because we were doing operations on an unknown entity ‘x’. the solution can become short if we operate on known quantity. Which is demonstrated in

Second Method(Short Cut Method)

He has 1 diamond left with him. Before giving 2 extra diamonds to thief he had 1+2=3 diamonds with him. He has given half the diamonds he had to watchman. So he had 3X2= 6 diamonds with him before meeting the third watchman

Similarly he had (6+2) X 2=16 diamond before meeting 2nd Watchman.

Similarly number of diamonds before meeting 1st watchman (16+2) X 2=36

Choice (b)

8)

In Anitha’s multiplication first multiplier=35

Second multiplier is unknown so lets take x

Product was supposed to be 35x

Instead the product is 53x

Difference in product because of error= 53x – 35x

= 18x

Given: Difference=540

Therefore 18x=540

Therefore x = 30

Therefore Actual Product = 53 x

= 53 X 30

= 1590 choice (d)

9)

Total Coins=300

Let number of 1 Rupee coins =x

Let number of 2 Rupee coins =y

Let number of 5 Rupee coins =z

Therefore x + y + z= = 300--------------(1)

Total Amount = Rs. 960

Therefore x + 2y + 5z = 960---------------(2)

Also on interchanging 1 rupee and 2 rupee coins total decreases by 40

Therefore 2x + y + 5z = 960-40

Therefore 2x + y + 5z = 920--------------------(3)

(2) – (1) gives

y + 4z = 660 ---------------------------------------(4)

(3) – two times (2) gives

3z-y=320 --(5)

(4) + (5) gives

7z=980

Therefore z=140 choice (b)

10)

Amount invested = Rs. 3000

Return Expected = 5%

Therefore Total Return Expected= 5% of 3000

$$= 3000 \text{ X } \frac{5}{100}$$

$$= 150$$

Lets assume he invests Rs. x more

Return expected for Rs. x = 8 % of x

= 8x/100

=2x/25

Therefore total amount invested = (3000 + x)

Total return expected = 150 + 2x/25

We want total return to be 6%

Therefore 150 + 2x/25 = 6% of (3000 + x)

Therefore 150 + 2x/25 = $\frac{6}{100}$ X (3000 + x)

Therefore $\frac{150X\,25+2x}{25}=\frac{6X\,(3000+x)}{4}$

Therefore 150 X 100 + 8 x = 18000 + 6x

Therefore 2x=3000

Therefore x=1500 choice (c)

11)

Let three consecutive even numbers be

2x(first number) , 2x+2(second number) and 2x+4(third number) where x is an integer

Now thrice the first number i.e. 3 X 2x exceeds double the third i.e. 2 X (2x+4) by 2

Therefore 3X2x = 2 X (2x+4) + 2

Therefore 6x = 4x + 8 + 2

Therefore 6x = 4x + 8 + 2

Therefore 2x=10

Therefore Third number is 2x + 4 = 10 + 4=14 choice (b)

12)

Let two positive integers be x and y

Since difference between them is 4

Therefore x-y=4 -------------------------(1)

Another thing they have said is that sum of their reciprocals is 10/21

Reciprocal of x =1/x

Reciprocal of y =1/y

Therefore $\frac{1}{x}+\frac{1}{y}=\frac{10}{21}$ -----------------------(2)

Putting x= 4 + y from equation (1) we get

$$\frac{1}{4+y}+\frac{1}{y}=\frac{10}{21}$$

Therefore $\frac{y+4+y}{(y)(4+y)}=\frac{10}{21}$

Therefore $\frac{4+2y}{(y)(4+y)}=\frac{10}{21}$

Therefore 84 + 42y = 10 (4y + y^2)

Therefore 10y^2 – 2y -84=0

- ⇨ 10y^2 -30y + 28y -84=0
- ⇨ 10y(y-3) + 28(y-3)=0
- ⇨ (10y+28)(y-3)=0
- ⇨ y=-28/10, y=3

Since y is positive integer therefore y=3

Choice (a)

13)

Let total number of basketball matches= x

So far team has won 17 matches and lost 3

Therefore total matches played= 17+3=20

From the question we have

$$\frac{2}{3}x = 20$$

- ⇨ x=30

If team has to win more than ¾ of the 30 matches

Therefore number of matches required to win > ¾ X 30

>22.5

Since number of matched required to win cannot be a decimal value therefore team requires to win minimum 23 matches to satisfy the condition

More matches to be won = 23 -17=6

Matches remaining = 30-20=10

Therefore maximum number of matches team can afford to lose = 10-6

= 4

choice (a)

14)

Let price of one car = x

Let number of cars sold = y

- ⇨ Total revenue of company = price of one car X number of cars sold
- ⇨ Total revenue of company = x X y
- ⇨ Total revenue of company = xy

