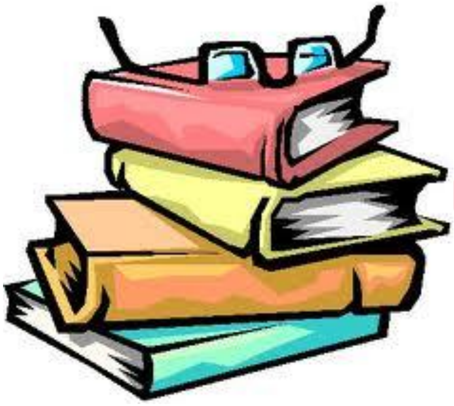
CoCubes.com
connecting. colleges. companies

Quantitative Aptitude Test (QAT) - 7th Aug 2012

Reference Booklet (Tips & Tricks)



Tips & tricks for Quantitative Aptitude

Quantitative Aptitude is a critical section in aptitude tests and one which all students need to master necessarily. It is critical for them in order to be clear employability tests.

We intend to make you aware about important sections in which you can score very high if you understand its concepts & practice well. We are also sharing quick conceptual tricks on different topics along with speedy calculation methods which help you increasing your speed of attempting a question correctly.

All the best!

Contents

Profit & loss

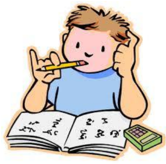
This is very commonly used section by most of the companies. Here are important formulas & definitions for you.

Cost price: The price at which article is purchased is known as C.P.

Selling price: The price at which article is sold is known as S.P.

Profit or gain: In mathematical terms we say if S.P is greater than C.P, then seller is said to have incurred profit or gain.

Loss: If Selling Price S.P is less than Cost price C.P, the seller is said to have incurred Loss.



Formulas to remember

- Gain= (S.P)-(C.P).
- Loss= (C.P)-(S.P).
- Loss or gain is always reckoned on C.P
- Gain %= {gain*100}/C.P.
- Loss% ={loss*100}/C.P.
- If the article is sold at a gain of say 35%, Then sp =135% of cp
- If a article is sold at a loss of say 35%. Then Sp=65% of cp.
- If the trader professes to sell his goods at Cp but uses false weights, then Gain=[error/(true value)-(error)*100]%

Tricky formulas

- S.P={(100+gain%) /100}*C.P.
- S.P= {(100-loss%)/100}*C.P.
- C.P= {100/(100+gain%)} *S.P
- C.P=100/(100-loss%)}*S.P
- When a person sells two items, one at a gain of x% and other at a loss of x%. Then the Seller always incurs a loss given by : (x^2/ 10)
- If price is first increase by X% and then decreased by Y% , the final change % in the price is

  X- Y - XY/100
- If price of a commodity is decreased by a% then by what % consumption should be increased to keep the same price

  (100*a) / (100-60)

[1] Highlighted formulas are the shortcuts to get answer quickly.

Practice Examples

Example 1: The price of T.V set is increased by 40 % of the cost price and then decreased by 25% of the new price. On selling, the profit for the dealer was Rs.1,000 . At what price was the T.V sold. From the above mentioned formula you get:

Solution: Final difference % = $40-25-(40*25/100)= 5$ %.

So if 5 % = 1,000

then 100 % = 20,000.

C.P = 20,000

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

Example 2: The price of T.V set is increased by 25 % of cost price and then decreased by 40% of the new price. On selling, the loss for the dealer was Rs.5,000 . At what price was the T.V sold. From the above mentioned formula you get :

Solution: Final difference % = $25-40-(25*45/100)= -25$ %.

So if 25 % = 5,000

then 100 % = 20,000.

C.P = 20,000

S.P = 20,000 - 5,000= 15,000.

Example 3: Price of a commodity is increased by 60 %. By how much % should the consumption be reduced so that the expense remains the same?

Solution: $(100* 60) / (100+60) = 37.5$ %

Example 4: Price of a commodity is decreased by 60 %. By how much % can the consumption be increased so that the expense remains the same?

Solution: $(100* 60) / (100-60) = 150$ %

Progressions

A lot of practice especially in this particular section will expose you to number of patterns. You need to train yourself so that you can guess the correct patterns in exam quickly.

Formulas you should remember 

Arithmetic Progression-An Arithmetic Progression (AP) or an arithmetic sequence is a series in which the successive terms have a common difference. The terms of an AP either increase or decrease progressively. For example,

1, 3, 5,7, 9, 11,....

14.5, 21, 27.5, 34, 40.5 ..... .

- Let the first term of the AP be a, the number of terms of the AP be n and the common difference, that is the difference between any two successive terms be d.
- The nth term, tn is given by: $t_n = a + (n-1)d$
- The sum of n terms of an AP, Sn is given by the formulas:
  - $S - n = \frac{n}{2}[2a + (n-1)d]$ or $S_n = \frac{n}{2}(a + l)$
- (Where l is the last term (nth term in this case) of the AP).

Geometric Progression- A geometric progression is a sequence of numbers where each term after the first is found by multiplying the previous term by a fixed number called the common ratio.

