## Introduction:-

Design thinking has become an Integral part of corporate strategy and planning these days.

This Course is meant for designers, engineers, planners, managers, strategists, economists, teachers & many other professions.

This designed framework will be useful for anyone who works in an industry that deals with addressing the needs of customers or works for external clients.

It will be helpful for the professionals from diverse spheres of profession to find innovative solutions to the problems that they or their departments are facing.

### Introduction to elements & principles of Design

The Elements of Design :- (Materials) (or) Building blocks

The elements of design are the materials that define the visuals, the tools & components that a person uses to create a composition. (or) art

In other words they represent the base of graphic design.

The principles of design :- (Methods/Techniques)

On the other hand, the principles of design are all about the methods/techniques, that a person

an effective/attractive
adopted for the graphic elements to create a display ad and convey a message.

The elements of design are discussed as follows:-

1. Dot
2. Line
3. Form (3D)
4. Shape.
5. Size
6. Space
7. Value
8. Texture
9. color

1. Dot :- Dot is most important element of a graphic design.

→ The images, films are all represented by a combination of dots of different colors

2. Line:- The distance b/w two points

(or).

Lines are combination of dots

function of lines:- Lines are mainly used for.

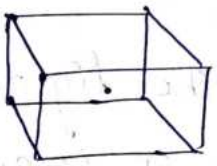
1. Division. 2. Direction.

Eg:- Newspaper.

Types of lines :- Lines are of various types.

1. Straight
2. Curve
3. Irregular
4. Dotted
5. parallel & perpendicular
6. Wave line
7. Zig zag
8. Spiral
9. Horizontal
10. Vertical
11. Diagonal

3. Form :- The 3D element is known as Form.



4. Shape :- shape is the very important element of design.

→ It is a combination of lines.

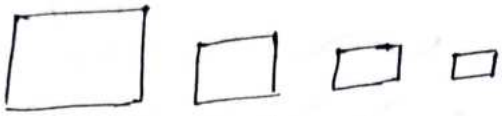
→ when some actual or implied lines combine & surround an area then a shape is created.

shapes are of 2D & 3D. types - 1. Geometric

Eg:- ○, △, □, ▯.

2. Organic
3. Abstract (combination of Geometric & organic)

5. Size:- Variation (or) comparision b/w two or more objects (or) shapes is called size



6 The function of size in designing is
1. Attraction
2. organises elements
3. Justifies functions

6. Space:- Space is an empty or open area b/w around, above, below or within the objects.

7. Value:- Value is the lightness or darkness of any object, area or color.

8. Texture:- The feeling of any surface is referred as texture such as rough, smooth, silky.

The texture are of 2 types. 1. Pattern Texture
2. Image Texture

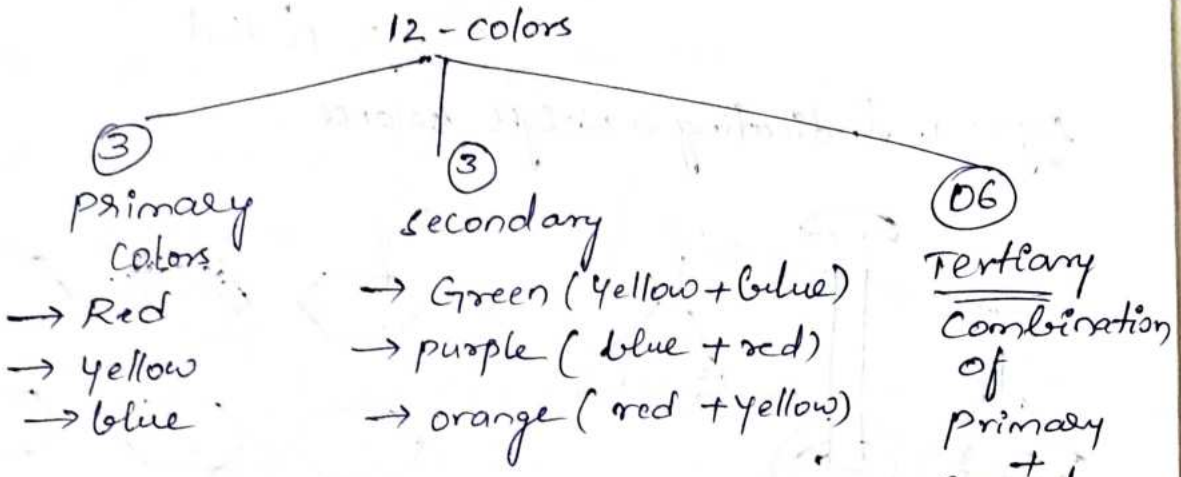
Eg: Grass, Sand flowers → organic textures.
Cement, tyre, bricks → Non-Organic textures

9. Color :- Graphic designing is incomplete without a color.

"color is the sensation of light".

