**Calendars**

Suppose you are asked to find the day of the week on 30th June, 1974. It would be tough job for you if you don’t know the method. The method of finding the day of the week lies in the number of “odd days”.

Note: Every 7th day will be the same day count wise, i.e. if today is Monday, then 7th day will again be Monday. Odd day is the days remaining after completion of an exact number of weeks. Odd days is the reminder obtained on dividing the total number of days with seven.

Ex. 52 days + 7 = 3 odd days.

**Leap Year:**

(i). Every year divisible by 4 is a leap year, if it is not a century.

(ii). Every 4th century is a leap year and no other century is a leap year.

Note: **A leap year has 366 days.**

**Examples:**

* 1. Each of the years 1948, 2004, 1676 etc. is a leap year.
  2. Each of the years 400, 800, 1200, 1600, 2000 etc. is a leap year.
  3. None of the years 2001, 2002, 2003, 2005, 1800, 2100 is a leap year.

**Ordinary Year:**

The year which is not a leap year is called an **ordinary years**. An ordinary year has 365 days.

1. **Counting of Odd Days:**
   1. 1 ordinary year = 365 days = (52 weeks + 1 day.)

http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif 1 ordinary year has 1 odd day.

* 1. 1 leap year = 366 days = (52 weeks + 2 days)

http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif 1 leap year has 2 odd days.

* 1. 100 years = 76 ordinary years + 24 leap years

  = (76 x 1 + 24 x 2) odd days = 124 odd days.

  = (17 weeks + days) http://www.indiabix.com/_files/images/aptitude/1-sym-deq.gif 5 odd days.

http://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif Number of odd days in 100 years = 5.

Number of odd days in 200 years = (5 x 2) http://www.indiabix.com/_files/images/aptitude/1-sym-deq.gif 3 odd days.

Number of odd days in 300 years = (5 x 3) http://www.indiabix.com/_files/images/aptitude/1-sym-deq.gif 1 odd day.

Number of odd days in 400 years = (5 x 4 + 1) http://www.indiabix.com/_files/images/aptitude/1-sym-deq.gif 0 odd day.

Similarly, each one of 800 years, 1200 years, 1600 years, 2000 years etc. has 0 odd days.

**Counting of Odd days, when only 1 date is given:**

Here we take January 1st AD as the earlier date and we assume that this days is Monday. We take its previous day, i.e. Sunday as the reference day. After this the above mentioned method is applied to count the number of odd days and find the day of the week for the given date.

**Counting number of odd days, when 2 dates are given:**

Any month which has 31 days has 3 odd days and any month which has 30 days has 2 odd days. Then, the total number of odd days are calculated by adding the odd days for each month. The value so obtained is again divided by 7 to get the final number of odd days. The day of the week of the second date is obtained by adding the odd days to the day of the week of the earlier date.

**Coding & Decoding**

Before looking at the different types of questions and some of the codes that can be used with the help of examples, let us first understand what we mean by coding and decoding. When we say coding, a particular code or pattern is used to express a word in English language as a different word or in a different form. The coded word itself does not make any sense unless we know the patter or code that has been followed. Decoding refers to the process of arriving at the equivalent English word from the code word given.

In the questions, a particular code is given and on the basis of this given code, we have to find out how another word ( In English language) can be coded. The correct code for the given word has to be selected from the answer choices on the basis of the code given in the question.

**Analogies**

Analogy means “similarity” or “similar relationship”. In questions on number or letter analogies, a pair, that has a certain relationship between them, is given. This number/letter pair is followed by a third number letter. We have to find out “fourth” number such that the relationship between the third and the fourth is similar to the relationship that exists between the first and the second.

**Number Analogies:** The relationship between the numbers in a given pair can be any of the following:

* One number is a multiple of the other.
* One number is the square or square root of the other.
* One number is cube or cube root of other.
* The 2 numbers are square of 2 other numbers which themselves are related. For example, the two numbers are squares of 2 consecutive integers or squares of 2 consecutive even integers or squares of 2 consecutive odd integers.
* The 2 numbers are such that they are obtained by subtracting a certain number from the squares or cubes of the 2 related numbers.
* The 2 numbers can be consecutive, even, odd or prime numbers.