Example: 1,3,9,27... Common ratio is 3.

Also a, b, c, d, ... are said to be in Geometric Progression (GP) if b/a = c/b = d/c etc.

- A GP is of the form $a, ar, ar^2, ar^3, ar^4, ar^5 \ldots\ldots$ etc. Where a is the first term and r is the common ratio.
- The *n*th term of a Geometric Progression is given by $t_n = ar^{n-1}$.

- The sum of the first n terms of a Geometric Progression is given by

  - When r<1 $$S_n = a\frac{(1-r^n)}{(1-r)}$$ 2.When r>1 $$S_n = \frac{a}{(1-r)}$$

- When r =1 the progression is constant of the for a,a,a,a,a,...etc.

- Sum of the infinite series of a Geometric Progression when |r|<1 is:

$$S_n = \frac{a}{(1-r)}$$

- Geometric Mean (GM) of two numbers a and b is given by $GM = \sqrt{ab}$

Harmonic Progression - A Harmonic Progression (HP) is a series of terms where the reciprocals of the terms are in Arithmetic Progression (AP).

- The general form of an HP is 1/a, 1/(a+d), 1/(a+2d)>, 1/(a+3d), ...
- The *n*th term of a Harmonic Progression is given by tn=1/(nth term of the corresponding arithmetic progression)
- In the following Harmonic Progression: $a_1, a_2, a_3, \ldots a_n$:

$$\frac{1}{a_2} - \frac{1}{a_1} = \frac{1}{a_3} - \frac{1}{a_2} = \ldots = \frac{1}{a_n} - \frac{1}{a_{n-1}}$$

- The Harmonic Mean (HM) of two numbers a and b is

$$HP = \frac{2ab}{(a+b)}$$

- The Harmonic Mean of n non-zero numbers $a_1, a_2, a_3, \ldots a_n$ is:

$$HM = \frac{1}{\frac{\frac{1}{a_1}+\frac{1}{a_2}+\ldots\frac{1}{a_n}}{n}}$$

Few tricks to solve series questions

Despite the fact that it is extremely difficult to lay down all possible combinations of series, still if you follow few steps, you may solve a series question easily & quickly.

Step 1: Do a preliminary screening of the series. If it is a simple series, you will be able to solve this easily.

Step 2: If you fail in preliminary screening then determine the trend of the series. Determine whether this is increasing or decreasing or alternating.

Step 3: (A) Perform this step only if a series is increasing or decreasing

Use following rules:

I. If rise is slow or gradual, this type of series is likely to have an additional based increase. Successive numbers have been found by adding some numbers

II. If rise is very sharp initially but slows down later on, the series is likely to be formed by adding squared or cubed numbers

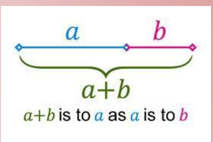
III. If the rise of a series is throughout equally sharp, the series is likely to be multiplication based

IV. If the rise is irregular and haphazard, there may be two possibilities. Either there may be a mix of two series or two different kinds of operations may be going on alternately. (The first is very likely when the increase is very irregular: the second is more likely when there is a pattern, even in the irregularity of the series.)

Step 3: (B) to be performed when series is alternating

If the rise is irregular and haphazard, there may be two possibilities. Either there may be a mix of two series or two different kinds of operations may be going on alternately. (The first is very likely when the increase is very irregular: the second is more likely when there is a pattern, even in the irregularity of the series.)

Ratios & Proportions



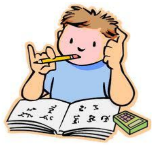
This is also one of the commonly used sections by most of the companies & is not difficult to understand.

Ratio: The ratio 5: 9 represents 5/9 with antecedent = 5, consequent = 9.

Rule: The multiplication or division of each term of a ratio by the same non-zero number does not affect the ratio. Eg. 4 : 5 = 8 : 10 = 12 : 15. Also, 4 : 6 = 2 : 3.

Proportion: The equality of two ratios is called proportion. If a : b = c : d, we write a : b :: c : d and we say that a, b, c, d are in proportion. Here a and d are called extremes, while b and c are called mean terms.

Product of means = Product of extremes.
Thus, a : b :: c : d (b x c) = (a x d).



Formulas to remember

- Fourth Proportional:
  If $a : b = c : d$, then d is called the fourth proportional to a, b, c.

- Third Proportional: $a : b = c : d$, then c is called the third proportion to a and b.

- Third proportion to x & y is:
  y^2/x

- Mean Proportional: Mean proportional
  b/w a and b is Square root (ab).

- Comparison of Ratios:
  We say that $(a : b) > (c : d) \Leftrightarrow \frac{a}{b} > \frac{c}{d}$.

- Compounded Ratio: The compounded ratio of the ratios: $(a : b)$, $(c : d)$, $(e : f)$ is $(ace : bdf)$.

- Duplicate Ratios:
  Duplicate ratio of $(a : b)$ is $(a^2 : b^2)$

- Sub-duplicate ratio of $(a : b)$ is $(a : b)$

- Triplicate ratio of $(a : b)$ is $(a^3 : b^3)$.

