**1. Algebra**

1. e

Applying the formula (a+b) 2=a2 + 2ab + b2

(x2+12x+36)= (x+6)2

Therefore, (994+6)2 = 10002 = 1000000

1. **b**

On the L.H.S., to add the fractions make the denominators same.

Therefore, **a+b/ab = 1/c**

Since, ab = c

Therefore, a+b = 1

Next, to find the average of a and b, divide a+b by 2

Since, L.H.S. is divided by 2, therefore, R.H.S. is also divided by 2 and thus a+b/2 = ½.

1. **a**

a2 – b2 = (a+b)(a-b)

Therefore, x2 – y2 = (x+y) (x-y) = 28

Substituting, x - y=8

8(x+y)= 28

x+y = 28/ 8 = 3.5

Average of x+y = x+y/2 = 3.5 / 2 = 1.75

1. **d**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| |  | | --- | | Vidya’s equation: | | x = 6 or x = 2  (x-6)=0 or (x-2) = 0  (x-6)(x-2) = 0  x^2 – 8x + 12 = 0 | | |  | | --- | | Vandana’s equation: | | x = -7 or x = -1  (x+7)=0 or (x+1) = 0  (x+7)(x+1) = 0  x^2 + 8x + 7 = 0 | |

Thus, the correct equation is : x2 – 8x + 7 = 0

Therefore, splitting the middle term or using the formula:  x=(-b+/-sqrt(b^2-4ac))/(2a). 

The correct roots are 7 and 1.

1. **c**

Rearranging the equation, y = (5 +3x) / 4

For y> 100 , (5+ 3x) > 400

Then, substituting x with the given values or plugging in the given options, we see that the smallest value of x for which y>100 is 132 ( 5 +3\*132= 5 + 396 = 401)Thus, 401/4 is greater than 100.

1. **e**

Let red marbles be r, blue be b and red be r. Thus, as per the given conditions:

**r = 4/5w**

**w = ¾ b**

Therefore, r = 4/5 \*3/4 b = **3/5 b**

Then, b + r + w = 470 Thus, b + 3/5 b + ¾ b = 470

Thus, 20b+12b+15b = 470 \* 20

Thus, 47b=470 \* 20 Thus, b = 200

1. **b**

Let the two numbers be a and b. Therefore, according to the problem:

**a \* b = 900** and **a + b = (a-b) + 30**

Therefore, 2b = 30 and thus b = 15

Substituting, b=15 in a\* b = 900 we get a = 60.

**OR** ( Plugging in method)

From the given options, factors of 900 are 15 and 60, 60 and 15, 75 and 12, 90 and 10, 100 and 9. Of these, 1st option is struck out since it is the smaller of the two factors. Rest could be tried out to check for the second condition i.e the sum has to exceed the difference by 30.

1. **c**

|  |  |  |
| --- | --- | --- |
|  | Weight in 1950 | Gain till 1980 |
| Assumption | 100 | 40 ( He was 40% heavier) |
| Actual | ? | 60 ( 2 lbs each year\* 30 years) |

Therefore, cross multiplying we get actual weight in 1950: 60 \* 100/ 40 = lbs 150

Therefore, in 1980 he was lbs 210 and in 1995 he was lbs 240.

Therefore, (1980’s weight / 1995’s weight) \* 100 = (210/240)\*100

Hint: Since 210/240 will give an answer in decimals and if observed only one option has decimal i.e. option c.

1. **d**

Let black balls be b and white balls be w.

Thus, **w/2 = b/3** Therefore, 3w=2b or **3w-2b = 0.**

And **2(b+w)= 3b+4** Therefore, 2b+2w=3b+4 Thus, **2w-b = 4**

Now, the equations could be solved simultaneously or by substituting the value of b or w.

Therefore, b = 12 and w = 8 and b+w = 20.

**10. e**

b= a + 5 Thus, **a = b - 5**

And c = b + 10 Thus, **b = c – 10** Thus**, a = c – 10 – 5 = c- 15**

Therefore, a + b + c = **(c–15) + (c - 10) +(c) = 38** Thus, **3c-25 = 38.** Thus, c = 63/3= 21.

**11. a**

Let the number be n .Therefore, the numbers formed are n + 5, n + 15 and n + 35 respectively.

According to the condition: **(n + 5) (n + 35) = (n + 15)2**

Solving we get: n2 + 40n + 175 = n2 + 30n + 225. Thus, 10n = 50. Thus, n = 5.

1. **b**

Let the son’s age be s. Therefore, man’s age = 5s

**s2 + (5s) 2 = 2106** Thus, 26 s2 = 2106 Thus, s2 = 81. Thus, s = 9 and man’s age = 5\*9= 45.

1. **c**

Let the consecutive numbers be n and n + 1. Therefore, 1/n + 1/n+1 =15/56

Therefore, (n+1 + n)/(n)(n+1) = 15/56

**OR**

|  |  |
| --- | --- |
| Out of the factors of 56 only 7 and 8 are the consecutive factors and 7 + 8 = 15.  Therefore, the numbers are 7 and 8. | (2n+1)56=15(n2+ n)  112n+56 = 15 n2 +15n  15 n2 – 97n – 56 = 0  15 n2 -105n + 8n - 56 = 0  15n(n – 7) + 8(n – 7) = 0  Thus, n = 7 or n = -15/8  But, since the number is positive integer,  -15/8 is not considered. |

1. **d**

Let the fraction be n/d. Therefore, (n-1) / (d+2) = ½ and (n-7)/(d-2) = 1/3

Therefore, 2n – 2 = d + 2 Thus, **2n – d = 4** and 3n – 21 = d – 2 Thus,**3n-d = 19**

Thus, solving both the equations, we get n=15 and d=26

**OR**

After plugging in the options, only 15/26 satisfies both the conditions.

1. **c**

Since either 4 or 3 students are seated on each bench therefore the total number of students is a multiple of 12 (L.C.M. of 4 and 3)

Therefore, from the options 3 options=42, 50, 54 are struck out.

Then, check for the remaining 2 options whether both the conditions are fulfilled.

Suppose, there are 60 students then number of benches required if 4 students sit on each bench – 15. Therefore, the actual number of benches = 18(15+3 As 3 benches are left vacant). And if 3 students sit on each bench, 6 students are left standing (60 – (3\*18) = 60 – 54). But, as per the problem, 3 students are left standing. Therefore, another option has to be tried.

Suppose, the number of students is 48, then if 4 students sit on each bench, the number of benches required is 12. But, actually there are 15 benches. And if 3 students sit on each bench, the number of students left standing = 48 – (3\*15)= 48 – 45 = 3(as per the condition).

**OR**

Let the number of students be s and the number of benches be b.

Therefore, as per the first condition**, s/4=b-3** Therefore, **s=4b – 12**

And, as per the second condition, **(s-3)/3 = b** Therefore, **s=3b + 3**

Solving both the equations, we get s = 48 and b = 15.

1. **b**

Since the product of 2 digits is 30, the digits could be 5 and 6 (these 2 numbers are single digit factors of 30 apart from 2 and 3. But 2 and 3 can’t be considered since the other factors-15 and 10 respectively- are 2 digit factors. Thus, the number could be 56 or 65. Only 56 satisfies both the conditions.

**OR**

Let the digit in the unit’s place be u and the digit in the ten’s place be t. Thus, t\*u=30

Therefore, **the number =10t + u** (a 2-digit number can be written as such. For eg- 89 = 8\*10 + 9)

According to the condition, **10u + t = (10t + u) + 9** (Interchanging the digits)

Thus, 9u – 9t = 9 Thus, u – t = 1

Then, plugging in the options would prove that only 56 is the correct answer.

1. **b**

For solving a quadratic of the form:ax2 + bx + c = 0 the formula:  x=(-b+/-sqrt(b^2-4ac))/(2a). can be used.

|  |  |
| --- | --- |
| If | Then the roots are: |
| b2 - 4ac = 0 | Real and equal |
| b2 - 4ac > 0 | Real and distinct |
| b2 - 4ac < 0 | Imaginary |

Since it is given that the roots are real therefore

b2 - 4ac = 0. Substituting, a = 9, b = 3a and c = 4 from the given equation, we get (3a)2 – 4(9)(4) = 0 Thus, 9a2 -144 = 0 Thus, 9a2 = 144 a2 = 16 a=+/-4

1. **b**

Let the distance travelled by Dick be 10 kms. Therefore:

Distance travelled by train = 4/7\*10 = 40/7 Thus, balance = 10 – (40/7)= 30/7

Distance travelled by bus = 5/6 \* 30/7 = 25/7 Thus, balance = 30/7 – 25/7 = 5/7

|  |  |  |
| --- | --- | --- |
|  | Total distance | Distance travelled by walking |
| Assumption | 10 | 5/7 |
| Actual | ? | 3 |

Cross multiplying we get, (3\*10) / (5/7) =Total distance travelled = 30 \* (7/5) = 42 kms.

**OR**

Let the distance travelled be d kms. Therefore:

Distance travelled by train = 4/7\*d= 4d/7 Thus, balance = d – (4d/7)= 3d/7

Distance travelled by bus = 5/6 \* 3d/7 = 15d/42 Thus, balance = 3d/7 –15d/42 = 3d/42

Distance travelled by walking = 3d/42 = 3 Thus, d = 42 kms.

1. **e**

Let c be number of correct answers and w be the wrong answers.

Therefore, c + w = 50 (Total number of correct and wrong answers)

And, as per the second condition, c - 2w = 38. (Final score)

Solving both the equations, we get c = 46 and w = 4

**OR**

Plug in the options to find out whether the final score turns out to be 38.

1. **d**

The disks can be arranged in 8 or 12 stacks. Therefore, the number of disks has to be a multiple of 8 and 12. And as per the condition in the problem, it has to be the least one (L.C.M.of 8&12)

1. **b**

Let the number of males be m and females be f. Thus, **m = 2f – 3** and

**m - 1 = f +1** (1 male is replaced by female means that 1male is reduced and 1 female is increased)

Thus, m = f + 2. Therefore, 2f – 3 = f + 2 Thus, f = 5 and m = 5 + 2 = 7.

1. **d**

Let the number of bricks in the bottom row be b. Thus, as per the condition in the problem:

Number of bricks in the rows above: **b – 1** and (b – 1) - 1 = **b - 2** and (b – 2) – 1 = **b - 3** and (b-3) – 1 = **b – 4 Thus,** b + (b – 1) + (b – 2) + (b-3) + (b-4) = 75 Thus, 5b – 10 = 75 Thus, b =17

1. **d**

Let the price of puppy of breed X be x and breed Y be y. Therefore, 3x + 2y = 690

y = x – (20%of x) i.e. y = 80% of x Thus, y = (80/100)\*x = 4/5 \* x

Thus, 3x+2(4/5\*x) =690 Thus, 3x + 8x/5 = 690 Thus, 15x+8x = 690\*5 Thus, x = (690\*5)/23=150

1. **c**

Price in cents per stamp(Denomination) Number of stamps bought Value

5 Let it be x 5x

25 x 25x

10 2x 20x

1 Let it be y y

Thus, total value/worth of stamps: Converting $2.65 in cents 265 = 5x+25x+20x+y Thus, 265=50x+y Now, the answer options can be plugged in to find the least value of y so that x can be integer (Number of stamps could not be a fraction or decimal)

1. **e**

Let the number of distance travelled at 55 miles per hour be x and at 60 miles per hour be y

Thus, total distance travelled: **x+y=500 Thus, y = 500 - x**

**Gallons of fuel used**

|  |  |  |  |
| --- | --- | --- | --- |
| Gallons | Miles travelled at the speed of 55 miles | Gallons | Miles travelled at the speed of 60 miles |
| 1 | 4.5 | 1 | 3.5 |
| ? | x | ? | y |

Therefore, gallons used: x/4.5 =x/(9/2) =2x/9 and y/ 3.5=y/(7/2)= 2y/7

Thus, total fuel used: 2x/9 + 2y/7 = 120 Thus, x/9+y/7 = 60 Thus, **7x+9y=3780**

Thus, y = (3780 – 7x)/9 Thus, 500 - x = (3780 – 7x)/9 Thus, 4500 – 9x = 3780 – 7x

Thus, 2x = 720 Thus, x = 360

**2. Average**

**Average = Summation of all the values / Total number of values**

**1. c**

**Total of 7 numbers = 35** and **total of first 6 numbers = 24** Thus, the seventh number is **35 – 24 = 11**

**2. e**

The **total of 9 numbers = 108**. Thus if each number is increased by 2 then the **total increase is 18**.

Thus, the **new total is 108 + 18 = 126** Thus, the **new average is 126/9**= 14.

OR

If each number increases by 2, the average too increases by 2. Thus, the new average=12+2=14.

**3. c**

The total age of 5 boys = **60** and the total age of other 3 boys = **48.**

**Thus, the total age of 8 boys = 60+48 = 108 Thus, average age of 8 boys= 108/8= 13.5.**

**4. d**

The total of 11 numbers is 583. The total of 1st 6 numbers=300 and last 6 numbers = 330.

The 6th number is included in both sets – 1st 6 and last 6 numbers. Thus, it has to be eliminated:

**300+330-583=47** OR (set theory)

Let A be the set of 1st 6 numbers and B be the set of last 6 nos.. Thus, A∩B i.e. common no.=6th no

n(AUB) = n(A) + n ( B) – n (A∩B) Thus, **583 = 300 +330 – 6th number**

1st 6 nos.

Last 6 nos.

6th number

A∩B

A

B

**5. d**

The total age of 30 boys = 480 (30\*16) and total age of boys and teacher = 527(31\*17)

Thus, age of teacher = Total age of boys and teacher – Total age of boys = **527 – 480** = 47.

**6. b**

Increase in the average age = 10\*0.4 = 4 years

This increase is because of the new girl. Thus, age of new girl=Age of old girl+Increase in age=**6+4=10** years

**7. d**

Total height of 25 students = **140 \* 25**

Total height of 30 students( 25 old students +5 newly admitted)=**141( 140 + Increase of 1 cm)\*30)**

Therefore, age of 5 newly admitted students = (141 \* 30) – (140\*25)= 5[(141\*6)-(140\*5)]

Thus, 5(846- 700)= 5\*146 Thus, average of 5 newly admitted students = (5\*146)/5 = 146 cms.

**8. c**Assume any convenient consecutive numbers. Let the consecutive numbers be 5, 6, 7 Therefore, the average is 6 ( Middle number or (5+6+7) /3) Next two consecutive numbers will be 8 and 9 Therefore, the average of 5,6,7,8,9 = 7 (Middle number or (5+6+7+8+9)/5 ) Thus, average increases from 6 to 7 i.e. increases by 10.

OR

Let the numbers be n ,n+1,n+2 Thus, the average is **n+1** (Middle term or (n+n+1+n+2)/3)

The next numbers will be n+3,n+4 Thus, the new average is **n+2**(Middle term of 5 numbers)

**9. c**

The total number of runs scored is **40 \* 50 = 2000**

Let his lowest score be **n**. Thus, his highest score = **n+172** Excluding these 2 innings, his total score=**38\*48**

Thus, **Total runs scored=Lowest score + Highest score + Total of other 38 innings**

Thus, 2000 = n + (n+172) + (38\*48) Thus, 2000 = 2n + 172 +(38\*48) Thus, dividing each term by 2 1000=n+86+(19\*48) Thus, 914 = n + (19 \* 48) Thus, n = 914 – 912 Thus, n = 2 and highest score=2 + 172.

**10. d**

Eight men spent Rs. **240**  Let the **average of nine** men’s spending be **a** Therefore, **ninth man spent a + 20**

Total spending = Total spending of 8 men + Spending of 9th man **Total spending of 9 men = 9a**

Thus, **9a = 240 + (a + 20 )** Thus, 9a-a = 260 Thus, a = 260/ 8 = 32.5 Thus, total spending=9\*32.5

**11. e**

It can’t be determined the score of Maths can’t be isolated.

1st set: E+H+D=150 2nd set: M + S + S.S+ C=280 3rd set: E+H+D+M + S + S.S+ C=406.

**12. b**

The 1st 6 odd primes are: **3,5,7,11,13 and 17** (1 is not a prime number and 2 is an even prime. Thus, they’re not counted) Therefore, average = (3+5+7+11+13+17)/6 = **56/6=9.33**

**13. d**

Let the 5 consecutive even numbers be b,b+2,b+4,b+6,b+8 Therefore, average=(b+b+2+b+4+b+6+b+8)/5=38

Thus, 5b+20= 38\*5 Thus, b+4=38 Thus, b=34 Thus,b+8=42 or Since, the middle term is 38, thus b+4=38 Therefore, b=34 and the largest is b+8=34+8=42

OR

Since the average of the 5 consecutive numbers is 38, therefore, the middle term is 38 Thus, the largest term=38+4(Adding 2+2 to 38. Also, 38 is 3rd term, 40 is 4th and 42 is the 5th or the largest term).

**14. a**

Let the ages be a,b,c,d,e respectively. Thus, total of ages: **a+b+c+d=58\*4** and **b+c+d+e = 60\*4**

a:e=7:8 Therefore, substituting,a = 7/8e in the first equation:7/8e+b+c+d=58\*4

Subtracting, first equation from the second equation: **b+c+d+e = 60\*4**

**b+c+d+7/8e = 58\*4**

Thus, **e-7/8e = 60\*4 – 58\* 4** Thus, **8e-7e = 8\*4(60-58)** Thus, **e = 8\*4\*2** Thus, **e = 64** years.

**15. d (Same as the 4th sum of this topic) 294+312 – 550 = 606 – 550 = 56.**

**16. c**

Let the average after 11 innings be a. Thus, after 12 innings his average is a+2.