Price of car increases by 30%

There for new Price of Car = x + 30% of x

- ⇨ new Price of Car = x + $\frac{30}{100}$x
- ⇨ new Price of Car = x + 0.3x

- ⇨ new Price of Car = 1.3x

New Sales of car = y – 20% of y

- ⇨ New Sales of car = y – 0.2 y
- ⇨ New Sales of car = 0.8y

Therefore Total Revenue of Company after the changes = 1.3x X 0.8y

- ⇨ Total Revenue of Company after the changes = 1.04xy

Difference in revenue before and after the changes = 1.04xy – xy

- ⇨ Difference in revenue before and after the changes = 0.04xy

Therefore Percentage change = (0.04xy/xy) X 100

- ⇨ Percentage change = +4 % choice (a)

15)

Let the number be x

Difference between (7/8) x and (7/18)x is 770

Therefore $\frac{7}{8}x - \frac{7}{18}x = 770$

- ⇨ 7x($\frac{1}{8}x - \frac{1}{18}x$) = 770
- ⇨ 7x($\frac{9-4}{72}$)=770
- ⇨ $\frac{35}{72}x = 770$
- ⇨ X=1584 choice (a)

16)

Average Marks = 80

Number of papers= 10

Therefore Total Marks= Average Marks X Number of Papers

- ⇨ Total Marks = 80 X 10
- ⇨ Total Marks = 800

Given: If the highest and lowest score are not considered, the average is 81

Also highest score = 92

But the problem is that its not given that subject with highest score is unique, so there can be multiple subjects in which he scored 92, therefore we don't know that average is 81 after removing how many subjects hence the lowest score cannot be determined, since it will vary depending upon number of subjects he got 92, hence answer cannot be determined

Choice (d)

17)

Man earns x % on Rs. 2000

- ⇨ Amount earned on Rs. 2000 = 2000 X x/100
- ⇨ Amount earned on Rs. 2000 = 20x

Amount earned on rest of the income = y %

Let total income of the man = T

- ⇨ Rest of the income of the man other than Rs. 2000 = T -2000

Therefore Amount earned on rest of the income = (T-2000) X $\frac{y}{100}$

Given that he earns Rs. 700 from income of Rs. 4000

- ⇨ Total Amount Earned=700= 20x + ((T-2000) X $\frac{y}{100}$)
- ⇨ 700= 20x + ((4000-2000) X $\frac{y}{100}$)
- ⇨ 700= 20x + (2000 X $\frac{y}{100}$)
- ⇨ 700= 20x + 20y -------------------------(1)

Given that he earns Rs. 900 from income of Rs. 5000

- ⇨ Total Amount Earned=900= 20x + ((T-2000) X $\frac{y}{100}$)
- ⇨ 900= 20x + ((5000-2000) X $\frac{y}{100}$)

- ⇨ $900= 20x + (3000 \text{ X } \frac{y}{100})$
- ⇨ 900= 20x + 30y -------------------------(2)

Solving (1) and (2) we get x=15% choice (a)

18)

Given: P,Q,R are three consecutive odd numbers in ascending order

An odd number can be taken as 2n-1 with

n= 1,2,3,4,…………… ∞

Our three consecutive odd numbers can be taken as

2n-1

2n-1 + 2

2n-1+2+2

i.e. 2n-1, 2n+1, 2n+3

- ⇨ P=2n-1
- ⇨ Q=2n+1
- ⇨ R=2n+3

Given that 3 times P is 3 less than 2 times R

- ⇨ 3(2n-1)=2(2n+3)-3
- ⇨ 6n-3=4n+6-3
- ⇨ 2n=6
- ⇨ n=3
- ⇨ R=2n+3
- ⇨ R=2X3+3
- ⇨ R=9 choice (c)

19)

Given:

Yearly payment of Servant = Rs. 90 + Turban

Let the cost of turban be T

- ⇨ Yearly payment = 90 + T

Servant left after 9 months. Therefore he is eligible for 9/12 of the total payment

- ⇨ Eligible Payment= $\frac{9}{12}$ (90+T)

Given: Payment made = 65 + T

- ⇨ 65 + T = ¾ (90 + T)
- ⇨ 260 + 4T=270 + 3T
- ⇨ T=10

Hence Price of Turban= Rs. 10 choice (a)

Level 2

1)

Rice in shop at the end = 0 kg

Rice in shop before the last customer bought additional ½ kg of rice = ½ kg

Rice in shop before last customer bought half of rice = ½ X 2 = 1 kg

Rice in shop before second customer bought additional ½ kg of rice = 1 + ½ =1.5 Kg