- Sub-triplicate ratio of $(a : b)$ is $(a^{1/3} : b^{1/3})$

If $\frac{a}{b} = \frac{c}{d}$, then $\frac{a+b}{a-b} = \frac{c+d}{c-d}$.

 Practice Examples

Example 1: A pig pursues a cat and takes 10 leaps for every 12 leaps of the cat, but 8 leaps of the pig are equal to 18 leaps of the cat. Compare the speed of pig & cat.

Solution: 8 leaps of the pig = 18 leaps of the cat = x say

1 leap of pig = x/8

1 leap of cat = x/18

In same time pig takes 10 leaps and cat 12 leaps

Distance covered by pig in the same time = 10 x/8

Distance covered by cat in same time= 12 x/18

Ratio of speed= 10/8 : 12/18 =15/18

Example 2: Sanjay & Sunil enters into a partnership. Sanjay invests Rs. 2000 and Sunil Rs. 3000. After 6 months, Sunil withdrew from the business. At the end of the year, the profit was Rs. 4200. How much would Sunil get out of this profit.

Solution: In partnership problems, the ratio in which profit is shared is

One person's (Investment X Time) : Another person's (Investment X Time)

Therefore the ratio in which Sanjay & Sunil would share their profit is-

2000 (12) : 3000 (6) = 4:3

Hence Sunil receives (3/7)*4200 = Rs. 1800

Simple Interest & Compound Interest

What are your interests? Watching movie, participating in KBC ☺. But the 'interest' which we are talking about is the one through which Banks earn a lot of money. You must have heard the word 'instalment' which is like paying money to banks in which Bank is very interested but we are less interested☹. Anyways but to get good score in aptitude tests you should be interested in SI & CI questions as these also falls under one of the easily understood sections.

Formulas to remember

Simple Interest

Principal: The money borrowed or lent out for a certain period is called the **principal** or the **sum**.

Interest: Extra money paid for using other's money is called **interest**.

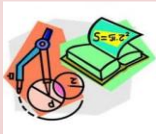
Simple Interest (S.I.): If the interest on a sum borrowed for certain period is reckoned uniformly, then it is called **simple interest**.

Let Principal = P, Rate = R% per annum (p.a.) and Time = T years. Then

$$\text{Simple Interest} = \left(\frac{P \times R \times T}{100}\right)$$

Formulas for Compound Interest: Sometimes it so happens that the borrower and the lender agree to fix up a certain unit of time, say *yearly* or *half-yearly* or *quarterly* to settle the previous accounts. In such cases, the amount after first unit of time becomes the principal for the second unit, the amount after second unit becomes the principal for the third unit and so on. After a specified period, *the difference between the amount and the money borrowed is called the* Compound *Interest (abbreviated* as *C.I.) for that period.*

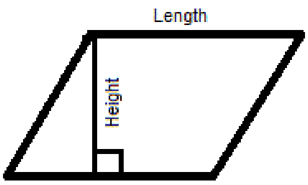
- Let Principal = P, Rate = R% per annum, Time = n years.
- When interest is compound Annually: Amount = P(1+R/100)n
- When interest is compounded Half-yearly: Amount = P[1+(R/2)/100]2n
- When interest is compounded Quarterly: Amount = P[1+(R/4)/100]4n
- When interest is compounded Annual1y but time is in fraction, say 3(2/5) years.
- Amount = P(1+R/100)3 x (1+(2R/5)/100)
- When Rates are different for different years, say Rl%, R2%, R3% for 1st, 2nd and 3rd year respectively. Then, Amount = P(1+R1/100)(1+R2/100)(1+R3/100)
- Present worth of Rs. x due *n* years hence is given by : Present Worth = x/(1+(R/100))n

Mensuration & Geometry 

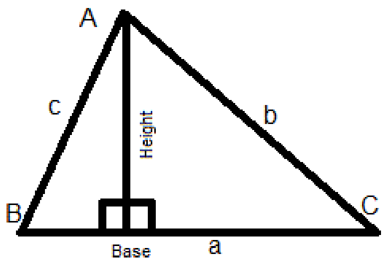
No matter how grown up you are, you have to always remember some basics. Mensuration is the topic which you must have dealt in matriculation & this is all out about geometric shapes. So just refresh following formulas & get ready to score high.

Formulas to remember 

- Area of rectangle (A) = length(l) * Breath(b)
- Perimeter of a rectangle (P) = 2 * (Length(l) + Breath(b))
- Area of a square (A) = Length (l) * Length (l)
- Perimeter of a square (P) = 4 * Length (l)
- Area of a parallelogram(A) = Length(l) * Height(h)



- Perimeter of a parallelogram (P) = 2 * (length(l) + Breadth(b))
- Area of a triangle (A) = (Base(b) * Height(b)) / 2

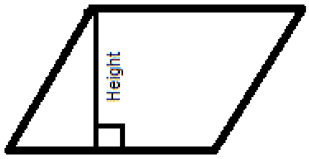


- And for a triangle with sides measuring “a” , “b” and “c” , Perimeter = a+b+c
  s = semi perimeter = perimeter / 2 = (a+b+c)/2
- Area of triangle = $A = \sqrt{s(s-a)(s-b)(s-c)}$
- Area of isosceles triangle = $\frac{b}{4}\sqrt{4a^2 - b^2}$
  Where , a = length of two equal side , b= length of base of isosceles triangle.