Total score after 11 innings = **11a**

Total score after 12 innings = **12(a+2)** As per the condition, **12(a+2) = 11a + 63** (Since he makes 63 runs in the 12th innings, therefore, total runs after 12 innings = Total of 11 innings+63 runs)

Thus, **12a + 24=11a + 63** Thus, **a = 39 and average after 12 innings = a + 2 = 39 + 2 = 41.**

**17. a**

Let the journey be 100 kms long ( Any convenient number can be assumed e.g. 1000,10, etc.)

|  |  |  |
| --- | --- | --- |
| Distance | Speed | Time (Distance / Speed) |
| 60 ( 60% of 100 kms) | 30 kmph | 2 hours |
| 20 ( 20% of 100 kms) | 20 kmph | 1 hour |
| 20 (Remaining distance100-60-20) | 10 kmph | 2 hours |
| **TOTAL: 100 kms** |  | **5 hours** |

Thus, average speed for the journey = **Total Distance / Total Time = 100 kms / 5 hours = 20 kmph**

**OR**

Let the total distance be d. Thus, distance travelled @30 kmph = 60% of d = 60d/100=3d/5 Time=(3d/5)/30=**d/50**

Distance@ 20 kmph = 20% of d = d/5 Time = (d/5)/20= **d/100**

Thus, remaining@10 kmph = d – ( 3d/5 + d/5) = d – (4d/ 5) = d/ 5( or remaining 20% of d) Time = (d/5)/10 = **d/50** Therefore, total time taken (**d/50+ d/100+ d/50** ) **= 5d/100**

**Average speed for the journey = d / (5d/100) = 100 / 5 = 20 kmph.**

**18. a**

Let the number of passed students be p and failed students be f

Total number of students = **p +f =120 Thus, f= 120 - p**

Total marks of passed students = Number of passed students \* Average of passed students = **p \* 39**

Total marks of failed students = Number of failed students \* Average of failed students = **f \* 15**

Total marks of all students = **120 \*35 or Total of passed students+Total of failed students**

Thus, **120 \*35 = p \* 39 + f \* 15**  Thus, **40 \* 35 = 13p + 5f**

Thus, substituting f, we get: **1400=13p+5(120-p)** .Thus, **1400=13p+600-5p.** Thus, **8p = 800.** Thus,**p=100.**

**19. b**

The total is 30\*45 = 1350 After correction, the total increases by **(24+6)=30** Thus, correct total = **1350+30**

Thus, correct average =1380 / 30 = 46 **OR**

Correct average =(Old total+increase in total)/30 Thus, (**30\*45 + 30)/30 = 30(45 + 1) /30 = 45+ 1=46**  **OR**

Since, the total increases by 30, therefore, average increases by 30 /30=1 Thus, average=45+1=46.

**20. c**

|  |  |  |
| --- | --- | --- |
| No of coins | Denomination | Total value |
| 5x | 1 | 5x |
| 6x | 0.50 =1/2 | 6x/2=3x |
| 7x | 0.25 =1/4 | 7x/4 |

Let the HCF of the numbers of the coins be x. Thus, the number of coins: **5x, 6x ,7x**

Thus,

429=5x+3x +7x/4

429\*4=20x+12x+7x

429\*4 = 39x

**x= 44**

Thus,5x**=220, 6x=264, 7x=308**

**Thus, total number of coins=220+264+308 =792.**

**21.e**

Average speed for the journey = **(2xy) / (x+y)** where x and y are different speeds for the same distance.

Thus, average speed =(2\*20\*30)20+30=(2\*20\*30)/50=120/5=**24 kmph**

OR

Let the distance from the beginning to the destination be x. Therefore, the total distance travelled=2x.

**Distance = Time \*Speed**. **Average speed for the journey= Total Distance / Total Time**

|  |  |  |
| --- | --- | --- |
| Distance | Speed | Time  (Distance/Speed) |
| x | 20 kmph | x / 20 |
| x | 30 kmph | x / 30 |
| 2x |  | x/20+x/30=5x/60 |

Thus, average speed for the journey: Total Distance/Total Time

Thus, 2x /(5x/60) = (2\* 60)/5

Thus, average speed=24 kmph  
 OR

Assume the distance to be any convenient number and proceed as in second method.

**22. b**

Total monthly income of 4 family members = **2940\*4 =11760**

Total monthly income of 3 family members = **2600\*3 = 7800**

Income of the deceased member = Income of 4 members – Income of 3 members Thus, **11760 -7800=3960.**

**23. c**

Total of 8 readings = 24.3\*8=**194.4** Total of 1st 2 readings=18.5\*2=**37**

Total of next three readings=21.2\*3=**63.6** Therefore, total of 1st 5 readings= **37+63.6=100.6**

Thus, total of last 3 readings=194.4-100.6= **93.8**

Let the **6th reading be r.** Therefore, **7th reading = r +** 3 and **8th reading = r + 8**

Thus, total of last 3 readings=**r+r+3+r+8**=**3r+11.** Thus, **3r+11=93.8.** Thus,3r=82.8.Thus, **r=27.6.**

**24. d**

Let the total number of employees be **e**. Thus, number of rest of employees = **e – 12**

Thus, total salary of all the employees=**60e**. Total salary of rest of employees =**56(e-12)**

The total salary of 12 officers=**4800 Thus, 60e=4800+56(e-12) Thus, 60e = 4800+56e-672**

**Thus,4e = 4128 Thus, e = 1032.**

**25. c**

Total weight of 35 students = 35\*47.5

Let the weight of the teacher be t

Thus, total weight of teacher and students=36\*48

Thus, weight of teacher=Total weight of teacher and students – Total weight of students

Thus, weight of teacher= **1728 - 1662.5 = 65.5**

OR

The total increase in weight of all = 500gm\*36=1/2\*36=18

Thus, weight of teacher=**47.5+18 = 65.5**

**3.Basic Arithmetic**

**1.c**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Classes of number** | **Numbers in which digit 3 appears** | | **Number of numbers** | |
| 100-110  111-120  121-130  131-140  141-150  151-160  131-170  171-180  181-190  191-200 | | 103  113  123,130  131-139  143  153  163  173  183  193 | 1  1  2  9  1  1  1  1  1  1 |

**Therefore, total number of numbers = 19.**

**Note: If the question was how many “times” does the digit 3 appears then the answer would be 20 since in the number 133, the digit 3 appears 2 times**.

**2. d**

320.16  \* 320.04 = 32 0.16 +0.04 = 320.2 = (25) 0.2  = 21 =2 (Laws of indices:am \* an = am+n and (am)n = amn

3. e

The number line for a number x such that 0<x<1 is: …..x3 < x2 < x < √ x< ….

And …< x3 < x2 < x < 1/ x < 1/x2 <1/ x3 <… Since, 0<0.9<1 thus, the root has to be greater than 0.9.

**4. b**

To compare the fractions, their denominators have to be the same. Thus, L.C.M. of the denominators of the 3 fractions has to be found i.e. the L.C.M. of 8, 11 and 16. The L.C.M. of 8 and 16 is 16 and the L.C.M. of 16 and 11 is 176. Thus, the denominators of all the fractions have to converted to 176, thus,**11\*11/16\*11**, **6\*16/11\*16**, **3\*22/8\*22**. Thus, the equivalent fractions with common denominators are **121/176, 96/176, 66/176.** Thus, the largest number i.e. **the largest fraction is 121/176 and the smallest is 66/176. Thus, (121 – 66)/176 = 55 / 176 = 5/16 ( Dividing by 11) OR Divide the terms individually, compare and subtract the required fractions.**

**5. c**

Firstly, the surds in the fraction 1/(√ 3 - √ 2)have to be **rationalized** by multiplying with their conjugates √3 + √ 2. Thus, the fraction becomes:**1 \* (√3 + √ 2)/ (√ 3 - √ 2) \* (√3 + √ 2) =(√3 + √ 2)/1**

(Since,(a+b)(a-b)=a2 - b2 thus, **(√ 3 - √ 2) \* (√3 +√ 2) =((√ 3)** 2**–(√ 2)** 2)=3-2=1)Thus,**=√3 + √ 2=3.146**

**6. d**

The number divides 728 by leaving reminder of 8 means that it completely divides **720 (728-8)** and divides **896 (901-5).** Thus, the **G.C.D. of 720 and 896** has to be found:

720 = **2\*2\*2\*2**\*3\*3\*5

896 = **2\*2\*2\*2**\*2\*2\*2\*7

Thus, G.C.D. = 2\*2\*2\*2 = 16

**7. d**

109 – 10 = 1000000000 which is **divisible by 10** since the last digit is 0: **divisible by 9** since all

- 10 the sum of the digits is divisible by 9: **divisible by 11** since there are 4

999999990 pairs of 9: **not divisible by 4** since the last 2 digits are not divisible by 4.

**8. b**

The **sum, difference and the product of the multiples** of any number are **always divisible** by that number. Thus, the sum of 7 multiples of 4 is always divisible by 4. Therefore, only options left are 4 and e(all of the above). Take 2-3 different sets of sum7 multiples of 4 and see whether it is divisible by 5 (easiest number to check the condition).Eg (4+8+12+16+20+24+28 =**112** which is not divisible by 5 but divisible by 7 and 48). May be different sets of multiples are divisible by 5 (eg 20+40+60+80+100+120+140 =**560**  also divisible by 7 and 28) but the **condition is always true only for 4.**

**9. d**

Numbers that are divisible by 7 and 11 are multiples of both the numbers i.e. Common multiples. To find how many numbers are divisible by both, we just have to find the multiples of **77 (L.C.M. of 7 and 11).**The multiples of 77 that are between 100 and 300 are **154 and 231.**

**10. c**

The bells will ring together at the **L.C.M. of 21,28 and 30.** Thus, options a,b (7 and 30) are struck out. Option e(1764) is struck out since the last digit is not zero and a multiple of 30 will have a 0 at the end. Thus, of the 2 options left i.e. c and d(420 and 630), **420 is the L.C.M.**.Also,630 is not divisible by 28( Since, 630 is not a multiple of 4 thus, it can’t be a multiple of any of its multiple).

**11. a**

Refer to the solution of the **3rd sum**.

**12. d**

Square of any integer (whether positive and negative) is always positive. Test the condition for all options. Except option d, all are negative numbers.

**13. d**

Plug in a negative odd and a negative even integer and a positive odd and a positive even integer and 0. Check for the all the conditions. Only option **d** satisfies the condition all the times. **OR**

Since any integer whether odd or even multiplied with an even number is even, therefore, only option d is correct since it is multiplied with an even number i.e. 2 after addition. Option d = 2(n+1).

**14. c**

Any individual expression can be even to make the entire expression compulsorily even. Thus, either (m) or (n+o) or (p-q) can be even. In other options, the condition may/may not be true.

**15. a**

932 = (92) 16 = (81) 16  which means that no matter whatever is the answer, the last digit will be 1. Any number having last digit as 1, when divided by 5 will give the remainder 1. Eg.11,21,31 etc…

**16. b**

Let the two numbers be x and y. Thus, as per the 1st condition: **x + y = 27**

As per the 2nd conditon : **x2 – y2= 243**. Thus, **(x + y) (x –y) = 243**. Thus, **27(x-y)=243**.Thus, **x – y = 9.**

**17. c**

Firstly, divide 15463 by 107. The **remainder is 55.**  The least number divisible by 107 is 107. Thus, 52 must be added to make the number 107.

**18. e**

**1st method:** Dividend = (Divisor) \* (Quotient) + (Remainder) Let the quotient be 1 thus, the number = 221\*1 + 64 = **285**. Dividing 285 by 13 we get remainder 12. Check for 2-3 different quotients.

**2nd method:** 221 is a multiple of 13. Thus, just divide the remainder 64 by 13 to get the remainder.

**19. e**

We have to find the G.C. D. or the H.C.F. of (38 – 2), (45-3) & ( 52 – 4) since the required number divides these numbers by leaving the mentioned remainders. Thus, the H.C.F.of 36, 42 and 48 is **6.**

**20. e**

Let the two positive integers be x and y. Thus, **x+y= 24** and **x2 – y2= 48.** Thus, (x+y)(x-y)=48. Thus, 24(x-y)=48. Thus, **x-y= 2**. Solving equations 1st and 2nd simultaneously or substituting the value of either x or y in either of the equations, we get x=13 and y=11. Thus, their product = 143.

**21. a**

The no. of cards can be 100, 101, 102 , ….110.According to the 1st condition, if the no. is divided by 3, the remainder is 2. Thus, the no. could be (**101, 104, 107, 110)**. According to the 2nd condition, if the no. is divided by 4, the remainder is 1. Thus, the no. could be (**101,105,109)**. The no. has to be common in both the sets. Therefore, the no is **101**.

**22. b**

Least no. that can be removed means the remainder is to be found when 969 is divided by 7.

**23. c**

Refer to the solution of the 1st problem.

**24. b**

The 3 consecutive odd integers can be written as x, x+2, x+4. Thus, x +(x+2)+(x+4)=39. Thus, 3x+6=39 Thus, x = 11.Thus, the 3 consecutive odd integers are 11,13 and 15. The sum of the next consecutive odd integers = 17+19+21 = 57. **OR** After finding x = 11, directly add 6,8 and 10 to it to find the next consecutive odd integers i.e. 17,19 and 21. **OR Since the sum is 39, the average is 13.**Thus, 13 is the 2nd of the consecutive integers. Thus, the other are 11 and 15. Then, the next 3 are 17,19 and 21.

**25. d**

The no. of stacks has to be equal, i.e. the no. of rows of 3-chip and 4-chip stacks have to be the same. Therefore, in 1 row 7 chips can be arranged. Therefore, divide 125 by 7 to find the remainder i.e. the no. of chips that have to be removed.

**4. Co- ordinate Geometry**

**1. b**

The distance formula is : **√(x2 – x1) 2 + ( y2 –y1 ) 2**Thus, √(7-3) 2 + (5-2) 2  = √(4) 2 + (3) 2  = √(5) 2 **= 5 units**

**Note:**It doesn’t matter which co-ordinates are taken as **( x1, y1  ) ( x2, y2 ). Just make sure you stick to it.**

**2. a**

The centroid formula i.e. the co-ordinates of a centroid of a triangle with vertices **( x1, y1  ) ,( x2, y2 ), ( x3, y3  )**

**is given by : G =( (x1 + x2 + x3 ) /3) ,((y1 +  y2 +  y3 ) / 3).** Substituting the given values in the above formula we get, **4= (y+2+3)/3** Thus, y= 12-5 **Thus, y=7.**

**3. c**

Area of a triangle in a co-ordinate system is given by: **1/2 1 x1  y1  = 1/2 [ 1(x2 y3 - x3 y2 )- x1(y3 - y2 )+ y1**

**Thus, substituting the values, we get 1 x2  y2  (x3 - x2) ] (Determinate) Substituting, the values we get : 1 x3  y3**

½ [(-9\*-5) – (-3\*-3)-5(-5-(-3)) + 2(-3-(-9))]

= ½ [(45-9)-5(-2) + 2(6)] = ½(36+10+12) = ½ ( 58) **= 29 sq. units. OR Heron’s formula** can be used too:

**√s (s-a)(s-b)(s-c) where a,b,c are the lengths of the sides and s is semi-perimeter i.e. s = (a+b+c) /2.**

**4. e**

Refer to the solution of the 2nd sum for formula and substitute the values. Let the vertices of the third vertex be a and b. Thus, 5/3 = (2+4+a)/3 and 5/3 = (4+(-2) +b)/3 Thus, a = 5 – 6 and b = 5 – 2 **Thus, a=-1 and b=3.**

**5. e**

To find the point of intersection, just solve the equations by simultaneous or substitution method to get the values of x and y.

**6. a**

The equation of line is given by these formulae: **y=mx+c** where c is the y-intercept and m is the slope of the line and **(y-y1)=m(x-x1)** where m is the slope of the line**{m=(y2-y1) / (x2-x1)}** and **(**x1, y1 ) are the co-ordinates of 1 of the points. Substituting the values in the 2nd formula, we get (y-2)=1/2(x-3) (m=0.5 or ½) **Thus, 2y=x+1**. **OR** To use the 1st formula, we need c i.e.the y-intercept. To find c, substitute the co-ordinates of the given point in the 1st formula. Thus, 2=1/2(3)+c Thus**, c=1** Thus, y=1/2(x)+1 Thus, **2y= x+1**.

**7. a**

Since the point of intersection between the given line and the x-axis is asked, the point will have y-co-ordinate as 0. There is only one option that satisfies this condition i.e. option a.

**OR** Find the equation of the line using the formula: **(y-y1)=m(x-x1)** Thus, substituting the co=ordinates in the equation we get: (y-(-5))=-1/2(x-3) **Thus, the equation for the given line is: 2y = -x -7** Now, since the point of intersection lies on the x-axis, therefore the y-co-ordinate is 0**. Thus, 2(0) = -x -7 Thus, x= -7 and y=0.**

**8. a**

To find the distance of a point (x1,y1) from the line of the form: ax+by+c=0, the formula is**: ax1 + by1 +c**

Thus, substituting the given values, we get: x1 **=0 and** y1 **=0 since the point is the origin √a2 + b2**

and a=3,b=-4 and c=-15. Note: The answer is the absolute value. Distance can’t be negative.

**9. a**

**1st method**: Find m(slope) i.e. -10/10 =-1 :Using the equation: **(y-y1)=m(x-x1)** We get (y-0)=-1(x-10) Thus,

y=-x +10 Thus, x + y =10. **Or** The formula **y=mx+c** could be used since the y-intercept is 10(B= 0,10 means that the line intersects the y-axis at point B) Thus, y = -1(x)+10 Thus, y=-x+10 Thus, x+y=10.

