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# NATA 2020 CAAD BITESIZE

19.08.2020

DAILY PCQ/MCQ LESSONS



PREPARED BY

EXPERTS IN  
ARCHITECTURE  
EDUCATION

ANNA UNIVERSITY  
COUNSELLING  
CODE  
**1152**

**BITESIZE**  
**18**

**B.Arch.,**

9710 55 4545 / 9710 93 0025

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▪ **ELEMENTS OF DESIGN** -  
*Visual Principles in Composition*

▪ **PRINCIPLES OF DESIGN**  
*Visual Principles of Composition*

▪ **ORGANISING PRINCIPLES** -  
*Spatial Relationship between objects*

▪ **GEOMETRY**  
*Spatial Intelligence & Graphical Similarities*

▪ **COLOUR**  
*Colour Scheme Awareness & Knowledge*

▪ **LIGHT & SHADOW**  
*Creative Expression*

▪ **VISUAL COMPOSITION**  
*Visual Principles of Composition*

▪ **PERSPECTIVES**  
*Visual images & Scenarios & Interpretation*

01. Identify the solid structure which has a continuous surface and the whole mass will appear as one immense dot against its background.

A. Matru Mandir, Auroville, Pondicherry



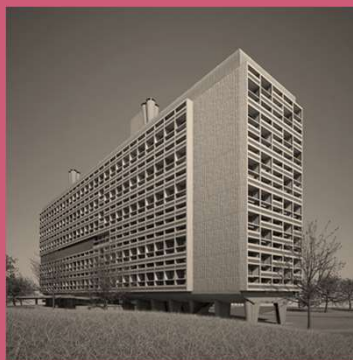
Source: auroville.org

C. Pyramids of Giza, Egypt



Source: history.com

B. Unité d'Habitation, France



Source: architizer.com

D. Leaning tower of Pisa, Italy



Source: towerofpisa.com

**Answer Key:**

A.



**Theory:**

**SPHERE** - A solid generated by the revolution of a semi circle about its diameter. A sphere is a centralized and highly concentrated form. It is self-centred and normally stable in its environment.

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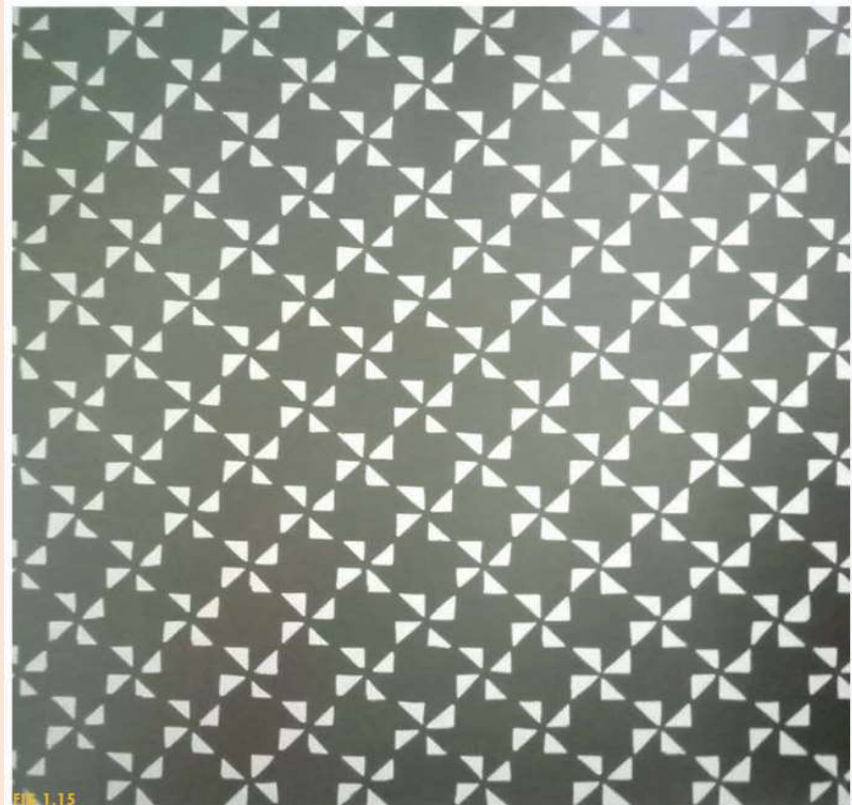
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02. Which principle of design is created by repeating, rotating or reflecting any element?



Source: Compositions, Batch 2018, CAAD.

A. Focal Point

C. Axis

B. Emphasis

D. Pattern

**Answer Key:**

**D. Pattern**

**Theory:**

**Pattern** is an underlying structure that organizes surfaces or structures in a consistent, regular manner. Pattern can be described as a repeating unit of shape or form, but it can also be thought of as the "skeleton" that organizes the parts of a composition.

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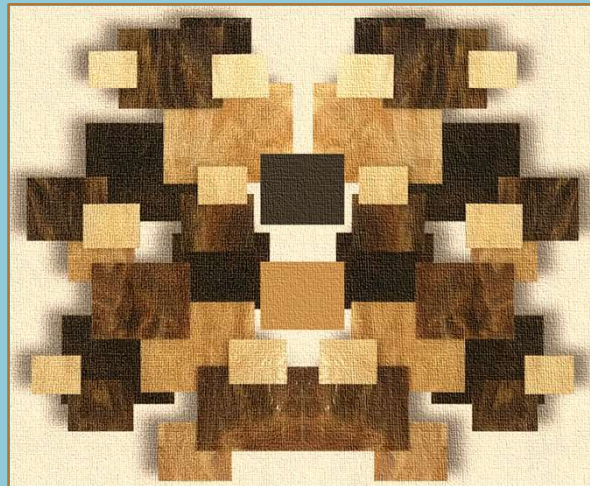
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03. Following are few vocabulary associated with designing principles. Find out the words that define the following composition



1. Clustered organization	6. Monochromatic
2. Symmetry,	7. Asymmetry
3. Square and its derivatives	8. Grid organization
4. Texture	9. Shades of red
5. Neutral colours	10. Form
A. Options 2,3,5	C. Options 1,3,8
B. Options 4,5,8	D. Options 2,4,6.

**Answer Key:**

**All the answers are right.**

**Theory:**

*This is a sample for PTQ.*

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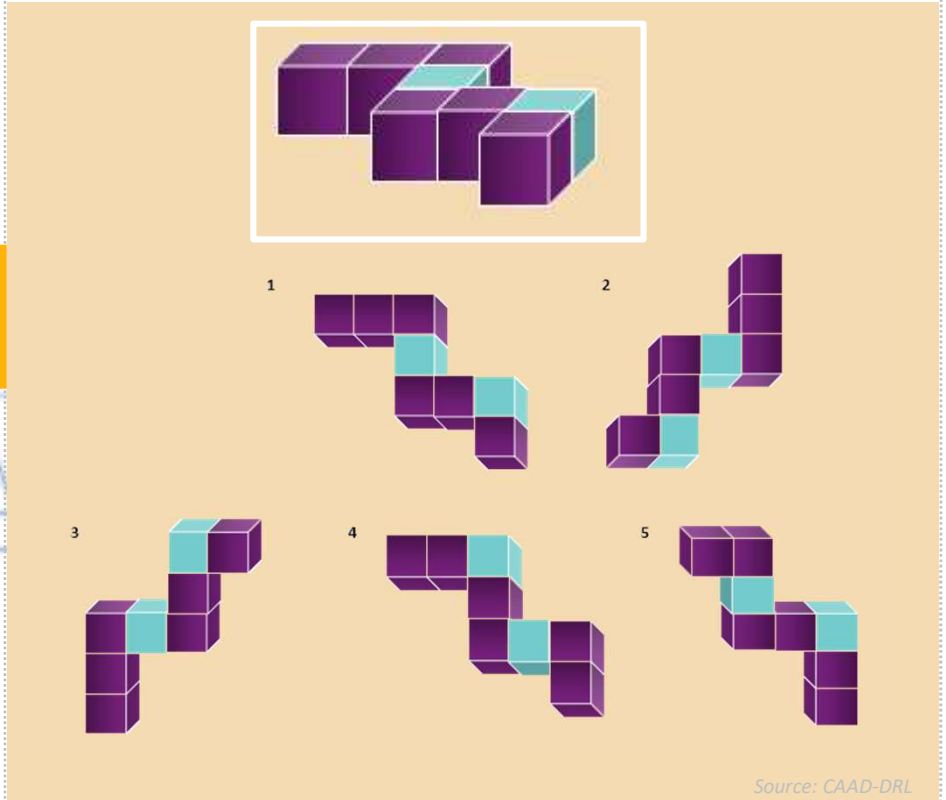
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04. Sam made this model by joining 6 purple cubes and 2 blue cubes. Then he turns his model in an upright position. Which of the following models are right when placed vertically?