Rice in shop before second customer bought half of rice = 1.5 X 2 = 3 kg

Rice in shop before second customer bought additional ½ kg of rice = 3 + ½ =3.5 Kg

Rice in shop before first customer bought half of rice = 3.5 X 2 = 7 kg

Since 7 kg lies between 5 and 8 choice (b)

2)

Price of Darjeeling Tea= 100 + 0.10n (n=1,2,3,…….,100)

Price of Ooty tea = 89 + 0.15n (n=1,2,3,…….,365)

The price of Ooty tea grows faster than Darjeeling tea by (0.15-0.10) = Rs. 0.05

Therefore we can say that price of Ooty tea approaches that of Darjeeling tea by Rs. 0.05 per day

Initial Difference between the prices of Darjeeling and Ooty tea= 100-89= Rs. 11

This difference diminishes by Rs. 0.05 per day

Therefore total difference diminishes in $\frac{11}{0.05}$ = 220 days

But the above answer is not correct as the price of Darjeeling tea becomes constant after 100 Days

Therefore Difference vanishes at the rate of Rs. 0.05 for 100 days and at rate of Rs. 0.15 after that

Therefore Decrease in difference in first 100 Days = 0.05 X 100

- ⇨ Decrease in difference in first 100 Days = 5
- ⇨ Difference remaining after 100 Days = 11-5
- ⇨ Difference remaining after 100 Days = 6

Therefore number of days above 100 days to bring this difference to Zero $= \frac{6}{0.15}$

- ⇨ number of days above 100 days to bring this difference to Zero = 40 Days
- ⇨ Total number of days after which price will be same for both teas= 100+40
- ⇨ Total number of days after which price will be same for both teas=140 days

Now

January – 31 Days

February – 28 Days (2007 is non leap year)

March – 31 Days

April – 30 Days

Total Number of Days till April 30= 31+28+31+30

- ⇨ Total Number of Days till April 30= 120 Days
- ⇨ 140^{th} Day shall be 20 Days after April 30 i.e. May 20 choice (c)

3)

Total age of family members 10 years ago = 231

After 3 years age of each of the 8 members increases by 3

Therefore Total Increase in Age of family after three years = 8X3=24 years

- ⇨ Total age of family after three years = 231+24=255 years
- ⇨ Total age of family after death of one member aged 60 years= 255-60=195 years

Again after three years same thing happens

Therefore after 6 years total age of family= 195 + 24 -60

- ⇨ After 6 years total age of family= 159

Given: Current Age of family = Age after 10 years from time of condition

- ⇨ Age after 10 years from time of condition= 159 + 8 X (10-6)
- ⇨ Age after 10 years from time of condition= 159 + 8 X 4
- ⇨ Age after 10 years from time of condition= 159 + 32
- ⇨ Age after 10 years from time of condition= 191 years

Therefore Average age after 10 years = $\frac{191}{8} = 23.875$ years

Which is close to 24 years choice (e)

4)

Let Free luggage allowance = x

Let luggage with Raja = y kg

Therefore Luggage with Praja= 60 – y kg

Let the excess luggage charges be Rs. ‘a’ per kg

Therefore Excess Luggage charges for Raja = (y-x) a

- ⇨ (y-x)a=1200 --------------------(1)
- ⇨ Excess luggage charges for Praja = (60-y-x) a
- ⇨ (60-y-x)a=2400 ------------------------(2)

Given: When 60 kg is with one person Excess luggage charges are Rs. 5400

Therefore (60-x)a=5400 -----------------------(3)

Eliminating ‘a’ by dividing (1) by (2)

$$\frac{(y-x)a}{(60-y-x)a} = \frac{1200}{2400} = \frac{1}{2}$$

Therefore 2y – 2x = 60- y- x

- ⇨ 3y-60=x ---------------------(4)

Similarly eliminating ‘a’ by dividing (2) by (3) we get

5x + 9y =300 ------------------------(5)

Solving (4) and (5) We get x= 15 kg, y= 25 kg

Therefore Weight of Praja’s Luggage= 60-Weight of Praja’s Luggage

- ⇨ Weight of Praja’s Luggage= 60-25=35 kg choice (d)

5)

Based on Data for Q4, free luggage allowance = x= 15 kg choice (c)

6)

Total number of questions = 100

Let Questions in group A=a

Let Questions in group B=b

Let Questions in group C=c

Given: a+b+c=100

Given: b=23

- ⇨ a + 23 + c = 100
- ⇨ a + c=77 -------------------------(1)

Given: Group A questions contribute 1 Marks, Group B Questions Contribute 2 Marks and Group C Questions Contribute 3 Marks