**10. a**

Formula for slope of a line: **m=(y2-y1) / (x2-x1)** where m is the slope of the line and x1, y1 and x2, y2 are co-ordinates of the points. The co-ordinates of the line are (-3,7) and (0,-2){Since the y-intercept is -3 thus the x-co-ordinate i.e. the abscissa will be 0} Substituting in the formula we get: m= (-2-7)/(0-(-3)) Thus,

m=-9/3 Thus, m=-3. or m= (7-(-2))/(-3 -0) Thus, m=9/-3=-3. **Note: It doesn’t matter if either of the points is taken as** x1, y1 or x2, y2. **Just be careful to stick with the option i.e don’t interchange** x1, with x2 **or** y1 with y2.

**11. b**

Just plot the points on an imaginary co-ordinate system. And check for the properties of the quadrilateral. Whether the sides are congruent i.e. the distances between the co-ordinates have to be equal and to check if it is a square or rectangle, check if the adjacent sides make right-angles i.e if the slopes are negative reciprocals of each other. To see if the opposite sides are parallel, check if the slopes of the sides are equal. On checking the conditions, it can be seen that the opposite sides are congruent and parallel but the adjacent sides don’t make right angles. Thus, it’s a **parallelogram**.

**12.a**

Just draw a hypothetical figure. Draw the median from vertex C. As can be seen in the figure, co-ordinates of C could thus be found out. The X-co-ordinate is the distance from the Y-axis i.e. **2a** and the Y-co-ordinate is the distance from X-axis i.e.+/- **√3a** (using the 300-600-900 theorem or Pythagoras theorem) **(For diagram refer to the end of this chapter i.e. after the 25th problem’s solution)**

**13. b**

Area of triangle=1/2\*b\*h. 12 units is the length of the base. To find the height, the formula used in the 8th sum is to be used. Here, a=3, b=7,c= -12, : x1 **=3 ,**y1 **=-5.** Thus, height= 38/ **√58** and area=1/2\*12\*38/ **√58**

**14. a**

Area of square = s2  To find the side of the square, use the distance formula to find the length of the side. Thus, s= √(6-0) 2 + (0-(-8)) 2  Thus,**s2 = 62+ 82 = 36+64=100 sq. units.**

**15. d**

The points are collinear means that they lie on the same line. Thus, slope formula could be used:

**(y2-y1) / (x2-x1) = (y3-y2) / (x3-x2) .** Thus, substituting the values we get, **(2-5) / (-7-2) = (3-2) / ( A –(-7))** = **-3/-9 = 1/(A+7)** Thus, A+7 = 3 Thus, **A=-4**.

**16. a**

**Area of trapezium = ½ (b1 + b2) \* h** where b1 and b2 are the lengths of the parallel sides and h is the height between the 2 parallel sides. Lengths of the parallel sides are given. To find the height, use the formula of the perpendicular distance between the parallel sides: **If the parallel sides are given by the equation:**

**ax + by +c1= 0 and ax + by +c2= 0 then the perpendicular distance=** **c**1 **+ c**2

**√a2 + b2**

Dividing the second equation by 2 and arranging it will give: 3x + 4y -10=0 and the 1st equation is 3x+4y-15=0. Thus, a=3,b=4 and **c**1 **=-15 and c**2 =-10. Thus, the height =1. Thus, the area= ½ (6+8)\*1= **4 sq. units**.

**17. d**

Just plot all the points given in the problem as well as in the options. On joining the points, it could be seen that only option d i.e.(-2,8) cannot be one of the vertices of the rectangle.

**18. d**

To find the answer, just substitute the values of x and y from the options and see which of the options gives R.H.S = L.H.S.. Suppose, the co-ordinates are 6,6 then L.H.S. = 6 but R.H.S. = 3 \* 6 + 4 = 22 which is not equal to the L.H.S. Only option D satisfies the equation i.e. 3(-2) +4 = -2 which is equal to y = -2.

**19. d**

The formula for equation of line : **(y-y1)=m(x-x1)** will give the equation. If  **y=mx+c** is to be used, c must be found. To find c, substitute the value of m=4, and x= 5 and y= -2 (Given co-ordinates). Thus, c= -22.

**20. b**

Plotting the points on an imaginary co-ordinate system will show that the triangle formed is a right-angled triangle. Thus, the formula **Area of a triangle = ½ \*b\*h** can be used. Base = 4 units and Height = 4 units.

**21. a**

Since the line is parallel to y= 4x+3, it must be of the form y=4x + c. To find c, just substitute the values of m=4(Slope of the lines) x=3 and y=4. Thus, c= -8. Thus, the equation is y = 4x -8.

**22. e**

Plotting the points on an imaginary co-ordinate system will show that the triangle formed is a right-angled triangle. Thus, the formula **Area of a triangle = ½ \*b\*h** can be used. Base = 8 units and Height = 6 units.

**23. a**

Either the formula **(y-y1)=m(x-x1)** or  **y=mx+c** could be used to find the equation of the line. In both the cases m (Slope) is to be found outusing the formula: **m=(y2-y1) / (x2-x1) .** Thus, m= 1. Using the first formula:

(y-3)=1(x-1) Thus, y= x+2. **Note: the second point (5,7) also could be used.** To use the 2nd formula, **c** would have to be found out as in earlier examples (eg. 9) and then substituted in the formula.

**24. b**

Since the line passes from the origin, and it makes an angle of 450 with the x-axis, x and y co-ordinates of the points would be equal. Thus, the equation of the line would be y=x. **Note:** Other option would be to plot few points and find the slope (**which in this case will be 1)** and use either of the formulae for equation of line.

**25. e**

On joining the vertices of the quadrilateral, it could be seen that it’s a parallelogram (opposite sides are parallel and congruent). Thus, formula for the area of a parallelogram i.e**. b \* h**. Base= 8 units and height = 4 units . Thus, area = 8\*4=32 sq. units.

**Percentages / Profit & Loss**

1. **c**

**Note for percentage sums, one could always use the following relation to find the required quantity or amount:**

**Actual Obtained / Requisite amount / quantity = Obtained / Requisite Percentage**

**Actual Total Amount / Quantity 100**

The minimum marks for passing is **27.** Thus, using the above relation, we get: 27/? = 36/100.

1. **d**

Suppose, B earns Rs 100, A earns Rs 125. Therefore, the difference in their income is Rs 25.

Thus, to compare the income difference with reference to A’s income, we get: 25/ 125 = ? / 100.

1. **b**

Since one of the two candidates gets 42%, thus the other candidate gets 58%. Thus, the winning / losing margin is 16%. Thus, 16 / 100 = 368 / ?.

1. **d**

Suppose the man has Rs 100. Thus, the bifurcation is as follows:

100

Wife- Rs 30 Remainder – Rs 70

Son – Rs 28 Remainder- Rs 42 ( 70-28)

Daughter 1 Daughter 2 Daughter 3

Rs 14 Rs 14 Rs 14

**Therefore: Assumption Actual**

**Daughter 14 224**

**Wife 30 ? Thus, wife = 480**

1. **d**

Suppose, if the original price of the sugar is Rs 10 therefore, reduction = Rs 1. Thus, new price = Rs 9.

Therefore, to get back to the original price, the price must be increased by Rs 1from Rs 9.

**Thus, 1 / 9 = ? / 100**

1. **e**

**Note: To calculate profit or loss percentage, it is important to know the C.P. , unless it is mentioned in the question as Profit / Loss Percentage =[ (Profit / Loss) / C.P.] \*100**

**Therefore: Assumption Actual**

**Cost price 100 ?**

**Selling price 90 45 Therefore, C.P. = Rs. 50 Therefore, profit = Rs. 15**

**Therefore, profit / gain percentage = (15 / 50) \* 100.**

1. **b**

Suppose, the S.P. of 1 mango is Rs. 10. Thus, the total S.P. of 150 mangoes = Rs 1500

Therefore, profit = Rs 300 and C.P. = S.P. – Profit = 1500 – 300 = 1200

Thus, profit percentage = (300 / 1200) \* 100 = 25%

1. **a**

Since the company gives a spoon of Rs 1.8 free, it has to bear the cost of the free spoon and thus the **actual S.P. is Rs 13.2** ( 15 - 1.8) which is inclusive of 10% profit. **Therefore: Assumption Actual**

**Cost price 100 ?**

**Selling price 110 13.2**

1. **a**

Suppose, if the price per ticket is Rs. 10 and number of visitors is Rs. 100, Then:

Price per ticket \* Number of visitors = Total Collection / Total Receipts

Original: 10 \* 100 = 1000

New: 12 \* 90 = 1080

Therefore using the formula for % change: [**Change (Increase / Decrease) / Original ] \*100 , we get: (80/1000) \* 100 = 8%**

1. **. c**

Let the cost of 1 kg sugar be **Rs 10** Therefore, after 1 year the cost become Rs 11 and then after the next year the cost becomes **Rs 12.1** ( It increases at the rate of 10% EVERY YEAR) Thus, the total change(increase) in the cost is **Rs 2.1**. Thus, % increase = 2.1 / 10 \*100

1. **. c**

Marks percentage of A exceeds that of B by : **50** ( 625 – 575) / **575** ( B’s marks) \* **100**

1. **.b**

Let the **original price per kg of sugar be Rs x.** Thus, the **original quantity bought was (100/ x) kgs**

[100= Price per kg \* Total sugar bought]. According to the condition, for Rs 100 a person could buy 5kgs more because of the reduced rate. Thus, **New price \* New quantity = 100.**

**Thus, (4x/5) \* ( 100/x + 5) = 100 Thus, x = Rs 5**

1. **.b**

Suppose the man has Rs 100, then 100

Balance – Rs 30 (

House rent- Rs 25 Food – Rs 45

Son – Rs 28 Remainder- Rs 42 ( 70-28)

Daughter 1 Daughter 2 Daughter 3

Rs 14 Rs 14 Rs 14

**Therefore: Assumption Actual**

**Daughter 14 224**

**Wife 30 ? Thus, wife = 480**

**14. c**

Refer to the 1st sum: 300 / ? = 60 / 100

**15. d**

**(18 / 100) \* x = (90/100) \* y. Thus, x = 5y Therefore, (60 / 100) \* x = (60/100) \* (5y) Thus, 60% of x = 3y. Thus, (3y / y) = 300 % of y.**

**16. b**

Let the **original price and quantity be x and y**. Thus, the increased price = (x+25% of x) = x+ x/4=**5x/4**

Let the reduced quantity be a. Thus,**(x)(y)= (5x/4)(a)** Thus, **a = 4y/5 i.e the new reduced quantity=4/5 or 80% of the original quantity.Thus, the reduction = 1/5 or 20 % of the original quantity.**

**17. b**

In all the team would play **52** games in the season. Thus, to make the winning percentage 75, it **must win 39** games (75 / 100 =? / 52). Of the total 39, it has already won 30 and thus needs to win **9 more**.

**18. d**

1/3rd of 4800 are officers i.e. **1600 are officers and 3200 are other employees**. Thus, if ½ of the officers are reduced, their number comes down to **800** **and the entire strength reduces to 4000(4800 – 800)**. Thus, percentage of officers to remaining employees is: **(800/4000) \* 100 = 20%.**

**19. e**

Suppose, the vendor begins with 100 apples, then between the opening and the noon, he **sells 40 apples and 60 apples remain.** Now, of the remaining 60 apples, he sells **36 apples(60/60 \*100). Thus, in all he sells 76 apples(40 + 36).Thus, percent sold ( 76 / 100 \* 100).**

**20. b**

1st method: 8% is subtracted from x means **x – (8/100)x = x – 0.08x = 0.92x.**

2nd method: 8 % is subtracted means that 92 % remains. Thus, **92 % means: (92/100)\* x = 0.92x.**

**21. a**

For sums of this kind, use the formula: (P% \* L%) / 100 = 20\*20/100= 4% OR

1st transaction: S.P. C.P. 2nd transaction: S.P. C.P.

924 ? 924 ?

120 100 80 100

Therefore, the C.P. of the 1st camera = 770 and the C.P. of the 2nd camera = 1155

Thus, the total C.P. of the transaction = 1925 and the total S.P. = 1848 (924 \*2)

Thus, loss = 77 (1925 – 1848) thus, % loss = (77 / 1925) / 100 = 4%

**22. c**

C.P. of each egg = p/12 cents and S.P. of each egg = p/4 Thus, the profit per egg=p/4 – p/12= 2p/12 = p/6

Thus, P% =( (p/6) / (p/12) ) \* 100 = 200% **OR**

The S.P. per dozen = 3p ( p/4\*12) and C.P. = p Thus, Profit = 2p Thus, P% = (2p/p) \* 100=200%

**23. c**

There are 2 situations in the sum: Actual and Hypothetical. Suppose:

Actual Hypothetical

If C.P. = Rs. x C.P.= x- 25% of x=x-x/4=3x/4

S.P. = 5x/4(x+25% of x) S.P.= 5x/4 - 25

Profit = x/4 **Profit = S.P.- C.P.= 25% of C.P.**

**Thus, (5x/4 – 25) – 3x/4 = ¼ (3x/4) = Solving the equation, we get x = 80**

**24. a**

Let the number of electronic items be 100 Thus, refrigerators = 60 and defective refrigerators = 5 % of 60

Thus, defective refrigerators = 3 Thus, overall %= 3 / 100 \* 100 = 3%.

**25. e**

Let the number of T.V. be t and that of refrigerator be r.

Thus, 150t+90r = 2910 and t = r+5 Substituting these values in the 1st equation we get: **150(r+5)+90r = 2910**

Thus, r = 9 and t = 14 Thus, total number = 23

**Probability**

* **Permutation (Orderly arrangement)**

n*P*r = m1c, where *r* is the size of the subgroup taken from a set with *n* elements.

**Note**: **0! = 1**

* **Combination (Selection/Choice)**

n*C*r  **=** m1c, or *nPr* /*r*!, where *r* is the size of the subgroup taken from a set with *n* elements.

* **Probability**probability=

Probability of an event **= n (E) i.e. Number of required events / Favourable Outcomes**

**n (S) Number of Sample Space / Total Outcomes**

* **The Range of Probability**

The probability, *P*, of any event occurring will always be **0 ≤ *P* ≤ 1**. A probability of 0 for an event means that the event will *never* happen. A probability of 1 means the event will always occur. For example, drawing a green card from a standard deck of cards has a probability of 0; getting a number less than seven on a single roll of one die has a probability of 1.

Thus, you can automatically eliminate any answer choices that are less than 0 or greater than 1.

* **The Probability That an Event Will *Not* Occur**

i.e **P(E)= 1-P (E’)**probabilityan

* **Probability and Multiple Events**

The probability of both the events occurring is the product of the probabilities of the events i.e.

***P*(*A*) m1c*P*(*B*),** where *P*(*A*) is the probability of the first event and *P*(*B*) is the probability of the second event.

The probability of one of the two events occurring is the sum of the probabilities of the events i.e.

***P*(*A*) + *P*(*B*),** where *P*(*A*) is the probability of the first event and *P*(*B*) is the probability of the second event.

**Note:**

* **When you come across “and”, multiply the probabilities.**
* **When you come across “or”, add the probabilities**.
* **Multiplying** probabilities that are less than 1 (or fractions) always gives an answer that is **smaller** than the probabilities themselves and **adding** probabilities always gives an answer that is **greater** than the probabilities themselves.
* The first step to find the probability is to find the sample space i.e. the total number of events. Then, one should proceed to find the number of favourable occurrences.
* When there are many combinations of an event or occurrence, take the counter probability i.e. **P(E) = 1 – P(E’)**.

1. a

Sample Space (Total number of arrangements of letters): 9P9 = 9! (9 letters can be arranged in 9! ways)

**For the first place, the number of events** = 3*P*1 = 3 and for the last place, the number of events = 2*P*1 = 2

and for the 7 places in between, the number of events = 7*P*7 = 7!( 6 consonants + 1 vowel). Thus, the probability = (3 \* 2 \* 7!) / 9!.

**OR**: The probability that the word would start with a vowel = 3/9 and the probability that it would end with a vowel = 2/8. Thus, the required probability = 3/9 \* 2/8 = 1/3 \* ¼

1. **e**

Probability of 3 language papers not being consecutive = 1 – Probability of 3 papers being consecutive.

**Sample Space= 7!.(In the absence of any condition, the 7 papers can arrange themselves in 7! Ways).**

**Event**: Consider the 3 language papers to be 1 paper. Therefore, 5 (4 non-language+ 1{set of language papers}) papers could be arranged among themselves in 5! ways and the 3 language papers can arrange themselves in 3! ways. Thus, the probability that 3 language papers are consecutive= (5!3!)/ 7! = 1/7. Thus, the required probability = 1 – 1/7.

1. **d**

**Sample Space=** n*C*r  **=** 100*C*2 **.**

**Event:** n*C*r  **=** 10*C*2

**25**

**10**

Tea∩Coffee∩Milk

Milk

Coffee

Tea

**5**

5

0

0

15

Tea∩Coffee

Tea∩ Milk

Coffee∩Milk

Thus, probability = 10*C*2

100*C*2

1. **b**

Probability that the room is lighted by at least 1 bulb=1- Probability that the room is dark.

**Sample space**: 12*C*3

**Event that the room is dark means all the 3 bulbs have to be chosen from the defective bulbs** :  6*C*3

Thus, the required probability = 1-(6*C*3 / 12*C*3)

1. **c**

**Sample space** : 11*P*11 = 11!

**Event** : 3 Americans can be arranged in 9*P*3 and 8 Indians can be arranged in 8! ways.

**A** I **A** I **A** I **A** I **A** I **A** I **A** I **A** I **A (**There are 9 likely positions where the Americans can be placed without being together). Thus, the required probability = (9*P*3  \* 8!) / 11!