The color wheel is discovered by Newton in 17th century. which have 12 colors known as "Hue".

There are 12 colours in the color Wheel



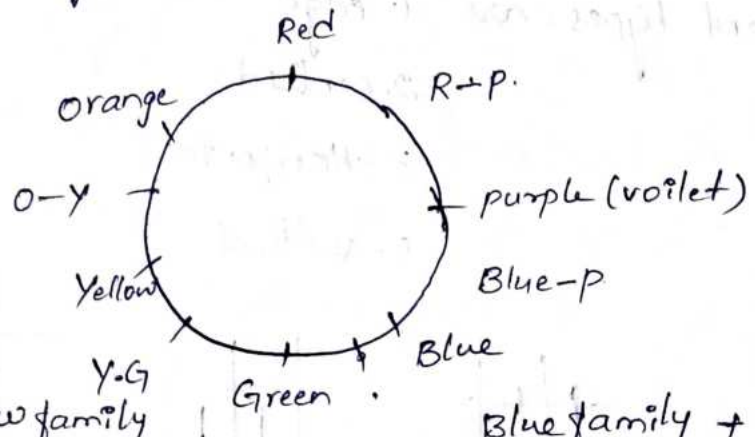

→ Neutral colors → Black & white

→ Warm colors

→ Red
→ Yellow
→ orange
} sunlight

Cool colors

→ blue
→ Green
→ purple
} plants & water.




Yellow family + Neutral → warm sensation

Blue family + Neutral → Coolest sensation.

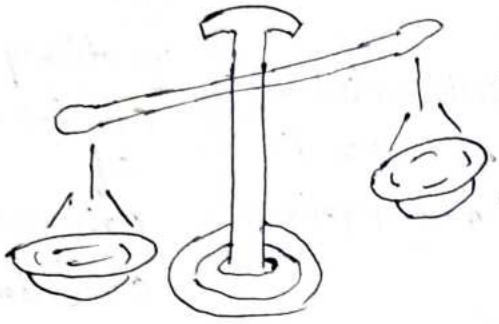
## Principles of Design:-

The following are the principles of design explains in detail.

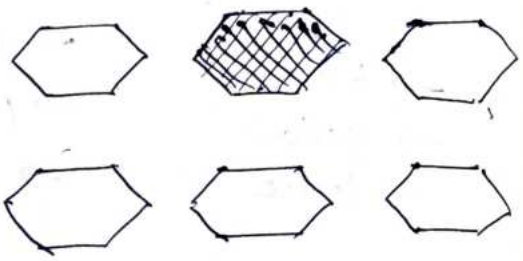
1. **Balance:-** "Equal distribution of 'visual weight'"

Balance are of three types 1. Symmetrical
2. Asymmetrical
3. Radial.

Eg:- 1. Indicating a weight balance.



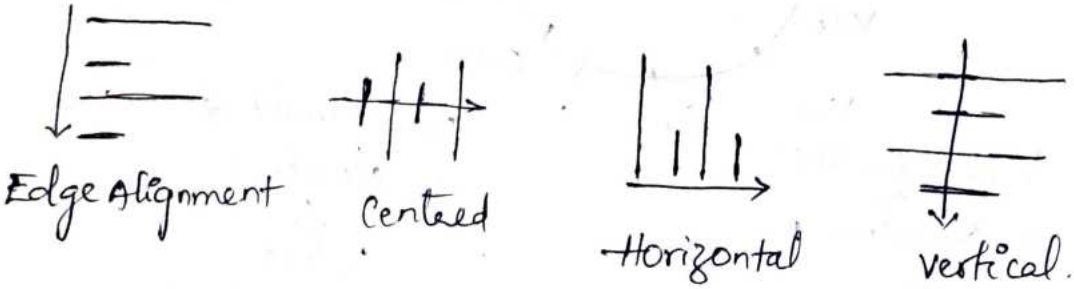
2.



2. **Alignment:-** Arrangement of elements of design within a straight line

Eg:- Car parking, school Assembly

Alignment types are 1. edge
2. centred
3. Horizontal
4. Vertical



3. Repetition:-

using same element in a design again & again

Eg:- In a book, the page numbers are repeated at a same place, so that it would be easy to navigate the pages.

4. Contrast:-

Arranging opposite elements together.