- ⇨ Total Marks Contributed by Group A= aX1=a
- ⇨ Total Marks Contributed by Group B= 23X2=46
- ⇨ Total Marks Contributed by Group C= cX3=3c
- ⇨ Total Marks in paper = a + 46 + 3c

Group A contributes more than 60% of total Marks

- ⇨ $\frac{GroupA}{Total} \geq \frac{6}{10}$

- ⇨ $\frac{a}{a+46+3c} \geq \frac{3}{5}$
- ⇨ 5a $\geq$ 3a + 138 + 9c
- ⇨ 2a $\geq$ 9a + 138 ----------------(2)

Substituting a=77-c in (2) we get

2(77-c) $\geq$ 9c + 138

- ⇨ 154-2c $\geq$9c+138
- ⇨ 16$\geq$11c
- ⇨ c$\leq$16/11 ------------(3)

Given each group has atleast one question c$\geq$1 ----------(4)

Therefore only one integral value of c is possible looking at (3) and (4)

i.e. c=1 choice (a)

7)

Continued from Q6

c=8

Therefore a+b=100-8

- ⇨ a+b=92 -----------------(1)

Going by the given condition this time we get

$$\frac{2b}{a+2b+3c} \geq \frac{20}{100}$$

On solving we get

8b-a $\geq$ 24 ----------------------------(2)

Substituting a=92-b from eqn (1) we get

8b-(92-b) $\geq$ 24

Which on Solving gives

b$\geq$ $12\frac{8}{9}$

We also know from the question

$$\frac{a}{a+2b+3c} \geq \frac{6}{10}$$

On substituting a= 92-b and c= 8 and solving we get

$b \leq 14$

Therefore $12\frac{8}{9} \leq b \leq 14$

Therefore b= 13 or 14 since number of questions cannot be fraction

Choice (c)

8)

Weights of 3 pieces of cake are 4 ½ , 6 ¾ and $7\frac{1}{5}$ units

In order to have each piece of cake asd heavy as possible we need to find a part of each weight which could perfectly divide all the cakes with no left overs

Therefore we need to find H.C.F. Of three weights

Finding HCF shall be easier on converting to grams

4 ½=450 gms

6 ¾=675 gms

$7\frac{1}{5}$=720 gms

H.C.F. of three wights = 45 gms

Therefore 1^{st} piece can be divided into 450/45 = 10 pieces

Therefore 2^{nd} piece can be divided into 675/45 = 15 pieces

Therefore 3^{rd} piece can be divided into 720/45 = 16 pieces

Therefore Minimum number of of guests to be served = 10+15+16

- ⇨ Minimum number of of guests to be served = 41 choice (d)

9)

The bowl has 17 mints left after the raid

Number of mints in bowl before Eugene threw back 2 mints = 17-2

- ⇨ Number of mints in bowl before Eugene threw back 2 mints = 15

Number of Mints before Eugene took half the mints = 15X2

- ⇨ Number of Mints before Eugene took half the mints = 30

Number of mints before Faizah threw back 3 mints = 30 – 3

- ⇨ Number of mints before Faizah threw back 3 mints = 27

Number of mints taken by Faizah is $1/4^{th}$

Therefore number of mints left in box = (1 – 1/4) th

- ⇨ number of mints left in box = $3/4^{th}$
- ⇨ $3/4^{th}$ = 27
- ⇨ Total mints before Faizah took= 27 X $\frac{4}{3}$
- ⇨ Mints before Faizah took = 36

Number of mints before Sean threw back 3 mints = 36 -4

- ⇨ Number of mints before Sean threw back 4 mints = 32

Number of mints taken by Sean is $1/3^{rd}$

Therefore number of mints left in box = (1 – 1/3)rd

- ⇨ number of mints left in box = $2/3^{rd}$
- ⇨ $2/3^{rd}$ = 32
- ⇨ Total mints before Sean took= 32 X $\frac{3}{2}$
- ⇨ Mints before Sean took = 48 choice (d)

10)

Given: Average score in class X = 83

Average score in class Y = 76

Average score in class Z = 85

Average score of students in class X and Y together = 79

Average score of students in class Y and Z together = 81

Let the students in class X = x

Let the students in class Y = y

Let the students in class Z = z

- ⇨ Total number of students in class X and Y together = x + y
- ⇨ Total of Marks of all students in class X = 83x
- ⇨ Total of Marks of all students in class Y = 76y
- ⇨ Total of Marks of all students in class X and Y together = 83x + 76y

Therefore Average Marks of class X and Y together = (Total of Marks of all students in class X and Y together)/(Total number of students in class X and Y together)

- ⇨ Average Marks of class X and Y together = $\frac{83x+76y}{x+y}$
- ⇨ $\frac{83x+76y}{x+y}$ =79