There can be more combinations but one has to identify at the time of solving.

**Verbal Analogies:**

Verbal analogies are based on the relationship between 2 words. The questions could be in the form of Clock is to time as thermometer is to: a. temperature. b. degrees. c. weather. d. centigrade

**Letter Analogies:**

The questions in this area are similar to Verbal Analogies. Here, the questions are based on the relationship between 2 groups of letters (instead of 2 words) as in verbal analogies. Typically, 3 sets of letters are given followed by a question mark (where a 4th set of letters is supposed to inserted). We have to find the relation or order in which the letters have been grouped together in the 1st 2 sets of letters on the left hand side of the symbol : : and then find a set of letters to fit in place of the question mark so that the third and the fourth set of letters will also have the same relationship as the first and the second.

**Symbols and Notations**

The basic approach for these questions is more or less to “Coding & Decoding”. As in “Coding & Decoding”, a basic word is coded in a particular way and the candidate is asked to code another word using the same logic.

Similarly in “Symbol and Notations”, one has to study the symbols and their meanings carefully which are given against them. Then, the meanings given are to be used in place of those symbols in answering the questions. The word “Notation” basically stands for the meaning which each symbol will be assigned.

Symbols for these types of questions stand for mathematical operations i.e. +, -, X, ÷, . So one must replace the symbols be mathematical operations and apply the ‘BODMAS’ rule to find the value of given expression. Symbols like etc are used by giving a proper definition of the symbol used.

**Clocks**

The hour hand and the minute hand of a clock move in relation to each other continuously and at any given point of time, they make an angle between 0 and 180 with each other.

If the time shown by the clock is known, the angle between the hands can be calculated. Similarly, if the angle between 2 hands is known, the time shown by the clock can be found out.When we say angle between the hands, we normally refer to the acute/obtuse angles (upto 180) between the 2 hands and not the reflex angle (<180)

Important Points:

1. Minute hand covers 360 in 1 hour, i.e., in 60 minutes. Hence Minute hand covers 6 per minute.
2. Hour hand covers 360 in 12 hours. Hence, hour hand covers 30per hour. Hence, Hour Hand cover ½ per minute.
3. In a period of 12 hours

* The hands make an angle of 0 with each other (i.e. they coincide with each other), 11 times.
* The hands make an angel of 180 (i.e. they lie on the same straight line), 11 times.
* 90 or any other angle with each other, 22 times.

1. The time gap between any 2 coincidences is 12/11 hours or 65 minutes.
2. If the hands of a clock (which do not show the correct time)coincide every p minute, then

* If p > 65, then the watch is going slow or losing time.
* If p < 65, then the watch is going fast or gaining time.

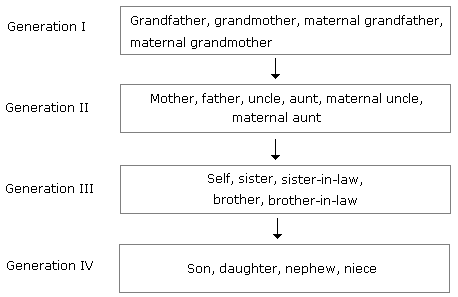
1. To calculate the angle ’ between the hands of a clock, we use the following formula is used (where m = minutes and h = hours)

* )
* )

1. “Clock” problems can also be solved with “Relative Velocity” method. As in 1 minute, minute hand covers 6 and hour hand covers ½ . Therefore, Relative velocity = 6 – ½ = 5½ per minute. Alternatively, in 1 hour, the minute hand covers 60 minute divisions whereas the hour hand covers 5 minute divisions. So relative speed = 60 – 5 = 55 minutes. However, adopting the approach of actual angles covered is by far the simplest and does not create any confusion.

