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Computational Short Cuts

To square a number ending with 5

Step 1: Omit the last digit 5 and get the number having the left over digits

Step 2: Increase the number obtained in step 1 by 1.

Step 3: Multiply the number in step 1 with the number in step 2.

Step 4: Insert 25 as the first two digits of the products in step 3 to get the requisite square

Illustrative Example 1

To get 75^2

Step 1- 7

Step 2- 8

Step 3- (7*8) = 56

Step 4 - 5625

Illustrative Example 2

To get 125^2

Step 1 - 12

Step 2 - 13

Step 3 - (12*13) = 156

Step 4 – 15625

Illustrative Example 3

To get 1015^2

Step 1 - 101

Step 2 - 102

Step 3 - (101*102) = 10302

Step 4 – 1030225

To multiply a number by 25

Insert two zeros on the right of the given number and divide it by 4.

Illustrative Example 4

7852*25 = 785200/4

= 196300

Illustrative Example 5

291857*25 = 29185700/4

= 7296425

To divide a number by 25

Step 1: Multiply the given number by 4

Step2: In the number obtained in step 1, shift the decimal point by two places to the left

Illustrative Example 1

To divide 6946 by 25,

Step 1: (6946*4) =27784

Step2: 277.84

Illustrative Example 2

To divide 192467 by 25,

Step1: 192467*4 =769868

Step2: 7698.68

To multiply a number by 125

Insert three zeroes on the right of the given number and then divide it by 8.

Illustrative Example 1

271864*125 =271864000/8 =3398300

Illustrative Example 2

2092578*125 =2092578000/8 =261572250

To divide a number by 125

Step 1: Multiply the given number by 8

Step2: In the number obtained in step 1, shift the decimal point by three places to the left.

Illustrative Example 1

Divide 164578 by 125

Step1: 164578*8 =1316624

Step2: 1316.624

Illustrative Example 2

Divide 654689.42 by 125

Step1: 654689.42*8 =5237515.36

Step2: 5237.51536

To multiply a number by 11

a) The number has only two digits and their sum does not exceeds 9

Step1: Retain the first digit of the number as the first digit of the product

Step2: Add the two digits

Step3: Insert the first digit of the number at the right and second digit at the left of the sum in step 2.

Illustrative Example 1

To multiply 45 by 11,

Step1: The first digit of the product is 5

Step2: 4+5 =9

Step3: The required product =495

Illustrative Example 2

To multiply 63 by 11

Step1: The first digit of the product is 3

Step2: 6+3 =9

Step3: The required product =693

b) The number has only two digits but their sum exceeds 9

Step1: Retain the first digit of the number as the first digit of the product

Step2: Add the two digits

Step3: Obtain the product by inserting

i) The first digit of the number as the first digit of the product

ii) The first digit of the sum in step 2 as the second digit of the product

iii) The second digit of the number increased by 1 as the third digit of the product

Illustrative Example 1

To multiply 75 by 11

Step1: The first digit of the product is 5

Step2: 7+5 =12

Step3: The required product =825

c) The number has more than two digits

Step1: Retain the first digit of the number as the first digit of the product

Step2: Add the first two digits

i) If the sum is single digit, retain that digit as the sum as the second digit of the product

ii) If the sum is 2-digit, retain the first digit of the sum as the second digit of the product and carry 1 to the next step

Step3: Add the second and the third digits

i) If the sum is single digit, retain that digit as the third digit of the product

ii) If the sum is 2-digit, retain the first digit of the sum as the third digit of the product and carry over 1 to the next step

Step4: Continue the above step for the third and fourth digits, fourth and fifth digits and so on till all the digits of the number are covered

Step5: Insert the last digit of the given number as the last digit of product. If the sum in the last part of step 4 has a carry over, increase the last digit by 1.

Illustrate Example 1

Multiply 7845645 by 11

Step1: The first digit of the product is 5

Step2: The sum of 5 and 4 is 9, a single digit, and so the second digit of the product is 9

Step3: 4 + 6 = 10, a 2-digit number and so the third digit of the product is 0 with a carryover 1

Step4: 6 + 5 =11 and adding the carry over, the sum is 12 and so the fourth digit of the product is 2 with a carryover 1.

5 + 4 = 9 and adding the carry over, the sum is 10 and so the fifth digit of the product is 0 with a carry over 1.

4 + 8 = 12 and adding the carry over, the sum is 13 and so the sixth digit of the product is 3 with a carry over 1.

8 + 7 = 15 and adding the carry over, the sum is 16 and so the seventh digit of the product is 6 with a carry over 1

Step5: Since there is a carry over in the last part of Step 4, the last digit of the product = 7 + 1 = 8 and the product is 86302095

Illustrative Example 18

Multiply 6346545 by 11

Step 1 : The first digit of the product is 5

Step 2: The sum of 5 and 4 is 9, a single digit, and so the second digit of the product is 9

Step 3: 4 + 5 = 9, a single digit number, and so the third digit of the product is 9

Step 4: 5 + 6 = 11 and so the fourth digit of the product is 1 with a carry over 1

6 + 4 = 10 and adding the carry over, the sum is 11 and so the fifth digit of the product is 1 with a carry over 1

4 + 3 = 7 and adding the carry over, the sum is 8 and so the sixth digit of the product is 8

3 + 6 = 9 and so the seventh digit of the product is 9

Step 5: Since there is no carry over in the last part of Step 4, the last digit of the product is 6 and the product is 69811995

To find the product of two numbers close to 100

a. Both the numbers are greater than 100, say 107 and 103

Step	Illustrative Example 19
1. Write the numbers one below the other along with the extra over 100	107 + 7 103 + 3
2. Multiply the extra parts	107 + 7 <u>103 + 3</u> +21
3. Add either of the numbers with the extra of the order, i.e., add diagonally	107 + 7 103 + 3 110 + 21
(Note: (107 + 3) = 110 = (103 + 7)	
4. The product is obtained by writing the product of the extras in Step 2 immediately following the diagonal sum in Step 3	11021

b. Both the numbers are less than 100, say 98 and 92

Step	Illustrative Example
1. Write the numbers one below the other along with the deficit from 100	98 -2 92 -8
2. Multiply the deficit parts	98 -2 <u>92 -8</u> +16
3. Add either of the numbers with deficit of the other, i.e. Add diagonally	98 -2 <u>92 -8</u> 90 +16
Note: (98-8)=90=(92-2)	
4. The product is obtained by writing the product of the deficit in step 2 immediately following the diagonal sum in step 3	9016

c. One number is greater than 100 and the other is less than 100, say 106 and 95

Step	Illustrative Example
1. Write the number one below the other	106 +6

along with extra over 10/ deficit from 100 as the case may be	95 -5
2. Multiply the extra and deficit parts taking into account the signs also	106 +6 95 -5 -30
3. Add either of the numbers with the extra/ deficit of the other taking into account the signs also i.e. add diagonally	106 +6 95 -5 101 -30
Note: (106-5)= 101 = (95+6)	
4. The product is obtained by adding the product of the extra and deficit in step 2 to the diagonal sum in step 3 followed by 2 zeros, taking into account the signs also	The product = 10100-30 = 10070

Mathematical Base For Shortcuts

There are number of mathematical concepts and results which can be intelligently employed to solve aptitude maths problems with ease and in the shortest possible time. Some of the important concepts and results which are handy are enumerated below.

Perfect Square:

1. A perfect square cannot end in 2,3,7 and 8
2. An even perfect square must also be a multiplier of 4
3. S perfect square ending in 6 cannot have an even digit in the tens place
4. A perfect square ending in 5 cannot have any digit other than 2 in the tens place
5. A perfect square cannot end in an odd number of zeros
6. A perfect square which is a multiplier of 3 must also be a multiplier of 9

Illustrative Example

Which of the following cannot be a perfect square?