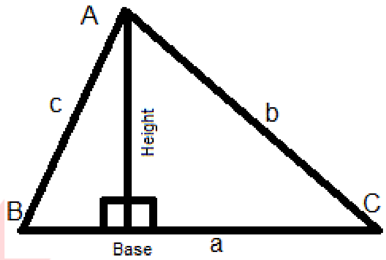
Mensuration & Geometry

The only way to score well in this section is to memorize as many formulas as possible. So just refresh following formulas & get ready to score high.

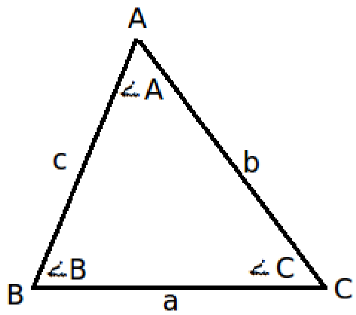
- ✓ Area of rectangle (A) = length(l) * Breath(b) $A = l \times b$
- ✓ Perimeter of a rectangle (P) = 2 * (Length(l) + Breath(b)) $P = 2 \times (l + b)$
- ✓ Area of a square (A) = Length (l) * Length (l) $A = l \times l$
- ✓ Perimeter of a square (P) = 4 * Length (l) $P = 4 \times l$
- ✓ Area of a parallelogram(A) = Length(l) * Height(h) $A = l \times h$



- ✓ Perimeter of a parallelogram (P) = 2 * (length(l) + Breadth(b)) $P = 2 \times (l + b)$
- ✓ Area of a triangle (A) = (Base(b) * Height(b)) / 2 $A = \frac{1}{2} \times b \times h$



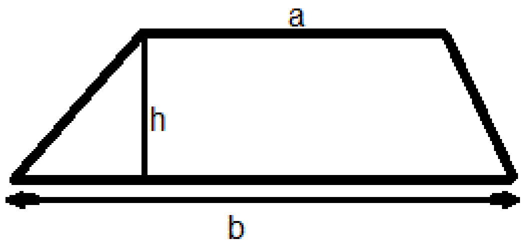
- ✓ And for a triangle with sides measuring “a” , “b” and “c” , Perimeter = a+b+c
- ✓ s = semi perimeter = perimeter / 2 = (a+b+c)/2
- ✓ Area of triangle = $A = \sqrt{s(s-a)(s-b)(s-c)}$
- ✓ Area of triangle(A) = Where , A , B and C are the vertex and angle A , B , C are respective angles of triangles and a , b , c are the respective opposite sides of the angles as shown in figure below:



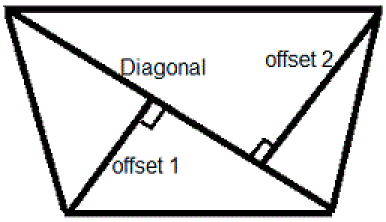
- ✓ Area of isosceles triangle = $\frac{b}{4}\sqrt{4a^2 - b^2}$

- ✓ Where , a = length of two equal side , b= length of base of isosceles triangle.

- ✓ Area of trapezium (A) = $\frac{1}{2}(a+b)\times h$
- ✓ Where,"a" and "b" are the length of parallel sides and "h" is the perpendicular distance between "a" and "b" .

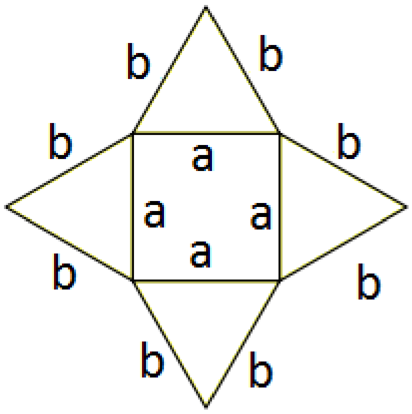


- ✓ Perimeter of a trapezium (P) = sum of all sides
- ✓ Area f rhombus (A) = Product of diagonals / 2
- ✓ Perimeter of a rhombus (P) = 4 * l
- ✓ where l = length of a side
- ✓ Area of quadrilateral (A) = 1/2 * Diagonal * (Sum of offsets)