**Blood Relations**

The easiest and non-confusing way to solve these types of problems would be to draw a family tree diagram and increase the levels in hierarchy. Grandfather and grandmother will come in the first stage, mother, father, uncle and aunt will come in the second stage; sister, brother and cousin will come at the third stage; son, daughter, niece and nephew will come in the fourth stage and finally, granddaughters and grandsons will come.



To remember easily the relations may be divided into two sides as given below:

**1. Relations of Paternal side:**

1. Father's father → Grandfather
2. Father's mother → Grandmother
3. Father's brother → Uncle
4. Father's sister → Aunt
5. Children of uncle → Cousin
6. Wife of uncle → Aunt
7. Children of aunt → Cousin
8. Husband of aunt → Uncle

**2. Relations of Maternal side:**

1. Mother's father → Maternal grandfather
2. Mother's mother → Maternal grandmother
3. Mother's brother Maternal uncle
4. Mother's sister → Aunt
5. Children of maternal uncle → Cousin
6. Wife of maternal uncle → Maternal aunt

Logical Deductions

The phenomenon of deriving a conclusion from a single proposition or a set of given propositions, is known as **logical deduction**. The given propositions are also referred to as the **premises**.

**Two Inferential Processes of Deduction**:

**I. Immediate Deductive Inference:**

Here, conclusion is deduced from one of the given propositions, by any of the three ways -conversion, obversion and contraposition.

**1. Conversion:** The Conversion proceeds with interchanging the subject term and the predicate term i.e. the subject term of the premise becomes the predicate term of the conclusion and the predicate term of the premise becomes the subject of the conclusion. The given proposition is called convertend, whereas the conclusion drawn from it is called its converse.

**Table of Valid Conversions**

|  |  |
| --- | --- |
| **Convertend** | **Converse** |
| A: All S is P Ex. All pins are tops. | I: Some P is S Some tops are pins. |
| E: No S is P. Ex. No fish is whale. | E: No P is S. No whale is fish. |
| I: Some S is P. Ex. Some boys are poets. | I: Some P is S. Some poets are boys. |
| O: Some S is not P. | No valid conversion |

Note that in a conversion, the quality remains the same and the quantity may change.

**2. Obversion:** In obversion, we change the quality of the proposition and replace the predicate term by its complement.

**Table of Valid Obversions**

|  |  |
| --- | --- |
| **Obvertend** | **Obverse** |
| A: All birds are mammals. | E: No birds are non-mammals. |
| E: No poets are singers. | A: All poets are non-singers. |
| I: Some nurses are doctors. | O: Some nurses are not non-doctors. |
| O: some politicians are not statesmen. | I: Some politicians are non-statesmen. |

**3. Contraposition:** To obtain the contrapositive of a statement, we first replace the subject and predicate terms in the proposition and then exchange both these terms with their complements.

**Table of Valid Contrapositions**

|  |  |
| --- | --- |
| **Proposition** | **Contrapositive** |
| A: All birds are mammals. | A: All non-mammals are non-birds. |
| I: Some birds are mammals. | I: Some non-mammals are non-birds. |

Note: The valid converse, obverse or contrapositive of a given proposition always logically follows from the proposition.

**II. Mediate Deductive Inference (SYLLOGISM):** First introduced by Aristotle, a Syllogism is a deductive argument in which conclusion has to be drawn from two propositions referred to as the premises.

**Example:**

1. All lotus are flowers.

2. All flowers are beautiful.

3. All lotus are beautiful.

Clearly, the propositions 1 and 2 are the premises and the proposition 3, which follows from the first two propositions, is called the conclusion.

**Term** : In Logic, a **term** is a word or a combination of words, which by itself can be used as a subject or predicate of a proposition.