(a) 555025 (b) 466489 (c) 1552516 (d) 76510009 (e) 98546

Solutions:

Ans (e)

(a), (b), (c) and (d) do not violate any of the above conditions and hence all of these could be perfect squares. But 98546 in (e) ends in 6 and has an even digit in the tens place. This is a violation of conditions (3) above. So, 98546 cannot be a perfect square.

[55025 = 745^2, 466489 = 683^2, 1552516 = 1246^2, 76510009 = 8747^2, 98546 = 313.92^2 which is not an integer]

Square roots of perfect squares

1. If the number has 2n-1 digits, the square root has n digits
2. If the number has 0 or 5 in units place, the square root has the same digit in unit place
3. Foe other digits in unit place, refer the following tree

Illustrative Example

What is the square root of 13689?

(a) 113 (b) 1123 (c) 117 (d) 97 (e) 115

Solution:

Ans (c)

Since, the number has 5 digits, the square root must have 3 digits. So, (b) and (d) are ruled out. The number ends in 9 and hence the square root must end in 3 or 7 by which (e) is ruled out. So, the answer is (a) or (c). Now, 115^2 = 13225. Since the given number is greater than 13225, the square root must be greater than 115. So, the only possibility is (c).

Squares of consecutive integers

The difference between the squares of two consecutive integers is also equal to the sum of the two integers.

Illustrative Example

Ramesh and his cousin share the same birthday but with a difference of 1 year. If the square of the present age of Ramesh exceeds the square of his cousin's present age by 49. What is his cousin's present age?

(a)24 (b)25 (c)26 (d)27 (e)28

Solution:

Ans: [a]

Ramesh and his cousin share the same birthday but with a difference of 1 year implies their ages are represented b y two consecutive integers. So, the sum of their present ages is 49. If present age of Ramesh is n, his cousin's present age must be (n-1) and the sum is (2n-1) which is given to be 49. So, n=25 and hence (n-1)=24.

Property of two digit numbers

If n is a 2-digit number and m is obtained by reversing the digit of n, then

1. (n+m) is always a multiple of 11
2. (n-m) is always a multiple of 9

Illustrative Example

Ravi's total score in his subject and the worst subject is 165. It so happens that when the digits of his score in the best subject are reversed the result is his score in the worst subject. Which of the following CANNOT be his score in either of the subjects?{For both subjects the maximum mark is 100}

(a) 87 (b) 78 (c) 97 (d) 96 (e) 69

Solution

Ans : [c]

The sum of the scores , 165 must be a multiple of 11 which in effect implies that the sum of the digits of the number representing the score must be 15. Only 97 does not qualify.

Illustrative example

A daily Wage earner with wage less than Rs.100, saves as many rupees per day as the number obtained by reversing the digits of the number representing his daily wage. All of the following could be his daily expenditure EXCEPT

(a) Rs.38 (b) Rs.54 (c) Rs.63 (d) Rs.45 (e) Rs.36

Solution

Ans [a]

Since the wage is less than Rs.100, it is a 2-digit number . Daily expenditure is the difference between the wage and the saving . By the property of the given numbers , this difference must be a multiple of 9. Only 38 is not a multiple of 9.

The following fraction equivalents of percentage ease calculations to great extent.

If a quantity Q increases by p%, the new value is Q(1+p)

If a quantity P increases by q%, the new value is P(1+q)

If the product AB of two variables A and B remains constant, an increase of p% in one necessitates a decrease of {p/(1+p)}% in the other.

Similarly, under the same conditions, a decrease of q% in one necessitates an increase of {q/(1+q)}% in the other.

An increase of p% in a variable leads to an increase of

- P% in any linear function of the variable
- {(1+p)^2 -1}% in any quadratic function of the variable
- {(1+p)^3-1}% in any cubic function of the variable .

Similarly, a decrease of q% in a variable leads to a decrease of

- q% in any linear function of the variable
- {1-(1-q)^2}% in any quadratic function of the variable
- {1-(1-q)^3}% in any cubic function of the variable.

[In the above exposition, all percentages are in decimal form.]

Illustrative Example

If the price of gold increases by 25% on Monday and by 33 1/3% on Tuesday but becomes down by 20% on Wednesday and by 25% on Thursday, by what percentage is the Thursday's price higher or lower than the initial price?

(a) 13 1/3% higher (b) 13 1/3% lower (c)8 1/3% higher (d) no change (e)cannot say

Solution

Monday price = 1.25(Initial price)

Tuesday price = (4/3) (Monday price)
= (4/3) (1.25) (Initial price)

Wednesday price = 0.8 (Tuesday price)
= (0.8) (4/3)(1.25)(Initial price)

Thursday price = (3/4) (Wednesday price)
= (3/4) (0.8)(4/3)(1.25)(initial price)

= (Initial price)

Percentage	8 1/3	16 2/3	33 1/3	66 2/3	12.5	25	50	75
Fraction equivalent	1/12	1/6	1/3	2/3	1/8	1/4	1/2	3/4

So, there is no change

Illustrative example

A theatre owner brings down the ticket fare by 20% in order to boost sales. By what percentage should the sale of tickets increase to ensure the same gate collection?

(a)20 (b)25 (c)30 (d)50 (e)15

Solution

Ans: [b]

If p and n respectively represents the fare per ticket and the number of tickets sold, the gate collection= np.

When p is down by 20%, for np to remain constant, n should increase by {0.2/(1-0.2)}

= 0.2/0.8

=1/4

=25%

Note: The following information is common to three examples that follow.
On being heated, the edge of a solid metallic square plate expands by 10%

Illustrate Example
By what percentage does the diagonal of the plate expand?
(a)10(root(2)) (b) 10/(root(2)) (c) 10 (d) (root(2))/10 (e) cannot say
Since the diagonal is [a(root(2))] is a linear function of the edge a, the expansion percentage is the same as in the edge.

Illustrative example
By what percentage does the surface area of the plate increase?
(a)11 (b) 60 (c)21 (d)44 (e) cannot say
Solution
Ans: [c]
Since the surface area (6a)^2 is a quadratic function of the edge a,
the increase percentage ={(1.1)^2-1]
= 1.21-1
= 0.21
=21%

Illustrative Example
By what percentage does the volume of the plate expand?
(a) 100 (b) 100/(root(2)) (c) 33 1/3 (d) 33.1 (e) cannot say
Solution
Ans: [d]
Since the volume (a) is a cubic function of the edge a, the expansion percentage ={(1.1)^2-1]
=1.331-1
=0.331
=33.1%

In the following Treatment , p,l,d and m respectively represent profit, loss, discount and mark up percentages (in decimal form) and CP, SP And MP respectively the cost price, the selling price and the marked price.
CP = SP/(1+p)
=sp/(1-l)

MP= SP/(1-d)
CP=MP/(1+m)

Cost price remaining the same, selling one unit at a profit percentage and another at an equal loss percentage, the net effect is no-profit-no-loss

Selling price remaining the same, selling one unit at a profit percentage and another at an equal loss percentage, the net effect is always loss and the loss percentage is the square of the common profit/loss percentage-all percentages being in decimal form.

P, d and m are connected as p = m-d-md

Note: The following three examples are based on the market set-up described below.

Two brothers and their cousin running the family business have shops adjacent to each other and they trade the same product which they also procure from the same source, but not necessarily at the same price. Not do they necessarily sell the product at the same price.