On Solving we get $\frac{x}{y}=\frac{3}{4}$ --------------------------------(1)

Similarly we can obtain

$\frac{76y+85z}{y+z}$ =81

On Solving we get $\frac{y}{z}=\frac{4}{5}$ --(2)

From (1) and (2) we can take

x= 3u

y=4u

z=5u

Average of all three classes= $\frac{83x+76y+85z}{x+y+z}$

- ⇨ Average of all three classes= $\frac{83X3u+76X4u+85X5u}{3u+4u+5u}$
- ⇨ Average of all three classes= $\frac{978u}{15u}$

- ⇨ Average of all three classes=81.5 choice(b)

11)

Lets assume length = S

Let Time taken for A to complete the race = t

- ⇨ Time taken by B to complete (S-12) m of race =t
- ⇨ Time taken by C to complete (S-18) m of race =t

Lets assume time taken by B to complete S m of race =t_1

Speed of B = $\frac{S-12}{t} = \frac{S}{t_1}$ -----------------------(1)

Speed of C = $\frac{S-18}{t} = \frac{S-8}{t_1}$ -------------------------(2)

This leaves us with two equations with three unknowns. So we need one more equation

We observe that when A completes the race B was 12m away and C was 18m away

When B covered a distance of 12 m and eventually completed the race C was 8 m away

Therefore In the time B covered 12 m, C Covered 18-8=10 m. Let that time be x

- ⇨ Speed of B=12/x
- ⇨ Speed of C=10/x
- ⇨ (Speed of B/Speed of C)=6/5
- ⇨ $\frac{\frac{S-12}{t}}{\frac{S-18}{t}} = \frac{6}{5}$
- ⇨ 5s – 60 = 6s -108
- ⇨ S=48 m choice (b)

12 to 15)

Amount with 4 Sisters at end of 4th Game

Situation	Suvarna	Tara	Uma	Vibha
End of 4th Game	32	32	32	32

4th Game was lost by Vibha

Therefore Amounts of Suvarna, Tara and Uma Doubled.

Therefore each of them had half of the amount of what they had at end of 4th game

Therefore Before 4th Game Suvarna, Tara and Uma had Rs.32/2=Rs. 16 each

Vibha doubled each of their amounts hence she lost Rs. 16X3 = 48

Therefore Vibha had Rs. 32+48=80 before the 4th Game

Hence the table would look like

Situation	Suvarna	Tara	Uma	Vibha
End of 4th Game	32	32	32	32
Start of 4th Game	16	16	16	80

Similarly We can construct a Full table tracing back to start of 1st game

Situation	Suvarna	Tara	Uma	Vibha
End of 4th Game	32	32	32	32
Start of 4th Game	16	16	16	80
Start of 3rd Game	8	8	72	40
Start of 2nd Game	4	68	36	20
Start of 1st Game	66	34	18	10

That answers all our questions

12) choice (c)

13) choice (d)

14) choice (a)

15) choice (b)

16)

The cost of 72 hens is Rs. _96.7_

We have Four options

a) Rs. 3.23 b) Rs. 5.11 c) Rs. 5.51 d) Rs. 7.22

On substituting

a) 72 X 3.23=232.56
b) 72 X 5.11 = 367.92
c) 72 X 5.51=396.72
d) 72 X 7.22= 519.84

As we see only option (c) is satisfying the input

Therefore choice (c)

17)

Person has sufficient amount to buy 50 oranges or 40 mangoes

Therefore Price of 40 mangoes = Price of 50 oranges

Let price of mango = m

Let price of orange = o

- ⇨ 40 m = 50 o
- ⇨ $\frac{o}{m} = \frac{4}{5}$

Given: Initial Amount with man = Rs. 50 o

Amount Retained = 10% of initial amount

Therefore Retained amount = 10 % of 50 o

- ⇨ Retained amount = 5o
- ⇨ Amount left after retaining taxi fare = 50o-5o
- ⇨ Amount left after retaining taxi fare = 45o

Man bought 20 mangoes

Price of 20 mangoes = 20m

- ⇨ Price of 20 mangoes = 20 X $\frac{5}{4}$
- ⇨ Price of 20 mangoes = 25o

Amount left after purchasing mangoes = 45o – 25o

⇨ Amount left after purchasing mangoes = 20o

With this amount he can buy 20 oranges choice(d)

18)

Let total number of voters = V

Voters promised for P = $\frac{2}{5}$ V

Voters promised for Q = $\frac{3}{5}$ V

Voters of P Backing out = 15% of $\frac{2}{5}$ V = $\frac{15}{100}$ x $\frac{2}{5}$ V= $\frac{6}{100}$ V