- ✓ Area of a Kite (A) = 1/2 * product of it's diagonals
- ✓ Perimeter of a Kite (A) = 2 * Sum on non-adjacent sides
- ✓ Area of a Circle (A) = $\pi r^2 = \frac{\pi d^2}{4}$. Where , r= radius of the circle and d= diameter of the circle.
- ✓ Circumference of a Circle = $2\pi r = \pi d$, r= radius of circle, d= diameter of circle
- ✓ Total surface area of cuboid = $2(lb+bh+lh)$. Where , l= length , b=breadth , h=height
- ✓ Total surface area of cuboid = $6l^2$, where , l= length
- ✓ length of diagonal of cuboid = $\sqrt{l^2+b^2+h^2}$
- ✓ length of diagonal of cube = $\sqrt{3l}$
- ✓ Volume of cuboid = l * b * h
- ✓ Volume of cube = l * l* l
- ✓ Area of base of a cone = πr^2
- ✓ Curved surface area of a cone =C = $\pi \times r \times l$. Where , r = radius of base , l = slanting height of cone

- Total surface area of a cone = $\pi r(r+l)$
- Volume of right circular cone = $\frac{1}{3}\pi r^2 h$. Where , r = radius of base of cone , h= height of the cone (perpendicular to base)
- Surface area of triangular prism = (P * height) + (2 * area of triangle). Where , p = perimeter of base
- Surface area of polygonal prism = (Perimeter of base * height) + (Area of polygonal base * 2)
- Lateral surface area of prism = Perimeter of base * height
- Volume of Triangular prism = Area of the triangular base * height
- Curved surface area of a cylinder = $2\pi r h$
- Where , r = radius of base , h = height of cylinder
- Total surface area of a cylinder = $2\pi r(r+h)$
- Volume of a cylinder = $\pi r^2 h$
- Surface area of sphere = $4\pi r^2 = \pi d^2$
- where , r= radius of sphere , d= diameter of sphere
- Volume of a sphere = $\frac{4}{3}\pi r^3 = \frac{1}{6}\pi d^3$
- Volume of hollow cylinder = $\pi r h(R^2 - r^2)$. Where , R = radius of cylinder , r= radius of hollow , h = height of cylinder
- Right Square Pyramid: If a = length of base , b= length of equal side ; of the isosceles triangle forming the slanting face , as shown in figure:



- A Surface area of a right square pyramid = $a\sqrt{4b^2 - a^2}$
- B Volume of a right square pyramid = $\frac{1}{2} \times base\ area \times height$
- Square Pyramid:
- Area of a regular hexagon = $\frac{3\sqrt{3}a^2}{2}$
- Area of equilateral triangle = $\frac{\sqrt{3}}{4}a^2$
- Curved surface area of a Frustums = $\pi h(r_1 + r_2)$

- ✓ Total surface area of a Frustums = $\pi(r_1^2 + h(r_1 + r_2) + r_2^2)$
- ✓ Curved surface area of a Hemisphere = $2\pi r^2$
- ✓ Total surface area of a Hemisphere = $3\pi r^2$
- ✓ Volume of a Hemisphere = $\frac{2}{3}\pi r^3 = \frac{1}{12}\pi d^3$
- ✓ Area of sector of a circle = $\frac{\theta r^2 \pi}{360}$. Where θ = measure of angle of the sector , r= radius of the sector

Number Systems

It's all about 0 & 1 & both has its importance. Again number system is one of the topics which needs more practice so that you can get exposed to a lot of new patterns. This section requires time to prepare. We are sharing few tricks along with a link to refer to.

- If you have to find the square of numbers ending with '5'.

  Example1. 25 * 25. Find the square of the units digit (which is 5) = 25. Write this down. Then take the tenths digit (2 in this case) and increment it by 1 (therefore, 2 becomes 3). Now multiply 2 with 3 = 6. Write '6' before 25 and you get the answer = 625.

Example 2. 45 * 45.
The square of the units digit = 25
Increment 4 by 1. It will give you '5'. Now multiply 4 * 5 = 20. Write 20 before 25. The answer is 2025.

Example 3. 125*125.
The square of the units digit = 25.
Increment 12 by 1. It will give you 13. Now multiply 12*13 = 156. Write 156 before 25. The answer is 15625.

HCF & LCM:

Highest Common Factor (H.C.F.) or Greatest Common Measure (G.C.M.) or Greatest Common Divisor (G.C.D.)

The Highest Common Factor H.C.F. of two or more than two numbers is the greatest number that divided each of them exactly.

There are two methods of finding the H.C.F. of a given set of numbers:

I. Factorization Method: Express the each one of the given numbers as the product of prime factors. The product of least powers of common prime factors gives H.C.F.

II. Division Method: Suppose we have to find the H.C.F. of two given numbers, divide the larger by the smaller one. Now, divide the divisor by the remainder. Repeat the process of dividing the preceding number by the remainder last obtained till zero is obtained as remainder. The last divisor is required H.C.F.

Finding the H.C.F. of more than two numbers: Suppose we have to find the H.C.F. of three numbers, then, H.C.F. of [(H.C.F. of any two) and (the third number)] gives the H.C.F. of three given number.

Similarly, the H.C.F. of more than three numbers may be obtained.

Least Common Multiple (L.C.M.):

The least number which is exactly divisible by each one of the given numbers is called their L.C.M.