Eg:- 1. Dark Vs light

2. large Vs Small

3. Rough Vs Smooth

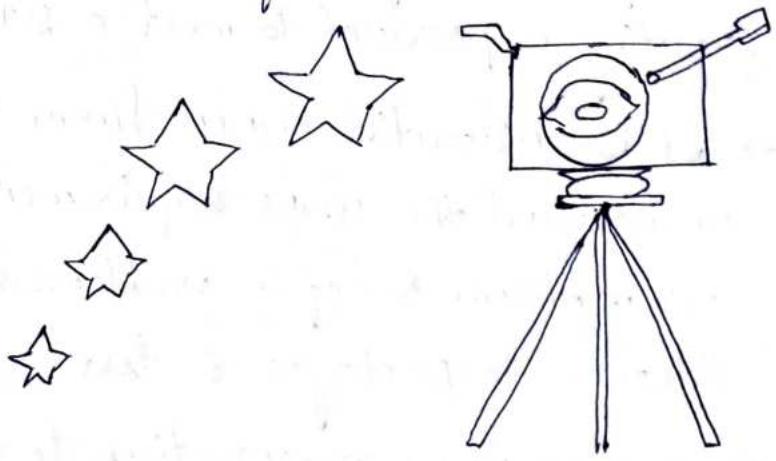
Contrast can be classified by size, shape, value, color, direction,

In our daily life, example of contrast is dressing.

5. Emphasis:-

Area or object within the design that draws attention, & becomes a focal point.

Eg:-



Unity:- Arrangement of design elements in such a way that combined together, they give feeling of a whole.

Eg:- The building is an example of unity which will be considered as a whole.

Movement:- Eye travelling.

pattern:- The regular repetition of design elements results to a pattern.

Eg:- Design patterns are mostly used in decoration.

Rythm:- Repetition of design elements in a specific pattern with certain gaps or intervals

Eg:- ECG is a best example of Rythm.

## Introduction to Design Thinking:

Design thinking is a process for deliberately creating a product to meet a set of needs.

→ It is an iterative & non-linear process to understand the users requirements, challenges assumptions, redefine problems & create innovative solutions to prototype & test.

→ It encourages organisations to focus on creating best product for which leads to technologically

feasible & economically viable.

Design thinking was developed by Stanford professor 'David Kelley' who is also the founder of the design agency IDEO.

Definition of Design Thinking:-

Design thinking is a human-centric,
iterative,
solution-based,
problem solving framework.

Design thinking is a

1. A problem solving approach: It is a methodology that is ideal for tackling complex problems that are ill-defined or unknown. This is because a design thinking helps us define a problem, challenge any assumptions & thus reframe it in a way that will help us come up with solutions that may potentially solve it.

2. Human centric:- In design thinking, we seek to understand the user. This is why the user - (the person for whom we are designing our product or services) for, is considered at each stage of design thinking process.

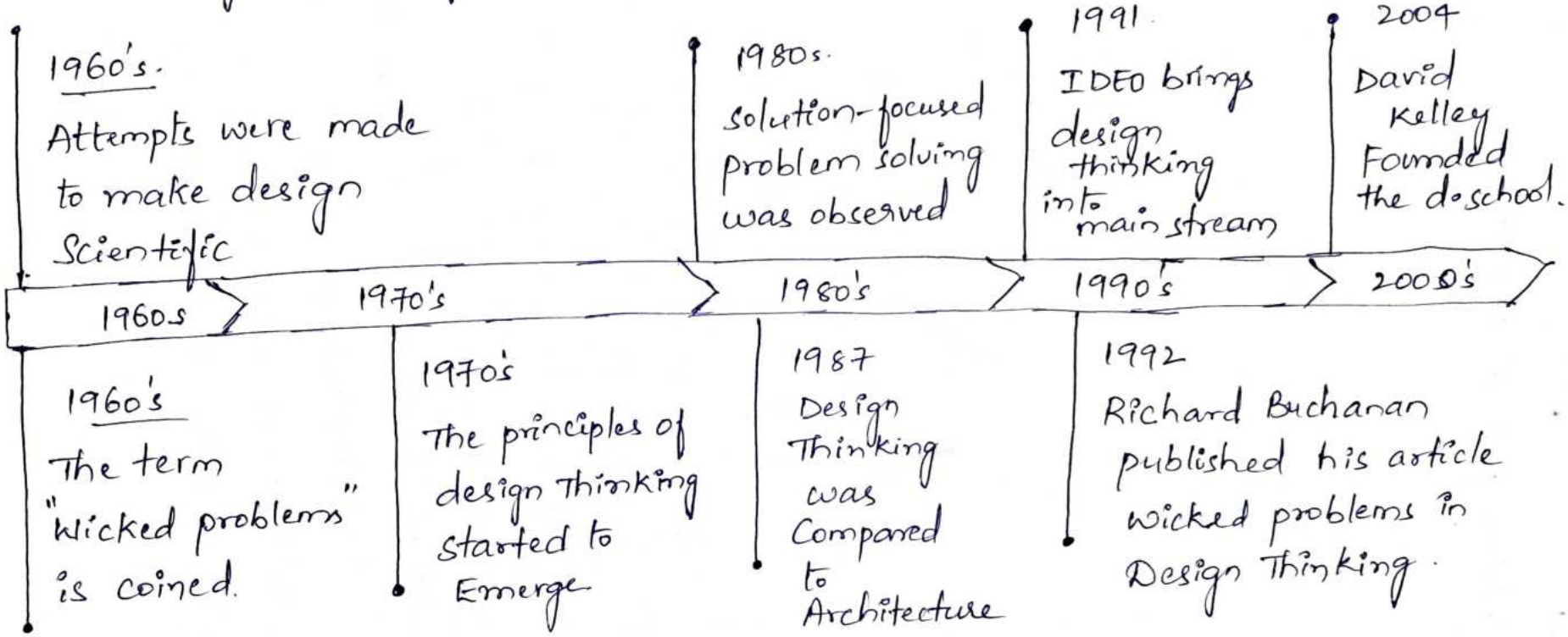
Iterative :- This means that in the different stages of design process, you will use the results to review, question and improve any initial assumptions, understandings & outcomes. This makes the design thinking approach a non-linear one.