Source: CAAD-DRL

A. Options 4,5

C. Options 1,2, 3

B. Options 1,2,5

D. Options 3, 4

**Answer Key:**

**C. Options 1, 2, 3**

**Theory:**

**GROUP ROTATION (THREE DIMENSIONAL)**

*In this method, the task is to identify the choices to the original shape/pattern. The multiple choices comprise of the original shape/pattern after single/ multiple rotations.*

**Key Strategy - Choose the asymmetrical shape in the group and determine how the shape would look when rotated clockwise or anticlockwise.**

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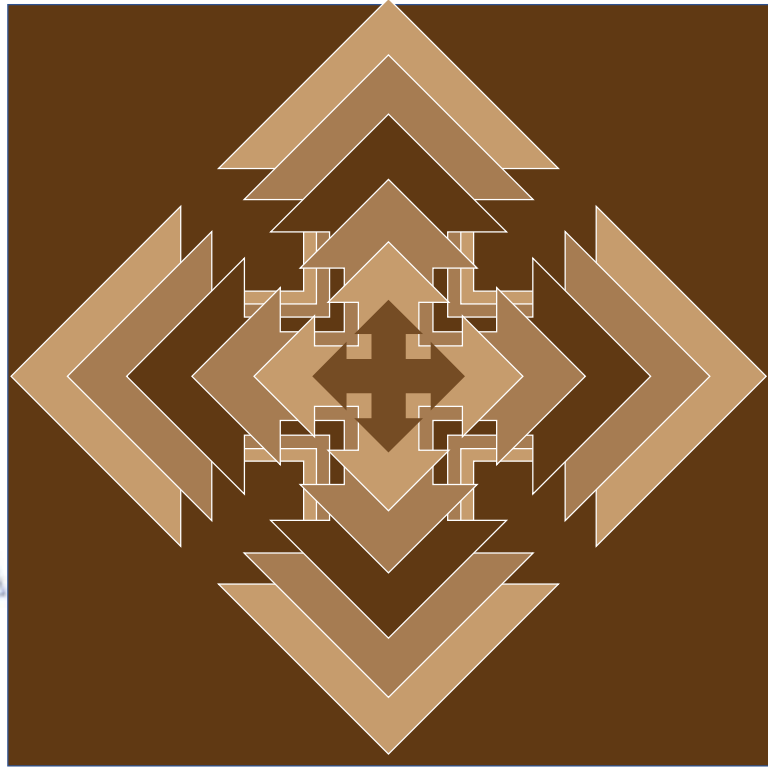


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05. What type of colours are used to create the pattern in this floor mat?

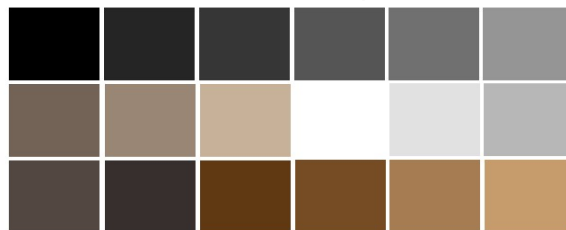


Source: CAAD-DRL

- |                    |                    |
|--------------------|--------------------|
| A. Primary Colours | C. Neutral Colours |
| B. Cool Colours    | D. Warm Colours    |

**Answer Key:**

**C. Neutral Colours**



**Theory:**

**NEUTRAL COLOURS**

Grey, Brown. These are not on most colour wheels, but they are considered neutral because they do not contrast with much of anything.

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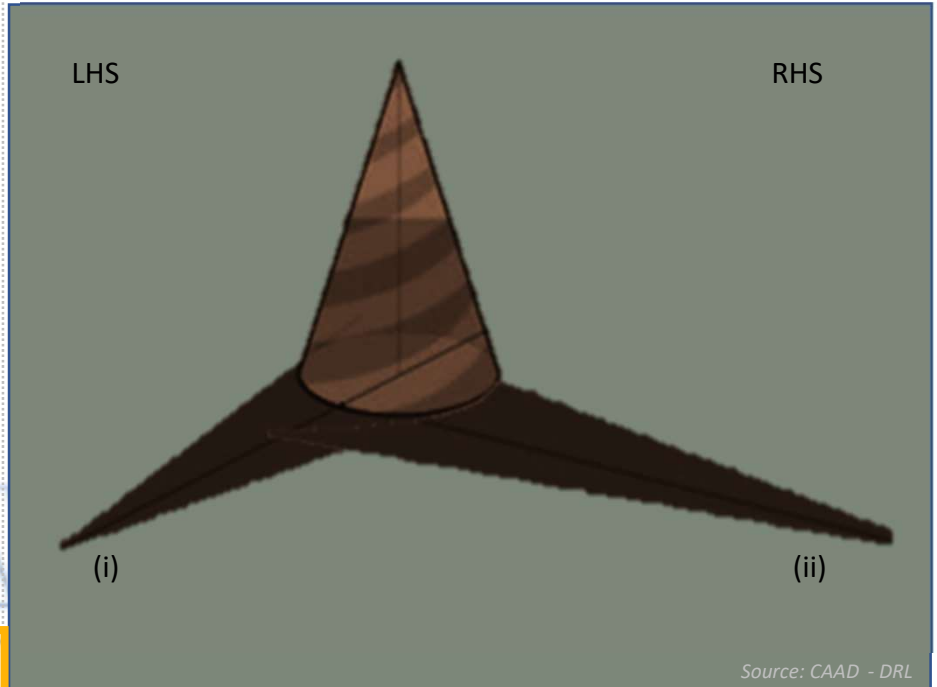


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06. Based on the shadow cast by the cone, identify the distance and position of the light source from the object.



- |   |   |
|---|---|
| A. (i) Light source is in the front and nearer to the object.<br>(ii) Light source is in the front and far away from the object.        | C. (i) Light source is behind, left side and near to the object. .<br>(ii) Light source is behind, right side and far away from the object. |
| B. (i) Light source is behind, right side and nearer to the object.<br>(ii) Light source is behind, left side and nearer to the object. | D. (i) Light source is behind, right side and far away from the object.<br>(ii) Light source is behind, left side and nearer to the object. |

**Answer Key:**

**D.** (i) Light source is behind, right side and far away from the object.  
 (ii) Light source is behind, left side and nearer to the object.

**Theory:**

Shadows are the relatively dark figures cast upon a surface by an opaque body or part of a body intercepting the rays from a light source.