There are two methods of finding the L.C.M. of a given set of numbers:

III. Factorization Method: Resolve each one of the given numbers into a product of prime factors. Then, L.C.M. is the product of highest powers of all the factors.

IV. Division Method (short-cut): Arrange the given numbers in a row in any order. Divide by a number which divided exactly at least two of the given numbers and carry forward the numbers which are not divisible. Repeat the above process till no two of the numbers are divisible by the same number except 1. The product of the divisors and the undivided numbers is the required L.C.M. of the given numbers.

2. Product of two numbers = *Product of their H.C.F. and L.C.M.*

3. Co-primes: Two numbers are said to be co-primes if their H.C.F. is 1.

Detailed analysis: http://www.thevbprogrammer.com/Ch04/Number%20Systems%20Tutorial.pdf

Probability

Probability is a topic which is one of the topics which has quite difficult concepts. Therefore a lot of diligence is required get proficient in it. But once concepts are understood well, all that is required is a little practice.

Important concepts & formulas:

Experiment**:** An operation which can produce some well-defined outcomes is called an experiment.

Random Experiment: An experiment in which all possible outcomes are know and the exact output cannot be predicted in advance, is called a random experiment.

Examples:

1. Rolling an unbiased dice.
2. Tossing a fair coin.
3. Drawing a card from a pack of well-shuffled cards.

4. Picking up a ball of certain colour from a bag containing balls of different colours.

Details:

1. When we throw a coin, then either a Head (H) or a Tail (T) appears.
2. A dice is a solid cube, having 6 faces, marked 1, 2, 3, 4, 5, 6 respectively. When we throw a die, the outcome is the number that appears on its upper face.
3. A pack of cards has 52 cards.
    a. It has 13 cards of each suit, name **Spades, Clubs, Hearts and Diamonds**.
    b. Cards of spades and clubs are **black cards**.
    c. Cards of hearts and diamonds are **red cards**.
    d. There are 4 honours of each unit.
    e. There are **Kings, Queens and Jacks**. These are all called **face cards**

Sample Space: When we perform an experiment, then the set S of all possible outcomes is called the **sample space**.

Examples:

1. In tossing a coin, S = {H, T}
2. If two coins are tossed, the S = {HH, HT, TH, TT}.
3. In rolling a dice, we have, S = {1, 2, 3, 4, 5, 6}.

Event: Any subset of a sample space is called an **event**.

Probability of Occurrence of an Event: Let S be the sample and let E be an event. Then, E $\subseteq$ S.

$$\therefore \ P(E) = \frac{n(E)}{n(S)}.$$

Results on Probability: P(S) = 1

1. $0 \leq P(E) \leq 1$
2. $P(\Phi) = 0$
3. For any events A and B we have : $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
4. If A denotes (not-A), then P(A) = 1 - P(A).

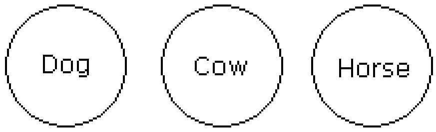
Set Theory & Venn Diagrams

This is very important & interesting section. One advantageous thing is that if you are clear about venn diagrams then this can help you solving variety of questions. This section is also commonly used by companies to check your analytical ability. One can solve reasoning questions also by using venn diagram methods.

Important types of Venn diagrams

Example 1: If all the words are of different groups, then they will be shown by the diagram as given below.

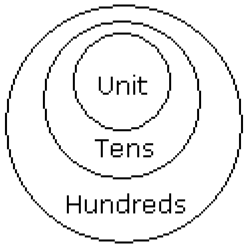
Dog, Cow, Horse



All these three are animals but of different groups, there is no relation between them. Hence they will be represented by three different circles.

Example 2: If the first word is related to second word and second word is related to third word. Then they will be shown by diagram as given below.

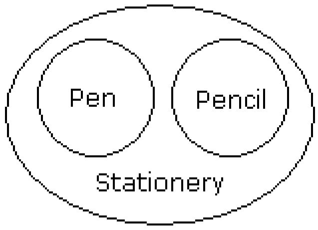
Unit, Tens, Hundreds



Ten units together make one Tens or in one tens, whole unit is available and ten tens together make one hundreds.

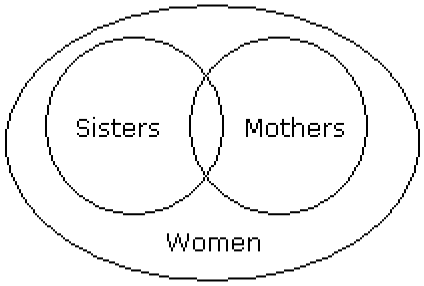
Example 3*:* If two different items are completely related to third item, they will be shown as below.

Pen, Pencil, Stationery



Example 4: If there is some relation between two items and these two items are completely related to a third item they will be shown as given below.

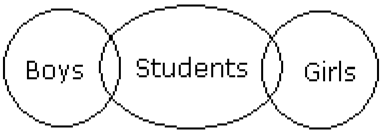
Women, Sisters, Mothers



Some sisters may be mothers and vice-versa. Similarly some mothers may not be sisters and vice-versa. But all the sisters and all the mothers belong to women group.