Voters of Q voting for P = 25 % of $\frac{3}{5}$ V= $\frac{25}{100}$ x $\frac{3}{5}$ V= $\frac{15}{100}$ V

Therefore total number of voters voting for P = $\frac{2}{5}$ V - $\frac{6}{100}$ V + $\frac{15}{100}$ V

⇨ total number of voters voting for P = $\frac{49}{100}$ V

Similarly total number of voters voting for Q = $\frac{3}{5}$ V - $\frac{15}{100}$ V+ $\frac{6}{100}$ V

⇨ total number of voters voting for Q= $\frac{51}{100}$ V

P lost by 2 votes

⇨ $\frac{51}{100}$ V- $\frac{49}{100}$ V=2

⇨ $\frac{2}{100}$ V = 2

⇨ V=100 choice (a)

19)

Expense incurred for manufacturing 1500 watches = 1500 X150 + 30000

⇨ Expense incurred for manufacturing 1500 watches = 225000 + 30000

⇨ Expense incurred for manufacturing 1500 watches = 255000

Watches Sold = 1200

Therefore Watches sold for Rs. 250 =1200

- ⇨ Watches sold for Rs. 100 =1500-1200(Sold after season)
- ⇨ Watches sold for Rs. 100 =300
- ⇨ Total Sale of Watches = 1200X250 + 300X100
- ⇨ Total Sale of Watches =330000

Profit = Sales – Expenses

- ⇨ Profit= 330000 – 255000
- ⇨ Profit= Rs. 75000

Choice (b)

20)

From Q 19 Expense incurred for manufacturing 1500 watches = 255000

Let the watches to be sold in season to break even = x

Therefore watches to be sold at Rs. 250 = x

- ⇨ Watches to be sold at Rs. 100= 1500-x
- ⇨ Total Sale of Watches = x X 250 + (1500-x) X100
- ⇨ Total Sale of Watches = 250x + 150000 -100x
- ⇨ Total Sale of Watches = 150x + 150000

To break evcn Total Sales of Watches= Cost incurred

- ⇨ 150x + 150000=255000
- ⇨ 150x=105000
- ⇨ x=700

choice (b)

21)

I paid Rs. 20 to clerk got back 3 stamps of Rs. 1 each

Therefore stamps I ordered are worth Rs. (20-3) = Rs. 17

Given: I ordered more than 1 stamp of every type

- ⇨ I ordered 2 or more stamp of every type
- ⇨ Minimum amount of stamps I ordered = 2X5 + 2X2 + 2X1

- ⇨ Minimum amount of stamps I ordered = 10 + 4 + 2
- ⇨ Minimum amount of stamps I ordered = Rs. 16

Therefore I ordered stamps worth Rs. (17-16=1) more than minimum order. This is possible only if I ordered a 1 rupee stamp

Therefore total number of 1 rupee stamps ordered = 2+1

- ⇨ total number of 1 rupee stamps ordered=3
- ⇨ total number of 2 rupee stamps ordered=2
- ⇨ total number of 5 rupee stamps ordered=2

Also 3 extra one rupee stamps were given by office person

Therefore total number of stamps I bought = 3+2+2+3=10

Choice (a)

22)

Since Quantity Sold is a two digit number let it be = 10x + y

Therefore Quantity sold obtained on reversing the digits = 10y + x

When the digits of quantity sold were reversed the inventory reduced by 54.

Quantity sold obtained on reversing digits – Actual Quantity Sold =54

- ⇨ 10y + x –(10x +y)=54
- ⇨ 9y-9x=54
- ⇨ 9(y-x)=54
- ⇨ y-x=6

i.e. second digit is 6 more than 1^{st} digit

Therefore possible options are

17

28

39

If the sales price of each quantity is k

Then either

17k=1148 or 28k=1148 or 39k=1148

- ⇨ k=1148/17 or k=1148/28 or k=1148/39

Since 1148 is not divisible by 17 or 39 but divisible by 28, therefore only possible value of k=1148/28= Rs. 41

Also we can validate the condition of question

Since 28X41=82X14

Choice (b)

23)

From Q22) quantity sold = 28 choice (a)

24)

PQ=64

Possible values of P and Q can be found by factorising 64

Here is the list of factors of 64

1,2,4,8,16,32,64

The various combination of two numbers whose product is 64 are

1,64

2,32

4,16

8,8

So possible sums are

1+64=65

2+32=34

4+16=20

8+8=16

We have 65, 20 and 16 as options 35 is the odd man out

Hence choice (d)

25)

Let A has a coins

B has b coins

C has c coins

D has d coins

Therefore a + b + c + d=100

Lets assume that person with maximum coins is A

If A has to get maximum number of coins B,C,D will have to get minimum possible coins

Given: Minimum number of coins anybody can get is 10

Given: Everybody has got even number of coins and no two people have same number of coins

Therefore minimum coins which B, C and D can have is 10, 12 and 14

Therefore B, C, D total can have minimum 10 + 12 +14=36 coins

Therefore maximum number of coins A can have is 100-64=36

Choice (a)

26)

From Q 25

a + b + c + d=100

Given a=54

- ⇨ 54 + b + c + d=100
- ⇨ b + c + d= 46

Since there are only 100 coins and A alone has 54 of them therefore clearly he has got highest number of coins

Lets assume B has second highest number of coins

In that case c + d shall be minimum.

