



23GET276 - VQAR-II

UNIT IV - NON - VERBAL REASONING

Figure series

Completion of Series

The **Non Verbal Reasoning** section of every competitive exam includes questions from the topic “Completion of Series”. This topic is considered to be quite important and every year a good number of questions are asked from this topic.

A **series** is described as a sequential arrangement of figures following a certain pattern of transition from one to other.

Different types of questions covered in this chapter as follows

1. Choosing the Next Term in the Series
2. Choosing the Missing Figure in the Series
3. Detection of Incorrect Order in the Series
4. Detecting the Wrong Figure in the Series

Basic Concepts of Classification - Series

Concept of Rotation

The movement of a block (figure) around a fixed point is known as rotations. The simplest example of rotation is the movement of hour and minute hand of the clock. Such movements are of two types.

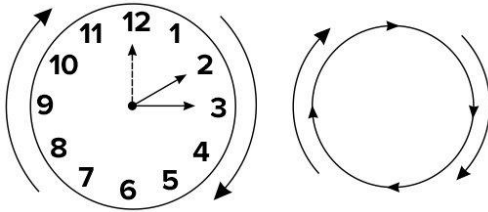
1. **Clockwise Rotation** : When a figure rotates in the direction of the hands of a clock, then this movement is called clockwise movement. This can be better understood with the help of direction of arrows.



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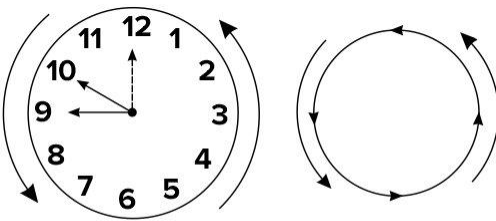
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Clockwise rotation

2. Anti-clockwise Rotation : When a figure rotates in the opposite direction of the hands of a clock, then this movement is known as anti-clockwise movement. This can be better understood with the help of direction of arrows.



Anti-clockwise rotation

Concept of Angles

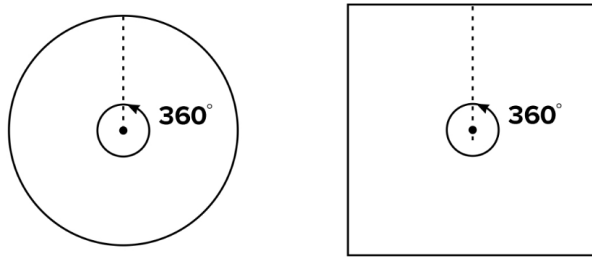
The figures are rotated either clockwise or anti-clockwise by a certain angle. The concept of angles can be better understood with the help of following figure where the dotted line shows the original/initial position, dark line shows the final position and the direction arrow shows the direction of rotation.

Angle	45°	90°	135°	180°	225°	270°	315°
Clockwise rotation							
Anti-clockwise rotation							

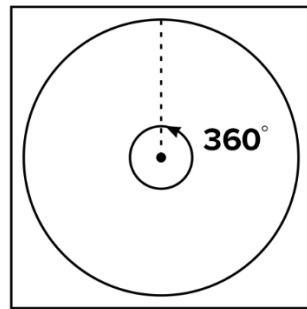


Concept of Angle in a Square

The same concept of angles which is explained above is also valid for square figure as both the figures (i.e., circle and square) form an angle of 360° with the centre as shown below.



Now, let us combine these two figures to have a more clear picture of the concept.



So, from the above figures it is clear that the clockwise and anti-clockwise angular rotations that takes place in a square block are similar to the above explained rotations.

Concept of Steps

In some type of question based on series, the whole figure is not rotated to obtain the another figure but one or more elements/symbols inside the figure move some steps in an orderly manner to obtain the subsequent figures. So, it is required to have a clear understanding about the concept of steps.

As we have already understood the concept of angles, we can extend the concept of angles to explain the concept of steps.