Solution based :- The design thinking process provides a very hands-on approach to problem-solving. you will formulate several potential problem-solving approaches, prototype them & test them in the context of the problem being solved. Due to the iterative nature of design thinking you will be able to re-shape & optimise these approaches until an optimal solution is chosen.

## characteristics of design-thinking :-

1. Better understand the needs of the people (customers, clients, students, users etc.
2. Reduce the risk associated with launching new ideas, products & services.
3. Generates innovative solutions- rather than adding more to existing ones.
4. Helps organisations learn faster.

# Design Thinking process timeline.




History of design thinking.

# Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components

The Elements of Design are essentially building blocks that the designer uses to create effects, define and segment spaces, convey emotions or states of being, and/or convey ideas. Line, value, shape, colour, and texture are a few of these in particular. As opposed to this, the Principles of Design are broad ideas and phenomena that come about as a result of the efficient use and manipulation of the aforementioned Design Elements. The following are just a few of these: emphasis, balance, and alignment; contrast; repetition; proportion; movement; harmony; form; depth; etc. Basically, the fundamental parts used to create a design are known as the "elements of design." The components are the instruments that will aid you in creating your design. There are eight components to the design. In contrast, the design principles are the guidelines you should adhere to for the best results. You should take into account each concept throughout their approach to create a fantastic design.

**What are the design principles**

To make sure a project looks good and provides the right visual experience, designers must abide by the principles of design. Design principles can make whatever you're creating more pleasant to look at in addition to enhancing the composition's or page's aesthetic appeal. For example, concepts like "balance" and "white space" make sure the eye isn't overloaded and becomes visually fatigued. Instead, variety and emphasis help to direct the viewer's focus in the right directions. Although the various design principles we'll discuss below are frequently referred to separately by designers, they typically function as a cohesive whole. To produce a particular effect, each principle or "element" complements, strengthens, and adds to the others.

**Terminologies**

The given table describes the major terminologies used to define principles of design

| Term | Description |
|---|---|
| **Pattern** | Pattern are a regular arrangement of elements (shapes, lines, colors) or motifs that are alternated or repeated. |
| **Contrast** | The contrasting of various design elements (such as rough and smooth textures, dark and light values, etc.) in order to draw attention to their differences or to establish a focal point. |
| **Emphasis** | One component of an artwork is given extra consideration or importance. The use of placement, contrast, color, size, and repetition can all be used to create emphasis. Connects to the focal point. |
| **Balance** | When design elements are arranged symmetrically or asymmetrically to give the impression of equal weight or importance, a sense of balance is produced. |
| **Proportion/ Scale** | The link between items in terms of their dimensions, numbers, and other factors. comprising the connection between a whole's component pieces. |
| **Harmony** | The placement of elements to convey to the observer that the piece's various components work together to create a cohesive whole. |
| **Rhythm/ Movement** | Using repeating themes to guide the viewer’s eye around the artwork Random, regular, alternating, progressive, and flowing are the five different types of rhythm. The arrangement of the pieces to draw attention to the focal point. For instance, movement can be controlled using shape, color, and edges. |