Illustrate example
The cousin marks up his merchandise by 60%. What is the maximum discount percentage he can afford to give if he wants to ensure at least 36% profit?
(a)24 (b)20 (c)18 (d)15 (e) cannot say
Solution
Ans: [d]
Profit percentage p= m*d-md
Substituting the values, 0.36 = 0.6-d-0.6d or
1.6d = 0.24 or
d = 0.15%

Illustrative Example
Buying the product at the same price as his cousin obtained in the above question, the younger brother ended up making a loss of 36%. What is the total profit made by them together?
(a)-18% (b) 18% (c)0 (d)9% (e) cannot say
Solution
Ans: [c]
When the cost price is the same, equal profit and loss percentages lead to no-profit no-loss in the overall.

Percentage Table

	SUBTRACTED	ADDED

4	4.16(1/24)	3.86(1/26)
5	5.26(1/19)	4.76(1/21)
10	11.11(1/9)	9.09(1/11)
12.5	14.28(1/7)	11.11(1/9)
15	17.55	13
20	25	16.67(1/6)
25	33.33	20(1/5)
30	42.8	23
40	66.67(2/3)	28
50	100	33.33(1/3)
60	150	37.5(3/8)
	when subtracted then add this%	when added the subtarct this%

-This table is used in questions related to topics like Profit and loss, time speed and distance, C.I.,S.I, etc. and also in D.I.

-This reduces ur calculation to the minimum level (but u shud know the reciprocals till 30 for that coz it will help a lot)

-**Example** – If the price of sugar increases then by how much % should one reduce his consumption to avoid extra expenditure. When price of sugar is increased by 50% the consumption will reduce by33.33%and like wise.

These will be most useful in TSD questions.

1. Find the value of 26% of 80

   10% of 80 are 8, thus 20% is 16
   1% is 0.8 and thus 6% is 0.8*6 i.e. 4.8
   Hence the answer is 16+4.8=20.8

2. Find the value of 18% of 130

   10% of 132 are 13.0
   1% is 1.30, thus 8% is 10.4
   Hence the answer is 13.0+10.4=23.4

Profit & Loss

When 2 quantities are sold as a group together. here r some more fundas, with examples.

Example-
A horse and a carriage were bought for Rs. 12000. the carriage was sold at a loss of 10% , horse was sold at a profit of 20%. Together I received Rs.13500.what is the C.P. and S.P. of each.

Method-
Assume everything to be a horse, so I should have sold everything at 20% profit. 20% of 12000+12000= 14400.But I received Rs. 13500 only that makes a difference of 900 or Rs. 900 are less. This also makes a difference of 30% because we calculated 40% profit (20+20%), but we had [+20%+(-10%)] =10%

I calculated 30% more on carriage. 30% or carriage=900

therefore 100%=3000

so now we have the individual cost of the horse, the carriage is for 9000/-and the S.P. can b calculated now.

Sample Question
5 kg of rice and 2 kg of tea cost Rs/- 35, prices of rice grew by10% and tea by 35% and together I could purchase it for Rs.420. What is the price of tea.(in these type of questions, whatever is asked take reverse of that, here tea is asked so work on rice.)

Method
350+10% of 350=385
420-385=35
There is a difference of 25%(35%-10%)
This is Rs. 35
25% corresponds to Rs. 35
therefore 100%=140
2 Kg=Rs 140. so 1kg =70

Example.-
I hired a servant for Rs. 300 per month and a cycle if he works for a year. After 8 months I threw him out and paid him Rs. 50 for that month and the cycle. How much does the cycle cost?

Method-
In 8 months the servant has earned 2/3rd (8/12) of the cycle. So he is leftwith just 1/3rd of the cycle, which we will cut in place of 300 we gave him only 50.1/3 corresponds to (300-50)=250

Therefore 1=750. So the cost of the cycle is Rs. 750

Calendar

1. 1st January 0001 was a Monday.

2. Calendar repeats after every 400 years.

3. Leap year- it is always divisible by 4, but century years are not leap years unlessthey are divisible by 400.

4. Odd days- remainder obtained when no. of days is divided by 7. Normal year has1 odd day and leap year has 2 odd days.

5. Calendar moves ahead by number of odd days.

6. While checking leap year just analyze whether February falls in that period or not.

7. Century has 5 odd days and leap century has 6 odd days.

8. Take out net odd days.(add all the odd days and again divide by 7)

9. In a normal year 1st January and 2nd July and 1st October fall on the same day.

In a leap year 1st January 1st July and 30th September fall on the same day.

10. 1st January 1901 was Tuesday.

11. We calculate odd days on the basis of the previous month.

Example –

what day is it on 29th August 1982?

Method-

As we know 1/1/1901 was a Tuesday now we take 1982 and 1901

1982-1901=81 years.-

81/4=20…. (disregard decimal)

81+20=101- 101/7- remainder is 3, so 3 days from Tuesday is Friday.

Now check whether it is a leap year or not. In this case it is not a leap year.Therefore 2nd July will be Friday

Now we have to go month wise . 2nd august = 3odd days= so from Friday 3 odddays will be Monday so 29th August will be a Sunday.

Clocks

• Here "#" means degrees.

• Normal clock has 60 divisions and each division =6 #

• In 60 minutes , minute hand moves 60 divisions whereas hour hand covers 5divisions whereas hour hand covers 5 divisions, therefore minute hand overtakes 55divisions in 60 minutes, so to overtake 1 division it needs 12/11 minutes.

• Minute hand covers 12 times the no. of divisions covered by hour hand in sametime.

• Whenever u need to imagine; imagine the position of hand at exact hour, becauseu know the gap between the hour hand and minute hand=(hour*5) and minutehand is behind

• Angle between hands – (11m-60h)/2, If the angle calculated does not exists in theans. options, then subtract your ans. from 360#

• Whatever position comes 1 in an hour, it takes place 11 times in 12 hrs.

• When u get ans. in decimals then remember base is 60.

• For every hour the gap is 60/13• I f two watches move at different speeds, then they show the same time when thegap is 12hrs. or 720 minutes.

• We use the concept of ratio to find time.

In a normal watch hands coincide every 65 5/11 minutes. If it is written that handsare coinciding every 65 minutes. it means, true time is 65 minutes but watch is giving 65 5/11 minutes, so it is gaining 5/11 minutes every 65 minutes, therefore to calculate the variance , we find the number of time periods of 65 minutes andmultiply it by 5/11

Q. when will there be an angle of 30# between 5 and 6?

Method-

5*5= 2530/6= 5, 6 here means 6 divisions.

Now we get 2 answers

i. 25-5=20 so 20*(12/11)

ii. 25+5=30 so 30*(12/11)

Simple Interest and Compound Interest

Here's a table for calculating SI and CI

------------------ S.I. ------------- C.I.

1--------------------S -------------Upto S

2------------------2S--------------- Upto 2S+X

3------------- -----3S--------------- Upto 3S+3X+

4--------------------4S ------------ Upto 4S=6X++

5--------------------5S ------------ Upto 5S+10X+++

6-------------------6S ------------ Upto 6S+15X+++

"++" it roughly takes a value of Rs. 2 for Rs 100 of X.

Q. the difference between CI and SI is Rs 9848 at 8% interest put out for 4 yrs.What is the principle?

Method-

For 4 yrs. The value that corresponds is 6X++

So 6X++ = 9848

Here we divide the amt. by 100 and ignore the decimal part so we get 98 and now we subtract 2 from it and now we get 96.

So 6x =96 , x =16

8% of SI= 16

So 1% of SI = Rs. 2.

100% of SI =200

200 is 8 % of principle therefore the principle is 2500.

Sample- What is the interest on Rs. 17250 for 3 yrs. At8% interest compounded annually?