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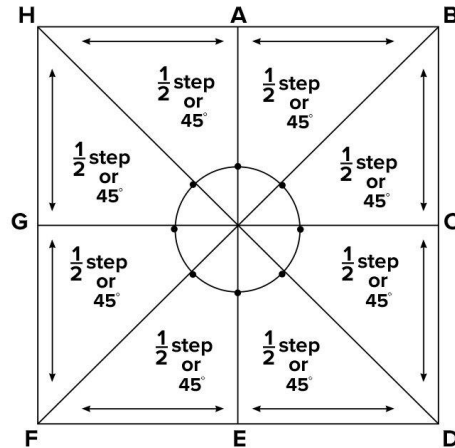
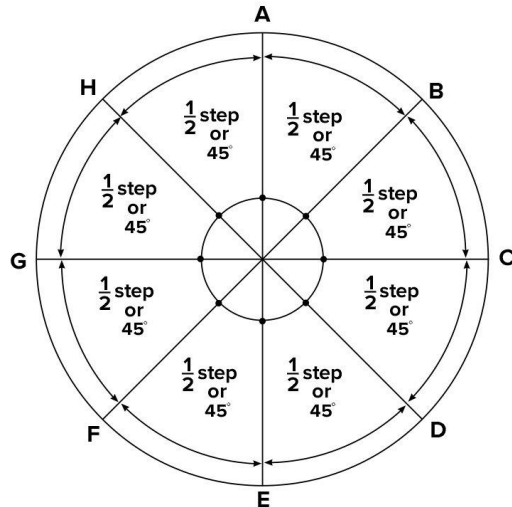
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Let us consider the following two figures



From the above figure it is very much clear that the length of arc or side corresponding to 45° is taken as half step. So, $\frac{1}{2}\text{step} = 45^\circ$

Counting of Figures

Counting of Figures can be explained as the realisation of simple geometrical plane figures from a complex figure.

Different types of questions covered in this chapter are as follows

1. Counting of Straight Lines and Triangles
2. Counting of Quadrilaterals and Polygons
3. Counting of Circles and Colours

This section of non-verbal reasoning is designed to test the analytical ability of the candidate. The figures which are asked for counting can be a straight line, triangle, square, rectangle, polygon etc. To find the accurate answer for these question, firstly, a candidate needs to find the required figures formed by individual section of the given figure, then the figure formed by combination of two figures and so on.



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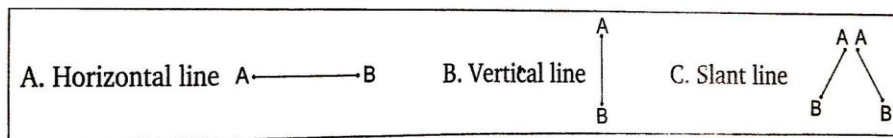
Counting methods of various geometrical figures are covered under different types, which are discussed as below

Type #1: Counting of Straight Lines and Triangles

In this type of questions, a candidate is required to find out the number of straight lines in the given figure.

A **straight line** is a set of points that extends endlessly in both the directions.

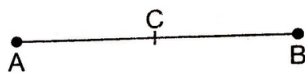
Some types of straight lines are defined below



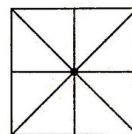
Counting Method of Straight Line

Let us consider a line (AB) given

Then, on counting, it will be counted as one line i.e., AB and not as a two straight lines AC and CB.



Example 1: How many straight lines are there in the figure given below?



(a) 14

(b) 8

(c) 4

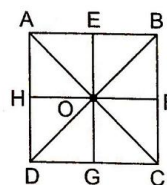
(d) 9

Sol: (b) Horizontal lines = AB + HF + DC = 3

Vertical lines = AD + EG + BC = 3

Slant lines = AC + BD = 2

\therefore Total lines = 3 + 3 + 2 = 8

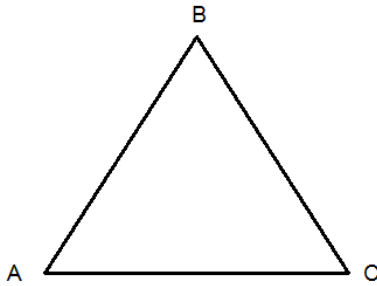




Counting of Triangles

In this type of question, a candidate is required to find the number of triangles in the given figures.

A **triangle** is a closed figure bounded by three side. Here, ABC is a triangle.



Counting Method of Triangles

1. Smallest triangles are counted first.
2. At the second step those triangles are counted which are formed with the two triangles and further counting goes on in the same way i.e., triangles formed with three, four, ... triangles are counted one after another.
3. Largest triangle is counted at the final step.

