Left side are the words used in the sentences – Right side will show the mathematical operator for the words mentioned.

(i) " Has the same value" - both the quantities are equal.

Example : m/n has the same value as 2/3
It means , m/n = 2/3

(ii) "of " - Multiply

Example : Find the value of 3/2 of 4/3
It means, 3/2 * 4/3 = 2

(iii)" times" (or) "as much as"- Multiply

Example : 2 times p
It means, 2 * p = 2p

(iv)"is" - equal to

Example : m is 9/4
It means , m = 9/4

(v) If 20% more than (or larger than) n

Before analyzing how to form an equation, we will relate this with an easy statement.

Case 1 :

If I am having 5 chocolates and you are having 1 chocolate more than me.
Then how many you have on the whole?
It is 6 chocolates , Right?
Which means, 5 + 1 (My amount of chocolate + your extra amount of chocolate)

Case 2 :

If I am having 5 chocolates and you have 20 % more than me.
In this case, how many you will have?
Its 5 + 20% of 5 , Right?

Likewise, follow the same logic for the above question: "If 20% more than n"
Relate this to the above case, 20% is extra and n is my amount of chocolate.
So, it should be n + 20% n

(vi)Lets complicate the above statement.
"If m is 20% more than n"

"is" in the sentence , means "equal", so m= n + 20% n

(vii)If x is 100% more than y

It is nothing but, x is twice as y.
“x = 2y”

Examples:

Question 1 : **" If half the number of roses in a garden number 20 more than a third of the daisies in it, what is the smallest possible numbers of roses and daisies put together in that garden?"**

Solution :

Let R be roses and D be daisies.
If half the number of roses in a garden --> It means 1/2R
number 20 more --> It means , it equals 20 +
than a third of the daisies in it -->It means, 1/3D.

If we join the phrases into equations, we get,
(1/2) R = 20 + (1/3)D
The above equation can be written as,
3R = 120 + 2D -------*equation(1)*

The question requires you to find, "what is the smallest possible numbers of roses and daisies put together in that garden"

So, we want to find the least number of roses and daisies , then we should add both.
How will you find it?
Substitute 0 , 1, 2, 3,4,5, etc., in the place of D in the equation, you will get the value, if tat value is perfectly divisible by 3, then we will get the value of R. So, if we do in that way, the equation will be satisfied, if we have the value of D as 3 and R as 42.
Hence the solution will be D + R = 3 + 42 = 45.

Question 2: **"A boy scored 80% in 4 tests of 100 marks each. Which of the following is closest to his score in the 5th test, with a total of 250 marks, if he raised his overall average by 5%?"**

Solution : A boy scored 80% in 4 tests of 100 marks each --> Total score is 400 , percentage scored = 80%, Therefore, the boys totally scored = 400 * 80% = 320 -----(1)

Which of the following is closest to his score in the 5th test, with a total of 250 marks, if he raised his overall average by 5% --> It means, the 5th test is for 250, so total score for which the students attended is 650.
The percentage has increased by 5%, so the current % is 85%
Therefore, the marks obtained will be 650 * 85% = 552.5----(2)

The solution is, we need to find the difference between (1) and (2)

552.5 - 320 = 232.5.

Question 3: **" (5/3) * (p/q) = (12/5) * (q/p) , how many 4 p's are present in 3 q's?"**

with the help of the given equation, you must have calculated p/q, but the question asked is , "how many 4p's are present in 3q's"
Let's take an example for this,
Can you guess, how many 5's are there in 10?
What you will do now?
we will calculate as, 10/5 = 2
So, we will conclude that, two 5's are there in 10.

How many 2's are there in 8?
It is 8/2 = 4
So, we have four 2's in 8.

Likewise, how many 4p's are there in 3q's?
It should be 3q/4p
We know the value of p/q by solving the given equation. It is 6/5.
So, 3q/4p = (3/4)*(q/p) = (3/4) * (5/6) = **5/8.**

Question 4 : **" A college party would cost $t ; n students agreed to share the cost equally. However d students couldn't make it and the others bore the expense equally. By how much % would the individual share increase over what had been planned?"**

This is basically related to the concept, which is average.
We need to find, by what %, the share of the individual increase.
For finding the % increase, what we need?
The current value and the previous value.
% increase = [(current value - previous value) / previous value] * 100

Now let's find the previous value
At first, the total cost $t is shared by n students, so the share of each individual is "$t/n" ---------(1)