Method- 8*3= 24

(8* /100= 0.64.

0.64*3= 1.92+ (approx. 2)

so 24+2=26%

26% of 17250= 4490

(here all the calculations can be done mentally and approximated, we generally do not need to write. This saves time. And we always have ans. options in the exam, so we can get the ans. closest to it, put we need practice for this)

Note – For 10% CI it keeps on increasing in this order every year.

1st year 110

2nd year 121

3rd year 133.1

4th year 146.4 and so on.

INSTALLMENT-

Q. A television worth Rs. 15000/- is bought at 10% interest, to be payable in 4 yrs.Tell me the equal installments?

Method –

According to the above table 4 yrs corresponds to 46.4%

So 15000+46.4%= 21960.Now

1--------------------2--------------------------- 3---------------------------4

x---1.331x

------------------x---1.21x

--x----------------------------1.10x

--4.641x

add all the three to get 4.641now 4.641x = 21960 so we can find out X.

MONTHLY INSTALLMENT.

R%= (24*I*100)/N(F+L)
Here I = interest rate

N=no. of installments

F=principle to be paid at time of 1st installment.

L= principle to be paid at time of last. Installment; it can be negative also.

Q. I borrow Rs 500, and pay Rs. 50 monthly for a year find the rate %?

Method-

R= (24*100*100)/12(500-50) =44%

Here I comes as 100 coz we pay 50 for 12 months which comes as 600 so 100 is the interest amount.

And L comes as 50 because we have paid 50*11= 550 by now and only Rs. 50 is leftover.

Note—

C.I moves in GP and SI moves in AP

0----------- 5-------------10---------------15------------20

S.I x----------- 1.5x----------2x------- 2.5x-----------------3x

C.I x----------- 1.5x---------2.25x-------3.375x-------------5x

At the same intervals previous sum is multiplied by same ratio.

0----------------5-----------10------------15------------------20

CI x------------nx----------(n^2)x----------(n^3)x----------- (n^4)x

Q. if Rs 5000 becomes Rs 20000 in 10 years. What was the amount after 7.5 years.

Method-

Here we take the above table as 0. , 2.5, 5, 7.5, 10. and x, nx, (n^2)x…….

So for 7.5 years. We have (n^4)x =4x

So n^4= 4

N= 2^1/2

(2^1/2)^3= x

1.414*2.=2.282

2.282* 50000 is the ans.

1)Suppose you have a big number given and have to multiply with 25. How do you go with it?

Ans:

Better way: Suppose the number is 5678*25

place two zeros at the end of the number, 567800

Now divide with 4, 567800/4.

Now which is faster, multiplying by 25 or dividing by 4.

Its very simple , multiplying the number by 25 = 100/4

That's what we tried here.

2) Square number

Is 5489632 a perfect square number?

You may have come across such Q in your test and thought the question is crazy.

Actually this takes just 1 sec to determine that this number is not a perfect square!

All perfect square numbers will end with 0,1,4,5,6,9.

Note: It does not mean that all the numbers ending with 0,1,4,5,6,9 is a perfect square eg.1000.

However the other way its true

Average

1. Find the average for 10, 16, 22, 28, and 34?

Cdtn: If the given numbers are consecutive and total count is odd, and then the result'll be the mid positioned value i.e. 22.

2. Find the average for 15, 20, 25, 30, 35, and 40?

Cdtn: If the given numbers are consecutive and total count is even, and then the result'll be the average value of mid positioned numbers i.e. (25+30)/2=27.5

Square Root

1. The square root values can be estimated simply by given last digit value.

Example:
To find the value of root of 81: The possible value will be 1 and 9.
Hence the value is 9.

Cdtn:	Given last digit value	possible values
	1	1, 9
	4	2, 8
	5	5
	6	6, 4
	9	3, 7

ADDITION:

1. What is the value of addition of first 20 natural numbers?

Soln: We can use the simplest formula as, n (n+1)/2

Quantz Shortcuts

Finding number of Factors

To find the number of factors of a given number, express the number as a product of powers of prime numbers.
In this case, 48 can be written as 16 * 3 = (24 * 3)

Now, increment the power of each of the prime numbers by 1 and multiply the result.

In this case it will be (4 + 1)*(1 + 1) = 5 * 2 = 10 (the power of 2 is 4 and the power of 3 is 1)

Therefore, there will 10 factors including 1 and 48. Excluding, these two numbers, you will have 10 – 2 = 8 factors.

Sum of n natural numbers

-> The sum of first n natural numbers = n (n+1)/2

-> The sum of squares of first n natural numbers is n (n+1)(2n+1)/6

-> The sum of first n even numbers= n (n+1)

-> The sum of first n odd numbers= n^2

Finding Squares of numbers

To find the squares of numbers near numbers of which squares are known

To find 41^2 , Add 40+41 to 1600 =1681

To find 59^2 , Subtract 60^2-(60+59) =3481

Finding number of Positive Roots

If an equation (i:e f(x)=0) contains all positive co-efficient of any powers of x , it has no positive roots then.

Eg: x^4+3x^2+2x+6=0 has no positive roots .

Finding number of Imaginary Roots

For an equation f(x)=0 , the maximum number of positive roots it can have is the number of sign changes in f(x) ; and the maximum number of negative roots it can have is the number of sign changes in f(-x) .
Hence the remaining are the minimum number of imaginary roots of the equation(Since we also know that the index of the maximum power of x is the number of roots of an equation.)

Reciprocal Roots

The equation whose roots are the reciprocal of the roots of the equation ax^2+bx+c is cx^2+bx+a

Roots

Roots of $x^2+x+1=0$ are $1,w,w^2$ where $1+w+w^2=0$ and $w^3=1$

Finding Sum of the roots

For a cubic equation $ax^3+bx^2+cx+d=o$ sum of the roots = $-b/a$ sum of the product of the roots taken two at a time = c/a product of the roots = $-d/a$

For a biquadratic equation $ax^4+bx^3+cx^2+dx+e = 0$ sum of the roots = $-b/a$ sum of the product of the roots taken three at a time = c/a sum of the product of the roots taken two at a time = $-d/a$ product of the roots = e/a

Maximum/Minimum

-> If for two numbers x+y=k(=constant), then their PRODUCT is MAXIMUM if x=y(=k/2). The maximum product is then $(k^2)/4$

-> If for two numbers x*y=k(=constant), then their SUM is MINIMUM if x=y(=root(k)). The minimum sum is then 2*root(k) .

Inequalties

-> x + y >= x+y (stands for absolute value or modulus) (Useful in solving some inequations)

-> a+b=a+b if a*b>=0 else a+b >= a+b

-> 2<= $(1+1/n)^n$ <=3 -> $(1+x)^n$ ~ (1+nx) if x<<<1> When you multiply each side of the inequality by -1, you have to reverse the direction of the inequality.

Product Vs HCF-LCM

Product of any two numbers = Product of their HCF and LCM . Hence product of two numbers = LCM of the numbers if they are prime to each other

AM GM HM

For any 2 numbers a>b a>AM>GM>HM>b (where AM, GM ,HM stand for arithmetic, geometric , harmonic menasa respectively) $(GM)^2$ = AM * HM

Sum of Exterior Angles

For any regular polygon , the sum of the exterior angles is equal to 360 degrees hence measure of any external angle is equal to 360/n. (where n is the number of sides)

For any regular polygon , the sum of interior angles =(n-2)180 degrees

So measure of one angle in

Square-----=90
Pentagon--=108
Hexagon---=120
Heptagon--=128.5
Octagon---=135
Nonagon--=140
Decagon--=144

Problems on clocks

Problems on clocks can be tackled as assuming two runners going round a circle , one 12 times as fast as the other . That is , the minute hand describes 6 degrees /minute the hour hand describes 1/2 degrees /minute . Thus the minute hand describes 5(1/2) degrees more than the hour hand per minute .
The hour and the minute hand meet each other after every 65(5/11) minutes after being together at midnight. (This can be derived from the above) .