The shape of the shadow is dependent on

- The position of shade line & the observer, The direction of the light and The form of the surfaces on which the plane of the shadow falls
- When the object is not in contact with the ground, the shadow will be seen detached from the object

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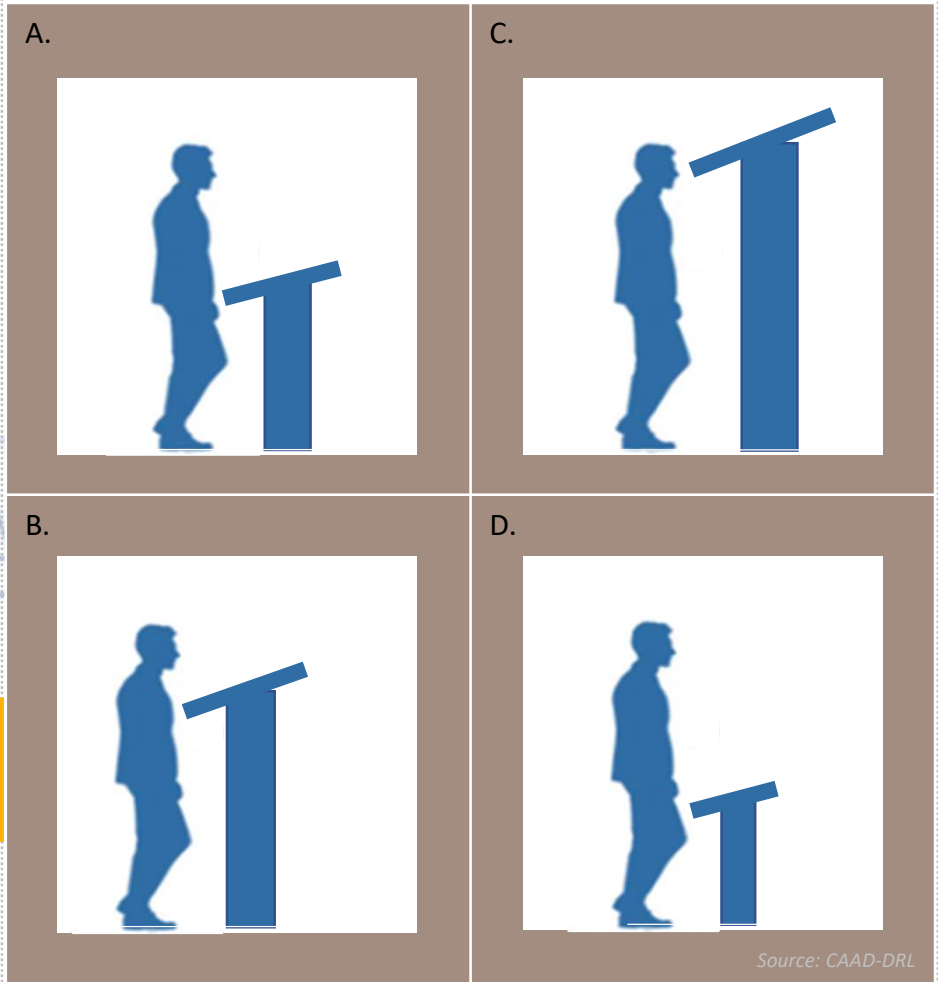
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07. Based on the human proportions, choose the right option which can serve as a podium?



**Answer Key:**



**Theory: Proportion**

*Proportion refers to the relationship of one part to another or to the whole, or between one object and another. This relationship may be one of magnitude, quantity, or degree.*

*The height of the space is perceived in proportion to the human height and it dictates the spatial usage. Measurable change in the height of a ceiling seems to have a greater effect on our impression of a space*

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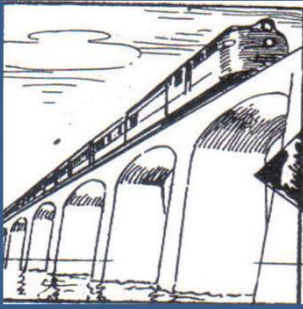
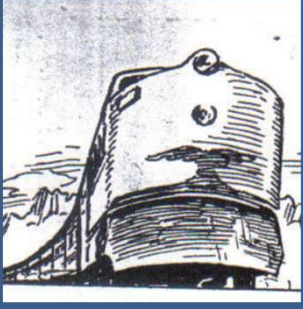

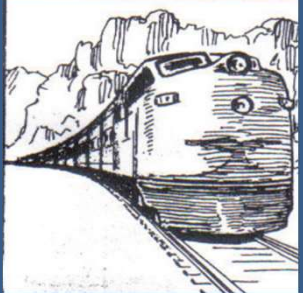
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08. Four persons are viewing the train from different positions. Identify the persons from whose perspective the following images are drawn

- a. A person waiting in the railway station
- b. An one year old kid seeing the train
- c. A person viewing the train from the mountain ridge
- d. A fish views the train from the river

1. 	3. 
2. <small>Source: Perspective Drawing by Ernest Norling</small> 	4. 

A.	a - 1	c - 3	C.	a - 4	c - 2
	b - 2	d - 4		b - 3	d - 1
B.	a - 4	c - 2	D.	a - 2	c - 3
	b - 3	d - 1		b - 4	d - 1

**Answer Key:**

**B.**

B.	a - 4	c - 2
	b - 3	d - 1

**Theory:**

**ONE POINT PERSPECTIVE:** One point perspective (frontal or central perspective) has only one vanishing point on the horizon line located somewhere within the picture plane and all the orthogonal converge towards it.

**THREE-POINT PERSPECTIVE:** Three point perspective uses three vanishing points where two of them are on the horizon line and the third is either high above the horizon line or way below it.

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ATTACHED BELOW  
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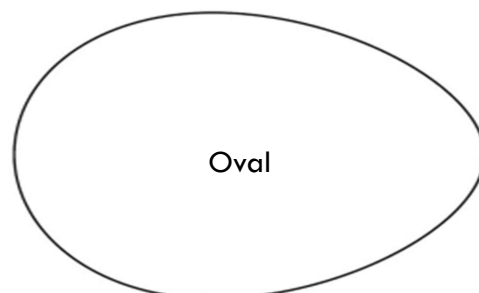
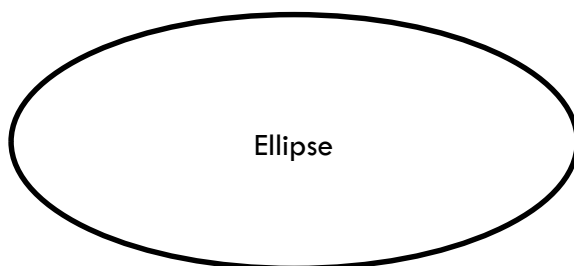
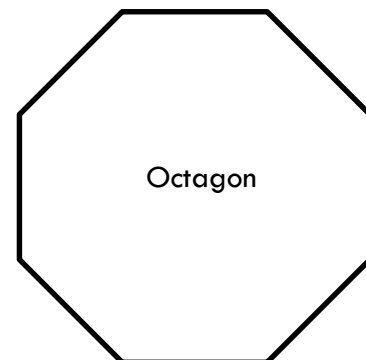
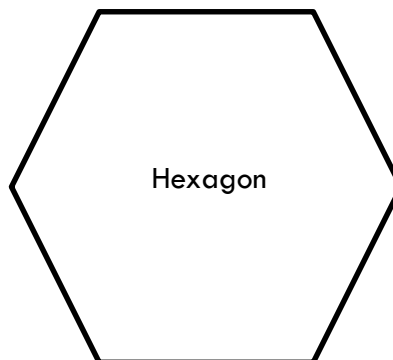
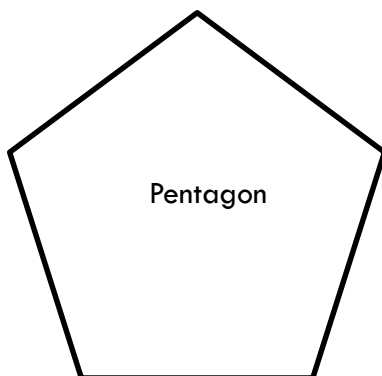
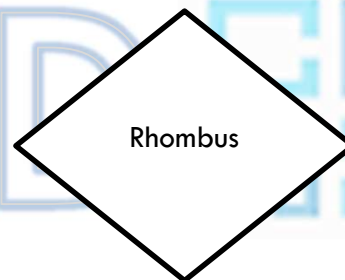
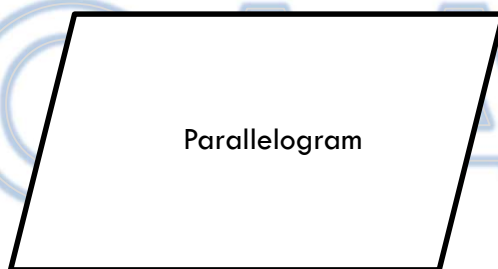
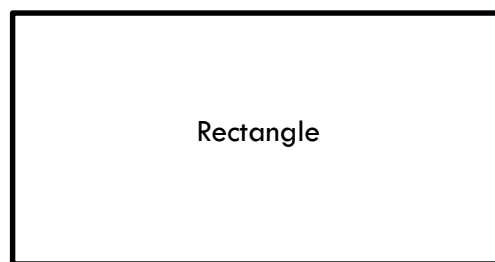
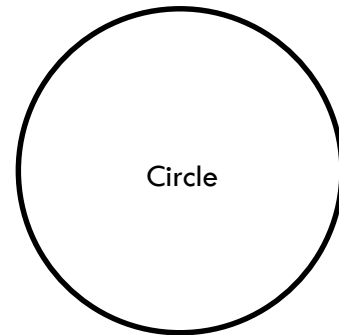
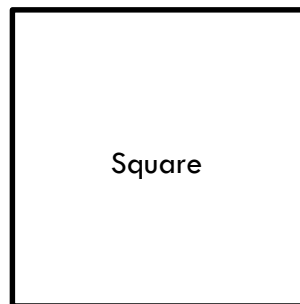
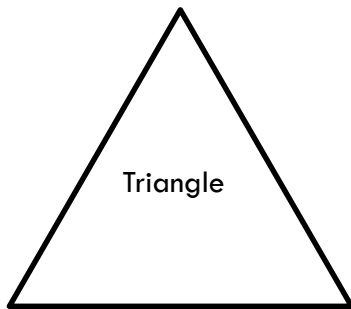
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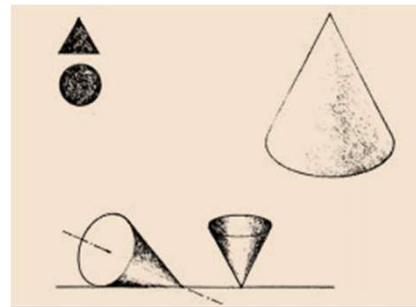
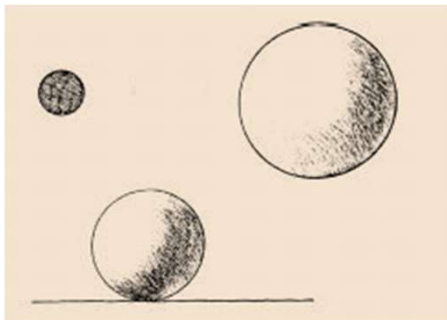
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INTRODUCTION TO BASIC SHAPES