Example 5: Two items are related to a third item to some extent but not completely and first two items totally different.

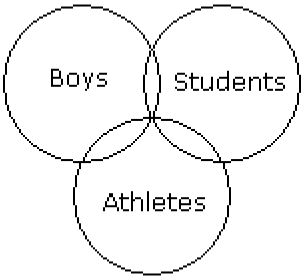
Students, Boys, Girls



The boys and girls are different items while some boys may be students. Similarly among girls some may be students.

Example 6: All the three items are related to one another but to some extent not completely.

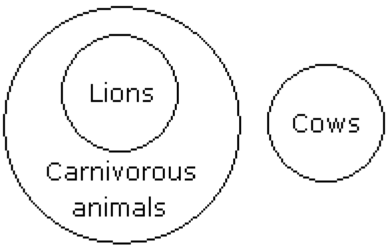
Boys, Students, Athletes



Some boys may be students and vice-versa. Similarly some boys may be athletes and vice-versa. Some students may be athletes and vice-versa.

Example 7: Two items are related to each other completely and third item is entirely different from first two.

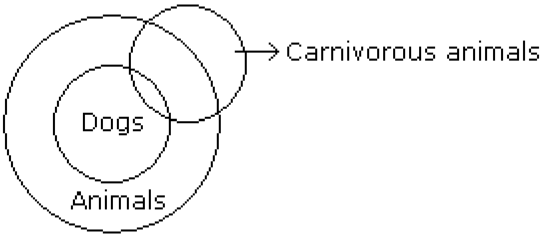
Lions, Carnivorous, Cows



All the lions are carnivorous but no cow is lion or carnivorous.

Example 8: First item is completely related to second and third item is partially related to first and second item.

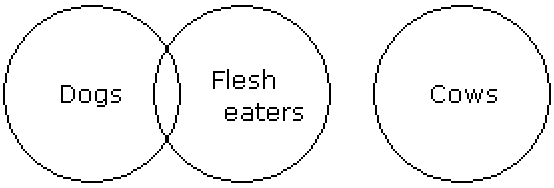
Dogs, Animals, Flesh-eaters



All the dogs are belonging to animals but some dogs are flesh eater but not all.

Example 9: First item is partially related to second but third is entirely different from the first two.

Dogs, Flesh-eaters, Cows



Some dogs are flesh-eaters but not all while any dog or any flesh-eater cannot be cow.

Time, Speed & Distance

This section can help you score high, with a little practice .Very important is to solve these questions quickly as you can save time here for solving tougher questions. So learn basic formulas, few tricks & important calculation tricks to score high.

Formulas with easy tricks

- ✓ *Speed, Time and Distance:*

  $$\text{Speed} = \left(\frac{\text{Distance}}{\text{Time}}\right), \text{Time} = \left(\frac{\text{Distance}}{\text{Speed}}\right), \text{Distance} = (\text{Speed x Time}).$$

- ✓ *km/hr to m/sec conversion:*

  $$x \text{ km/hr} = \left(x \times \frac{5}{18}\right) \text{m/sec.}$$

- ✓ *m/sec to km/hr conversion:*

  $$x \text{ m/sec} = \left(x \times \frac{18}{5}\right) \text{km/hr.}$$

- ✓ If the ratio of the speeds of A and B is $a : b$, then the ratio of the times taken by then to cover the same distance is (1/a):(1/b) or b:a

- ✓ Suppose a man covers a certain distance at x km/hr and an equal distance at y km/hr. Then, the average speed during the whole journey is (2xy/x+y) km/hr.

Time & Work

This section , similar to the Speed & Distance, can help you score high, with a little practice .

Now carefully read the following to solve the Time and work problems in few seconds.

- ✓ If A can finish work in X time and B can finish work in Y time then both together can finish work in (X*Y)/ (X+Y) time.
- ✓ If A can finish work in X time and A and B together can finish work in S time then B can finish work in (XS)/(X-S) time.
- ✓ If A can finish work in X time and B in Y time and C in Z time then they all working together will finish the work in (XYZ)/ (XY +YZ +XZ) time
- ✓ If A can finish work in X time and B in Y time and A,B and C together in S time then :

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

  B+C can finish in (SX)/(X-S) and

  A+ C can finish in (SY)/(Y-S)

Example 1: Ajay can finish work in 21 days and Blake in 42 days. If Ajay, Blake and Chandana work together they finish the work in 12 days. In how many days Blake and Chandana can finish the work together ?

(21*12)/(24-12) = (21*12)/9= 7*4= 28 days.