Syllogism is concerned with three terms :

**1. Major Term :** It is the predicate of the conclusion and is denoted by P (first letter of 'Predicate').

**2. Minor Term:** It is the subject of the conclusion and is denoted by S (first letter of 'Subject').

**3. Middle Term:** It is the term common to both the premises and is denoted by M (first letter of 'Middle').

**Example**:

**Premises**:

1. All dogs are animals.

2. All tigers are dogs.

**Conclusion** :

All tigers are animals.

Here 'animals' is the predicate of the conclusion and so,.it is the major term. P.

'Tigers' is the subject of the conclusion and so, it is the minor term, S.

'Dogs' is the term common to both the premises and so, it is the middle term, M.

**Major And Minor Premises :** Of the two premises, the major premise is that in which the middle term is the subject and the minor premise is that in which the middle term is the predicate.

**Rules for Deriving Conclusion:**

1. The conclusion does not contain the middle term.
2. No term can be distributed in the conclusion unless it is distributed in the premises.
3. The middle term (M) should he distributed at least once in the premises. Otherwise, the conclusion cannot follow.
4. No conclusion follows

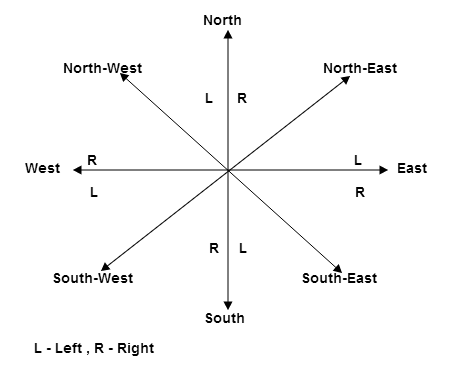
* if both the premises are particular
* if both the premises are negative.
* if the major premise is particular and the minor premise is negative.

1. If the middle term is distributed twice, the conclusion cannot be universal.
2. If one premise is negative, the conclusion must be negative.
3. If one premise is particular, the conclusion must be particular.
4. If both the premises are affirmative, the conclusion must be affirmative.
5. If both the premises are universal, the conclusion must be universal.

**Direction Sense**

The questions on direction sense typically involve a person moving certain distances in specified directions. Then, the student is asked to find out the distances between the initial and the final points. The easier way of solving these problems is to draw a diagram as you read the information given in the problem and ensure that the diagram reflects all the information given the problem.

To solve these types of problems, the student should be aware of directions. The student should also recognize the left and right of a person walking in a particular direction. The following diagram shows all the directions and Left (L) and Right (R) of a person walking in that direction.



**Important Points**

* The distance from a particular point after travelling a distance of x meters in the horizontal direction and a distance of y meters in the vertical direction is equal to
* In common usage, North South direction is referred to “Vertical” Direction and the East West direction is referred to as the “Horizontal” direction.

**Seating Arrangement**

Seating arrangement refers to the sitting pattern of any object or person. There are two types of sitting arrangements

1. **Linear Arrangements:**

In these arrangements objects/person are arranged only on the “axis” and hence, the position of the subjects assumes importance here in terms of order like first position, second position etc.

1. **Circular Arrangements:**

Questions on circular arrangement involve seating of people around a table or arrangement of things in a circular manner. (For example, different coloured beads strung to form a necklace)

**Important Points:**

* 1. In case of people sitting around a table, the table could be of any shape – rectangular, square, circular or any other type.
  2. The data given in such sets of questions specify the positions of some or all of the individuals (or things) in the arrangement. The positions are specified through conditions involving specified persons sitting (or not sitting) opposite each other or a particular person sitting to the right or left of another person, etc.
  3. Once you read the data, first draw the shape specified in the data and then draw the slots in the seating arrangement.
  4. Statements like “A and B are sitting farthest from each other” or “A and B sit across the table” imply that A and B sit opposite each other.
  5. Unlike Linear arrangement words like “immediately” and “directly” do not play role in circular arrangement. So, if its given that C sits to right of B, then it is clear that C must be to the immediate right of B.
  6. Go “anticlockwise” if anybody’s right has to be located, and go “clockwise” if somebody’s left has to be located.