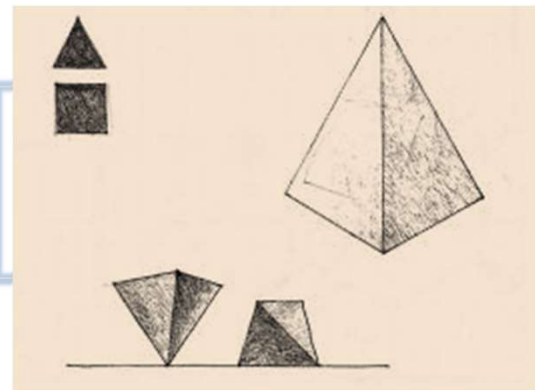


**INTRODUCTION TO PRIMARY SOLIDS****SPHERE**

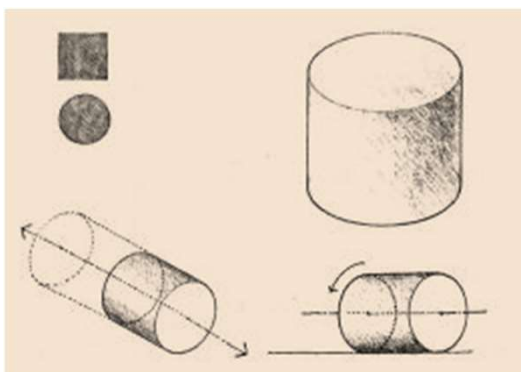
A solid generated by the revolution of a circle about its diameter. It has no directional quality, neither horizontal nor vertical, but simply static. A sphere is a centralized and highly concentrated form. It is self-centred & normally stable in its environment. In any point it retains its circular shape.

**PYRAMID**

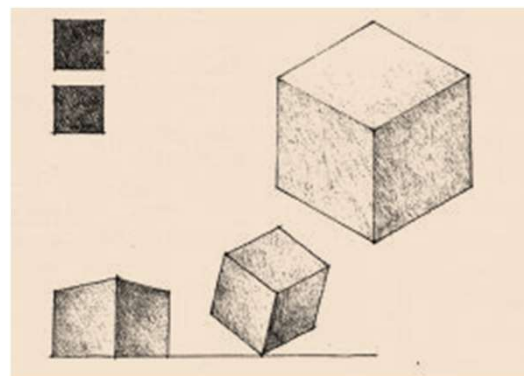
A polyhedron having a polygonal base and triangular faces meeting at a common point or vertex. The pyramid has properties similar to those of the cone. Because all of its sides are flat planes. However its stable on all its faces.

**CYLINDER**

A solid generated by the revolution of a rectangle about one of its sides. A cylinder is centralized about the axis passing through the centres of two circular faces. A cylinder is stable if it rests on its one of the circular faces.

**CUBE**

Prismatic solid bounded by six equal square sides, the angle between any two adjacent faces being a right angle. It is stable on all its sides excepts when it stand on its edges.

**CONE**

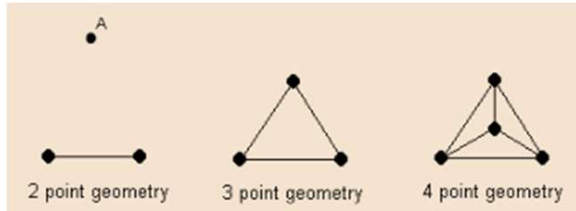
A solid generated by the revolution of a right triangle about one of its sides. Like the cylinder, the cone is a highly stable form when resting on its circular base. It can also rest on its apex in a precarious state of balance.

Reference: Architecture Form, Space and Order - FRANCIS D.K CHING

**INTRODUCTION TO ELEMENTS IN ARCHITECTURE**

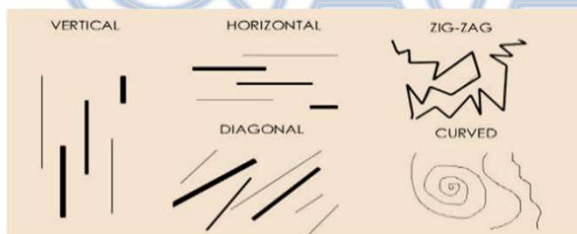
**POINT**

A point or mark is the smallest and most basic element. The single point represents a visual stop. Two points represent a direction. Three points makes the eyes move in a closed path. They signify a shape.



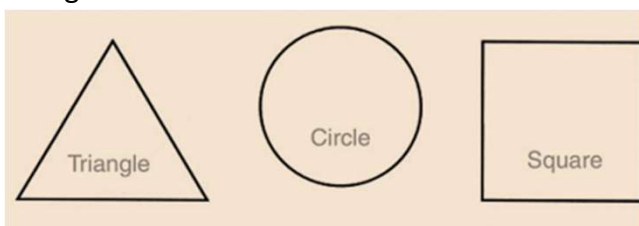
**LINE**

Point that is extended along a direction. Line has length and describes a point in motion. Expresses direction, movement and growth. Line also defines the edges of planes and give them the shape. A Line can articulate the surfaces of planes. A line is a form with width and length, but no depth. The direction, weight, and character of line convey many different states and emotions.