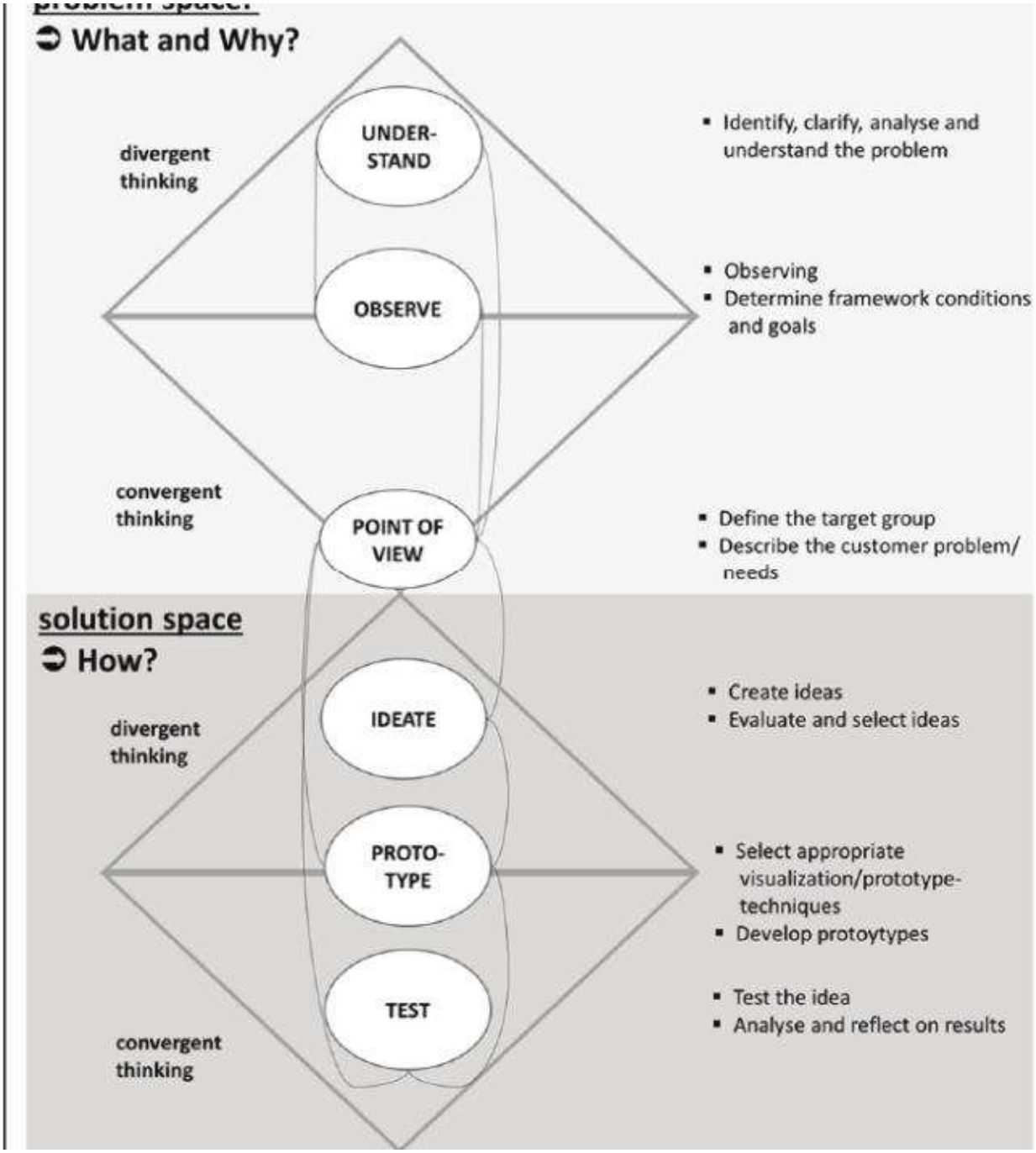
**What is the Meaning of Elements of Design**

The fundamental components that designers use to construct their designs are known as "design elements." The parts, the components that can be isolated and defined in any visual design, are the work's structure, the elements that can be arranged and used as a part of any composition. Regardless of talent, taste, or style, design elements are present and have an impact on how a piece of work is interpreted, executed, and used. In one way or another, everything has a form. Form is not the same as form's substance when we discuss it. Line, colour, shape, form, value, space, and texture are the primary elements. If you have a firm understanding of these concepts, you can comprehend design elements and others that may appear. It will be possible to examine a design in detail and learn about the creative process.

**Terminologies**

The given table illustrates the major terms used to define the elements of design

| Term | Description |
|---|---|
| **Line** | Vertical, horizontal, and diagonal angular, dotted, fractured, straight hefty, thin |
| **Shape** | Two-dimensional and flat Geometric (square, circle, oval, triangle) (square, circle, oval, triangle) Organic (all other shapes) (all other shapes) |
| **Form** | 3D (three dimensional) (three dimensional) Geometric (cube, sphere, cone) (cube, sphere, cone) Organic (all other forms such as: people, animals, tables, chairs, etc.) (all other forms such as: people, animals, tables, chairs, etc.) |
| **Colour** | Relates to the light's wavelengths refers to the names of hue, value (lightness/darkness), intensity (amount of pigment saturated), and temperature (warm and cool) relates to shade, tone, and tint |
| **Texture** | The way a surface feels, looks, is thick, or is sticky (for example: smooth, rough, silky, furry) |
| **Space** | The region surrounding, enclosing, or separating images or portions of images has to do with perspective Positivity and opacity |


problem space
What and Why?
divergent thinking
UNDER-STAND
Identify, clarify, analyse and understand the problem
OBSERVE
Observing
Determine framework conditions and goals
convergent thinking
POINT OF VIEW
Define the target group
Describe the customer problem/ needs
solution space
How?
divergent thinking
IDEATE
Create ideas
Evaluate and select ideas
PROTO-TYPE
Select appropriate visualization/prototype-techniques
Develop protoytypes
TEST
Test the idea
Analyse and reflect on results
convergent thinking

**Principles of Design**

The principles of design are the rules you must follow to create an effective and attractive design composition. The fundamental principles of design are: Emphasis, Balance and Alignment, Contrast, Repetition, Proportion, Movement and White Space.