1. **a**

**Sample Space**: 7*P*4 (Without any condition, the 7 digits can be arranged into a number of 4 digits in this way)

There are 2 cases in which the number would be greater than 3400:

**Case I** : The number starts with the digit 3 OR **Case II** : The number starts with digits greater than 3

Options for Thousand’s place: 1(3) 4 ( 4,5,6,7)

Options for Hundred’s place: 4 (4,5,6,7) 6 ( 1,2,3 plus 3 left)

Options for Ten’s place: 5 (1,2 plus 3 left from the above) 5 (Digits left )

Options for Unit’s place: 4(Digits left ) 4 (Digits left)

Thus, event: 1 \* 4 \* 5 \* 4 + 4 \* 6 \* 5 \*4

7*P*4  7*P*4

1. d

**Sample Space** : 63 = 216. If B has to win the game, then B must get a total of 17 or 18 which can happen in the following ways(**Events**): Total of 17 = (6,6,5) or (6,5,6) or (5,6,6) or Total of 18 = (6,6,6).

Thus, the number of events = 1+1+1+1 = 4. Thus, the probability = 4 / 216.

1. d

**Sample Space**: 64 .

Event: 2<=Face value<=5. Thus, there are 4 face values(2or3or4or5) that are applicable.

Thus, probability = 44 / 64 = (4/6)4 = (2/3) 4

1. e

**Sample Space** : 16*C*3

Event : 12*C*3 Thus, probability = 12*C*3 / 16*C*3

10. e

**Sample Space**: **25\*25** =625 (A has 25 choices and B has 25 choices)

**Event**: A and B can win only if the numbers both choose match. This can happen only in **25 cases**{(1,1)or (2,2)or(3,3)or …….(25,25)} . Thus, they won’t win in 600 cases (625-25) Thus, probability = 600/625=24/25

**OR**: In one turn, A and B could win only in one case i.e. if both choose the same number. Thus, out of 25 numbers, 24 numbers would not lead to their victory. Thus, 24/25.

11. b

**Sample Space**: 63 **Event**: The total required :16 {(6,6,4)or(6,4,6)or (4,6,6) or(6,5,5)or(5,5,6)or (5,6,5}or 17{(6,6,5) or (6,5,6) or (5,6,6)} or 18{(6,6,6)} . Thus, total number of events=6+3+1=10. Thus, probability=10/ 63 = 5/108.

1. **a**

**Sample Space** : 16*C*3

Event : 5*C*3 Thus, probability = 5*C*3 / 16*C*3

1. **c**

**Sample Space**: 62 **Event:** (2,2) or (3,3) or (4,4) or (5,5) or (6,6). Probability = 5/36

**Note:** **Option C is wrong. It should be 5/36 and not 5/14.**

1. **d**

**Sample Space** : 100*C*1

**Event**: 86*C*1 (14 numbers out of 100 are divisible by 7) Thus, probability= 86*C*1 / 100*C*1

1. **b**

The probability that the 1st letter would go in the correct envelope is : ¼ And

The probability that the 2nd letter would go in the correct envelope is : 1/3 And

The probability that the 3rd letter would go in the correct envelope is; ½ And

The probability that the 4th letter would go in the correct envelope is :1/1. Thus, the probability that all the letters would go into the right envelope is : ¼ \* 1/3 \* ½ \* 1/1 = 1/24

1. **There is a problem in the framing of the sum. So, no answer to it.**
2. **e**

Any number formed with all the 5 digits without repetition would be divisible by 9 (The divisibility test of 9 is to check whether the digits of the number add upto a multiple of 9). Thus, the probability is 1, since the required event = the sample space.

1. **a**

The probability of choosing a particular bag from the 2 bags is ½ .

The probability of choosing a black ball from the 1st bag is 2*C*1 / 5*C*1 and the probability of choosing a black ball from the 2nd bag is 3*C*1 / 5*C*1 . Thus, the required probability is ½ (2*C*1 / 5*C*1 + 3*C*1 / 5*C*1 )=1/2 ( 2/5 +3/5)

1. **d**

**Sample Space** : 100*C*1

**Event**: 89*C*1 (11 numbers out of 100 are divisible by 9) Thus, probability= 89*C*1 / 100*C*1

1. **a**

**Sample Space**: 52*C*2

**Event**: For a king: 4*C*1  and for a queen 4*C*1. Thus, the required probability = (4*C*1 \*  4*C*1 ) / 52*C*2

1. **a**

**Sample Space**: 25*C*4

**Event:** Exactly 2 doctors can be selected from 4 doctors in 4*C*2 ways and the other 2 members can be selected from the remaining 21 members in 21*C*2 ways. Thus, the required probability= (4*C*2 \* 21*C*2 )/ 25*C*4

1. **d**

**Sample Space**: 8!

**Event**: 5 \* 3 \* 6! (1st place \* 2nd place \* 6 places) Thus, probability = (5\*3\*6!) / 8!

OR : 5/8 \* 3/7 (Probability of 1st alphabet of being a vowel and the probability of the last place being a consonant). **Note:** **For detailed elucidation see the solution to the 1st question of this chapter.**

1. **b**

**Sample space** : 9*P*9 = 9!

**Event** : 3 girls can be arranged in 9*P*3 and 6 boys can be arranged in 6! ways.

Thus, the probability is (9*P*3 \* 6!) / 9!.

**Note:** **For detailed elucidation see the solution to the 5th question of this chapter.**

1. **c**

**Sample Space for the 1st ticket** : 20*C*1 and **Sample Space for the 2nd ticket** : 19*C*1

**Event for the 1st ticket** : 10*C*1 and **Event for the 2nd ticket** : 9*C*1

Thus, the required probability is:( 10*C*1 /20*C*1) \* (9*C*1 \* 19*C*1 )

1. **a**

There would be too many possibilities of the problem being solved. The problem is solved if:

Only A or Only B or Only C or A and B or B and C or C and A or A and B and C solve it.

Thus, to avoid tedious calculations: **Probability (problem is solved) =1- Probability (Problem not solved)**

Thus, the probability of the problem not being solved=Probability that none of A, B and C solves it.

Thus, the probability that neither A nor B nor C solves it, as follows:

‘A’ not solving : 1 – Probability of A solving = 1-1/3 = 2/3

‘B’ not solving : 1 – Probability of B solving = 1-1/2 = ½

‘C’ not solving : 1 – Probability of C solving = 1-1/4 = ¾ .

Thus, the probability that none of A, B and C solves it = 2/3 \* ½ \* ¾ = ¼

Thus, the probability that the problem is solved = 1 – ¼ = ¾

**Progression**

**Formulae for Arithmetic Progression**:

**nth Term**=**Tn = a + (n – 1)d** where a is the 1st term, n is the number of term and d is the common difference

**Sum of n terms**=**Sn** = **n/2 ( a + l )** where a is the 1st term and l is the last term or S**n** = **n/2 ( 2a + (n-1) d)**

**Common difference** = **Tn - Tn – 1 = Tn - 1 - Tn – 2** For e.g. **T3 – T2 = T2 - T1.  Thus, T3 + T1 =** 2**T2 Thus, T2** =**(** **T3 + T1** **) /2**

**Note: d could be negative or positive and less than 1 or greater than 1.**

**3 terms in an A.P. :a-d, a, a+d**

**4 terms in an A.P. :a-2d, a-d, a+d, a+2d**

**5 terms in an A.P. :a-2d, a-d, a, a+d,a+2d**

**Formulae for Geometric Progression**:

**nth Term**=**Tn= a \* rn-1** where a is the 1st term, n is the number of term and r is the common ratio

**Sum of n terms**=**Sn** = **(a( rn - 1) / (r – 1)) if r > 1**

**Sum of n terms**=**Sn** = **(na) if r = 1**

**Sum of n terms**=**Sn** = **(a(1 - rn ) / (1 - r)) if r < 1 and n is finite**

**Sum of n terms**=**Sn** = **(a / (1- r)) if r < 1 and n is infinite**

**Common rato** = **Tn /Tn – 1 = Tn - 1 /Tn – 2** For e.g. **T3 / T2 = T2 /T1.  Thus, (T2 ) 2 = T3 \* T1**

**Note: r could be less than 1 or greater than 1 and positive or negative.**

**3 terms in a G.P. :a/r, a, ar**

**4 terms in a G.P. :a/r3, a/r, ar, ar3**

**5 terms in a G.P. : a/r2, a/r, a, ar, ar2**

**Formulae for Harmonic Progression**:

**nth Term** = **Tn = 1 / (a + (n – 1)d)**

where a is the 1st term, n is the number of term and d is the common difference of the denominator.

1. **a**

**Sn** = **950**, **a = 2, d = 3 Thus, 950 = n/2 ( 2\*2 + (n-1)3). Thus, 950 =n/2(4 + 3n-3) Thus, 1900=n(3n+1). Thus, 1900=3n2** **+ n. Just plug in the values to get L.H.S. = R.H.S. or solve the quadratic equation to find positive roots.**

1. **b**

a= ¾ , n = 9, d = -1/12 Thus, **Sn** =9/2(2\*3/4 + (9-1)(-1/12))

1. **c**

Since the nth term is (4n+1) Thus, 1st term= (4(1) + 1)= 5 and the 15th term = (4(15)+1)=66

Thus, **Sn** =15/2 ( 5 + 66)

1. **d**

Solve the sum first. (a-d)+a+(a+d)=27. Thus, 3a=27. Thus, a = 9. Therefore, the 3 terms are (9-d) + 9+ (9+d)

(9-d)\*9\*(9+d)=504. Thus, (9**2** – d**2**) = 56 Thus, d**2**=25. Thus, d= +/- 5 Thus, 1st term=4 or 14

1. **e**

**Sn** = **306**, **a = 9, d = 3 Thus, 306 = n/2 ( 2\*9 + (n-1)3) Once you get a quadratic equation, just substitute the values to get L.H.S. = R.H.S. or solve the quadratic equation to find positive roots as in the 1st sum.**

1. **b**

Solve the product first. a/r \* a\* ar = 1728. Thus, a**3**=1728 Thus, a =12 Thus, the terms are 12/r, 12 and 12r

Thus, 12/r + 12 + 12r = 38. Thus, 6+6r+6r**2** = 19r. Thus, 6r**2**-13r+6 = 0 Solving, we get r = 2/3 or 3/2 Thus, 1st term = 8 or 18.

1. **a**

Solve the product first. a/r \* a\* ar = 216. Thus, a**3**=216 Thus, a =6 Thus, the terms are 6/r, 6 and 6r

Thus, 6/r + 6 + 6r = 19. Thus, 6+6r+6r**2** = 19r. Thus, 6r**2**-13r+6 = 0 Solving, we get r = 2/3 or 3/2 Thus, 1st term = 4 or 9.

1. **a**

**Sn** = **155**, **a = 2, l = 29 Thus, 155=n/2(2+29)**

1. **b**

**Sn** = **600**, **n = 15, d = 5 Thus, 600 = 15/2(2(a)+(15-1)5)**

**10. a**

Let the middle 3 terms be **T11 ,T12 ,** and **T13** and the last 3 terms be **T23 , T22 ,** and **T21** . Thus:

**T11** = a + 10d , **T12** =a + 11d, **T13** =a + 12d Thus, a + 10d +a + 11d + a + 12d = 144. Thus, **3a + 33d = 144**

**T23** =a + 22d, **T22** =a + 21d, **T21** =a + 20d Thus, a + 22d +a + 21d + a + 20d = 264. Thus, **3a + 63d = 264**

Thus, solving both the equations, we get, a = 4 and d = 4. Thus, **T16** =a + 15d = 4 + 15(4) = 64.

**11. a**

**It’s a G.P. since the terms are in common ratio. Sn** = **341**, **a = 1, r = 4. Thus, 341=1(4n - 1) / 4-1**

**Thus, 341 = (4n - 1) / 3. Thus, 1023 = 4n - 1. Thus, 1024 = 4n .**

**12. e**

**n = 21, d = 3/2 , a = 5/2 Thus, Sn** = **21/2 ( 2(5/2) + (21-1) 3/2) = 21/2 (5+30) = 21/2 \* 35**

**13. a**

**n = 74, d = 4 , a = 3 Thus, T74** = (3 + (74-1)4) = 3+ 73(4)=3+292

**14. c**

Man’s total earning = Basic Pay + Total Increment. Basic Pay = 6\*30000 = **180000**

**Total Increment is in an A.P., where a = 0, d = 750** (1500 p.a. means 750 per 6 months), **n=12**(Since his salary increases in every 6 months) Thus, total increment (**S12** )= 12/2 (2\*0+(12-1)750) =6\*8250=**49500**

Thus, total salary = **180000 + 49500**

**15. b Note**: The 2nd term is 9 and not 8

**It’s a G.P. since the terms have common ratio.** **a = 3, r = 3, n = 6. Thus, S6** =3(3**6** – 1 ) / 3-1.

Thus, 3(729-1)/2 = 3(728) / 2 = 3 \* 364

**16. c**

**It’s a G.P. since the terms have common ratio. a = 1, r = ½ , n = Infinite. Thus, Sn = 1 / (1- ½ ) = 1 / ( ½ )**

**17. a**

**It’s a G.P. since the terms have common ratio. a = 4, r = 4 , n = 10. Thus, T10 = 4(**4**10-1** ) =4(4**9** ) = 4**10**

**18. c**

Let the 3 terms be a-d, a, a+d. Thus, a-d + a + a+d = 24. Thus, 3a = 24. Thus, a = 8. Thus, the terms are:

8-d , 8, 8+d. According to the condition, 6-d, 4, 4+d are in G.P. Thus, 4**2** =(6-d)+(4+d)=16=24+6d-4d-d**2**

Thus, d**2** -2d - 8=0 Thus, d = 4 or -2. Thus, 1st term = 4 or 10.

**19. d**

In this case, let a be the 1st installment and d be the difference between 2 installments.

**Total sum of all the installments**: **S40** = **3600**, **n = 40. Thus, 3600 = 40 / 2(2a+(40-1)d)**

**Sum paid in installments :S30** = **2400**, **n = 30. Thus, 2400 = 30/2(2a+(30-1)d).**

**Thus,3600=20(2a+39d) and 2400=15(2a+29d). Solving both the equations, we get a = 2 and d=2.**

**20. b**

The terms of the A.P. end in either 3 or8. 310 ends in 0 and hence cannot be a term of the A.P..

1. **c**

a =1**. T3** =(1)r**2** and **T5** =(1)r**4** Thus, = (r**4** + r**2**)= 90. Thus, r**2** (r**2**+1)= 90. Just plug in the answer options to get L.H.S. = R.H.S.. Or in (r**4** + r**2**)= 90, substitute r**2**= a. Thus, a**2** + a =90. Thus, a**2** + a – 90=0. Thus, a = 9 or -10

Thus, r = √a = √9 or √-10. Since, √-10 is an imaginary number, thus, r = ±3.

1. **c**

**Sn** = **715**, **a = 1, d = 3 Thus, 715 = n/2 ( 2\*1 + (n-1)3). Thus, 1430=n(2+3n-3). Thus, 1430=n(3n-1). Thus, 1430=3n2** **- n. Just plug in the values to get L.H.S. = R.H.S. or solve the quadratic equation as in the 1st sum.**

1. **d**

a4 = a+3d and a7 = a + 6d. Thus, (a+3d) / (a+6d) = 2 / 3. Thus, 3(a+3d) = 2(a+6d) Thus, 3a+9d = 2a +12d

Thus, a = 3d. Thus**, a6=a+5d= 3d+5d=8d** and a8**=a+7d=3d+7d=10d**. Thus, a6/a8=8d / 10d=**4 / 5.**

1. **e**

a = 1.3, d = 1.1, n=6. Thus, **6/2 ( 2(1.3) + (6-1) 1.1) = 3( 2.6 + 5.5)= 3 \* 8.1 = 24.3**

1. **b**

**T4** = ar**4** = 81and **T8** =ar**7**  = 2187. Thus, (**T8** ) / ( **T4** ) = 2187 / 81. Thus, ar**7**  / ar**4**  = 2187 / 81. Thus, r**3** = 27. Thus, r = 3 and a = 1(Substitute r = 3 in ar**4** = 81). Thus, **T4** = 27.

**Ratios / Proportion / Variation / Alligation**

1. **b**

Let Tom’s age be 3x and Harry’s age be 5x. Thus, 3x+5x=80. Thus, x=10. Thus, their current ages = 30 and 50. After 10 years, their ages would be 40 and 60. Thus, the ratio would be 40 / 60 = 2 / 3.

1. **d**

Original quantity of milk = (4/5 \* 35) = 28 liters and of water = 7 liters. New quantity of water = 8liters. Thus, the new ratio of milk and water = 28/8 = 7/2.

1. **c**

Income = Expenditure + Savings

Let the annual income of P be 8x and of Q be 5x. Let the expenditure of P be 5y and of Q be 3y. Thus,

8x = 5y + 1200 and 5x = 3y + 1000. Solve, both the equations to get x. The value of x = 1400. Thus, the total income = 13x (8x+5x) = 13 \* 1400 = 18200.

**Note**: Separate variables should be taken for income and the expenditure.

OR:

Expenditure of P = 8x – 1200 = 5 . Thus, x = 1400. Thus, the total income = 1400\*13 = 18200.

Expenditure of Q = 5x – 1000 = 3

**4. e**

Let the numbers be x and y. Thus, x + y = 40 and x – y = 4. Thus, solving both the equations using the simultaneous or substitution method, we get x = 22 and y = 18. Thus, their ratio = 22 / 18 = 11/ 9.

**5. c**

Use alligation method to solve this sum. Consider the proportion of milk or honey. Considering the proportion of milk:

5/9 – 5/6

4/9

5/6

5 / 9

5/9 – 4/9

**In 1st vessel In 2nd vessel**

**In 3rd vessel**

**Ratio of milk from 1st vessel Ratio of milk from 2nd vessel**

1/9 : 2/18

5/18 : 2/18

Thus, 5 : 2

Note: Only absolute values are to considered and the negative sign is to be ignored.

**6. d**

The amount of time taken by the three workers = x , 2x and 5x. Thus, x + 2x+ 5x = 104. Thus, x = 13. Thus, the longest time taken = 5x = 5 \* 13 = 65.