**SHAPE**

Shape is an area that is contained within implied lines. Shapes have two dimensions-length and width, and can be geometric or free-form. A shape is formed when the lines encloses an area. Shapes whether geometric or organic it adds interest to the design.



Reference: Architecture Form, Space and Order - FRANCIS D.K CHING

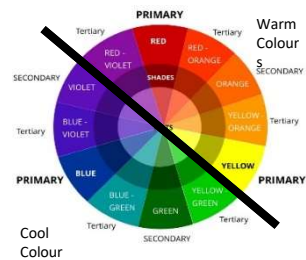
**SPACE**

Space is three-dimensional volume that can be empty or filled with objects. It has width, height, and depth. The form defines the space.

**COLOUR**

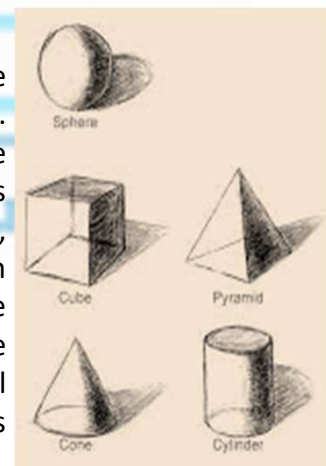
Colour adds the magic element to a design. Each colour has a mood, an emotion and different levels of significance.

Colours can reflect warm or cool, hard or soft, light or dark, passive or active, all of which when used individually or in combination of one another greatly affects the mood.



**FORM**

Form is any three dimensional object. They can be measured in terms of height, width, breadth. Form describes volume and mass, or the three dimensional aspects of objects that take up space.



**TEXTURE**

Texture refers to the surface quality. Textures can create a more three-dimensional appearance on this two-dimensional surface. it can be categorized as visual and tactile texture.



**INTRODUCTION TO PRINCIPLES IN ARCHITECTURE**

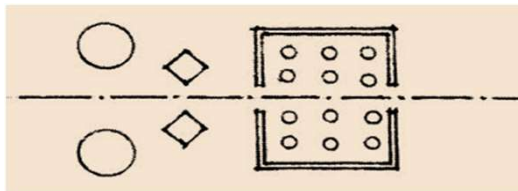
**AXIS**

A Line established by two point in space about which form and spaces can be arranged in symmetrical and balanced manner



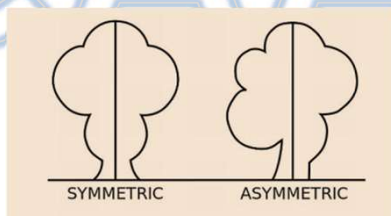
**SYMMETRY**

The balanced distribution and arrangement of equivalent forms and spaces on opposite sides of dividing plane or about a centre axis



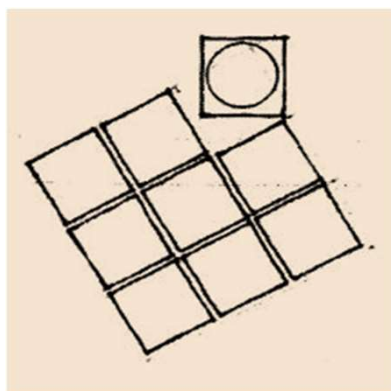
**ASYMMETRY**

Asymmetrical or Informal Balance Parts of the design are not identical but are equal in visual weight on opposite sides of dividing plane or about a centre axis



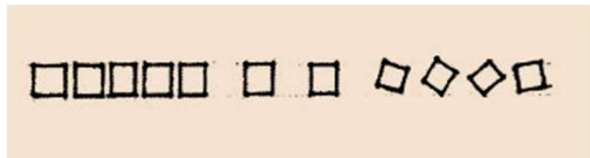
**HIERARCHY**

The articulation of importance and significance of form or space by its size shape and placement relative to other forms and spaces of organization



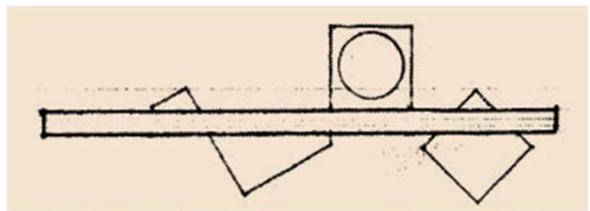
**RHYTHM**

Unifying movement characterized by patterned repetition or alteration of formal elements or motifs in same or modified forms



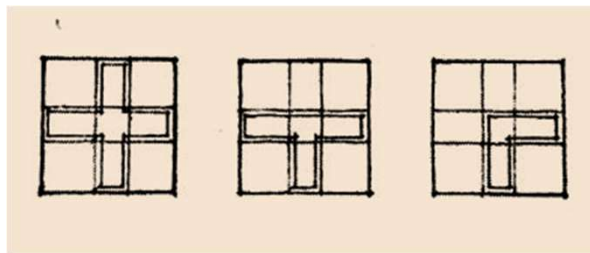
**DATUM**

A line plane or volume that , by its continuity and regularity , serves together , measure and organize a pattern of form and spaces.



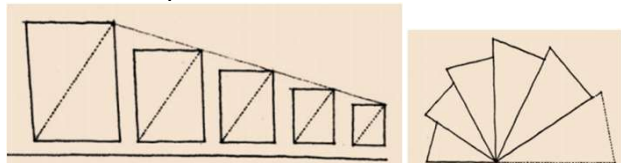
**TRANSFORMATION**

The principle that an architectural concept or organization can be retained, strengthened and built upon through a series of discrete manipulation and transformations.



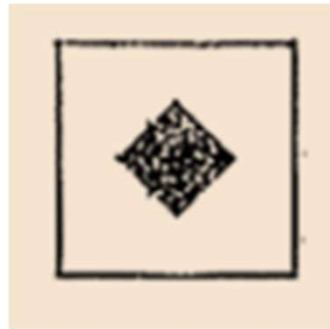
**REPETITION**

Repetition refers to one object or shape repeated; pattern is a combination of elements or shapes repeated in a recurring and regular arrangement; Rhythm is a combination of elements repeated, but with variations



Reference: Architecture Form, Space and Order - FRANCIS D.K CHING

**INTRODUCTION TO SPATIAL RELATIONSHIPS**

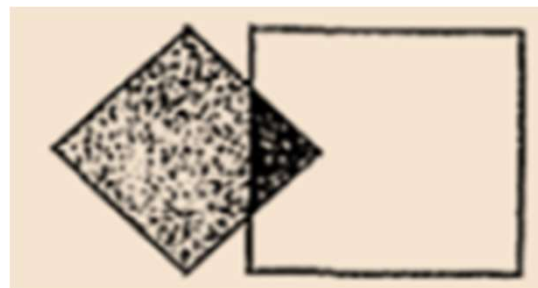


**SPACE WITHIN A SPACE**

A large space can envelope and contain a similar space within its volume. Visual and spatial continuity between the two spaces can be easily accommodated

**INTERLOCKING SPACES**

An interlocking spatial relationship results from the overlapping of two spatial fields and the emergence of a zone of a shared space. Each space interlocking retains its identity. But the intersection of two spaces is subjected to a number of interpretations

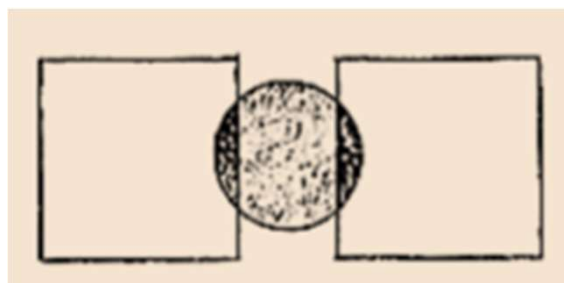


**ADJACENT SPACES**

Two spaces may abut each other or share a common border. It allows each space to be clearly defined and to respond, each in its own way to functional or symbolic requirements

**SPACES LINKED BY A COMMON SPACE**

Two spaces which are separated by a distance can be linked or related to each other by a third, intermediate space. The visual and the spatial relationship between the two spaces depends on the nature of the third space.