Current value, Since d students could not make it, the total students sharing the amount will be (n - d) , but the cost remains the same, i.e $t.
Now, the share of each individual is "$t / (n - d)" -----(2)

We have got the current as well as previous value, now find the % increase of individual's share.

$$\left[\left(\frac{t}{(n-d)} + \frac{t}{n} \right) / \frac{t}{n} \right] * 100$$

Solve the equation, you will get the solution as $\frac{100d}{(n-d)}$

Question 5: **"The boys in a class together scored 20% more than the total score of the girls in the same class. If the total score of all the 25 girls in the class is 1200 and boys are fewer in number by 20%, by how much percentage did the boys' average marks exceed the girls' average? "**

Let Boys score be B and Girls score be G.
The first statement says, Boys together scored 20% more than Girls.
If we put that in the equation, we get, B = G + 20%G , It is nothing but, B = 120%G ---------(1)

It says, 25 girls scored 1200 and boys are fewer in number by 20%, it means, the number of Boys in the class, is 20% less than girls, the equation will be
No. of Boys = 25 - 25 (20%) = 25 -5 = 20 Boys in the class.

Now we have found the number of boys, with the help of first equation, we can find the score of all the Boys
B = 120%(1200) = 1440

The exact question asked is, we need to find the % increase of Boys average score and Girls average score
Boy's average score is 1440/20 = 72
Girl's average score = 1200/25 = 48

Therefore % increase = [(72 - 48) / 48] * 100 = 50%

Question 6: **" Given that half of m is 50% larger than three quarters of n, express the value of $\sqrt{n/m}$ in a fraction."**

half of m = (1/2)m
is means "="
50% larger than three quarters of n --> It means, 150% of three quarter of n --> where three quarter of n = (3/4)n--> So on the whole it is (150%)(3/4)n

If we combine all these, we will get
(1/2)(m) = (150%)(3/4)(n)

If we solve the above equation, we get, (m/n) = (9/4)

The questions requires you to express the value of $\sqrt{n/m}$ in a fraction

It means you need to find $\sqrt{4/9}$ = **2/3.**

Now let us concentrate on how to calculate Percentages:

The formula for percentage increase and decrease are formed with the help of **what is referred to what**.

Lets see few examples:

(i) By what percentage A is greater than B

Here, A is compared with B and B is the "Reference"
Numerator should be the "difference between them" and Denominator should be "Reference"
Therefore, it is [|A - B|/B] * 100

(ii) By What percentage A is less than B.

B is the Reference.
Therefore, [|A - B|/B] * 100.
If Modulus is removed, then it should be [(B-A)/B]*100

(iii)By what percentage B is greater than A

Here, A is the Reference.
Therefore, [(B-A)/A] * 100

(iv)By what percentage B is less than A.

Here, A is the Reference
Therefore, [(A-B)/A] * 100

If we have two years to compare, say 1980 and 1981.
Then, what is the % change from 1980 to 1981.

Numerator will be the difference between the values in two years and the denominator will be the base year.

So, % change = (Value in 1981 – Value in 1980) / Value in 1980

Example 1 : If the population in the year 1997 is 3 million and in the year 1999 is 6 million, what is the % increase of population from the year 1997 to 1999.

Numerator = difference between the values in two years = 6 million – 3 million = 3 million
Denominator = Value in the base year = 3 million

Therefore, % increase = (3 million / 3 million)* 100 = **100% increase**

Example 2 : If the population in the year 1997 is 3 million and in the year 1999 is 1 million, what is the % decrease of population from the year 1999 to 1997.

Numerator = difference between the values in two years = 3 million – 1 million = 2 million
Denominator = Value in the base year = 3 million

Therefore % decrease = (2 million / 3 million)*100 = **66.67 % decrease.**

When you face a **worded problem**, first break it into phrases and for each phrase form an equation. Only if you form an equation, will you be able to solve the problem. To begin with, you may find it difficult to form equations. However, this can be overcome by practice.

Example 1 :

"A mall sells a muffler at a loss of 6.75% . A hike of $2.50 in its S.P converts the deal into 3.25% profit. How much will the muffler cost the mall?"

Now let us try breaking the question into phrases and forming equations.