**7. a**

3N = 2Z and 6C = Z. Thus, 3N=12C. Thus, N = 4C.

**8 . b**

Number of officers = 5x and workers = 72x. According to the condition, 5x / (72x + 8) = 5 / 74. Thus, 74x =72x + 8. Thus, 2x=8 and x = 4. Thus, the number of officers = 5x= 20.

**9 . c**

Number of boys = 3x and number of girls = 5x. Thus, 5x + 3x = 32. Thus, x=4. Thus, the number of boys = 12 and the number of girls = 20. To make the ratio 1:1, The number of boys and girls should be 16 each. Thus, 8 additional boys would have to be enrolled ( 8+8 ).

**10. c**

The amount of money decided to be spent by A, B and C would be 2x,3xand4x respectively.The total amount they spend= 1440(250+700+490). Thus, 2x+3x+4x=1440. Thus, x=16. Thus,ideally,B should have spent 480 but instead he spent 700 i.e. 220(700-480)more.Thus, A and C together should give B that sum.

**11. b**

|  |  |
| --- | --- |
| 6 | 5 |
| 7 | 6 |

**Grey Hound**

**Deer** To find a common ratio, we would need a common denominator for the ratios, i.e. would be 42. Thus, the ratios would be 36:35.

**12. d**

The amount of money shared by the sons and the daughter would be x/4,x/5 and x/3. Thus, x/4+x/5+x/3=846. Thus, x= 1080 and daughter’s share = 1080/3.

**13. c**

The numbers would be 2x,3x and 4x.Thus, (1/2x) + (1/4x)=(1/3x) + 5/12.Thus,x=1 and the 2nd number = 3\*1.

**14. c**

A+B+C= 1087. According to the condition, A-10=5x; B-12= 7x; C-15=9x. Thus, (A-10)+(B-12)+(C-15)=1087-10-12-15. Thus, 5x+7x+9x=1050. Thus, x=50. Thus, B-12 = 7(50). Thus, B=350+12.

**15. e**

Use alligation method to solve this sum. The cost price of the sugar should be considered. Thus, the C.P. of sugar to be sold at 4.8 would be Rs 4 ( Let, C.P. be the cost price. Thus,4.8 = x+20% of x. Thus, x=4)

**C.P. of 1st type C.P. of 2nd type**

6.10

2.85

**Required C.P.**

4

**Ratio of sugar of 1st C.P. Ratio of sugar of 2nd C.P.**

4 – 2.85

4 – 6.10

2.10 : 1.15

42 : 23

Thus, 126 kgs : ? kgs. Thus, the required quantity is 69 kgs.

**16. d**

Quantity of alcohol = 63 ltrs (90% of 70) and quantity of water = 7 ltrs (10% of 70). Now, after the addition of water, the composition changes to 63%(alcohol) and 37%(water) i.e. 63:37.Since, there is no change in the quantity of alcohol it remains to be 63 ltrs. Thus, the new quantity of water would be 37 ltrs.Thus, 30 ltrs would be added. **Or** Let the quantity of the water added be x. Thus, 7 + x = 37% of (70+x). **Or**

**Composition of water:**

**In 1st mixture In 2nd mixture (Consists only water)**

100

10

**In 3rd vessel**

37

**Ratio of water from 1st mixture Ratio of water from 2nd mixture**

10-37

100 - 37

63 : 27

7 : 3

Thus, 70 liters : ? liters. Thus, the required quantity is 30 liters.

**17. e**

F = m1 \* m2 and F = 1/ d**2** . Thus, m1 \* m2 = 1/ d**2**. According to the condition, 2m1 \* 2m2 = 4m1 \* m2 and

1/ (2d)**2** = 1 / 4d**2** . Being in direct proportion with m1 \* m2 and in inverse proportion with 1/ d**2**, multiplying m1 \* m2 with 4 and 1/ d**2** with ¼, F would not change since the ratio doesn’t change.

**18. c**

Given 2 numbers are in ratio 6:7. Let the numbers be 6 and 7(You could try with any other pair such as 12 and 14, 18 and 21; any numbers in the ratio 6:7). Let the whole number to be subtracted be x. Thus,

6-x < 16 . Thus, 126 – 21x < 112 – 16x . Thus, 14 < 5x. Thus, 14/5 < x. Thus, x > 2.8. The smallest integer 7-x 21 greater than 2.8 is 3.

**19. c** Note: The ratio in the sum are 4/3.

There are 12 even-numbered and 13 odd-numbered questions in each section. Thus, the total number of even-numbered questions is 96 (12\*8) and odd-numbered questions is 104 (13\*8). Thus, he answered 96+78 (All even-numbered and ¾ th of odd-numbered questions) correctly.

**20. c**

Convert the time of Lou and Selma in minutes. Thus, Lou works for 200 minutes and 160 minutes. Thus, the ratio of their working time: Lou:Selma = 200:160 i.e. 5:4. Thus, Lou would get 5/9 \* 72.

**21. c** Note: The ratios in the sum are 7/8 and 4/5.

Number of schools that have agreed to participate= 40\*7/8=35. Number of questionnaires given = 60\*35.

Number of questionnaires completed and returned = (60\*35)\*4/5

**22. b**

**v = 5/80**

w= 0.05 / 0.08 = 5/8

**x = 0.5 / 8 = 5 /80**

**y = 0.05 / 8.0 = 5/80**

z = 0.05 / 0.008 = 50/8. Thus, v,x and y are equivalent.

**23. b**

Preference of X = 3. Thus, No. of people who prefer X = 120. Thus, no. of people who prefer Y = 40. Thus,

Preference of Y 1 No. of people who prefer Y ? the total number of people = 120+40.

**24. d**

Number of men on the board = 2x and the number of women =5x. Thus, according to the condition,

2x + 4 = 2 . Thus, x = 3. Thus, number of men = 2\*3.

5x 3

**25. b**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Players** | **Beginning** | **1st Game** | **2nd Game** | **3rd Game** | **4th Game** |
| **Tom** | 400 | **600(400+200)** | 300 | **550(300+250)** | 275 |
| **Carlos** | 400 | 200 | **500(200+300)** | 250 | **525(250+275)** |

Thus, Tom has 275 chips after the 4th game or at the end.

**Solid Geometry**

Formulae required in solving this chapter

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 3 – D Figures | Volume | Total Surface Area | | Curved Surface Area |  |
| **Prism**   * Cube * Cuboid/Rectangular solid * Cylinder   **Pyramid**   * Cone   **Sphere**  **4 walls** | **Area of base \* height**  Side**3**  Length\*Breadth\*Height  ∏r**2**h  **1/3 \* Area of base \* height**  1/3 \* ∏r**2**h  4/3 \* ∏r**3** | Area of all faces  6 \* side**2**  2 \* (lb+bh+lh)  2∏r \* (r + h)  ∏r(l + r)  -  2h (l+b) | | -  -  2∏rh  ∏rl  - | l = √r**2** + h**2** |
| **2 – D Figures** | **Area Perimeter** | | **Notes** | | |
| **Square**  **Rectangle**  **Circle** | Side**2** 4\*side  Length \* Breadth 2 ( l + b)  ∏r**2** 2 ∏r | | * 3-D figures have 3 dimensions and 2-D figures have 2 dimensions. * Depth =Height=Thickness * Width = Breadth | | |

Greatest distance in a cuboid or rectangular solid = √l**2** + b**2** + h**2**

Greatest distance in a cube or square solid = √3 \* side

To find weight, calculate volume.

**1. c**

Playground is in rectangular shape. Thus, l\*b\*h = 5600 m**2** \* 0.01m= 56 m**3**. Thus, total cost = 56 \* 2.80

**2. b**

Use the formula of area of 4 walls of a room. 2\*h \*(45+20)\*5 = 6500.

**3. c**

According to the condition, **2 ∏r = 4\*side** Thus, **1st method**: **Side =** **∏r/2**. Thus, area of square = (∏r/2) **2** and area of circle = ∏r**2** . Thus, area of circle / area of square =∏r**2** /(∏r/2) **2** . Thus, ∏r**2**/ /(∏ **2** r **2** /4)

=4/∏= 4/(22/7). Thus, 28/22 = 14/11. **2nd method r = 2s/∏.** Thus, area of circle / area of square =∏(2s/∏)**2** / s**2**  . Thus, 4∏s**2** / ∏**2** s**2** . Thus, 4 /∏= 4/(22/7). Thus, 28/22 = 14/11.

**4. b**

Area of 1 face = **l\*b=p**. Area of second face = **b\*h=q**. Area of third face = **l\*h=r**. Volume of rectangular solid= lbh = √p**2** q**2** r**2**  √pqr. You can just plug in the options, to get lbh.

**5. c**

Given: lbh = 8. Thus, 2l\*2b\*2h= 8\*lbh. Thus, 8\*3=24.

**6. e**

Area of square of A = s**2** = 16. Thus, side of square A=4. Thus, perimeter of square A = 16. Now, perimeter

of square B= 3/2 perimeter of square A. Thus, perimeter of square B = 24. Perimeter of square C= 3/2 perimeter of square B. Thus, perimeter of square C = 36. Thus, side of C = 9. Thus, area of square C= 9\*4

**7. c** Note: It is cube and not cone.

Volume of new cube = Sum of the volumes of all cubes=3**3** + 4**3** +5**3**= 216. Thus, side =cube root of 216.

**8. c**

Volume of rectangular block= 10\*2\*5=100 cm**3** .Volume of cone = 1/3\*∏\*3**2**\*7=66 cm**3** . Thus, iron wasted= 34 cm**3** .Thus, waste percentage = (34/100)\*100.

**9. e**

Number of bricks required = Volume of wall / Volume of each brick = (500cm\*300cm\*20cm) / (25\*12.5\*7.5)

**10. d**

Greatest possible distance = √10**2** + 10**2** + 5**2**=√100+ 100+ 25=√225 cms

**11. b**

Number of spherical buttons that can be made = Volume of ball / Volume of each show button

= {4/3\*∏\*(50 mm) **3** } / {4 /3 \* ∏\*(2.5 mm) **3**}. Convert cm into mm or mm into cm.

**12. a**

Number of bricks required = 80% of the Volume of wall / Volume of each brick =

80% of (2400cm\*800cm\*600cm) / (24cm\*12cm\*8cm)

**13. c**

Just take some values for radius and height. Suppose original r = 10units, h = 1. Thus, original volume=∏\*10**2**\*1=100∏.New radius=15 units. Thus, new volume = ∏\*(15)**2**\*1=225∏. Thus, increase = 125∏. Thus, increase % = (125∏/100∏)\*100

**14. d**

Cloth required = Curved surface area of cone + Curved surface area of cylinder= ∏rl + 2∏rh =2\*∏\*35(l+2h).

l = √35**2** + 12**2** ( Radius of cone = Radius of cylinder = 35 m. Height of cone = 12 m)= √1369=37.Thus, Cloth required = ∏\*35 (37+(2\* 3))=110\*43=4730. Thus, cost of material = Cloth required \*10=4730\*10.

**15. c**

Volume of hemisphere = Volume of cone. Thus, 2/3\*∏\*7**3** = 1/3\*∏\*r**2**\*49. Thus, 14 = r**2**

**16. e**

1 hectare = 100m \* 100m=10000m**2**. Goldsheet is in rectangular form.

Thus, Volume of goldsheet = Area of goldsheet \* h. Thus, 0.5m**3** = 10000m**2**  \* h. Thus, h = (0.5/10000)m.

**17. d**

Original side = s. Thus, original volume = s**3** . New side = 2side. Thus, new volume = (2side) **3 OR**: Assume

some value for the original side e.g. If original side = 1 unit then original volume = 1unit**3**. New side = 2 unit.

Thus, new volume = 8 unit**3**.

**18. d**

Volume of Earth dug out=Volume of Earth to be spread=Volume of playground on which it would be spread

Thus, 3 \* 1.5 \* 2 = (22\*14 - 3\*2)\*h. Thus, 9 = 302 \* h. Thus, h = (9 / 302) m

**19. b**

140 =2(l+30). Thus, b= 40. Thus, diagonal =√30**2** + 40**2**

**20. a**

Rise in the level of water in the cylindrical vessel = Weight of the sphere submerged i.e.

Volume of the rise in the cylindrical vessel = Volume of the sphere i.e.∏\*3**2**\*h = 4/3\*∏\*2**3** Thus, 9h = 32/3

**21. e**

Number of ice cubes = Volume of ice compartment / Volume of each ice cube = (10\*4\*5 )/ 2**3**

**22. d**

Let the original radius of the cylinder be 10 unit and height be 1unit. Thus, original volume =∏\*10**2**\*1 =100∏.

New radius = 10-5 = 5 units. Thus new volume=.∏\*5**2**\*1=25∏ .Thus, ratio of volumes =25∏ / 100∏.

**23. b**

Length = 5x; Breadth = 4x and Height = 2x. Thus, 2{(5x\*4x)+(4x\*2x)+(2x\*5x)}=1216. Thus, 38x**2** = 608. Thus, x**2**= 16. Thus, x=4 and length = 20;breadth =16 and height = 8. Thus, volume=20\*16\*8.

**24. d**

Greatest possible distance = √10**2** + 10**2** + 5**2**=√100+ 100+ 25=√225 inches

**25. a**

**2∏rh =3∏r2** (Given) Thus, 2h=3r and h = r +7(Given).Thus, 2(r+7) = 3r. Thus, r = 14 cms and h = 21 cms.

Thus, Volume= **∏\*142\*21**

**Time, Distance and Work**

**Formulae**:

* **Distance = Time \* Speed** or **Time = Distance / Speed** or **Speed = Distance / Time**
* 1 km / hr = 5/18 m/sec and 1 m/sec = 18/5 km / hr.
* If two bodies move in the opposite directions at the speed of x km/hr and y km/hr respectively, they approach each other at the relative speed of (x+y) km/hr i.e. the speeds get added if the bodies move in opposite direction.
* If two bodies move in the parallel or same directions at the speed of x km/hr and y km/hr respectively, they approach each other at the relative speed of (x-y) km/hr(If x>y) or (y-x) km/hr(If y>x) i.e. the speeds get subtracted if the bodies move in the same direction.
* If A can do a work in a days, then in 1 day, A can do 1/ath part of work. Similarly, if B can do the same work in b days, then in 1 day, B can do 1/b th part of work. If both of them work together, then in 1 day, they can work : (1/a + 1/b)th part of work. Thus, **in 1 day they could do a+b/ab part of work** and they would finish the work in **ab/ a+ b days**.
* If a tap fills a cistern in x minutes, another tap fills the cistern in y minutes and a third tap empties or exhausts it in z minutes, then in 1 minute, (1/x+1/y-1/z) part of the cistern is filled.
* **M1 \* R1 \* T1 = M2 \* R2 \* T2** where M = Number of men or labour employed; R = Rate of the work

**W1 W2** T = Time taken to do the work and W = Work done

The formula could also be manipulated as : **M1 \* T1 = M2 \* T2 or M1 \* R1 \* T1 = M2 \* R2 \* T2 or**

**M1 \* T1= M2 \* T2 or M1 \* R1 = M2 \* R2 .**

**W1 W2 *Note: Time and rate/speed are in inverse proportion***

1. **b**

3 men’s capacity = 6 Women’s capacity. Thus, 1 Man’s capacity = 2 Women’s capacity. Thus, 12 Men and 8 Women would be 16 Men or 32 Women. Thus, 3 \* 20 = 16 \*? Or 6 \* 20 = 32 \*- ? = 15 / 4 days = 3 ¾ days **.**

**Note: Don’t convert time i.e. hours or minutes or days in decimals. For calculation convenience, convert the time in mixed fractions.**

1. **b**

Let the number of men be m. Thus, m \* 10 = (m-10) \* 12.

1. **b**

Let the son take s days. Thus, in one day: 1/60 \* 1/s = 1/20.

1. **d**

Let the leak take x hours to empty the cistern. Thus, in 1 hour, 1/8 – 1/x = 1/10 (Since the leak takes 2 hours longer, thus the time taken is 8+2).

1. **a**

Distance covered by the car = 480 (48\*10) kms. Thus, the speed it should travel to complete the journey in 7.5 hours = 480 / 7.5=64 km/hr. Thus, the car needs to increase its speed by 64-48 = 16 km/hr.

1. **c**

Let the distance by d kms and the time taken by the train be t hours. According to Time = Distance / Speed;

(t + 16/60) – ( t + 10/60) = (d/30) – (d/40). Thus, 6/60 = (4d – 3d) / 60. Thus, 6 = d. OR

d / (t + 16/60) = 30 and d / (t + 10/60) = 40. Thus, 60d / ( 60t +16) = 30 and 60d / ( 60t +10) = 40. We would get 2 equations, but it would be tedious to solve the equations. Thus, it would be better to solve such sums using the 1st method.

1. **a**

Let the third tap empty the tank in t minutes. Thus, in 1 minute: 1/60 + 1/75 – 1/t = 1/50

1. **c**

In 1 day Mohan can do 1/20th part of work and Harish and can 1/25th part of work. Thus, they would do (20+25/500)=(45/500)=9/100th part of work in 1 day. Thus, in 5 days, (9/100)\*5 = 9/20th part of work is done. Thus, the remaining 11/20th part of work would be done by Mohan in (11/20) / 20 days= 11 days.