Using the same logic as Q 25 c + d is minimum c,d are 10 and 12

Therefore minimum value of c+d=10+12=22

Therefore b=46-22

- ⇨ b=24

Therefore difference between highest and second highest cannot be less than

54 – 24 =30

Choice (c)

27)

From question 26

B + C + D = 46 -------- (1)

We also know that B = 2C + 2

Therefore substituting in (1)

2C + 2 + C + D = 46

3C + D = 44

In above case minimum value of C = 10

So if C is minimum

3 x 10 + D = 44

Hence D = 14

Trying with next possible value of C = 12

We get 3 x 12 + D = 44

Hence D = 8

But D = 8 is not valid as D $\geq$ 10

Similarly value of D will go down as we increase C

Therefore permissible value of C will be 10, as it is the only value which gives a valid D.

When C = 10

B = 2C + 2 = 22

Choice (d)

Level 3

1)

Let three consecutive integers be

m, m+1, m+2

From the condition in the question

$m^1 + (m+1)^2 + (m+2)^3 = (m+m+1+m+2)^2$

- ⇨ $m + (m+1)^2 + (m+2)^3 = (3m+3)^2$
- ⇨ $m + (m+1)^2 + (m+2)^3 = 3^2(m+1)^2$
- ⇨ $m + (m+1)^2 + (m+2)^3 = 9(m+1)^2$
- ⇨ $m + (m+2)^3 = 8(m+1)^2$
- ⇨ $m + m^3 + 8 + 3 \text{ x } m \text{ x } 2(m+2) = 8(m^2+2m+1)$ [using $(a+b)^2$ and $(a+b)^3$ formula]
- ⇨ $m + m^3 + 8 + 6m\,(m+2) = 8m^2 + 16m + 8$
- ⇨ $m + m^3 + 6m^2 + 12m = 8m^2 + 16m$
- ⇨ $m^3 – 2m^2 – 3m = 0$
- ⇨ $m\,(m^2 – 2m – 3) = 0$
- ⇨ $m = 0$ or $m^2 – 2m - 3 = 0$

m = 0 is not the solution as m is a positive integer.

For $m^2 – 2m – 3 = 0$

- ⇨ $m^2 – 3m + m – 3 = 0$
- ⇨ $m\,(m-3) + 1\,(m-3) = 0$
- ⇨ $m = -1$ or $m = 3$

m = -1 is not the solution as m is a positive integer.

Therefore m = 3

Choice (a)

2)

Lets assume cheque amount was *x* Rs. and y paisa

- ⇨ Total paise on the cheque = 100*x* + y

Since bank teller transposed the rupees and paise he gave y Rs. and x paise

- ⇨ Total paise given by bank teller = 100y + x

When Shailaja bought a toffee for 50 paise

Amount left with her = 100y + x – 50

This is thrice the cheque amount

- ⇨ (100y + x – 50) = 3 x (100x + y)
- ⇨ 100y + x – 50 = 300x + 3y
- ⇨ 97y = 299x + 50 with x < 100 and y < 100

x and y are less than 100 because number of paise in both the above cases will be less than 100

But we have only one equation with 2 unknowns

Therefore we will have to test each option

(a) Rupees = 13

Therefore x = 13

- ⇨ 97y = 299 x 13 + 50
- ⇨ 97y = 3887 + 50
- ⇨ Y = 3937/97 which is not an integer.

Therefore this option is rejected.

(b) Rupees = 7

Therefore x = 7

- ⇨ 97y = 299 x 7 + 50
- ⇨ 97y = 2143
- ⇨ Y = 2143/97 which is not an integer.

Therefore this option is rejected.

(c) Rupees = 22

Therefore x = 22

- ⇨ 97y = 299 x 22 + 50
- ⇨ 97y = 6628
- ⇨ Y = 6628/97 which is not an integer.