Water Images

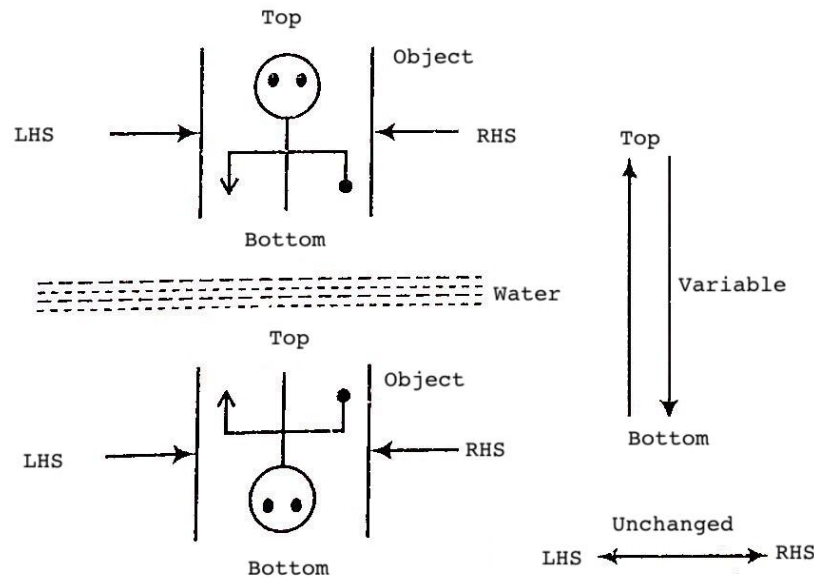
When an object is placed near water source like river, pond or water tub etc, then the image formed in the water is called water image of the object.

Water Image is the reflection of an object into water. It is the vertically inverted image obtained by turning the object upside down. The water image of the figure looks like the mirror image of the figure when the mirror is placed horizontally at the bottom of the question figure.

From the below figure, it is clear that the water image is an inverted form of a real object in which LHS (Left Hand Side) and RHS (Right Hand Side) remains unchanged but the top and bottom of the object gets interchanged i.e. top becomes bottom and bottom becomes top.



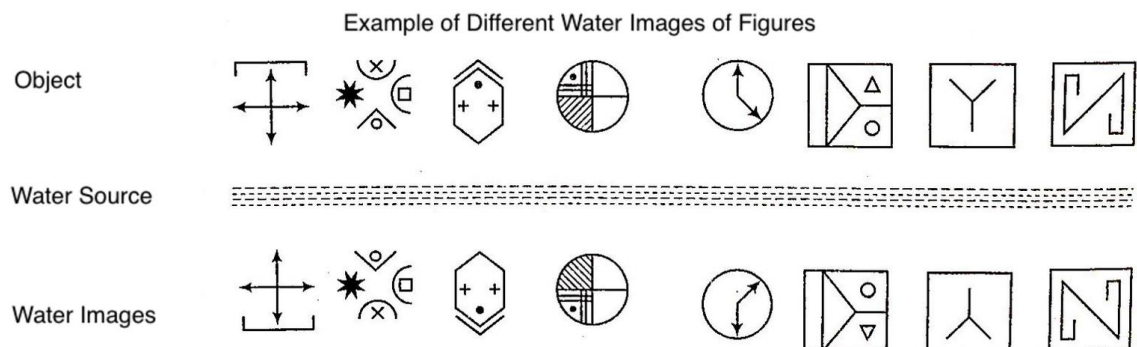
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Different types of questions covered in this section are as follows

1. Water Image of Figure/Symbol/Sign
2. Water Image of Letters and Numbers

Mostly the water image of a figure is different from the original figure which is because of the dissimilarity in the upper and lower half of the figure. This can be better understood with the help of example illustrated below



Sometimes it happens that water image formed is identical to the original figure. This is the case when upper half of the figure is similar to the lower half of the figure but in opposite direction.



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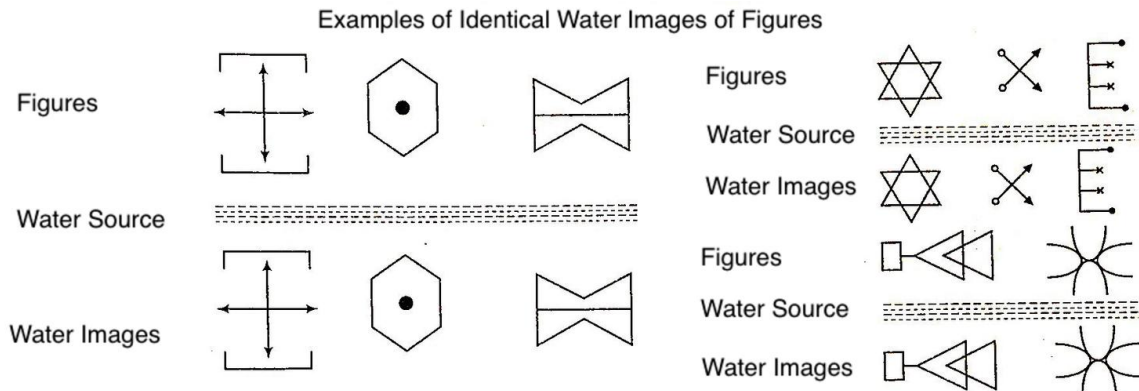
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This can be better understood with the help of identical water images of figures which are given below

Example of Identical Water Images of Figures



From the above examples, it is clear that in the water image, (LHS) and (RHS) remain unchanged while upper and lower parts get interchanged, means top becomes bottom and bottom becomes top.