1. **b**

In this sum: **M1 = 200, T1 = 100, W1 = ¼ and M2 = (200+x) , T2= 200, W1 = ¾** where x is the number of additional men. Thus, (200 \* 100 ) / ¼ = ((200+x) \* 200) / ¾ ,using,  **M1 \* T1 = M2 \* T2**

**W1 W2**

1. **a**

After the leak **: Time Tank filled**

15 hours 90%

? 100%

1. **b**

The speed of the man in m/sec = 4 \* 5/18 = 10/9 m/sec. Thus, in 9 seconds the man covers 9\*10/9 = 10m. Thus, the train covers 125+10 = 135 m in 9 seconds. Thus, its speed = 135 / 9 =15 m/sec = 15\*18/5 km/hr

1. **a**

Let the distance by d kms and the time taken by the clerk be t hours. According to Time = Distance / Speed;

(t + 5/60) – ( t - 10/60) = ((d/4) – (d/5)).Thus, 15/60 =(5d – 4d)/20. Thus, ¼ = d/20

1. **c**

The basket is full after 60 minutes. Thus, since the basket doubles itself after every minute, the basket must have been half full after the 59th minute. Thus, the basket is half full after 59 minutes.

1. **d**

Let the capacity of the tank be x litres. Thus, in 1 minute the action taking place is:

**(x/24) + (x/40) – 30 = x/60.**

1. **c**

Since Ravi can row a distance of 1 km downstream in 10 minutes; thus, the speed downstream is 6km/hr. Similarly, the speed upstream would be 2 km/hr (1 km in 30 minutes). Thus, the speed of the stream =

½ (Speed downstream = Speed upstream)= ½ (6 – 2).

1. **b**

**1st method**: Meena and Leena together can type 900 (500+400) words in 10 minutes. Thus:

**Words Minutes 2nd method:** Meena can type 50 words in 1 minute and Leena can type 40

900 10 words in 1 minute. Thus, together they can type 50+40=90 words in 1 minute.

3600 ? Thus, to type 3600 words, they would take 3600/90 minutes.

1. **c**

If it is assumed that the sarees are not dried on one another, the difference in the number of sarees would not make any difference in the drying time.Thus, 25 sarees would also take the same time as 1 saree would.

1. **b**

The action of the monkey would be : 1st minute : Ascends 5 metres. Thus, reaches 5 metres.

2nd minute : Descends 3 metres. Thus, climbs 2 metres.

3rd minute : : Ascends 5 metres. Thus, reaches 7 metres.

4th minute : Descends 3 metres. Thus, climbs 4 metres.

Thus, it can be seen that in every 2 minutes, the monkey climbs 2 metres. Thus, after 16 minutes, the monkey climbs 16 metres. Thus, after 17th minute, the monkey reaches 21 metres(16+5).

1. **b**

Let both the pipes be open for x minutes i.e. let the 1st tap would be closed after x minutes. Thus, for 16-x only the second pipe is open. Thus, the cistern is full in the following way: **x/24 + x/ 32 + (16-x) / 32 = 1**

1. **b**

**Average speed of the aircraft = Total distance travelled by the aircraft / Total time taken by the aircraft**. Thus:

|  |  |  |
| --- | --- | --- |
| Distance | Speed | Time taken = Distance/Speed |
| 200 kms  200 kms  200 kms  200 kms | 100 km/hr  200 km/hr  300 km/hr  400 km/hr | 2 hrs = 200/100  1 hr = 200/200  2/3 hr = 200/300  ½ hr = 200/400 |

Thus, total distance = 800 kms and total time = (2+1+2/3+1/2)=25/6 hrs. Thus, avg speed = 800 / (25/6).

1. **e**

Let the distance by d kms and the time taken by the man be t hours. According to Time = Distance / Speed;

(t + 7/60) – ( t - 5/60) = ((d/5) – (d/6)).Thus, 12/60 =(6d – 5d)/30. Thus, 1/5 = d /30.

1. **b**

Pam would have covered 4 miles since she started an hour early. Thus, the distance between Pam and Sue is 54 miles. Thus, both approach each other at the speed of 9 miles per hour (4+5). Thus, they would meet each other after 54/9=6 hours. Thus, in 6 hours, Sue would have covered 6\*5=30 miles.

1. **a**

In 1 day, A, B and C would complete (1/15 + 1/6 + 1/10)th part of work. Thus, together they would complete 10/30th i.e. 1/3rd part of work in 1 day. Thus, they would complete the work in 3 days. Thus, they would take

9 days to complete three times the same work.

1. **a**

R can sort x/60 letters in 1 minute and S will also sort x/60 letters in 1 minute. Thus, together they would sort x/60+x/60 = 2x/60=x/30 letters in 1 minute. Thus, to sort x letters, they would take 30 minutes.

1. **c**

The ratio of working of H: R: K in 1 day = 1/9 : 1/8 : 1/6. Thus, their ratio is 9:8:12 (The L.C.M. of 9, 8 and 6 is 72.)Thus, the earnings should be divided in the ratio of their working.

**Statistics**

**Formulae**:

* **Range**: The difference between the highest and the lowest value.
* **Mode**: The most frequent value.
* **Median**: The middle value of an array of data values.
* If the number of the data values ,n, is odd, the median is : **Value of [(n+1) / 2] th term**
* If the number of the data values, n, is even, the median is **:[ Value of (n/2) th term + Value of {(n/2)+1}st term] / 2** i.e. the average of middle 2 terms.
* **Mean:**

**Arithmetic Geometric Harmonic**

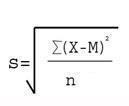
* **Arithmetic mean**: ( x ) = Σ x or Σ fx where Σ is the sum of all the values

N Σ f

* **Geometric mean** : (x1 \* x2\*x3\*x4\*…..\*xn)1/n or n√x1 \* x2\*x3\*x4\*…..\*xn
* **Harmonic mean**: n / (1/ x1 +1/ x2+1/ x3+1/ x4+…….+1/ xn)
* **Harmonic mean < Geometric mean < Arithmetic mean**
* **Standard deviation**: It is a measure of the dispersion of a set of data from its mean i.e. the Standard Deviation (**σ**) is a measure of how spread out numbers are. **The more spread apart the data, the higher the deviation.**

Steps in calculation the standard deviation:

1. Find the mean, x or M ,of the values.
2. For each value *xi* calculate its deviation ( x- x ) or ( x- M) from the mean.
3. Calculate the squares of these deviations.
4. Find the mean of the squared deviations i.e. divide the sum of the squared deviations by n. This quantity is the [**variance**](http://en.wikipedia.org/wiki/Variance) ***σ*.**
5. Take the square root of the variance. This calculation is described by the following formula:

**Variance : *σ*= s2**  M = x i.e.the [arithmetic mean](http://en.wikipedia.org/wiki/Arithmetic_mean) of the values *x*, defined as: Σ x / N

* **Mean deviation** : Σ x- x where x is the data value and x is the mean.

N

Or : Σ f x- x

N

* **Combined mean**: If the mean of two series and their sizes are given, then the combined mean for the resultant series is:

**X = n1x1 + n2 x2**

**n1 + n2**

where: X = Combined mean of the two series

n1 = Size of the first series

n2 = Size of the second series

x1 = Mean of the first series

x2 = Mean of the second series

* **Corrected mean: Incorrect Σ – Incorrect value(s) + Correct value(s)**

**Number of values (N)**

**1. 61.6**

Using the formula: Σ fx / Σ f we get: (52\*7+58\*5+60\*4+65\*6+68\*3+70\*3+75\*2) / 30.

**2. 80**

Suppose the number of male employees is m and that of female employees is f. Then, using the formula for combined mean, we get: 25000 = m \* 27000 + f \*17000 Thus, m = 4f. Thus, the total no. of employees

m + f is 4f + f= 5f. Thus, the % of males: (4f s/ 5f) \*100

**3. 2.47**

Using the formula: Σ fx / Σ f we get: (0\*38 + 1\*144 + 2\*342 + 3\*287 + 4\*164+ 5\*25) / 1000.

**4. 35**

Arrange the data values in the ascending order to find the 8th ( (15+1)/2)th value.

**5. 27**

Arrange the data values in the ascending order to find the 6th ( (11+1)/2)th value

**6. 25**

Steps in finding the median:

1st : Arrange the data values in an ascending order

2nd : Find the cumulative frequency i.e. The sum of successive data items or the sum total of the frequencies.

3rd: Since the total number of data values is odd i.e. 43, the median would be ((43+1)/2)th value i.e. the 22nd data value or item is the median. 25 is the 22nd data value.

|  |  |  |
| --- | --- | --- |
| **X ( Marks)** | **F (No of students)** | **Cumulative frequency(c.f.)** |
| **9**  **20**  **25**  **40**  **50**  **80** | **4**  **6**  **16**  **8**  **7**  **2** | **4**  **10**  **26**  **34**  **41**  **43** |

**7. 20**

Since the number of data items is even, the median would be: **:[ Value of (n/2) th term + Value of {(n/2)+1}st term] / 2 i.e.** ((x+1) + (x+3)) / 2 = 22. Thus**,** 2x + 4 = 44. Thus, x = 20.

1. **24.81 NOTE: This is a very unlikely GRE sum.**

The formula to solve this kind of sum is: **(L1 + n/2 – C.f.) \* i**

**F**

**where :** L1 = Lower limit of the median class n = Size of the series c.f = Cumulative frequency of the class preceding the median class f = Frequency of the median class i = Class Interval of the median class i.e. the range of the median class.

To find the median class, follow the normal steps in finding the middle value. In this case the middle value is the average of the 50th and the 51st terms. Both fall in the class of 20-30. Thus, **L1 = 20 n = 100 c.f =23**

**f = 27 i = 10. Thus, the median is: (20+ (100/2 - 23) / 27 \* 10).**

**9. 7**

The mode is 7 since the frequency is the highest i.e. 35 for it.

**10. 5.6**

Using the formula for mean deviation : : Σ x- x we get, x = 740 / 10 = 74. Thus,

N

|  |  |
| --- | --- |
| X (Marks) | X - x ( x-74) |
| 70  65  68  70  75  73  80  70  83  86 | 4  9  6  4  1  1  6  4  9  12 |

Thus, Σ x- x = (4+9+6+4+1+1+6+4+9+12)= 56

Thus, mean deviation is 56 / 10.

**11. 2.24**

Using the formula for mean deviation : : Σ f x- x we get, x = 1200/100 = 12. Thus,

N

|  |  |  |  |
| --- | --- | --- | --- |
| X (Marks) | F (No of students) | X - x ( x-12) | f x- x |
| 20  18  16  14  12  10  8  6 | 2  4  9  18  27  25  14  1 | 8  6  4  2  0  2  4  6 | 16  24  36  36  0  50  56  6 |

Thus, Σ f x- x = (16+24+36+36+50+56+6)= 224

Thus, mean deviation is 224 / 100.

**12. 1.12**

Using the first formula for standard deviation: we get

|  |  |  |
| --- | --- | --- |
| X | X - x (x – 4.5) | (X - x ) **2** |
| 3  4  5  6 | -1.5  -0.5  0.5  1.5 | 2.25  2.5  2.5  2.25 |

√Σ (x – x) **2** = √ (2.25+2.25+0.25+0.25) / 4 = √ 5/4 = Approximately,

N 1.12

**13. 39.9**

Using the formula for corrected mean we get: [(40 \* 100) – 10 ]/ 100 = 3990/100

**QUANTITATIVE TEST – 1**

1. **c**

The first number is 144. Now, the 2nd number should be the greatest factor of 144 i.e. 72. Thus, the greatest possible common divisor of 144 and 72 is72.

1. **c**

Let the students be 1,2. Let the desks be : A, B, C, D. Thus, according to the condition, the arrangements could be as follows: 1st 2nd 3rd 4th 5th 6th

**A 1 A 2 A A A 1 A 2**

**B B B 1 B 2 B B**

**C 2 C 1 C C C C**

**D D D 2 D 1 D 2 D 1**

1. **c**

If you plot the points on the graph, you would get b=8 and h=6. Thus, the area of the triangle is : ½ \*8\*6

1. **c**

Let the number of revolutions the back wheel makes be x. Thus, the front wheel makes (x+20) revolutions.

Now, the distance covered by the back and the front wheels would be equal. Thus, **9∏x = 6∏(x+20)**

Thus, x = 40. Thus, the distance covered = **9∏x =9∏(40) = 360∏**

1. **c**

Let the time taken to travel at 4 km/ hr be x hours and the time taken to travel at 5 km/hr be y hours. Thus,

total distance covered = **4x+5y = 35**. According to the condition, **5(x+y) = 37.** Solving the equations, x = 2 and y = 27/5 i.e. 5 and 2/5 hours i.e. 5 hours and 24 minutes. Thus, total time = 2+5 hours and 24 minutes.

1. **c**

Let the rate the man buys the milk be Rs 10 per litre. Suppose, he buys 10 litres. Thus, the total cost price of milk is Rs 100. Since, the man earns 30% profit i.e. the profit is Rs 30. Thus, he sells milk worth Rs 130 at the rate of Rs 10 per litre. Thus, he sells 13 litres of milk of which 10 litres is milk and 3 litres is water. Thus, the percentage of water= (3/10)\*100. **NOTE: You could have assumed any other rate and quantity.**

1. **c**

The letters of Harry’s order are : t,e,a,p,a,s,t,r,y and the letters of Dick’s order are : c,o,f,f,e,e,c,a,k,e. But, the different letters of the orders are: t,e,a,p,s,r,y i.e. 7 and c,o,f,e,a,k,e i.e. 6. Thus, the response time for Harry = 49 and for Dick = 36. Thus, the ratio of Harry’s time to Dick’s time= 49/36.

1. **c**

Try various values. But the condition is true only when n is 2 or n is 4.

1. **e**

Let the cost of 1 roll be r, 1 muffin be m, 1 loaf of bread be b. Thus,**4r+6m+3b = 9.10** and **2r+3m+b = 3.90**

Thus, multiplying the 2nd equation by 2 we get, **4r +6m+2b = 7.8**.Thus, subtracting this equation from the 1st

equation we get, b=1.3.

1. **a**

Assume some value as mean. Let us assume the mean is 3 and one of the numbers be 5. Thus, the total of

2 numbers is (3\*2)=6. Thus, the other number is 1 (6-5). Thus, the ratio of the 2 numbers is 1:5. OR Take one of the number to be 10. Thus, the mean is 6 ( Since the mean and the number are in the ratio 3:5) Thus, the total is 12 (6\*2). Thus, the other number is 2 ( 12 -10) Other numbers could also be plugged in. But just plug in numbers such that either the mean is a multiple of 3 or the number is a multiple of 5.

1. **c**

Let the smallest term of the A.P. be a. Thus, the greatest term is 4a. Thus, using the formula for sum of an A.P., we get: **Sn** = **n/2 ( a + l ). 100**= **4/2 ( a + 4a )** Thus, 50=5a. Thus, a = 10 and T4 = 40.Using the formula for the nth term **Tn = a + (n – 1)d** **,** we get T4 = 10 + (4 – 1)d Thus, 40 = 10+3d**. Thus, d = 10.**

**Thus, T2 = 10 + (2 – 1)10. Thus, 2nd term = 20.**

1. **d**

**Method 1**: Since 77 is divisible is divisible by 11, thus, the sum of equal number of consecutive integers greater and lower than 77 would also be divisible by 11.

**Method 2**: The integers are as follows: 76,75,74,73 and 78,79,80,81. Their sum is:**616** which is not divisible by 3 and 9 (Since the sum of the digits of 616 (i.e. 6+1+6=13) is not divisible by 3 and 9). 616 is not divisible by 5 since the last digit is neither 0 nor 5. The only options left are 11 and 13 and 616 is not divisible by 13 (It can be found out by division). The divisibility tests of numbers are helpful for solving this sum.

1. **d**

Let the number of children be c. Thus, according to the condition: **11c = 2c2 + 12. Thus, 0 = 2c2 -11c+ 12.** Solving the quadratic equation, we get c = 4 or c = 3/2. **Note: The number of children cannot be in fraction.**

1. **c**

Using the formula for compound interest : **A = P (1 + r/100) n** we get: 2420 = 2000(1+r/100) **)**2

Thus, 2420=2000[(100+r)/100] **)2** Thus, 2420/2000 = [(100+r) **)**/ 100] **2**Thus, 121/100 =(100+r)/100 **) 2** Taking out square root on both the sides: 11/10 = 100+r / 100 Thus, 11= (100+r) / 10. Thus, r =110-100.

1. **e**

Assume an integer such as 19 (18 + 1), 37 (36+1), 55 (54+1) (Multiples of 18 + 1).Thus, n = 19 or 37 or 55. None of the numbers would be divisible by 2 since they would be odd integers. Thus, 2 and 6 are out. Also, since the numbers are not divisible by 18 and the remainder is 1, the numbers would not be divisible by 3 and 9. thus, the only option left is 5. And if checked 55 is divisible by 5.

1. **c**

**M1 \* R1 \* T1 = M2 \* R2 \* T2** where M = Number of men or labour employed; R = Rate of the work

**W1 W2** Time = Time taken W = Work done

Using the above formula: (9\*8\*30) / 480 = (12\*8\*30) / No of required chairs. Thus, no of chairs = 640.

**OR:** Since the number of days i.e. the time taken and the rate of work are the same, therefore:

**No. of Carpenters No. of Chairs**

9 480 Thus, we get number of chairs = 640

12 ?

1. **c**

Suppose the cost price of 40 pens is $100. Then: **Cost price Actually sold for Required selling price**

**Assumption 100 75 125**

**But, Actual - 3 ?**

Thus, the required selling price is $5 for 40 pens. Thus, for $1, 40/5 pens should be sold.

1. **d**

Suppose, the population of the city is 100. Therefore, the number of illiterate people is 36 and thus the number of literate people is 64. The number of poor is 64, thus, the number of rich is 36. Since, 25% of rich are illiterate, 9 rich people are illiterate. Thus, the remaining 27 illiterate (36 - 9) people are poor. Thus, the fraction of poor illiterate population to the total illiterate population is 27/ 64.

1. **d**

A Draw a figure according to the information.