Co-ordinates

Given the coordinates (a,b) (c,d) (e,f) (g,h) of a parallelogram , the coordinates of the meeting point of the diagonals can be found out by solving for [(a+e)/2,(b+f)/2] =[(c+g)/2 , (d+h)/2]

Ratio

If a1/b1 = a2/b2 = a3/b3 = ... , then each ratio is equal to (k1*a1+ k2*a2+k3*a3+..............) / (k1*b1+ k2*b2+k3*b3+..............) , which is also equal to (a1+a2+a3+............./b1+b2+b3+..........)

Finding multiples

x^n -a^n = (x-a)(x^(n-1) + x^(n-2) + ...+ a^(n-1)) ......Very useful for finding multiples .For example (17-14=3 will be a multiple of 17^3 - 14^3)

Exponents

e^x = 1 + (x)/1! + (x^2)/2! + (x^3)/3! + ...to infinity 2 <>GP
-> In a GP the product of any two terms equidistant from a term is always constant .

-> The sum of an infinite GP = a/(1-r) , where a and r are resp. the first term and common ratio of the GP .

Mixtures

If Q be the volume of a vessel q qty of a mixture of water and wine be removed each time from a mixture n be the number of times this operation be done and A be the final qty of wine in the mixture then ,
A/Q = (1-q/Q)^n

Some Pythagorean triplets

3,4,5----------(3^2=4+5)
5,12,13--------(5^2=12+13)
7,24,25--------(7^2=24+25)
8,15,17--------(8^2 / 2 = 15+17)
9,40,41--------(9^2=40+41)
11,60,61-------(11^2=60+61)
12,35,37-------(12^2 / 2 = 35+37)
16,63,65-------(16^2 /2 = 63+65)
20,21,29-------(EXCEPTION)---

Appolonius theorem

Appolonius theorem could be applied to the 4 triangles formed in a parallelogram.

Function

Any function of the type y=f(x)=(ax-b)/(bx-a) is always of the form x=f(y) .

Finding Squares

To find the squares of numbers from 50 to 59

For 5X^2 , use the formulae

(5X)^2 = 5^2 +X / X^2

Eg ; (55^2) = 25+5 /25
=3025
(56)^2 = 25+6/36
=3136
(59)^2 = 25+9/81
=3481

Successive Discounts

Formula for successive discounts
a+b+(ab/100)
This is used for succesive discounts types of sums.like 1999 population increses by 10% and then in 2000 by 5% so the population in 2000 now is 10+5+(50/100)=+15.5% more that was in 1999 and if there is a decrease then it will be preceeded by a -ve sign and likewise.

Rules of Logarithms:

-> loga(M)=y if and only if M=ay

-> loga(MN)=loga(M)+loga(N)

-> loga(M/N)=loga(M)-loga(N)

-> loga(Mp)=p*loga(M)

-> loga(1)=0-> loga(ap)=p

-> log(1+x) = x - (x^2)/2 + (x^3)/3 - (x^4)/4 ....to infinity [Note the alternating sign . .Also note that the ogarithm is with respect to base e]

Divisibility rules

-> A number is divisible by 2 if and only if the last digit is divisible by 2.

-> A number is divisible by 3 if and only if the sum of the digits is divisible by 3.

-> A number is divisible by 4 if and only if the last 2 digits is a number divisible by 4.

-> A number is divisible by 5 if and only if the last digit is divisible by 5.

-> A number is divisible by 6 if and only if it is divisible by 2 and 3.

-> A number is divisible by 8 if and only if the last 3 digits is a number divisible by 8.

-> A number is divisible by 9 if and only if the sum of the digits is divisible by 9.

-> A number is divisible by 10n if and only if the number ends in n zeros.

-> A number is divisible by 11 iff the sum of every other digit minus the sum of the rest of the digits is divisible by 11.

-> To find out if a number is divisible by seven, take the last digit, double it, and subtract it from the rest of the number.Example: If you had 203, you would double the last digit to get six, and subtract that from 20 to get 14. If you get an answer divisible by 7 (including zero), then the original number is divisible by seven. If you don't know the new number's divisibility, you can apply the rule again.

-> If n is even , n(n+1)(n+2) is divisible by 24

Numbers

-> For three positive numbers a, b ,c
(a+b+c) * (1/a+1/b+1/c)>=9

-> For any positive integer n
2<= (1+1/n)^n <=3

-> The greatest common divisor is found by looking at the prime factorizations or using the Euclidean algorithm.

-> The least common multiple of a and b is found by looking at the prime factorizations or (ab)/gcd(a,b).

-> Two numbers are said to be relatively prime in the greatest common factor is 1.

-> If gcd(a, b)=d, then there exist integers x and y so that ax+by=d.

-> If d divides both a and b, then d divides a+b and d divides a-b.a=b mod m iff m divides a-b iff a and b both have the same remainder when divided by m.

-> ap-1 = 1 mod p (a is not a multiple of p)af(m)=1 mod m (gcd(a, m) =1)

-> If a probability experiment is repeated n times and the probability of success in one trial is p, then the probability of exactly r successes in the n trials is nCr (p)r(1-p)(n-r).

-> The number of zeros at the end of n! is determined by the number of 5's. To find this you do the following process: n/5 = n1 and some remainder. Drop the remainder and compute n1/5 = n2 plus some remainder. Drop the remainder and compute n2/5 = n3 plus some remainder, etc. The number of zeros is n1+n2+n3+n4...

-> The sum of any consecutive integers k through n, with n being the larger,simply use this equation:(n+k)(n-k+1)------------ 2

-> a^2+b^2+c^2 >= ab+bc+ca If a=b=c , then the equality holds in the above. -> a^4+b^4+c^4+d^4 >=4abcd

-> (n!)^2 > n^n (! for factorial)

-> If a+b+c+d=constant , then the product a^p * b^q * c^r * d^s will be maximum if a/p = b/q = c/r = d/s .

-> Consider the two equations a1x+b1y=c1 a2x+b2y=c2

-> (m+n)! is divisible by m! * n! .Then , If a1/a2 = b1/b2 = c1/c2 , then we have infinite solutions for these equations. If a1/a2 = b1/b2 <> c1/c2 , then we have no solution for these equations.(<> means not equal to) If a1/a2 <> b1/b2 , then we have a unique solutions for these equations..

-> When a three digit number is reversed and the difference of these two numbers is taken , the middle number is always 9 and the sum of the other two numbers is always 9 .

-> Let 'x' be certain base in which the representation of a number is 'abcd' , then the decimal value of this number is a*x^3 + b*x^2 + c*x + d

Combinatorics

-> (Multiplication Principle) If there are n choices for the first step of a two step process and m choices for the second step, the number of ways of doing the two step process is nm.

-> The number of arrangements of n objects is n!-> The number of arrangements of r out of n objects is nPr = n!/(n-r)!

-> The number of arrangements of n objects in a circle is (n-1)!

-> The number of arrangements of n objects on a key ring is (n-1)!/2

-> The number of arrangements of n objects with r1 of type 1, r2 of type 2, ..., ri of type i is n!/(r1!r2!...ri!)

-> The number of ways of choosing n out of r objects is nCr = n!/((n-r)! r!)

-> The number of distributions of n distinct objects in k distinct boxes is kn.