A mall sells a muffler at a loss of 6.75% → S.P = C.P – 6.75% C.P ----------(1)A hike of $2.50 in its S.P converts the deal into 3.25% profit → S.P + $2.50 = C.P + 3.25% C.P------(2)

How much will the muffler cost the mall → Find the cost price (C.P)

C.P can be found by solving both the equations.

You can try this for most of the questions. I am sure that you will find it very easy and will enjoy solving worded problems. Only if we create an interest for something will it stay in our mind for long. I know that you like this subject and you will follow this method while solving advance practice problems and adaptive tests.

(2)If you are not able to crack any problem and are confused with some statement, form equations for the rest of the statement that you understand well. Use that to make an intelligent guess by eliminating a few options. However, guessing the solution, without even converting a known phrase into an equation might lead you to choose the wrong option.

Example 2 : "A furniture store owner dropped the price of the recliners by 20% to spur business. By the end of the week she sold 50% more recliners. What is the % increase in gross earning?"
Let the price of the product = P
Quantity sold = Q

So, in the beginning, what was the store's income.
Store's Income = PQ -------equation(1)

Now it is said, the price has be reduced by 20%
Therefore, the current price = **80%P = 4/5P**

The quantity sold was increased by 50%
Therefore, the current quantity sold = **150%Q = 3/2Q**

From these two values, we can find the current income of the store = (4/5P)(3/2Q) = (6/5)(PQ)------ equation(2)

The question requires us to find the % increase in earnings

= [(6/5)(PQ) - PQ] / PQ **(Do you agree?)**
= [(1/5)PQ] / PQ
= 1/5
= 20%..

Example 3 :
" A sporting goods store sold 64 Frisbees in a week, some for $3 and some for $4 each. Receipts from Frisbee sales totaled $204. what is the Number of Frisbees that could have been sold for $4? "

Let's take x items sold for $3 and y items sold for $4.
Phrase 1 : A sporting goods store sold 64 Frisbees in a week ⇒ x + y = 64 ------equation (1)

Phrase 2 : some for $3 and some for $4 each. Receipts from Frisbee sales totaled $204⇒ 3x + 4y = 204------- equation (2).

Phrase 3 : what is the Number of Frisbees that could have been sold for $4 ⇒ It means, to find the value of y.

If you solve equation (1) and (2), then you will get the answer for y as 12.

I will give you a few tips to solve an inequality problem to try out with other such problems.

(I) Suppose the question requires you to define the value of an integer x, if it is given that $2 < x < 5$ and $3 < 2x < 4$

If you are able to define the value of x as an integer, x can take values such as {....., -2,-1,0,1,2,.....} Then we can say that both the above ranges for x can define it.

When we take the above example

Given $2 < x < 5$:

Here x can be 3 and 4
It means that both are integers
Therefore, this defines x as an integer.

Also, given $3 < 2x < 4$

x cannot be 1, because $2x = 2(1) = 2$, which is not greater than 3.
x cannot assume values greater than or equal to 2, because if we substitute them, the second part of the condition (less than 4) will not be satisfied. Hence, in this case, x can assume any value from 1.6 to 1.9, which are not integers.

Therefore, the second part does not define the value of x as an integer.

Hence, for this problem, we should mark the answer as “only 1 and not 2”.

(ii) Suppose the question requires you to check for some multiples, such as “x should be a multiple of 2”, we should check for that condition.

(iii) If the data given is $2<x<5$ and $3>y>7$ and you are asked to find the maximum value of x-y.
First think logically—they have asked for maximum value; so we need to find when x-y will be maximum.

x-y will be maximum, when x is maximum and y is minimum.
So, find the values accordingly.

When you are required to find the minimum value of x-y, it is just the opposite—x should be minimum and y should be maximum.

Few points to remember while solving Probability and Permutation & Combination problems.

(i) Read the question carefully and check whether it is a permutation or combination question.

For permutation: Order of selection is important.
For Combination: Order of selection is not important.

(ii) Recollect the formula.

Permutation : $nPr = n! / (n-r)!$
Combination : $nCr = n! / r!(n-r)!$

(iii) If there are two events in the question: "this AND that" or "this OR that"

If the statement is "this AND that", you should multiply both the events

If the statement is "this OR that", you should add both the events.

(iv) In a probability question, you must check the number of total outcomes and number of possible outcomes.
Formula: number of possible outcomes/number of total outcomes.

(v) When 3 words are given and you need to shuffle them to form a new word, shuffle the letters within each word and also the order of the words.