E The figure would be similar to the one on the left where:

36 m 39 m 39 m **AB is the height of the 1st window, DE is the 2nd window**,

15 m **AC = CE= Length of the ladder** and **BC + CD** is the width of the

B C D **street.**

Thus, BC + CD = **√ (392 – 362 ) + √ (392 – 152)** = √ [ (39+36) (39-36)] +√ [(39+15) (39-15)] =

√(75)(3) + √(54)(24) =√ (3\*5\*5) \*3 + √ (2\*3\*3\*3)\*(2\*2\*2\*3) = (3\*5) + (2\*2\*3\*3) = 15 + 36 = 51.

1. **d**

Let the daily wage of women be w. Thus, the daily wage of men = (w+10). So, the total wages of all the employees =Total wages of women + Total wages of women Therefore, 25.50\*1000 = w\*400 + (w+10)\*600.

Thus, simplifying we get, 255000 = 400w + 600w + 6000. Solving the equation we get, w =19.5.

1. **d Note: The answer is 11800 and not 11900**

Let the S.P. of the most expensive product be x. Thus: **25\*1200 = (14\*1000) + (10 \* 420) + x** .Since x has to be the maximum, prices of the other products have to be the minimum. Now, exactly 14 products sell for 1000, no product sells below 420 and the average price of the 25 products is 1200. Thus, an equation such as the one above is formed and x could be found by solving the equation.

1. **e**

Let Tom take t days to complete the work. Since his assistants work with ¾ efficiency of Tom, they would take 4t / 3 days to complete the same work. Thus, in one day Tom would complete (1/t)th part of work and his assistants would complete (¾ t )th part of work in 1 day. Thus, in 1 day, 3 of them would complete:

(1/t) + (3/4t) +( 3/4t) = 5/2t. Thus, they would complete the work in 2t/5 days. Thus, the fraction of time taken : (2t/5)/t = 2/5**. Alternatively**, you can assume Tom takes 15 days to complete a work. Thus, his assistants would take 20 (15 \* 4/3) days. Thus, in one day all three would complete: 1/15 + 1/20 + 1/20 = 1/6th work in 1 day. Thus, the work would be complete in 6 days. Thus, the fraction would be 6/15 = 2/5.

1. **c**

Let the smallest term of the A.P. be a. Thus, the greatest term is 3a. Thus, using the formula for sum of an A.P., we get: **Sn** = **n/2 ( a + l ). 120**= **4/2 ( a + 3a )** Thus, 60=4a. Thus, a = 15 and T4 = 60.Using the formula for the nth term **Tn = a + (n – 1)d** **,** we get T4 = 15 + (4 – 1)d Thus, 45 = 15+3d**. Thus, d = 10.**

**Thus, T2 = 15 + (2 – 1)10. Thus, 2nd term = 25.**

1. **d**

Let the weight of jar be j and the weight of wine be w. Thus, according to the 1st condition : j+w =1 and according to the 2nd condition: j + w/2 = ¾ . Thus, solving both the equations we get: j = ½ and w = ½ .

According to the question, Weight of the wine when the jar is half full of wine / Weight of the jar = (¼) / (½).

1. **c**

Let the amount of John’s deposit be j. Thus, according to the 1st condition, amount in John’s account on Tuesday = j – 15% of j = 85j/100.On Thursday, the amount in his account = 85j/100 +175. Thus, amount on Thursday: **85j/100 +175 = 120% of j** Thus, 85j / 100 + 175=120j / 100. Thus,120j– 85j = 17500. **j = 17500/35**

1. **b**

Let the number of pens be p and the pencils be q. Thus, 15p+8q = 190. Now, since Paul has to buy maximum number of items, he would have to buy mostly pencils and the least number of pens. Thus, assume p = 0. Thus, 8q = 190. Now, p cannot be in fraction or decimal. Thus, p =0. Now, try for p=1.Thus, 8q = 175. Again, q would be in fraction or decimal. Next, try with p = 2, thus, 8q = 160. Thus, q =20. **p+q=22**

1. **d**

Let the amount invested in bonds be b and in fixed deposits be f. Thus, **b+f=2000**. Therefore, the total return on investments: 12%of b + 7% of f = 180. Thus, **12b/100 + 7f/100 = 180**. Solving both the equations using either simultaneous or substitution method gives us b =800.

1. **b**

Let the mother’s age be m and the son’s age be s. According to the 1st condition: **(m-5) =5(s-5)**

According to the 2nd condition: **(m+2)=3(s+2).** Thus, solving the equations we would get m=40 and s=12. Thus, ratio of their ages: 40:12 = 10:3.

1. **d**

Since the number is between 45 and 50, thus, the number could be: 45, 46,47,48,49 or 50. Since when she counted 2 at a time, 1 was left, thus, the number would be an odd number only. Thus, we are left with:

45, 47,49. Since when she counts 3 at a time, the remainder is 2, thus, 45 and 49 are out (Since 45 is a multiple of 3 and 49 divided by 3, the remainder is 1). Thus, we are left with only 1 option i.e. 47 and if the number of birds is 47 and when 47 is divided by 4, the remainder is 3. Thus, all the conditions are fulfilled.

1. **c**

Plug in the options to the conditions of the problem. Now, since the number is divisible by 7, the number of pens is multiple of 7. In the options only 1number i.e. 301 is a multiple of 7.

**QUANTITATIVE TEST – 2**

1. **e**

Assume Dick has an amount of 30 and Tom will therefore have 60 (Take some values that is multiple of 3).

At the end of the 1st game, Dick has 50 (30+1/3rd of 60) and Tom has 40(60 – 1/3rd of 60). Since, both must have equal sum, each must have 45 (Since the total sum is 90, and each must have an equal sum). Thus, Tom must win 5 from Dick. Thus, fraction of Dick that must be won by Tom: 5/50 = 1/10th .

1. **d**

Cost price of goods sold at a loss=150. Loss suffered on the 1st transaction=$15.(10% of 150). Since a 20% profit on the whole transaction is to be gained, $90 (20%of 450) is originally to be gained. But since on the 1st transaction, $15 was lost, $15 in addition to $90 is to be gained. Thus, in all, $105(90+15) is to be gained. Therefore, profit percentage = (105/450) \* 100.

1. **d**

Let the speed of the boat upstream be u km/hr. Thus, the speed downstream = 5u km/hr. Now, **speed of the boat in still water = ½ (5u+u)=3u and speed of the current or stream = ½ (5u-u) =2u.** Thus, speed of current as a percent of the speed of still water = (2u/3u) \* 100.

1. **a**

Let the number of children be c. Thus, according to the condition: **12c = 3c2 + 12. Thus, 4c = c2 + 4. Thus,**

**0 = c2 - 4c+ 4.** Solving the quadratic equation we get, c = 2.

1. **d**

**Sample Space**: Choosing 3 units out of 10 units. = **10*C*3** **Event** : Choosing 3 non defective units out of 6 non-defective ones= **6*C*3** . Thus, probability of choosing 3 non- defective units out of 10 units =**6*C*3** / **10*C*3.**

1. **b**

Let the original number of men be x. Thus, using the formula:  **M1 \* T1 = M2 \* T2** where ,  **M1 = x ,T1 = 9, M2** = **15** and **T2 = ( x-6 ) , we get: 9 \* x = 15 \* (x-6).**

1. **d**

Let the larger number be l and the smaller number be s. Thus, according to the 1st condition: **l - s = 540.** According to the 2nd condition: **l = 3s + 80 (Dividend = Divisor \* Quotient + Remainder). Thus, solving both**

the equations (by substitution or simultaneous method), we get: s = 230.

1. **d**

E

F

Let the centres of the circles be A, B and C.Joining the

centres we get an equilateral triangle, ABC in which .

CD is the median and the perpendicular bisector

And the length of each side = 20 (AD=BD=10 Radii

Of the circles. Now, **CD = (AC \* √3) / 2** [ Property of 30-60-90 triangle). Thus, CD = **10√3. Thus, the**

**Length of the rectangle = EF = ( CD + ED +CF)**

**= (10√3 + 5√3+5 √3) (Since ED = CF = 10)**

**Thus, EF = 10√3+10+10 = 20 +10√3.**

**Breadth of the rectangle = 40 (2\*diameter of the circles) .Thus, area of the rectangle = l \*b = (20+10√3 )\* 40**

1. **d**

Since x/ y = 4, thus, x = 4y. Thus, 2x – y = 2\*4y – y = 7y. Thus, according to the problem: Value of 2x-y = What percent of x. Thus, (7y / 4y) \* 100.

1. **c**

The **monthly average of sale = 1500** (18000 / 12). Thus, sales in August = 1/3 rd of 1500.

1. **c**

Let the number that must be subtracted be x. Thus, **(14-x) \* (21-x) = (17-x) 2 (Since the square of the middle term = The product of the previous and the next tem)**.Thus, solving the equation, we get x = 5.

1. **c**

The area of the square PQRS = (110) **2 = 12100.** Thus, area of each part = 12100/5 = 2420. Thus, area of the circle= 2420 sq. cm = ∏r**2 .** Thus, r**2 = 2420 /** ∏ = (2420 \* 7) / 22 = 770. Thus, r = Approximately 28 cm.

1. **d**

Try out various values for p and q. Eg : **p = 2 q = 4 or p = -3 q = -2; p=0 q = 1; p = -1 q =0; p =1/4 q = ½.**

Try sets with 2 positive numbers, 2 negative numbers, 2 numbers of which 1 is 0 and 2 fractions. For all of the values, only d is always possible.

1. **c**

Try various values for P. Eg P =1 or P = 3 or P = 5. For all of the values only c is possible.

1. **c**

Try various values for P. Eg P = 5 or P = 7 or P = 11. For all of the values either a or b is possible.

1. **d**

Let the total number of mice in the lab be m. Thus, number of white mice / 2 =m/8. Thus, **number of white mice = m/4**. Number of gray mice/3 = m/9. Thus, **number of gray mice = m /3.** Thus, ratio of white to gray mice = **(m/4 ) / (m/3)=3/4.**

1. **d**

Alliteration could be used to solve this sum. **OR**

**1st Concentration 2nd Concentration (3/100 \* (x)) + (30/100\*6) = 12/100\*(x+6)**

Where x is the quantity taken from 1st

**30 %**

**3%**

Solution.

**Required Concentration**

**12%**

**Ratio of mixture Ratio of milk from 2nd vessel**

**9%**

**18 %**

**18 : 9**

**2 : 1**

Thus, if 6 litres of 30% solution is taken, 12 litres of 3% solution should be taken since the ratio of 3% to 30% is 2:1.

1. **a**

Let the cost price for P be Rs 100. (Some other value could also be assumed). Thus, C.P.s for each:

**P Q R Thus, for R the C.P. would be 121 and the S.P. would be 100. Thus, loss percent :**

**100 110 121 (Loss / C.P. )\* 100 = (21 / 121) \* 100 = 17.36%**

1. **d**

3 consecutive terms of A.P. = a-d , a , a+d. Thus, according to the 1st condition:**a-d+ a+a+d = 21**.Thus, a =7.

Thus, the terms are: 7-d,7,7+d. According to the 2nd condition: **(7-d)\*(8+d) = 62** . Thus, 56 –d –d**2** = 36. Thus, d**2** + d – 20 = 0. Thus, **d = 4 or d = -5**. Thus, the terms are: 3,7,11 or 12,7,2

1. **e**

The unit digit of 13**4** = 1. The unit digit of 17**2**= 9 and the unit digit of 29**3** =9. The unit digit of 13**4 \*** 17**2 \*** 29**3**

= The unit digit of 1 \* 9 \* 9 = 1.

1. **a**

See the solution to the 17th question. Just substitute the values accordingly.

1. **c**

Let the cost price for A be Rs 100. (Some other value could also be assumed). Thus, C.P.s for each:

**A B C Thus, the sum of the profits made by A and B would be (40+35) = 75. Thus,profit percent**

**100 140 175 (Profit / C.P. )\* 100 = (75/ 100) \* 100 = 75%**

1. **c**

The total cleaning cost of the chimney form an A.P. in which: **S100 = 20400, a = 6 , d = x, n = 100**

Thus, **20400= (100 / 2) (2\*6 + [100-1] \* x) {Using the formula for the sum of n terms of an A.P.}.Thus, x = 4.**

1. **e**

According to the 1st condition, the number has to be a multiple of 6 i.e. the number could be 6,12,18,24, etc.. According to the 2nd condition, the number is not a multiple of 9. Thus, the number could be 6,12,24,30,etc..

1. **c**

The ratio of perimeters of OPRQ : OPSQ = **(OP + OQ +Length of arc PRQ) / (OP +OQ + Length of arc PSQ).** Thus, **OP=OQ = r = 8** (Find r from the area). **Length of arc PRQ = (120 /360) \* 2\*∏\*8** = (2\*3\*8) / 3=16. Similarly, **Length of arc PSQ = (240/360)\*2\*∏\*8** = (2\*2\*3\*8)/3 = 32. Thus, the required ratio:

**(8+8+16) / (8+8+32) = 32/48 = 2/3.**

1. **e**

The weightage of the questions form an A.P. in which: **S16= 528 , a = x , d = 4, n = 16**

Thus, **528= (16 / 2) (2\*x+ [16-1] \*4) {Using the formula for the sum of n terms of an A.P.}.Thus, x = 3 i.e. 1st term = 3. Now, using the formula for Tn = a + (n – 1)d** we get 11th term as **T11 = 3 + (11 – 1)4**

1. **d**

Let the original price of the article be Rs 100. Then,

**Original price Tag / New price Sale price**

**100 80 72** Thus, the 2nd mark up is (20/80)\* 100 = 25%. Thus, the 1st mark up is (8/72) \* 100 [ (80-72) / 72] = 11.11%. You could have assumed any number but the answer would have been the same.

1. **c**

Speed downstream = (Speed of still water + Speed of Stream) = (6+4)= 10 m/h

Speed upstream = (Speed of still water + Speed of stream) = (6-4) = 2 m/h

Thus, time downstream = 20 / 10 = 2 hours and time upstream = 20/2 = 10 hours. Thus, ratio of time = 10/2

1. **c**

The area of the rectangle = Approximately 1550 sq.inches (50 \* 31 )=1550 sq.inches= 15 times the area of the square. Let the side of square be x. Thus, 15x2 = 1550. Thus, x2  = Approx.103 sq.inches Thus, x=10

1. **c**

(0.2) 5 /( (0.2)3) 2 = (0.2) 5/ (0.2) 6= 1/0.2 = 10/2 = 5

**QUANTITATIVE TEST - 3**

1. **c NOTE: The question is what is not possible.**

Assume some sets of values: For e.g x = 3 y = 0. x = 4 y = -1/2 , x = 8 y = -1/4 , x=4 y =-1/8 , x=5 y = 0. For all the options only option c is not possible.

**2. b**

Let the number of already seated students be x. Thus, according to the condition, 5 = 25 % of x. Thus, x = 20 i.e. the number of already seated students = 20. Thus, the number of chairs = 20+5=25

**3. b**

Just plug in the options. The trick is to find a multiple of 7 that leaves a remainder of 1when divided by 6, 15 and 17. Only 1 option fits that is 511.

**4. b**

Convert all the measurements in inches. Thus, **the total height of 22 trees = 22 \* 15\*12 = 3960 inches**.

Let the height of the **tallest tree be t inches**. Thus, the height of the **smallest tree = t – 40 inches** ( 3\*12+4)

The **total height of the other 20 trees = 20 \* 178** (20\* 14 ft and 10 inches = 20\*(14\*12 + 10 = 168 + 10 = 178 inches) = **3560 inches**.Thus, **3960 = t + (t-40) + 3560 .Thus, t = 220 inches = 220 / 12 ft = 18 ft and 4 inches**

**5. e**

Let the value of the turban be $ t. Thus, Payment Time of service(in months)

T+100 12

T + 65 9 Thus, **9(t+100) = 12(t+65).** Thus, t = $40.

**6. b**

Let the C.P. be Rs 100. Thus, the marked price = Rs 140. Now, the seller gives an initial discount of 10% = Rs 14. Thus, the price after the 1st discount = 140-14 = Rs 126. Now, the seller finally makes a profit of 10% i.e. 10% of Rs 100. Thus, he makes Rs 10 profit. Thus, the S.P.= Rs 110. Thus, the difference between the S.P. and the price after the 1st discount = Rs 126 – Rs 110 = Rs 16. Thus, 16 = x%of 126. Thus, 16 = (x/100)\*126. Thus, x = approximately 13%.

**7. d**

Let the fraction be n/d. Thus, according to the condition; [(n/d)\*(n/d)] / 1/n/d =( n2 / d2 ) / (d/n) = (n2 / d2 ) \* n/d = n3 / d3 = 512 / 27 =. Thus, n/d = 8/3 = 2 ⅔

**8. d**

Let the total stock of ABC Corporation be x. Thus, John owns=20%of x = x/5. Thus, Dick owns (x-30000-x/5)

= (4x – 150000) / 5 = 50 % more than John’s amount. Thus, (4x – 150000) / 5 = (x/5 + 50% of x/5). Thus,

(4x – 150000) / 5 = (x/5 + {1/2 \* x/5}) . Thus, (4x – 150000)/5 = (x/5 + x/10 ) = (4x-150000) / 5 = (3x/10).

Thus, (4x-150000) \* 2 = 3x . Thus, 8x – 300000 = 3x. Thus, 5x = 300000. Thus, x = 60000. Thus, John’s share = 60000 / 5 = 12000.

**9. d**

The quantity of milk in the 1st vessel = **4/5** (1-1/5 i.e. 1- the quantity of mango juice). Similarly, the quantity of milk in the 2nd vessel = **6/7** (1-1/7). Thus, the total quantity of milk in both the vessels = (4/5 + 6/7) = (58/35) and the total quantity of mango juice in both the vessels = (1/5 + 1/7)=(12/35). Thus, the ratio of milk to the

ratio of mango juice = (58 / 35 : 12 / 35) = 29/6 = 29:6.