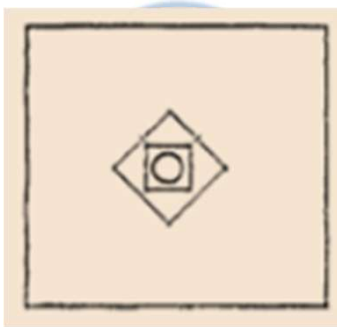


Reference: Architecture Form, Space and Order - FRANCIS D.K CHING

**INTRODUCTION TO SPATIAL ORGANIZATION**

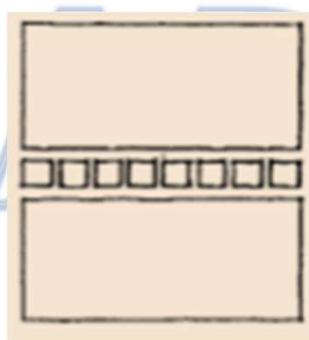
**CENTRALIZED ORGANIZATION**

A centralized organization is a stable, concentrated composition that consists of a number of secondary spaces grouped around a large, dominant central space. The central unifying space of the organization is generally regular in form and large enough in size to gather a number of secondary spaces about its perimeter.



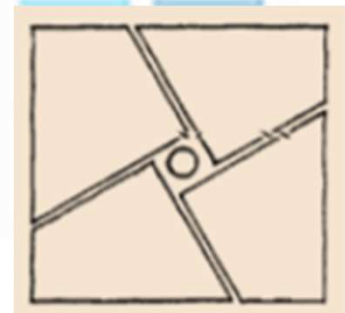
**LINEAR ORGANIZATION**

A linear organization consists essentially of a series of spaces. These spaces can either be directly related to one another or be linked through a separate and distant linear space. It usually consists of repetitive spaces which are similar in size, form and function. It may consist of a single linear space that organizes along its length a series of spaces that differ in size, form and function.



**RADIAL ORGANIZATION**

A radial organization of space combines elements of both centralized and linear organizations. It consists of a dominant central space from which a number of linear organizations extend in a radial manner. Whereas a centralized organization is an introvert scheme that focuses inward on its central space a radial organization is an extrovert plan that reaches out to its context.



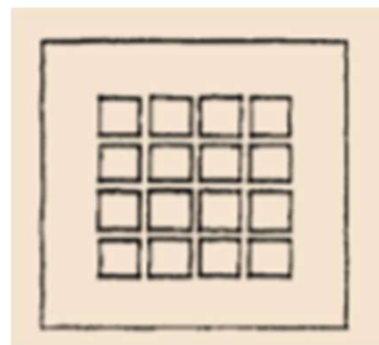
**CLUSTERED ORGANIZATION**

A clustered organization grouped by proximity or the sharing of a common visual trait or relationship



**GRID ORGANIZATION**

Space organized within the field of a structural grid or another three dimensional framework



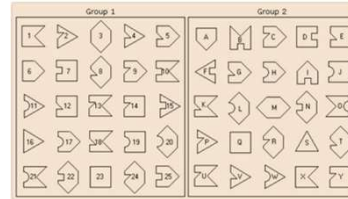
Reference: Architecture Form, Space and Order - FRANCIS D.K CHING



**INTRODUCTION TO SPATIAL ABILITY ASSESSMENT (Few Samples)**

**01. SHAPE MATCHING (TWO DIMENSIONAL)**

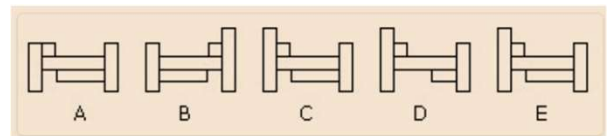
In this method, two groups of simple, flat objects are given and the question is to match the pairs by same size and shape. Each drawing in the first group is exactly the same as a drawing in the second group. The objects in the second group may have been moved and some may have been rotated.



Answers: 1. X; 2. P; 3. M; 4. V; 5. G; 6. A; 7. D; 8. T; 9. C; 10. B; 11. W; 12. E; 13. U; 14. Y; 15. F; 16. S; 17. H; 18. K; 19. J; 20. L; 21. O; 22. N; 23. Q; 24. R; 25. I

**02. VISUAL COMPARISON (TWO DIMENSIONAL)**

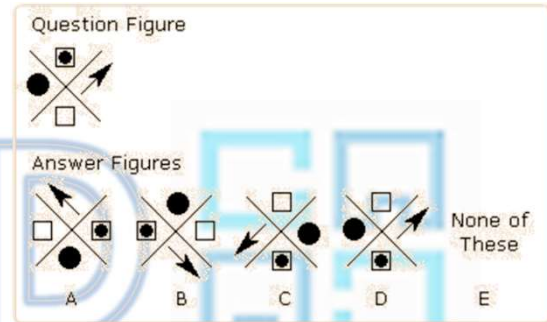
Several objects will be grouped together in the question and the identical pair has to be marked out.



Answer: C and E are the only two pictures that are identical

**03. GROUP ROTATION (TWO DIMENSIONAL)**

In this method, the task is to identify the choices to the original shape/pattern. The multiple choices comprise of the original shape/pattern after single/multiple rotations.

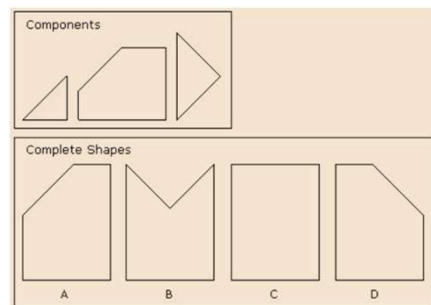


Answer: C

**Key Strategy - Choose the asymmetrical shape in the group and determine how the shape would look when rotated clockwise or anticlockwise.**

**04. COMBINING TWO-DIMENSIONAL SHAPES**

In this pattern, question comprise of series of two dimensional shapes which are cut from a parent shape. The question is to identify the parent shape.

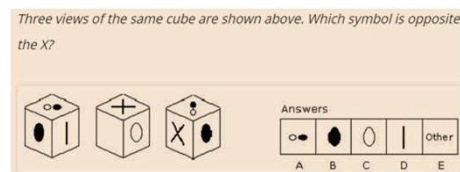


Answer: B

**Key Strategy: Observe parent shape from the choices and look for distinct features that matches with the element. Also parent shape does not have elements sticking out.**

**05. CUBE VIEWS IN THREE DIMENSIONS**

These questions comprise of different views of a patterned cube. Question will be to identify the pattern on a particular face of the cube.



Answer: D

**Key Strategy: Use the process of elimination**

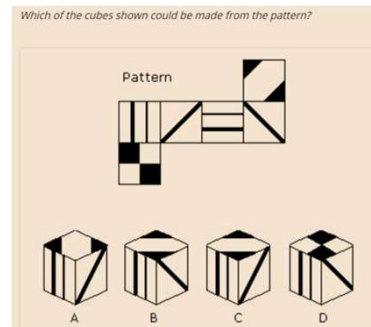
Reference: [www.wikijob.co.uk](http://www.wikijob.co.uk).

**INTRODUCTION TO SPATIAL ABILITY ASSESSMENT**

**06. CUBES IN TWO & THREE DIMENSIONS**

These type of questions have the layout of the cube in two dimension and is to identify the right cube when the layout is folded. The question can be vice-versa too.