Design differs from art in that it has to have a purpose. Visually, this functionality is interpreted by making sure an image has a center of attention, a point of focus. Maybe you're thinking, 'But wait! I thought design was all about creativity?' If you're a business owner, marketer or designer who's just starting out, you might be tempted to go wild and combine the first five typefaces and colors that catch your eye, believing you're creating something fresh and new. You will probably find yourself with a design that is muddled, unfinished, or well, just plain ugly.

Graphic design, like any discipline, adheres to strict rules that work beneath the surface to make the work stable and balanced. If the design is missing that balance, it will be weak and ineffective.

- Emphasis
- Balance and alignment
- Contrast
- Repetition
- Proportion
- Movement
- White space

**1. Emphasis**

The first of the 7 design principles is emphasis, referring to the focal point of a design and the order of importance of each element within a design. Say you're creating a poster for a concert. You should ask yourself: what is the first piece of information my audience needs to know? Is it the band? Or the concert venue? What about the day and the cost of attending?

Make a mental outline. Let your brain organize the information and then lay out your design in a way that communicates that order. If the band's name is the most essential information, place it in the center or make it the biggest element on the poster. Or you could put it in the strongest, boldest type. Learn about color theory and use strong color combinations to make the band name pop.

**2. Balance and alignment**

Never forget that every element you place on a page has a weight. The weight can come from color, size, or texture. Just like you wouldn't put all your furniture in one corner of a room, you can't crowd all your heavy elements in one area of your composition. Without balance, your audience will feel as if their eye is sliding off the page.

Symmetrical design creates balance through equally weighted elements aligned on either side of a center line. On the other hand, asymmetrical design uses opposite weights (like contrasting one large element with several smaller elements) to create a composition that is not even, but still has equilibrium.

**3. Contrast**

Contrast is what people mean when they say a design "pops." It comes away from the page and sticks in your memory. Contrast creates space and difference between elements in your design. Your background needs to be significantly different from the color of your elements so they work harmoniously together and are readable.

If you plan to work with type, understanding contrast is incredibly essential because it means the weight and size of your type are balanced. How will your audience know what is most important if everything is in bold?

As you seek out examples of really strong, effective design, you'll notice most designs only feature one or two typefaces. That's because contrast can be effectively achieved with two strong fonts (or even one strong typeface in different weights). As you add fonts, you dilute and confuse the purpose of your design.

**4. Repetition**

If you limit yourself to two strong typefaces or three strong colors, you'll soon find you'll have to repeat some things. That's ok! It's often said that repetition unifies and strengthens a design. If only one thing on your band poster is in blue italic sans-serif, it can read like an error. If three things are in blue italic sans-serif, you've created a motif and are back in control of your design.

Repetition can be important beyond one printed product. Anyone thinking about a startup knows one of the first things you need is a strong logo to feature on your website, business cards, social media and more. Brand identity? Another term for repetition.

**5. Proportion**

Proportion is the visual size and weight of elements in a composition and how they relate to each other. It often helps to approach your design in sections, instead of as a whole.

Grouping related items can give them importance at a smaller size—think of a box at the bottom of your poster for ticket information or a sidebar on a website for a search bar. Proportion can be achieved only if all elements of your design are well-sized and thoughtfully placed. Once you master alignment, balance, and contrast, proportion should emerge organically.

**6. Movement**

Going back to our concert poster. If you decided the band was the most important piece of information on the page and the venue was the second, how would you communicate that with your audience?

Movement is controlling the elements in a composition so that the eye is led to move from one to the next and the information is properly communicated to your audience. Movement creates the story or the narrative of your work: a band is playing, it's at this location, it's at this time, here's how you get tickets. The elements above—especially balance, alignment, and contrast—will work towards that goal, but without proper movement, your design will be DOA.

If you look at your design and feel your eye get "stuck" anywhere on it—an element is too big, too bold, slightly off-center, not a complimentary color—go back and adjust until everything is in harmony.

**7. White space**

All of the other principles of design deal with what you add to your design. White space (or negative space) is the only one that specifically deals with what you *don't* add. White space is exactly that—the empty page around the elements in your composition. For beginning designers it can be a perilous zone. Often simply giving a composition more room to breathe can upgrade it from mediocre to successful.