-> The number of ways of distributing n identical objects in k distinct boxes is (n+k-1)Cn.

-> The sum of the coefficients of the binomial expression (x+y)n is 2n.

-> To find the sum of the coefficients of a power of any polynomial, replace the variables by 1.

-> When solving an equation for integer solutions, it is important to look for factoring. Important factoring forms:
1. .a2-b2=(a-b)(a+b)

2. a3-b3=(a-b)(a2+ab+b2)

3. an-bn=(a-b)(an-1+an-2b+an-3b2+...+abn-2+bn-1)

4. a3+b3=(a+b)(a2-ab+b2)

5. If n is odd, an+bn=(a+b)(an-1-an-2b+an-3b2-...-abn-2+bn-1) (alternate signs)

Quantitative Ability

1. If an equation (i.e. f(x) = 0) contains all positive co-efficients of any powers of x, it has no positive roots.
Eg: x3+3x2+2x+6=0 has no positive roots

2. For an equation, if all the even powers of x have same sign coefficients and all the odd powers of x have the opposite sign coefficients, then it has no negative roots.

3. For an equation f(x)=0 , the maximum number of positive roots it can have is the number of sign changes in f(x) ; and the maximum number of negative roots it can have is the number of sign changes in f(-x)

4. Complex roots occur in pairs, hence if one of the roots of an equation is 2+3i, another has to be 2-3i and if there are three possible roots of the equation, we can conclude that the last root is real. This real root could be found out by finding the sum of the roots of the equation and subtracting (2+3i)+(2-3i)=4 from that sum.

5.
a.For a cubic equation ax3+bx2+cx+d=o
Sum of the roots = - b/a
Sum of the product of the roots taken two at a time = c/a
Product of the roots = -d/a

b.For a bi-quadratic equation ax4+bx3+cx2+dx+e = 0
Sum of the roots = - b/a
Sum of the product of the roots taken three at a time = c/a
Sum of the product of the roots taken two at a time = -d/a
Product of the roots = e/a

6. If an equation f(x)= 0 has only odd powers of x and all these have the same sign coefficients or if f(x) = 0 has only odd powers of x and all these have the same sign coefficients, then the equation has no real roots in each case (except for x=0 in the second case)

7. Consider the two equations

a1x+b1y=c1
a2x+b2y=c2
Then,
a. If a1/a2 = b1/b2 = c1/c2, then we have infinite solutions for these equations.
b. If a1/a2 = b1/b2 <> c1/c2, then we have no solution.
c. If a1/a2 <> b1/b2, then we have a unique solution.

8. Roots of x2 + x + 1=0 are 1, w, w2 where 1 + w + w2=0 and w3=1

9. a + b = a + b if a*b>=0
else, a + b >= a + b

10. The equation ax2+bx+c=0 will have max. value when a<0>0. The max. or min. value is given by (4ac-b2)/4a and will occur at x = -b/2a

11. a. If for two numbers x + y=k (a constant), then their PRODUCT is MAXIMUM if x=y (=k/2). The maximum product is then (k2)/4.

b. If for two numbers x*y=k (a constant), then their SUM is MINIMUM if x=y (=root(k)). The minimum sum is then 2*root (k).

12. Product of any two numbers = Product of their HCF and LCM. Hence product of two numbers = LCM of the numbers if they are prime to each other.

13. For any 2 numbers a, b where a>b

a. a>AM>GM>HM>b (where AM, GM ,HM stand for arithmetic, geometric , harmonic means respectively)

b. (GM)^2 = AM * HM

14. For three positive numbers a, b, c

(a + b + c) * (1/a + 1/b + 1/c)>=9

15. For any positive integer n

2<= (1 + 1/n)^n <=3

16. a2 + b2 + c2 >= ab + bc + ca
If a=b=c, then the case of equality holds good.

17. a4 + b4 + c4 + d4 >= 4abcd (Equality arises when a=b=c=d=1)

18. (n!)2 > nn

19. If a + b + c + d=constant, then the product a^p * b^q * c^r * d^s will be maximum if a/p = b/q = c/r = d/s

20. If n is even, n(n+1)(n+2) is divisible by 24

21. x^n -a^n = (x-a)(x^(n-1) + x^(n-2) + ...+ a^(n-1)) ......Very useful for finding multiples. For example (17-14=3 will be a multiple of 17^3 - 14^3)
22. e^x = 1 + (x)/1! + (x^2)/2! + (x^3)/3! + ...to infinity
Note: 2 <>23. log(1+x) = x - (x^2)/2 + (x^3)/3 - (x^4)/4 ....to infinity [Note the alternating sign . .Also note that the logarithm is with respect to base e]

23. (m + n)! is divisible by m! * n!

24. When a three digit number is reversed and the difference of these two numbers is taken, the middle number is always 9 and the sum of the other two numbers is always 9.

25. Any function of the type y=f(x)=(ax-b)/(bx-a) is always of the form x=f(y)

26. To Find Square of a 3-Digit Number

Let the number be XYZ

Steps

a.Last digit = Last digit of Sq(Z)
b. Second last digit = 2*Y*Z + any carryover from STEP 1
c. Third last digit 2*X*Z+ Sq(Y) + any carryover from STEP 2
d. Fourth last digit is 2*X*Y + any carryover from STEP 3
e. Beginning of result will be Sq(X) + any carryover from Step 4

Eg) Let us find the square of 431

Step
a. Last digit = Last digit of Sq(1) = 1
b. Second last digit = 2*3*1 + any carryover from STEP 1=6+0=6
c. Third last digit 2*4*1+ Sq(3) + any carryover from STEP 2 = 8+9+0 = 17 i.e. 7 with carry over of 1
d. Fourth last digit is 2*4*3 + any carryover from STEP 3 = 24+1 = 25 i.e. 5 with carry over of 2
e. Beginning of result will be Sq(4) + any carryover from Step 4 = 16+2 = 18
THUS SQ(431) = 185761

27. If the answer choices provided are such that the last two digits are different, then, we need to carry out only the first two steps only.

-> The sum of first n natural numbers = n(n+1)/2

-> The sum of squares of first n natural numbers is n(n+1)(2n+1)/6

-> The sum of cubes of first n natural numbers is (n(n+1)/2)2/4

-> The sum of first n even numbers= n (n+1)

-> The sum of first n odd numbers= n2

28. If a number 'N' is represented as a^x * b^y * c^z… where {a, b, c, …} are prime numbers, then

-> the total number of factors is (x+1)(y+1)(z+1) ....

-> the total number of relatively prime numbers less than the number is N * (1-1/a) * (1-1/b) * (1-1/c)....

-> the sum of relatively prime numbers less than the number is N/2 * N * (1-1/a) * (1-1/b) * (1-1/c)....

-> the sum of factors of the number is {a^(x+1)} * {b^(y+1)} * ...../(x * y *...)

-> Total no. of prime numbers between 1 and 50 is 15

-> Total no. of prime numbers between 51 and 100 is 10

-> Total no. of prime numbers between 101 and 200 is 21

-> The number of squares in n*m board is given by m*(m+1)*(3n-m+1)/6

-> The number of rectangles in n*m board is given by n+1C2 * m+1C2

29. If 'r' is a rational no. lying between 0 and 1, then, r^r can never be rational.

Certain nos. to be remembered

-> 210 = 45 = 322 = 1024

-> 38 = 94 = 812 = 6561

-> 7 * 11 * 13 = 1001

-> 11 * 13 * 17 = 2431

-> 13 * 17 * 19 = 4199

-> 19 * 21 * 23 = 9177

-> 19 * 23 * 29 = 12673

30.
-> The number of squares in n*m board is given by m*(m+1)*(3n-m+1)/6

-> The number of rectangles in n*m board is given by n+1C2 * m+1C2

31. Where the digits of a no. are added and the resultant figure is 1 or 4 or 7 or 9, then, the no. could be a perfect square.