**Key Strategy - Mark the faces of the cube as Front, Back, Top, Bottom, Right side and Left side in the layout and work on the cube formation.**

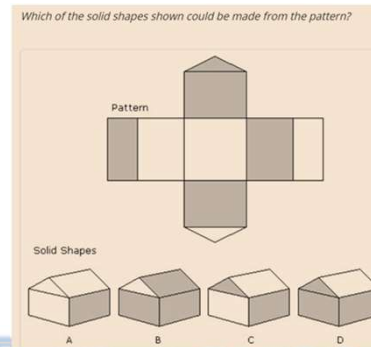


Answer: A

**07. OTHER SOLIDS IN TWO & THREE DIMENSIONS**

These questions use irregular solid shapes as a layout and the question is to identify the three dimensional form arrived at by folding. This is similar to cube exercise (Point no 6)

**Key strategy - Use the process of elimination. Consider the connection between four visible faces and look out for patterns / shades.**

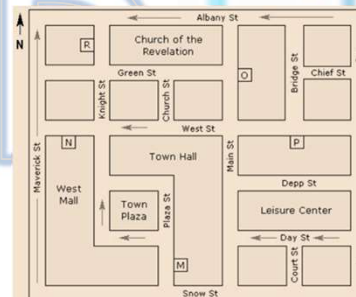


Answer: D

**08. TWO-DIMENSIONAL MAPS**

Simple two-dimensional maps will be given in the question to test the ability to follow instructions and visualizing a route.

**Key Strategy - Basic sense of direction and imagine yourself following the instructions.**



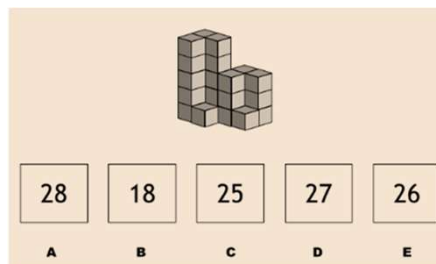
Answer: B

Officer Wilkinson is in Depp St and can see the Town Hall to her right. What direction is she facing?

**09. BLOCK COUNTING IN THREE DIMENSIONS**

This type of question will be having a three dimensional form made up of multiple units/ blocks, some of which may be hidden. The question will be to quantify the hidden elements that comprise the three-dimensional form.

**Key Strategy - Count the number of units as rows and columns and calculate the hidden blocks numerically.**



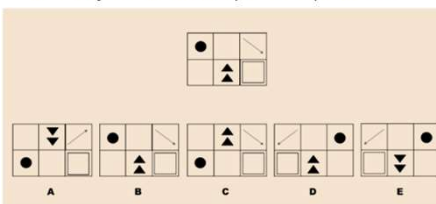
Answer: E

How many blocks make up the shape below?

**10 TWO -DIMENSIONAL MIRROR REFLECTIONS**

This question presents an image and will be asked to identify its mirror image.

**Key Strategy - Use the process of elimination**



Answer: D

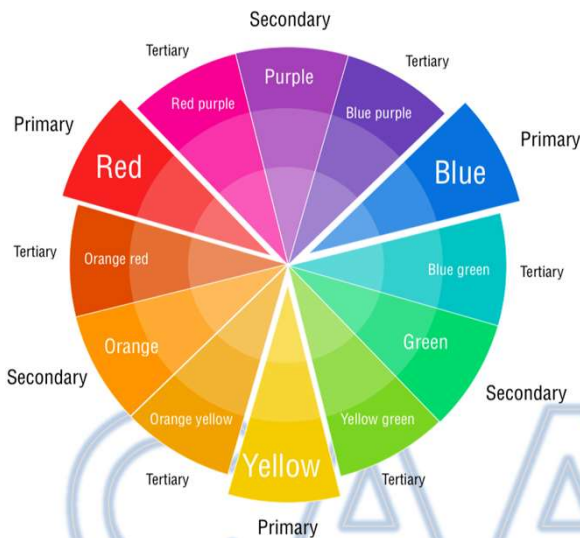
Which answer shows a reflection of the image below?

Reference: [www.wikijob.co.uk](http://www.wikijob.co.uk).

**INTRODUCTION TO COLOUR THEORY**

A colour circle, based on red, yellow and blue, is traditional in the field of art. Sir Isaac Newton developed the first circular diagram of colours in 1666. Since then scientists and artists have studied and designed numerous variations of this concept. Colour theory is a body of practical guidance to colour mixing and the visual effects of a specific colour combination. There are also definitions (or categories) of colours based on the colour wheel: primary colour, secondary colour, and tertiary colour.

**COLOUR WHEEL**



**PRIMARY COLOURS**

These are the three pigment colours that cannot be mixed or formed by any combination of other colours. All other colours are derived from these three hues.

**SECONDARY COLOURS**

These are the colours formed by mixing the primary colours.

**TERTIARY COLOURS**

These are the colours formed by mixing a primary and a secondary colour. So it is referred as a two word name, such as blue-green, red-violet, and yellow-orange.

**WARM & COOL COLOURS**

**Warm colours**, such as red, yellow, and orange evoke warmth when observed.

**Cool colours**, such as blue, green, and purple (violet) evoke a cool feeling when observed.

**NEUTRAL COLOURS**

Grey, Brown. These are not on most colour wheels, but they're considered neutral because they don't contrast with much of anything.

**TINTS, SHADES AND TONES**

**Tint** – adding white to pure colour



**Shade** – adding black to pure colour



**Tone** – adding grey to pure colour



**COLOUR SCHEME/HARMONY**

**Complimentary colours**

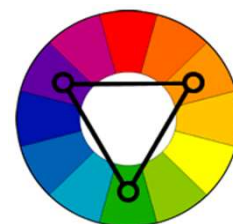
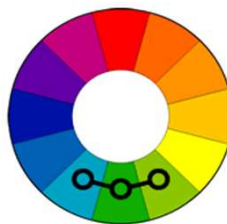
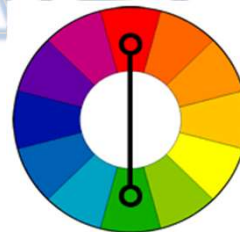
Red and Green, Blue and Orange, Purple and Yellow - located directly opposite to each other on the colour wheel.

**Analogous Colours**

Red and Orange, Blue and Green, etc. – located right next to each other on the colour wheel.

**Triad Colours**

Uses colours that are evenly spaced around the colour wheel.

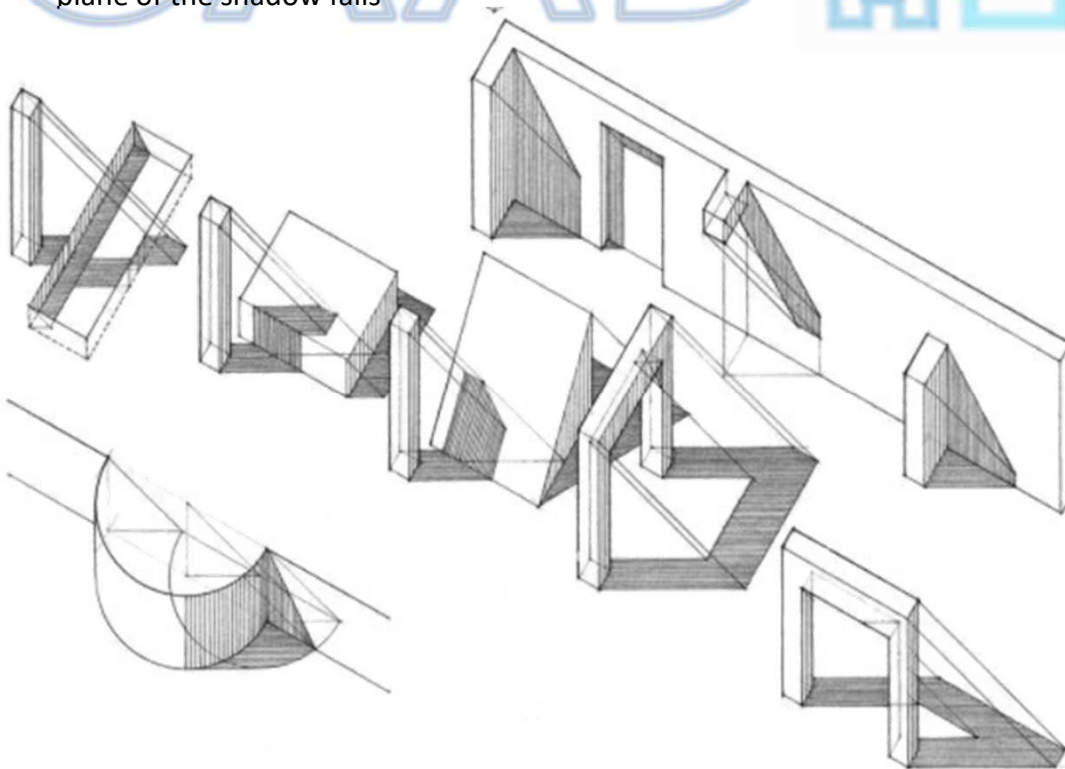
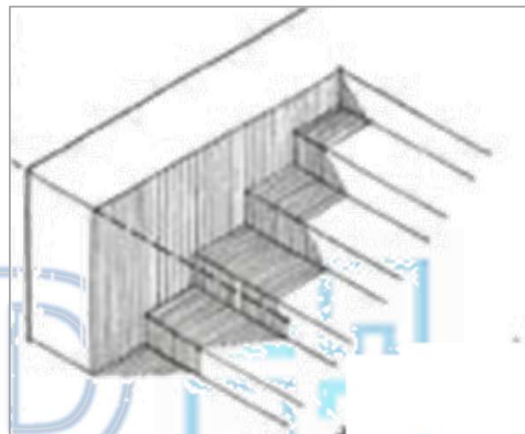
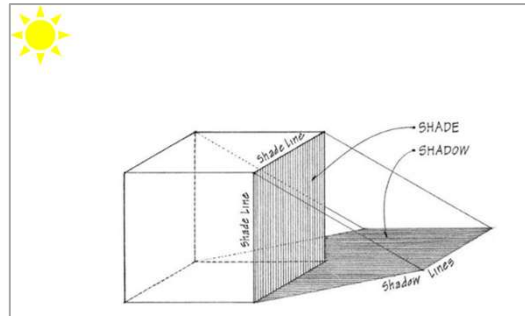