Trigonometry

In a right-angled triangle,

Sinθ= Opposite Side/Hypotenuse

Cosθ= Adjacent Side/Hypotenuse

Tanθ= Sinθ/Cosθ = Opposite Side/Adjacent Side

Cosecθ = 1/Sinθ= Hypotenuse/Opposite Side

Secθ = 1/Cosθ = Hypotenuse/Adjacent Side

Cotθ = 1/tanθ = Cosθ/Sinθ = Adjacent Side/Opposite Side

SinθCosecθ = CosθSecθ = TanθCotθ = 1

Sin(90-θ) = Cosθ, Cos(90-θ) = Sinθ

$Sin^2θ + Cos^2θ = 1$

$Tan^2\theta + 1 = Sec^2\theta$
$Cot^2\theta + 1 = Cosec^2\theta$

General Calculations Tips

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. If the answer is more than a 2 digit number perform the above again. If the result is 0 or is divisible by 7 the original number is also divisible by 7.

Example 1. 259
9*2= 18.
25-18 = 7 which is divisible by 7 so 259 is also divisible by 7.
Example 2. 2793
3*2= 6
279-6= 273
now 3*2=6
27-6= 21 which is divisible by 7 so 2793 is also divisible by 7.

- To find square of a number between 40 to 50:

Step 1: Subtract the number from 50 getting result A.
Step 2: Square A getting result X.
Step 3: Subtract A from 25 getting result Y
Step 4: Answer is xy

Example 1: 44
50-44=6
Sq of 6 =36
25-6 = 19
So answer 1936

Example 2: 47
50-47=3
Sq 0f 3 = 09
25-3= 22
So answer = 2209

To find square of a 3 digit number :
Let the number be xyz
Step 1: Last digit = last digit of SQ(Z)
Step 2: Second Last Digit = 2*Y*Z + any carryover from STEP 1.
Step 3: Third Last Digit 2*X*Z+ Sq(Y) + any carryover from STEP 2.

Step 4: Fourth last digit is 2*X*Y + any carryover from STEP 3.
Step 5: In the beginning of result will be Sq(X) + any carryover from Step 4.

Example: SQ (431)
STEP 1. Last digit = last digit of SQ(1) =1
STEP 2. Second Last Digit = 2*3*1 + any carryover from STEP 1.= 6
STEP 3.Third Last Digit 2*4*1+ Sq(3) + any carryover from STEP 2.= 2*4*1 +9= 17. so 7 and 1 carryover
STEP 4. Fourth last digit is 2*4*3 + any carryover (which is 1). =24+1=25. So 5 and carry over 2.
STEP 5. In the beginning of result will be Sq(4) + any carryover from Step 4. So 16+2 =18. So the result will be 185761. If the option provided to you are such that the last two digits are different, then you need to carry out first two steps only , thus saving time. You may save up to 30 seconds on each calculations and if there are 4 such questions you save 2 minutes which may really affect UR Percentile score.

Equations & Algebra

The quadratic equation

$$ax^2 + bx + c = 0$$

has the solutions

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

Consider the general quadratic equation

$$ax^2 + bx + c = 0$$

with $a \neq 0$. First divide both sides of the equation by *a* to get

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

which leads to

$$x^2 + \frac{b}{a}x = -\frac{c}{a}.$$

Next complete the square by adding $\left(\frac{b}{2a}\right)^2$ to both sides

$$x^2+\frac{b}{a}x+\left(\frac{b}{2a}\right)^2 = -\frac{c}{a}+\left(\frac{b}{2a}\right)^2$$

$$\left(x+\frac{b}{2a}\right)^2 = -\frac{c}{a}+\frac{b^2}{4a^2}$$

$$\left(x+\frac{b}{2a}\right)^2 = \frac{b^2-4ac}{4a^2}\,.$$

Finally we take the square root of both sides:

$$x+\frac{b}{2a}=\pm\frac{\sqrt{b^2-4ac}}{2a}$$

or

$$x=-\frac{b}{2a}\pm\frac{\sqrt{b^2-4ac}}{2a}\,.$$

We call this result the **Quadratic Formula** and normally write it

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}\,.$$

Remark. The plus-minus sign states that you have two numbers $\frac{-b+\sqrt{b^2-4ac}}{2a}$ and $\frac{-b-\sqrt{b^2-4ac}}{2a}$.

Example: Use the Quadratic Formula to solve

$$2x^2-3x+\frac{1}{2}=0\,.$$

Solution. We have *a*=2, *b*= -3, and $c=\frac{1}{2}$. By the quadratic formula, the solutions are

$$x=\frac{3\pm\sqrt{(-3)^2-4(2)(1/2)}}{2(2)}=\frac{3\pm\sqrt{5}}{4}\,.$$

Important Links to refer to

Speed Maths: http://www.watch2learn.org/Categories.aspx?CatId=18

http://www.youtube.com/user/tecmath

Aptitude: http://www.watch2learn.org/Categories.aspx?CatId=2

http://aptitude9.com/short-cut-methods-quantitative-aptitude/

Ratio & Proportions: http://www.youtube.com/watch?v=ZLiPr8xvCe8&feature=related

Number Systems: http://www.thevbprogrammer.com/Ch04/Number%20Systems%20Tutorial.pdf

Time & Work: http://www.youtube.com/watch?v=JckAiuheXdc

http://www.youtube.com/watch?v=SvLwIg9bg28