32. If a no. 'N' has got k factors and a^l is one of the factors such that l>=k/2, then, a is the only prime factor for that no.

33. To find out the sum of 3-digit nos. formed with a set of given digits

This is given by (sum of digits) * (no. of digits-1)! * 1111…1 (i.e. based on the no. of digits)

Eg) Find the sum of all 3-digit nos. formed using the digits 2, 3, 5, 7 & 8.
Sum = (2+3+5+7+8) * (5-1)! * 11111 (since 5 digits are there)
= 25 * 24 * 11111
=6666600

34. Consider the equation x^n + y^n = z^n

As per Fermat's Last Theorem, the above equation will not have any solution whenever n>=3.

35. Further as per Fermat, where 'p' is a prime no. and 'N' is co-prime to p, then, N^(p-1) – 1 is always divisible by p.

36. 145 is the 3-digit no. expressed as sum of factorials of the individual digits i.e.
145 = 1! + 4! + 5!

37.
->Where a no. is of the form a^n – b^n, then,
· The no. is always divisible by a - b
· Further, the no. is divisible by a + b when n is even and not divisible by a + b when n is odd

-> Where a no. is of the form a^n + b^n, then,
· The no. is usually not divisible by a - b
· However, the no. is divisible by a + b when n is odd and not divisible by a + b when n is even

38. The relationship between base 10 and base 'e' in log is given by log10N = 0.434 logeN

39. WINE and WATER formula
Let Q - volume of a vessel, q - qty of a mixture of water and wine be removed each time from a mixture, n - number of times this operation is done and A - final qty of wine in the mixture, then,
A/Q = (1-q / Q)^n

40. Pascal's Triangle for computing Compound Interest (CI)
The traditional formula for computing CI is
CI = P*(1+R/100)^N – P

Using Pascal's Triangle,

Number of Years (N)

----

1 1

2 1 2 1

3 1 3 3 1

4 1 4 6 4 1

… 1 …. …. … … ..1

Eg: P = 1000, R=10 %, and N=3 years. What is CI & Amount?

Step 1:

Amount after 3 years = 1 * 1000 + 3 * 100 + 3 * 10 + 1 * 1 = Rs.1331

The coefficients - 1,3,3,1 are lifted from the Pascal's triangle above.

Step 2:

CI after 3 years = 3*100 + 3*10 + 3*1 = Rs.331 (leaving out first term in step 1)

If N =2, we would have had,

Amt = 1 * 1000 + 2 * 100 + 1 * 10 = Rs.1210

CI = 2 * 100 + 1* 10 = Rs.210

41. Suppose the price of a product is first increased by X% and then decreased by Y% , then, the final change % in the price is given by:

Final Difference% = X - Y - XY/100

Eg) The price of a T.V set is increased by 40 % of the cost price and then is decreased by 25% of the new price. On selling, the profit made by the dealer was Rs.1000. At what price was the T.V sold?

Applying the formula,

Final difference% = 40 – 25 - (40*25/100) = 5 %.

So if 5 % = 1,000

Then, 100 % = 20,000.

Hence, C.P = 20,000

& S.P = 20,000+ 1000= 21,000

42. Where the cost price of 2 articles is same and the mark up % is same, then, marked price and NOT cost price should be assumed as 100.

43.

-> Where 'P' represents principal and 'R' represents the rate of interest, then, the difference between 2 years' simple interest and compound interest is given by P * (R/100)2

-> The difference between 3 years' simple interest and compound interest is given by (P * R2 *(300+R))/1003

44.

-> If A can finish a work in X time and B can finish the same work in Y time then both of them together can finish that work in (X*Y)/ (X+Y) time.

-> If A can finish a work in X time and A & B together can finish the same work in S time then B can finish that work in (XS)/(X-S) time.

-> If A can finish a work in X time and B in Y time and C in Z time then all of them working together will finish the work in (XYZ)/ (XY +YZ +XZ) time

-> If A can finish a work in X time and B in Y time and A, B & C together in S time then

· C can finish that work alone in (XYS)/ (XY-SX-SY)

· B+C can finish in (SX)/(X-S); and

· A+C can finish in (SY)/(Y-S)

45. In case 'n' faced die is thrown k times, then, probability of getting atleast one more than the previous throw = nC5/n5

46.

-> When an unbiased coin is tossed odd no. (n) of times, then, the no. of heads can never be equal to the no. of tails i.e. P (no. of heads=no. of tails) = 0

-> When an unbiased coin is tossed even no. (2n) of times, then, P (no. of heads=no. of tails) = 1-(2nCn/22n)

47. Where there are 'n' items and 'm' out of such items should follow a pattern, then, the probability is given by 1/m!

Eg) 1. Suppose there are 10 girls dancing one after the other. What is the probability of A dancing before B dancing before C?

Here n=10, m=3 (i.e. A, B, C)

Hence, P (A>B>C) = 1/3!

= 1/6

Eg)2. Consider the word 'METHODS'. What is the probability that the letter 'M' comes before 'S' when all the letters of the given word are used for forming words, with or without meaning?

P (M>S) = 1/2!
= 1/2

48. CALENDAR

-> Calendar repeats after every 400 years.

-> Leap year- it is always divisible by 4, but century years are not leap years unless they are divisible by 400.

-> Century has 5 odd days and leap century has 6 odd days.

-> In a normal year 1st January and 2nd July and 1st October fall on the same day. In a leap year 1st January 1st July and 30th September fall on the same day.

-> January 1, 1901 was a Tuesday.

49.
-> For any regular polygon, the sum of the exterior angles is equal to 360 degrees, hence measure of any external angle is equal to 360/n (where n is the number of sides)

-> For any regular polygon, the sum of interior angles =(n-2)*180 degrees
So measure of one angle is (n-2)/n *180

-> If any parallelogram can be inscribed in a circle, it must be a rectangle.

-> If a trapezium can be inscribed in a circle it must be an isosceles trapezium (i.e. oblique sides equal).

50. For an isosceles trapezium, sum of a pair of opposite sides is equal in length to the sum of the other pair of opposite sides (i.e. AB+CD = AD+BC, taken in order)

51.
-> For any quadrilateral whose diagonals intersect at right angles, the area of the quadrilateral is 0.5*d1*d2, where d1, d2 are the length of the diagonals.

-> For a cyclic quadrilateral, area = root((s-a) * (s-b) * (s-c) * (s-d)), where s=(a + b + c + d)/2
Further, for a cyclic quadrilateral, the measure of an external angle is equal to the measure of the interior opposite angle.

-> Area of a Rhombus = Product of Diagonals/2

52. Given the coordinates (a, b); (c, d); (e, f); (g, h) of a parallelogram , the coordinates of the meeting point of the diagonals can be found out by solving for
[(a + e)/2, (b + f)/2] = [(c + g)/2, (d + h)/2]

53. Area of a triangle

-> 1/2*base*altitude
-> 1/2*a*b*sin C (or) 1/2*b*c*sin A (or) 1/2*c*a*sin B
-> root(s*(s-a)*(s-b)*(s-c)) where s=(a+b+c)/2
-> a*b*c/(4*R) where R is the circumradius of the triangle
-> r*s ,where r is the inradius of the triangle

54. In any triangle
-> a=b*cos C + c*cos B
-> b=c*cos A + a*cos C
-> c=a*cos B + b*cos A
-> a/sin A=b/sin B=c/sin C=2R, where R is the circumradius
-> cos C = (a^2 + b^2 - c^2)/2ab
-> sin 2A = 2 sin A * cos A
-> cos 2A = cos^2 (A) - sin^2 (A)

55. The ratio of the radii of the circumcircle and incircle of an equilateral triangle is 2:1

56. Appollonius Theorem

In a triangle ABC, if AD is the median to side BC, then
AB2 + AC2 = 2(AD2 + BD2) or 2(AD2 + DC2)

57.
-> In an isosceles triangle, the perpendicular from the vertex to the base or the angular bisector from vertex to base bisects the base.