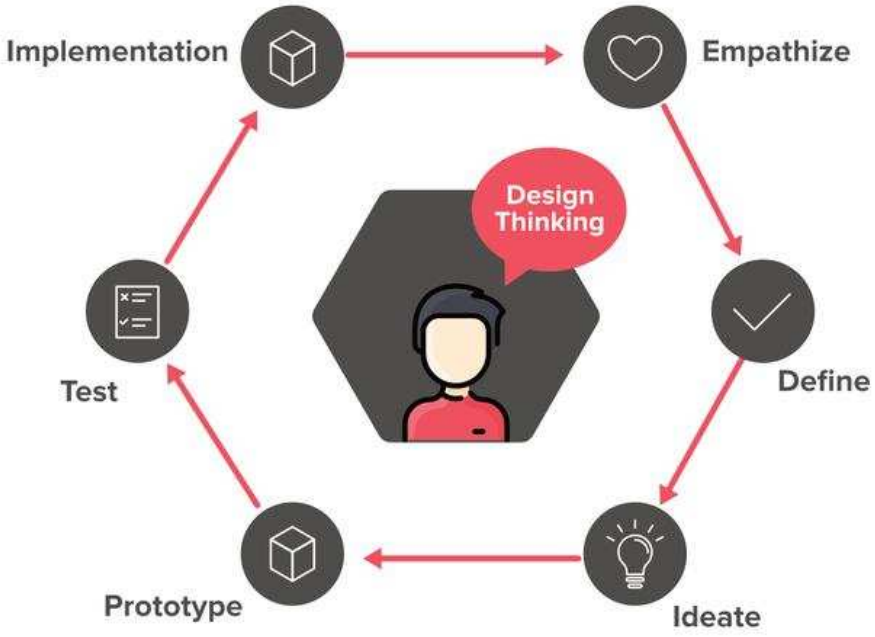
White space isn't sitting there doing nothing—it's creating hierarchy and organization. Our brains naturally associate ample white space around an element with importance and luxury. It's telling our eyes that objects in one region are grouped separately from objects elsewhere.

Even more exciting, it can communicate an entirely different image or idea from your main design that will reward your audience for engaging with it. The logo above uses active negative space to communicate multiple ideas in one fun, creative design.

## Introduction to design thinking

**Design Thinking** is a methodology basically used for Problem Solving. It concentrates on the human point of view and the customer's usage area. The Design Thinking approach specially used in business, marketing, and design fields. The main motive of the methodology is to take the User into consideration initially and then take the remaining considerations. This is done only by finding needs, creating a solution for a product that is really helpful.

**Design Thinking Concept is Divided into 6 Phases as Shown:**




**1.Empathize:** This phase is basically the Information Gathering phase. Business-related information gathered by searching and understanding the customer's views. It is done by interviews, group discussions, and most of the observations. Along with this the questions related to What, How, Why take into consideration.

**2. Define:** In this phase, we focus on the collection and classification of the information from the empathize phase. The information gets categorized according to ideal customers, their problems, the solution to their problems and needs, and fears of users that we have to consider.

**3. Ideate:** In this phase, we give an optimized and real-time solution to the problems. No irrespective and illogical thinking accepted. These solutions are raised by Sketching and Prototyping.

**4. Prototype:** In the prototyping phase, the basic implementation of the design thinking solution is used to verify the solution in real life. During prototyping it finally takes our idea in real life. The prototype must be less expensive and the very first version of the ideal solution.

**5. Test:** After the above phases finally, it is time to verify the product in real life. Customers are able to use it and give feedback for their personal experience. Also, the designer can ask questions on how to improve such products for better usage.

**6. Implementation**: This is a final phase of design thinking where all collected information gets converted into the final product. The implementation phase takes about a month to develop our new system. Both frontend and backend developers work to implement the requirements.