**10. c NOTE: The information about the length of the platform is redundant.**

Firstly, the speed of the train is converted into m/s. Thus, the speed of the train = 36 \* 5/18 m/s = 10 m/s.

Now, the distance train has to cross = (1200 + 600) = 1800 m. Thus, the time taken by the train = 1800 m / 10 m/s = 180 seconds = 3 mins.

**11. c**

Let the original cost of goods be Rs 100. Thus, the profit earned = Rs. 20. Thus, the selling price = Rs. 120. If the cost of the goods doubles, the cost becomes Rs. 200 and the profit percent becomes 1/5th of original profit percent i.e. 1/5th of 20% = 4%. Thus, profit earned = 4% of Rs. 20 = Rs. 8. Thus, (8/20)\*100= 40%.\

**12. e**

The probability that the ball is neither red nor green = The probability that the ball is blue = 7/21 = 1/3.

1. **b A**

**83 117**

B C ABC = 830 . Thus, CBD = (1220 –

830) = 580. Thus, EDF = 580

D E (corresponding angles)

F

**14. a**

Let the number of basketballs be b and the price per ball be $p. Thus, bp = $450. According to the 2nd condition, (p-15)(b+5)= 450. Thus, pb-15b+5p-75 = 450. Thus, 450-15b+5p-75 = 450. Thus, -15b+5p-75=0.

Substituting p = 450/b, we get the above equation as : -15b + 5(450/b)-75=0. Thus, -15b2 +2250 -75b=0. Thus, rearranging and dividing each term by 15 we get, **b2 + 5b-150 = 0.** Thus, solving the equation would give roots as **-15 and 10**. As the number of balls cannot be a negative number, the answer is 10.

**OR :** Plugging in the options, and checking for the conditions could be tried. Example: if the number of balls is 10, then the price per ball = $45 (450/10). According to the 2nd condition, if the price per ball becomes $30, the number of balls that could be bought = 450/30=15 i.e. 5 more than the original number.

**15. b NOTE: Each player either scores point or points.**

|  |  |  |  |
| --- | --- | --- | --- |
| N : Points Disks Total  2 0 0  2 5 10  2 10 20  2 15 30  2 20 40  2 25 50 | M : Points Disks Total  5 10 50  5 8 40  5 6 30  5 4 20  5 2 10  5 0 0 | TOTAL Points scored (M+N)  0+50 = 50  10+40 = 50  20+30 = 50  30+20 = 50  40+10 = 50  50+0 = 50 | Difference in disks  10 – 0 = 10  **8 - 5 = 3**  10 - 6 = 4  15 – 4 = 11  20 – 2 = 18  25 – 0 = 25 |

Thus, the least difference between the number of disks = 8- 5 = 3.

1. **c**

Let the number of books on the 3rd shelf be t, 2nd shelf be s and 1st shelf be f. Thus, **f + s + t = 48**.Thus, according to the condition: t-3 = f and s + 3 = 2f. Thus, t = f + 3 and s = 2f -3. Thus, **f + 2f – 3 + f+3** = 48. Thus, 4f =48. Thus, f= 12. Thus, s = 2\*12-3 = 21 and t = 12+3 = 15. Thus, the books are: 12,21 and 15.

OR: Plug in the options and check for the conditions.

1. **e**

John could reach the top in the following ways: (1 1 1 1) , (1 2 1) , (1 1 2) , (2 1 1) , (2 2) , (1 3) , (3 1) , (4).

1. **e**

We neither have any information about the values of m and n nor are they expressed in terms of a,b,c or d.

1. **d**

Suppose the number of trees is 200 ( Take a multiple of 8, since we have 1/4th of the remaining ½).

200(Trees cut)

Thus, total no. of birds =

½ ½ 200+25+300= **525**

100 100 if there are 200 trees.

No. of sparrows= Thus, if there are 630 birds,

100 \* 2= ¼ ¾ then:

1. 25 75 **Trees cut Birds**

No. of pigeons= No. of birds = **Assumption 200 525**

25\*1 = **25** 75 \* 4 = **300** **Actual ? 630**

Thus, actual no. of trees cut = (630 \* 200) / 525 = 240.

1. **b**

Given : 2(l+b) = 32. Thus, (l+b) = 16. Thus, trying out various combinations for length and breadth, would give us the following results: 1 and 15; Area = 1\* 15 = **15** . 2 and 14; Area = **28**. 3 and 13; Area = **39**. 4 and 12; Area = **48**. 5 and 11; Area = **55**. 6 and 10; Area = **60**. 7 and 9; Area = **63**. 8 and 8; Area = **64**. (Square is a subset of rectangle, thus, the sides can be equal). (It does not matter what are the individual measurements of lengths and breadths. Eventually, the area remains the same, since it is the product).

1. **e**

The pond is completely after 60 days. Thus, since the level of water doubles each, the pond must have been half full after the 59th day. It must have been 1/4th ( ½ of ½) filled after the 58th day and 1/8th ( ½ of ¼ ) filled after the 57th day.

1. **c**

Let the weight of the vessel be v and that of the wine be w. Thus, according to the 1st condition, **v + w = 26**.

According to the 2nd condition, **v + (w/5) = 10** . Thus, solving the equations either by substitution or simultaneous method would give the answer.

1. **d**

Since John finished 1/3rd of the job in 6 hours, he would finish the entire job in 18 hours. Let Mark take m

hours to complete the same job. Now, it took both of them 4 hours to complete 2/3rd of the work; thus, they would complete the work in 6 hours. Thus, **in one hour both can complete : (1/18) + (1/m) = 1/6th part of work.** Thus, 1/m = 1/6 – 1/18 = 2/18 = 1/9. Thus, 1/m = 1/9; therefore, m=9.

1. **c**

At least 2 greens mean: 2 greens or 3 greens: Thus, the probability of drawing 2 greens and 1 yellow:

**(3*C*2 \* 7*C*1) / 10*C*3  = 21 / 120**. The probability of drawing 3 greens **= 3*C*3 / 10*C*3  = 1/ 120**. Thus, the required probability = (**21/120) + (1/120) = (22 / 120) = 11/60 = 0.18**

1. **b**

Total cost of gravelling = Total area of roads \* Cost per sq. ft.

Total area of roads = (100\*8)+(80\*6)-(8\*6)

=800+480-48=1232 sq.ft.. Thus, total cost =

$2 \* 1232 = $2464.

1. **d**

**Given: Sum of interior angles of a polygon= 4\*(Sum of exterior angles)**. Thus, (n-2) \* 180 = 4\*360. Thus, we get: n-2 = 4\*2. Thus, n=10.

1. **d**

For each machine: **Time (in minutes) Holes drilled Thus, one machine can drill 300 holes in 1 1/3 hours.**

**8 30 Thus, 4 such machines would drill 4\*300 holes = 1200**

**80 ?**

1. **b**

Since the base is square, **the length = breadth**. Thus, the volume of the rectangular solid i.e. (l\*b\*h) = (l2 \* h).

Thus, 252 = l2  \* 7. Thus, l2 =36. Thus, l = 6. Therefore, the perimeter of the square base = 4\*length=**4\*6**.

1. **e**

Total cost of repairing = **1.2\*15 +20\*2 = $18+40=$58. (Just substitute p=15 and h=2).**

1. **d**

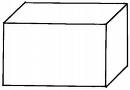
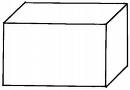
Simplifying both the equations we get:**y + 4x** = **y + x .Thus, y+4x = y + x. Thus, 3y+12x = 4y+4x. 8x=y. x = 1**

**4xy 3xy 4 3 y 8**

**QUANTITATIVE TEST - 4**

1. **d**

Let the edge of the cube be 2 units. When the cube is cut parallel (whether horizontally or vertically) to form 2 cuboids (rectangular solids) of equal volume, we get dimensions of each cuboid as follows: **2\*2\*1.** Thus, the **total surface of each cuboid= 2(2\*2 + 1\*2 + 1\*2)=16**. Now, there is only 1 face which is not painted. Surface area of the face which is not painted =2\*2=4. Thus, % of surface area not painted = 4/16)\*100=25%.

[](http://ngfl.northumberland.gov.uk/clipart/Shapes/images/cuboid_jpg.jpg) [](http://ngfl.northumberland.gov.uk/clipart/Shapes/images/cuboid_jpg.jpg)

1. **c**

Firstly, we have to find the volume of the tank =∏r**2**h = ∏\*(7) **2**\*10.5. = 22/7 \* 7\*7\*10.5 = **1617 cubic metres.**

If the tank is half full, the volume is 1617/2 cubic metres. Thus, time taken = (1617/2) / 10.5 = **77 hours**.

1. **d**

Probability of choosing a jellybean that is neither red nor purple = Choosing a jellybean of the remaining colours i.e **choosing a jellybean from the remaining 91 jellybeans** (100-{4+5}). Thus, required probability=

**91*C*1 / 100*C*1 = 91/100 = 0.91. OR : 1- Probability of choosing a red or a purple jellybean**

**= 1-( {5*C*1/ 100*C*1 }+{ 4*C*1  / 100*C*1 } ) = 1-( {5/100 }+ {4/100}) =1-(9/100).**

1. **b**

Given: 65/100\*30/100\*p = q. Thus, p = (q\*100\*100) / (30\*65)= q\*200/39 = q\*5.1= 5q

1. **b**

Given**: (p-q) = (x+y)+6 and (p+q) = (x-y)-3.** Thus, if we add both the equations simultaneously, we get:

**2p = 2x+3.** Thus, **2p-2x = 3**. Thus, **p-x = 3/2.**

1. **d**

Check for various values for a and b. Example a=5 and b= -1; a=5 and b=0; a=5 and b=1; a=5 and b=5. For all the values, the only option that is true is d.

1. **c**

Let the present ages be: age of John’s father : f years ; age of John be j years and age of mother be m years. Thus, according to the conditions given: **(f+6) = 2(j+6) and (m-2) = 2(j-2). Substituting John’s age as 22** years in the above equations,we get **his father’s age as 50 years and mother’s age as 42 years.**

1. **c**

Speed of the boat in still water = ½ \* (Speed downstream + Speed upstream). Thus, speed downstream = 30/2=**15 km/hr** and speed downstream =30/6=**5 km/hr. Thus, speed of boat = ½ \* (15+5) = 10 km/hr.**

1. **a**

Check for the square of any number whose unit digit is 3 or 8 (Since only numbers with 3 or 8 in the unit’s place would give a remainder of 3 when divided by 5. Suppose the number is 13 or 18. In both the cases, when the squares(169 or 324) are divided by 5, the remainder is 4.

1. **a**

The time taken to complete the journey without any halt would be : 240 / 40 (**t = d/s**) = **6 hours**. Now, since the man rests for 20 minutes after every 80 km, he will have 2 rest periods (1st after 80 and 2nd after 160 km. **NOTE:** There wont be a 3rd rest period, as he would be reaching the destination i.e. he would have covered 240 km). Thus, he **would rest for a total of 40 minutes**. Thus, the total time for the journey = 6 hrs +40 mins

1. **d**

Let the number of sides of the polygon be n. Thus, according to the condition if each of the interior angle is 11 times the exterior angle, the sum of the interior angles would be 11 times the sum of the exterior angles,

i.e.: **(n-2) \* 180 = 11 \* 360. Thus, n-2 = 11\*2. Thus, n= 22+2=24.**

1. **d**

James received 10 votes (0.5% of 2000). To win the election, a candidate would require at least 1001 votes(more than 50% of 2000 votes). Thus, James would require at least **991 votes (1001-10).**

1. **c NOTE: The shaded regions are the ones with 300 .**

Thus, a total of 60**0** is shaded. Thus, fraction of the entire circle = 60/360

1/6.

1. **b**

Let the number of remaining games be g. The team has already won 6 games (40% of 15 games). Thus, according to the given conditon: **6 + (75% of g) = 60% of (15+g). Thus, 6 + (3g /4 ) = 60/100 \* (15+g). Thus, (24+3g) / 4 = 3/5(15+g). Thus, (24+3g) / 4 = (45 + 3g) / 5. Thus, 120 + 15g = 180 + 12g. Thus, g=20.**

1. **d**

**Suppose, 1 dozen eggs were sold in May then:**

|  |  |  |
| --- | --- | --- |
| **Months**  May  April  June  **TOTAL** | **Eggs bought**  1 doz i.e. 12 eggs  8 eggs (2/3 of May)  16 eggs ( 2 \* April)  **36 eggs = 3 doz** | **Total Price (number of eggs \* price per egg)**  $1.2  $ 0.84 ( 8 \* 1.26 /12)  $ 1.44 ( 16 \* 1.08 / 12)  **$3.48** |

Thus, average price per dozen = Total price/Total eggs

$ 3.48 / 3 =$ 1.16

1. **a**

**Times: Water taken out Milk added Quantity of water remaining Quantity of milk**

1st time : 3 ltrs 3 ltrs 7 3

2nd time: 3 ltrs 3 ltrs 4 6

3rd time: 3 ltrs 3 ltrs 1 9

**Thus, ratio of milk and water = 9:1.**

1. **c**

Since there are 40 chips in all, each stack must have 10 chips (40/4). Now, if we want one stack to have the maximum blue chips, the remaining 3 should have the least i.e. 1 blue chip in each stack. Thus, the maximum number of blue chips that could be accommodated in one stack = **6 chips (9-3).**

1. **c**

In 1 minute, the amount of work completed by all three = 1/20 + 1/20 +1/30 = 4/30=2/15. Thus, in 5

mins they would complete, (2/15 )\*5 = **2/3 part of work**. The slowest i.e. the person who takes 30 minutes would complete (1/30) \* 5 = **1/6** part of work**.** Thus, % of work completed by the slowest =

**{(1/6) / (2/3)} \* 100.**

1. **e (58 km/hr) NOTE: The speed is to be found in km/hr.**

Speed of the man in m/s = 10 \* 5/18 = 25/9 m/s. . Thus, the distance covered by the man in 7 ½ =15/2 secs=

(25/9) \* (15/2)= (375/2) m. Thus, the distance covered by the train = (100+ 375/18) = (**2175/18)** m. Thus, speed of the train = (2175/18)m / (15/2) sec = 145 / 9 m/s = (145/9) \* 18/5 km / hr.

**20. b**

The total distance covered in both the cases = 500m (280+220). Let the speed of the fastest train be **x m/s** and that of the slower train be **y m/s**. Thus, we get two equations : **500 / (x-y) = 50** and **500 / (x+y) =5. Thus, we get, 10 = x – y and x + y = 100. Thus, after adding both the equations simultaneously,we get x = 55.**

**21. e**

Original number of boys = 48 (40% of 120 ) and original number of girls = 72 (60% of 120). Thus, according to the condition 1/3rd of the boys are dropped out i.e. 16 boys are dropped out and 4 girls are dropped out. Thus, remaining number of boys and girls = 32 and 68 respectively. Thus, the total number of remaining students = 100 ( 32+68 ). Thus, % of girls = (68 / 100) \* 100.

**22. d**

Number of full-length coats = **120** (15% of 800). Thus, number of shorter length coats = **680** (800-120 or 85% of 800). 500 shorter coats are removed, the remaining number of coats = **800-500 = 300**. Thus, % of full-length coats = **(120 / 300) \* 100**= 40%.

1. **b**

Let the expenditures of A,B and C be $a , $b and $c respectively. According to the 1st condition,

c = b + (50% of b). Thus, **c = b + b/2 = 3b/2.** According to the 2nd condition, **a = 5c/6**. Thus,**a = (5/6)\*(3b/2)**

Thus, **a = 5b/4**. According to the 3rd condition, a = b+2. Thus, **5b/4 = b + 2.** Solving the equation we get, **b=8.** Substituting the value of b, in the previous equations would give the value of **a = $10 and c =$12.**

1. **e**

Let the number of days after the 8 days of stay be x. Thus, following equation would give the total account of his rent : **$130 = $5 + $15 +$50 + (x\*$30)** i.e. **Total amount paid = Registration fee + Rent of 1st 3 days+ Rent of next 5 days + Rent of the remaining days.** Thus, **x = 2. Thus, total days = 3+5+2.**

1. **a**

Let the altitude of the parallelogram be h. Given : **Area of circular sheet = Area of parallelogram.** Thus,

**∏r2 = b\*h.** Thus, **22/7 \* (5.25) 2 = 10.5 \* h.** (r= 10.5/2). Thus, after solving the equation, we get, h=8.25 cm.

1. **d**

From the information given in the problem, we can find out only the ratios. Since there are no values given, the ages could not be found out.

1. **e**

Let the cost of the fruits be a, f, t and c. Thus, according to the 1st condition; **a +f + t + c=$9.60.**

According to the 2nd condition, **f = t + c**. Given: **a= $2.8**. This is all that could be found out. The given information is insufficient to find out the cost of carrots since it gives no relation between the cost of carrots and cost of other fruits.

**28. b**

To find out the most economical typist, we need to find out the work done i.e. words typed out per dollar.

Thus, **A can type 3600** words per hour (60\*60), **B can type 4800** words per hour (80\*60) and **C can type 6600 words** per hour (110\*60). Thus, **per dollar** : **A can type 900 word**s (3600/4); **B can type 960 words** (4800/5) and **C can type approximately 943 words** (6600/7). Thus, B can type the most words for $1.

**29. d**

Let both the pipes be open for x minutes i.e. let the 1st tap would be closed after x minutes. Thus, for 16-x only the second pipe is open. Thus, the cistern is full in the following way: **x/24 + x/ 32 + { (16-x) / 32} = 1**

**30. d**

Let the cost of each article sold at Paul’s store be p and at Linda’s store be *l*. Thus, according to the 1st condition: p = *l* + (40% of *l*). Thus, **p = 1.4*l*.** Let the cost of article x be $x and that of article y be $y. Thus, according to the given condition, **x = 3y.** Thus, from the information given : **x = 1.4(3y**). **Thus, x = 4.2y.**