-> In any triangle the angular bisector of an angle bisects the base in the ratio of the other two sides.

58. The quadrilateral formed by joining the angular bisectors of another quadrilateral is always a rectangle.

59. Let W be any point inside a rectangle ABCD, then,
WD2 + WB2 = WC2 + WA2

60. Let a be the side of an equilateral triangle, then, if three circles are drawn inside this triangle such that they touch each other, then each circle’s radius is given by a/(2*(root(3)+1))

61.
-> Distance between a point (x1, y1) and a line represented by the equation ax + by + c=0 is given by ax1+by1+c/Sq(a2+b2)
-> Distance between 2 points (x1, y1) and (x2, y2) is given by Sq((x1-x2)2+ (y1-y2)2)

62. Where a rectangle is inscribed in an isosceles right angled triangle, then, the length of the rectangle is twice its breadth and the ratio of area of rectangle to area of triangle is 1:2.

Tips for Family Chain Problems

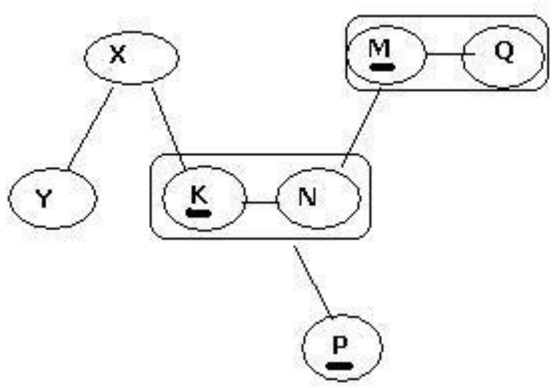
Few things to remember:

1. For solving Logical reasoning questions always try to apprehend the point/inputs by using a graphical reprsentation.

Eg: for Family-Relationship kind of questions such as

1. X is Ys father
2. Y is brother of K
3. Ks mother in law is M
4. N is the only child of M
5. P is grand daughetr of Q, who is husband of M For such questions create a tree like representation using your own notations.

Tree structure for above case is shown below:



Here an underline is used to distinguish between male/female. (Underline is for female).

Couples are enclosed toather in rounded brackets

Data Interpretation Tips

DI is all about how fast you can comprehend the given data and how fast and accurately you are able to add, multiply subtract, divide and calculate ratios percentages. Below are some of the tips to improve in ths section:

1. Spend about a minute to read the graph and the data properly.

2. Check the range of the options given. You may round off the data for calculations depending upon how far the choices are from each other.

3. Read the footnotes or the legends of the graphs and tables properly. Some people assume that the graphs and figures in the question paper are drawn to scale but this may not be the case.

4. Select the sets which are easy to comprehend and are easy to solve when taking Mocks or the real exam. The only way you will be able to identify easy question is by more practice. Expose yourself to as many questions on DI as possible.

5. Improve your calculation speed specially for calculation of averages and percentages.

6. Needless to say, more practise means more confidence and better result. So practise as much as possible from as many sources as possible.

7. Spend some time on analysis on what kind of mistakes you usually make and try to improve on these areas.

8. During your preparation, after you attempt questions on DI, be it right or wrong check the method used to solve the question by the writer of the book/reference material. Keep a record of all the questions you are not able to attempt correctly in the first go (Just write down Q No. Page No. and Book Name) and attempt these questions again after a few days.

For Data sufficiency questions you don't have to actually solve the answers, you just need to find if the data given is enough to solve the questions.

Improve speed and accuracy in Data interpretation/ Data Sufficiency. As there is no substitute for hard work, its obovious that its ur hard work that can only improve your speed and skills.

Practising more questions with setting your time period for exams will surely help u in developing speed.

The more u practice the quicker u will be…

-> In gleaning data from a chart, graph or table, it's remarkably easy to inadvertently grab your data from the wrong graph, bar, line, etc.

This is the #1 cause of incorrect responses in CAT Data Interpretation. To avoid this blunder, point your finger to the data you want; put your finger directly against the question paper and keep it there until you're sure you're looking at the right part of the right chart or graph.

-> Check to see if the question asks for an approximation. If so, you can safely estimate numbers by rounding off.

CAUTION: When rounding off fractions, round the numerator and denominator in the same direction (either up or down); otherwise you'll distort the value of the fraction.Don't confuse percentages with raw numbers. Always ask yourself which type of number the chart or graph is providing, and which type the question is asking for.

-> It's okay to rely on visual approximations when it comes to reading bar graphs and line charts. The test-makers are not out to test your eyesight.

So if two or more answer choices come very, very close to your solution, rest assured that you needn't estimate values more precisely. Instead, go back to square 1; you've made some other mistake along the way.

-> Take 15-30 seconds right up front to assimilate and make sense of the chart, graph, or tableâ€"and be sure to read all the information around it.

(You might need to scroll vertically to view all the information.) Get a sense for what the variables are and how they relate to one anotherâ€"before you tackle the questions.

Tables, Charts, and Graphs (Data Interpretation)

Graphs and charts show the relationship of numbers and quantities in visual form. By looking at a graph, you can see at a glance the relationship between two or more sets of information. If such information were presented in written form, it would be hard to read and understand.

Here are some things to remember when doing problems based on data interpretation:

1. Take your time and read carefully. Understand what you are being asked to do before you begin figuring.

2. Check the dates and types of information required. Be sure that you are looking in the proper columns, and on the proper lines, for the information you need.

3. Check the units required. Be sure that your answer is in thousands, millions, or whatever the question calls for.

4. In computing averages, be sure that you add the figures you need and no others, and that you divide by the correct number of years or other units.

5. Be careful in computing problems asking for percentages.

a. Remember that to convert a decimal into a percent you must multiply it by 100. For example, 0.04 is 4%.

b. Be sure that you can distinguish between such quantities as 1% (1 percent) and .01% (one one-hundredth of 1 percent), whether in numerals or in words.

c. Remember that if quantity X is greater than quantity Y, and the question asks what percent quantity X is of quantity Y, the answer must be greater than 100 percent.

WHAT DO WE UNDERSTAND BY DATA?

Data refers to facts or numbers, collected for examination, consideration and useful for decision-making. It is in raw form i.e. it is in a scattered form. Information refers to data being arranged and presented in a systematic or an organize form, so that some useful inferences can be drawn from the same. By data we generally mean quantities, figures, statistics, relating to any event.

WHAT DO YOU UNDERSTAND BY DATA INTERPRETATION?

As the name implies, Data Interpretation is extraction of maximum information, as required by us from the given set of data or information. In other words the act of organizing and interpreting data to get meaningful information is known as Data Interpretation. The representation of data can be broadly classified as tables and graph.

TABLES: Any statistical data pertaining to a situation can be represented by tables. Tables are the easiest and most convenient form of data representation if the data is reasonably limited.

(1) Tables present data logically.
(2) Tables give a bird's eye-view of the data in a concise and a compact manner thereby saving time and space.
(3) The columns and the rows that constitute any table facilitate data comparison.
(4) Tables facilitate also analysis and informed decision-making, a la any other data representation type.