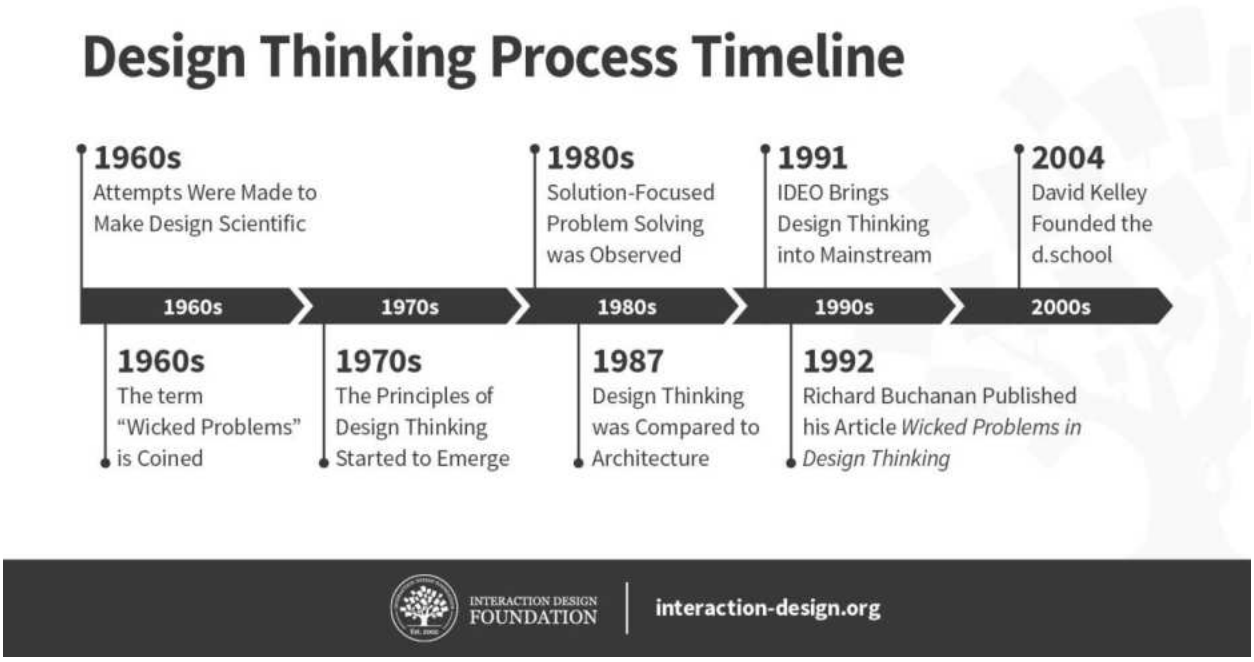
**Design Thinking is Helpful in Many Areas:**

- It is used in project management, it is used to define the scope and architecture of the project.
- It is used for business management. It used to focus on the features which have more value in the actual world.
- It helps to allocate the goal so that we can go towards the exact direction with more clear views. In this way, it is helpful in the development field.
- For most of the team works, It allows us to work in a more effective manner and according to users' requirements.

**History of Design Thinking:**

It's virtually impossible to list all of the influential factors that led to the contemporary understanding of design theory, process and practice. Business analysts, engineers, scientists and creative individuals have studied the methods and processes behind innovation for decades. **Early glimpses of design thinking date back to the 1950s and 1960s**, although these references were more within the context of architecture and engineering — fields which struggled to grapple with the rapidly changing environment of that era.

World War II did have a profound effect on strategic thinking, however, and we have looked for new ways to solve complex problems ever since. In fact, we can say this huge world event fundamentally changed the way we apply ourselves to management, production and industrial design in the modern world. Let's take a look at the history of design thinking, decade by decade, and see how the story unfolds from this point onwards.




**The 1960s: Attempts Were Made to Make Design Scientific**

In the '60s, people applied scientific methodology and processes in an attempt to understand every aspect of design.

The struggle continued throughout the decade as further attempts were made to bring the field within the objective of rational sciences and, ultimately, make design *scientific*.

The term "Wicked Problems" is Coined

In the mid-1960s, Horst Rittel wrote and spoke extensively on the subject of problem-solving in design… so much so that he's known as the design theorist who coined the term "wicked problem" to describe problems which are multidimensional and extremely complex.

**The 1970s: The Principles of Design Thinking Started to Emerge**

Cognitive scientist and Nobel Prize laureate **Herbert A. Simon was the first to mention design as a way of thinking in his 1969 book**, *The Sciences of the Artificial.* He then went on to contribute many ideas throughout the 1970s which are now regarded as principles of design thinking.

**The 1980s: Solution-Focused Problem-Solving was Observed**

Bryan Lawson, Emeritus Professor at the School of Architecture, University of Sheffield, UK, also discussed the insights he'd gathered from a series of interesting tests. The main goal of the tests was to compare the methods used by scientists and architects when they attempted to solve the same ambiguous problem.

**1987: Design Thinking was Compared to Architecture Once Again**

Peter Rowe, then Director of Urban Design Programs at Harvard, published his book *Design Thinking* in 1987. It focuses on the way architectural designers approach their tasks through an inquisitive lens.

**The 1990s to the Present**

**1991**

It is widely accepted that IDEO is one of the companies that brought design thinking into the mainstream. They developed their own customer-friendly terminology, steps and toolkits over the years, and made the process more accessible to those not schooled in design methodology.

**1992**

Richard Buchanan, then Head of Design at Carnegie Mellon University, published his article "Wicked Problems in Design Thinking", which discussed the origins of design thinking.

**2004**

**David Kelley founded the Hasso Plattner Institute of Design at Stanford—commonly known as the d.school.** The d.school has made the development, teaching and implementation of design thinking one of its central goals since inception, and it serves as a source of huge inspiration to design thinkers across the world, including us here at the Interaction Design Foundation.

**Present Day**

At present, the **design thinking movement is rapidly gaining ground**—with pioneers like IDEO and the d.school paving out a path for others to follow. Other prestigious universities, business schools and forward-thinking companies have adopted the design thinking methodology