Mirror Images

The figure obtained by putting a mirror in front of the real object is known as mirror image or we can say that the reflection of an object into the mirror is called its mirror image.

Mirror Image is the image or the reflection of an object into a mirror when that object is placed near it.

Position of Mirror

There are two positions of mirror to get the image from it which are as follow

1. When Mirror is Placed Vertically

When a mirror is placed to the left or right of the object, then standard form of mirror image is formed. Here, the Left Hand Side (LHS) and Right Hand Side (RHS) of an object interchange their places while top and bottom remains at their position. Vertical mirror image is obtained by **lateral inversion** of the object.



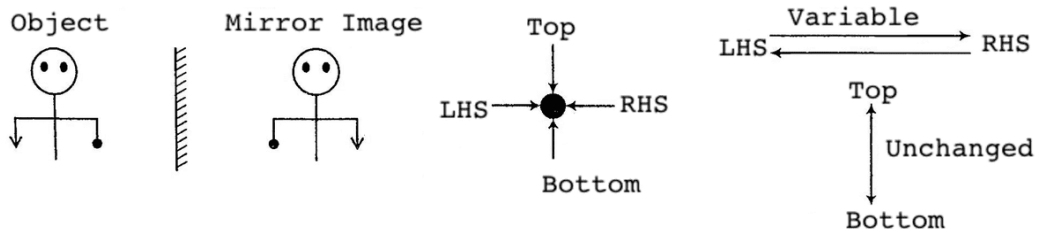
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The figure given below will help you to understand the formation of image formed by a vertical mirror

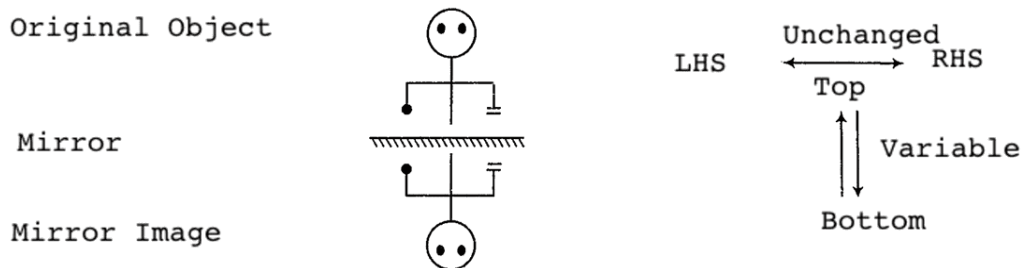


In the above figure, you can see clearly that Left Hand Side (LHS) and Right Hand Side (RHS) have interchanged their position but top and bottom remains at the same place.

2. When Mirror is Placed Horizontally

When a mirror is placed at the top or bottom of the object, then the image, so obtained is like the water image. Here, the top and bottom of an object interchange their position. Horizontal mirror image is obtained by **vertical inversion** of the object.

The figure given below will help you to understand the formation of image formed by a horizontal mirror.



In the above figure, you can see LHS and RHS of the image remains unchanged but the top and bottom interchange their positions.



Embedded Figures

"A figure is said to be **embedded** in another figure when the second figure completely contains the first figure."

Different types of questions covered in this section are as follows

1. Question Figure Embedded in Answer Figure
2. Answer Figure Embedded in Question Figure

Questions based on Embedded Figures comprise of a question figure and four answer figures and it is asked to find the correct answer figure embedded in given question figure or the correct answer figure in which the given question figure is embedded.

These type of problems judge the visual ability and concentration level of a candidate. While attempting these questions, the candidates should visually judge the figure and try to find out the option in which this figure is embedded.

Let us consider following two figures

You are required to find out if Fig. (X) is embedded on Fig (Y).

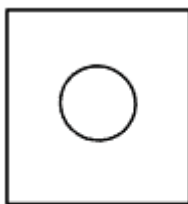


Fig. (X)

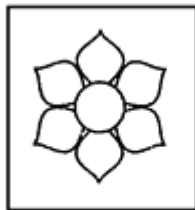


Fig. (Y)

By careful examination of Fig (Y), we find that Fig (X) is embedded in it, as shown in the below figure.