## INTRODUCTION TO SCIOGRAPHY (SHADE & SHADOWS)

Sciography is a science of perspective dealing with the projection of shadows or delineation of an object in perspective with its gradations of light and shade.

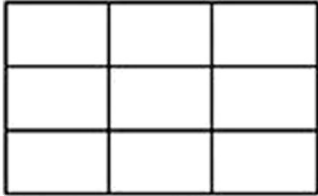
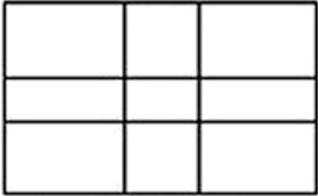

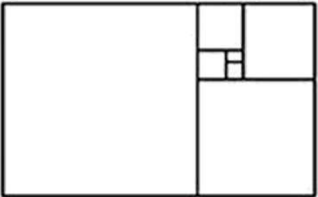
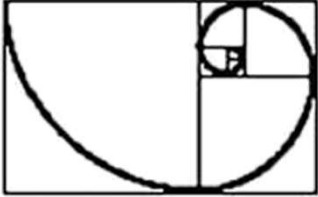

### SHADE & SHADOWS:










- Shade refers to the relatively dark area on those parts of a solid that are tangent to or turned away from a light source.
- Shadows are the relatively dark figures cast upon a surface by an opaque body or part of a body intercepting the rays from a light source.
- A shade line or casting edge separates an illuminated surface from one in shade.
- A shadow line is the shadow cast by a shade line on a receiving surface
- The shape of the shadow is dependent on
  - The position of shade line
  - The position of the observer
  - The direction of the light and
  - The form of the surfaces on which the plane of the shadow falls



**COMMON METHODS OF VISUAL COMPOSITION**

**GOLDEN PROPORTIONS**

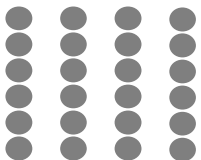
		
Rule of Thirds	Golden Section	Golden Triangles
		
Spiral Section	Golden Spiral	Harmonious Triangles

		
Cross	Diagonal	Compound curve
		
Focal mass	Radial	Pyramid
		
V- arrangement	L- arrangement	Circular

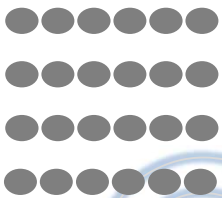
**INTRODUCTION TO GESTALT'S THEORY**

**LAW OF PROXIMITY:**

The closer objects are to each other, the more likely they are to be perceived as a group.



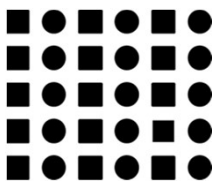
The above image is perceived as columns rather than rows



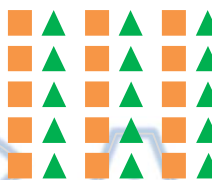
The above image is perceived as rows rather than columns

**LAW OF SIMILARITY:**

The principle of similarity states that things which share visual characteristics such as shape, size, color, texture, value or orientation will be seen as belonging together (form groups).



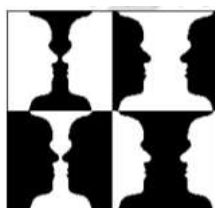
This image is grouped together by shapes



This image is grouped together by colours

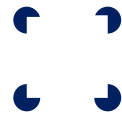
**LAW OF FIGURE – GROUND:**

Figure and Ground explains how different elements are put together to make one scene or a whole image. "Figure" is the more dominant shape. "Ground" can be referred to as the background. Once the figure is identified, the rest of the image becomes the ground.



**LAW OF CLOSURE:**

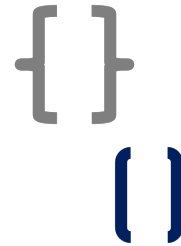
In perception there is the tendency to complete unfinished or partially obscured objects. (If a large pattern is with missing components, the eye tends to fill in the missing parts to create the actual image)



The eye perceives the square

**LAW OF SYMMETRY**

The human brain perceives symmetrical objects as parts of the same group. They create an impression of stability and order.



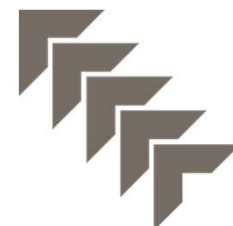
**LAW OF GOOD CONTINUATION:**

Objects will be grouped as a whole if they are co-linear, or follow a direction. Objects arranged in either a straight line or a smooth curve tends to be seen as an unit. In cases where there is an intersection between objects, individuals tend to perceive the two objects as two single uninterrupted entities.



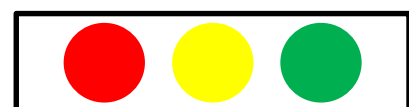
**LAW OF COMMON FATE**

It states that humans perceive visual elements that move in the same speed and/or direction as parts of a single stimulus. A common example of this is a flock of birds.



**LAW OF PAST EXPERIENCE**

Elements or objects frequently seen together in the past experience of a person are perceived to be as a group or in one single entity. The below three colours are perceived as traffic lights



**INTRODUCTION TO PERSPECTIVES**

The way one see the world is driven by rules of perspective. Perspective in sketching is a tool to create a realistic illusion of three-dimensional space. Everything that is drawn, from an apple to a spaceship, needs to follow the rules of perspective in order to look realistic.

**ONE-POINT PERSPECTIVE:**

One-point perspective ( frontal or central perspective) has only one vanishing point on the horizon line located somewhere within the picture plane (PP) and all the planes converge towards it.

**TWO-POINT PERSPECTIVE:**

Two-point perspective (angular perspective) has two vanishing points on the horizon line, which do not necessarily need to be within the picture plane (PP)

**THREE-POINT PERSPECTIVE:**

Three-point perspective uses three vanishing points where two of them are on the horizon line and the third is either high above the horizon line or below it. There are two basic types of three-point perspective based on the position of the horizon line:

- Worm’s Eye View  
The view perceived when a person looking high up, the horizon line is situated very low.
- Bird’s Eye View  
The view perceived when a bird views over a city and looking down, the horizon line is situated above.