(d) Rupees = 18

Therefore x = 18

- ⇨ $97y = 299 \times 18 + 50$
- ⇨ $97y = 5432$
- ⇨ $Y = 5432/97 = 18.56$ an integer

Hence choice (d)

3)

Let the cost of 1 burger = b

Cost of 1 shake = s

Cost of 1 fries = f

- ⇨ $3b + 7s + f = 120$ ------- (1)
- ⇨ $4b + 10s + f = 164.5$ ------- (2)

Multiplying equation (1) by 3 we get

$9b + 21s + 3f = 360$ -------- (3)

Multiplying equation (2) by 2 we get

$8b + 20s + 2f = 329$ --------- (4)

On (3) – (4) we get (subtracting (4) from (3))

$9b + 21s + 3f = 360$

$- \underline{(8b + 20s + 2f) = 329}$

$b + s + f = 31$

Cost of 1 burger + 1 fries + 1 shake = 31

Hence choice (a)

4)

Let the cost of pen = p

Cost of pencil = pe

Cost of eraser = er

Let the amount I spent = x

⇨ $5p + 7pe + 4er = x$ ------- (1)

Rajan paid half more than what I paid

⇨ Rajan paid $x + \frac{1}{2}x = \frac{3x}{2}$ ------ (2)

Multiplying equation (1) by 2 we get

$10p + 14pe + 8er = 2x$ ------ (3)

Equation (3) – equation (2) (subtracting equation (2) from equation (3))

$10p + 14pe + 8er = 2x$

$\underline{-(6p + 14pe + 8er) = 3x/2}$

$4p = x/2$

Therefore $5p = 5x/8$

5 pens costed $5x/8$ in x

$\frac{5x/8}{x} \times 100 = 62.5\%$

Hence choice (b)

5)

Akshay can be given a start of 128m by Bhairav in a mile race

i.e. if Akshay starts 128m ahead of Bhairav in one mile race then they will take same time to finish the race

|---128m---|---------------------------------1472m----------------------------------|

|----------------------------------- 1600 m---|

Therefore time taken by Bhairav to complete 1600m = time taken by Akshay to complete 1600 – 128 = 1472m

Let the time taken be t

Speed of Bhairav = 1600/t

Speed of Akshay = 1472/t

<u>Speed of Bhairav</u> = <u>1600</u> = <u>25</u> --------- (1)

Speed of Akshay   1472   23

Similarly

$$\frac{\text{Speed of Bhairav}}{\text{Speed of Akshay}} = \frac{100}{96} = \frac{25}{24} \text{ --------- } (2)$$

From (1) and (2)

$$\frac{\text{Speed of Akshay}}{\text{Speed of Chinmay}} = \frac{23}{24}$$

Let speed of Akshay = 23x
Speed of Chinmay = $24x$

Time taken by Chinmay to complete one and half miles race

$$= \frac{1600 \text{ x } 1.5}{24x} = \frac{100}{x}$$

In same time distance covered by Akshay

$$= \frac{100}{x} \text{ X } 23x$$

= 2300m

Therefore lead = 2400 – 2300

= 100 m

= 1/16 mile

Therefore winner is Chinmay by 1/16 mile

Hence choice (d)

6)

Lets assume my son has x chocolates

Given: He needs to have double biscuits and more apples than biscuits and apples together

- ⇨ Number of biscuits my son had = 2x
- ⇨ Number of apples my son had > 2x + x
- ⇨ Number of apples my son had > 3x

Given:

Cost of chocolate = Rs. 1, the cost of apple is twice the chocolate and four biscuits are worth one apple

- ⇨ Cost of apple = 2X1= Rs.2
- ⇨ Cost of 4 biscuits = Rs. 2
- ⇨ Cost of biscuit = $\frac{2}{4}$ =Rs. 0.5

Therefore total cost incurred = x X 1 + 2x X 0.5 + 3x X 2 + cost of extra apples

- ⇨ Therefore total cost incurred = x + x + 6x
- ⇨ Therefore total cost incurred = 8x + cost of extra apples

Now if we look at the options

34 = 8X4 + cost of 1 apple

While Rs. 33 and Rs. 8 do not satisfy the condition

Hence choice (a)

7)

Let the cost of pencil = p

Cost of eraser = e

Cost of sharpener = s

Therefore 2p + 5e + 7s = 30 --------------------------------(1)

Also from the condition in question

3p – 6e + 5s =15 --(2)

Multiplying eqn (1) by 3 we get

6p + 15e + 21s = 90 --(3)

Multiplying eqn (2) by 4 we get

12p + 20s – 24e=60 --(4)

Subtracting eqn (4) from eqn (3) we get

6p + 15e + 21s = 90

-(12p + 20s – 24e=60)

$=-6p + s + 39e = 30$

Therefore cost of 39 erasers and 1 sharpener exceeds cost of 6 pencils by Rs. 30

Hence choice (b)