Unit 1

Introduction to modeling

In this unit, you will learn:

- **Subject-related knowledge:** Color theory

  Design sketch
- **Academic skill:** Searching for information
- **Reading strategy:** Dealing with unknown words (Part I)
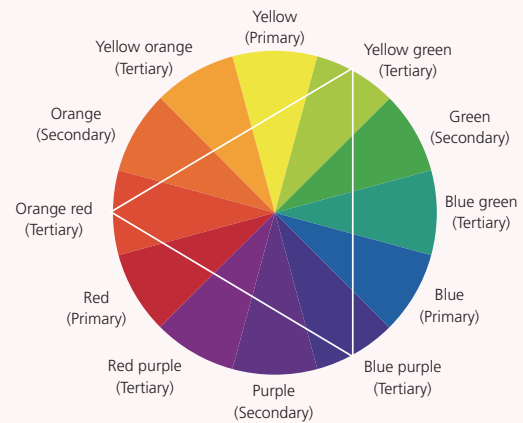
Section A

Pre-reading

1 Answer the following questions to test how much you know about some basics of color theory.

Q1. What is a primary color?
   A. Any color of the rainbow.
   B. A color made from mixing two others.
   C. A color that cannot be made by mixing any other colors.
   D. A color made by mixing three colors together.

Q2. List the primary colors you know.
   _____

Q3. What do you get when you mix two primary colors together?
   A. A secondary color.
   B. A cool color.
   C. A warm color.
   D. An adjacent color.

Q4. When yellow and purple are used together in a composition, they are referred to as being _____.
   A. unbalanced   B. complementary
   C. dull   D. gloomy

Share the reasons for your choice in Q4 with your partner(s).

1 Color theory is a set of principles used to create harmonious color combinations. Understanding color theory in art and design helps our appreciation of the different ways in which artists use this visual element.

2 A primary color is a color that cannot be made from a combination of any other colors. A secondary color is a color created from a combination of two primary colors. A tertiary color is a color made by mixing either one primary color with one secondary color, or two secondary colors, in a given color space.

Yellow (Primary)
Yellow orange (Tertiary)
Yellow green (Tertiary)
Orange (Secondary)
Green (Secondary)
Orange red (Tertiary)
Blue green (Tertiary)
Red (Primary)
Blue (Primary)
Red purple (Tertiary)
Blue purple (Tertiary)
Purple (Secondary)

Primary colors
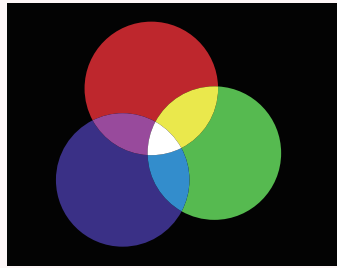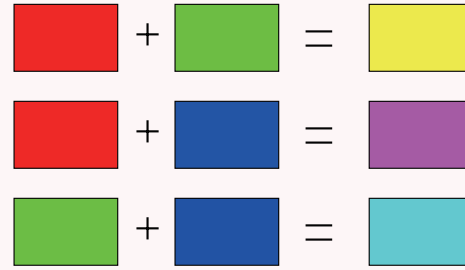
Secondary colors

Tertiary colors

Color theory

3   Printers and artists have different definitions for primary colors. The traditional primary colors that painters have used are red, yellow, and blue. Modern printing press primary colors are magenta, yellow, and cyan. These two primary color systems obviously do not agree. Additive color process and subtractive color process are the two primary methods for reproducing a range of colors.

Additive color

4   Additive color synthesis is the creation of color by mixing colors of light. Human vision relies on light-sensitive cells in the retina of the eye. There are two basic kinds of sensors. They are rods and cones. Rods are cells which can work at very low intensity, but cannot resolve sharp images or colors. Cones are cells that can resolve sharp images and colors, but require much higher light levels to work. The combined information from these sensors is sent to the brain and enables us to see.

5   There are three types of cones. Red cones are sensitive to red light; green cones are sensitive to green light; and blue cones are sensitive to blue light. The perception of color depends on an imbalance between the stimulation level of these three cone types.

6   The three primaries in light are red, green, and blue, because they correspond to the red, green, and blue cones in the eye. Example 1 shows how the light from red, green and blue flashlights would appear if shone on a dark wall.

7   Additive color processes, such as television, work by having the capability to generate an image composed of red, green, and blue light. Since the intensity information for each of the three colors is preserved, the image color is preserved as well. The spectral distribution of the image will probably be

Example 1: additive principle of color combining (light)

Derivation of additive secondaries from additive primary colors

wrong, but if the degree of intensity for each of the primary colors is correct, the image will appear to be the right color.
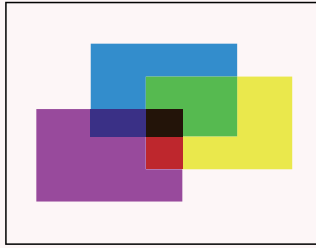
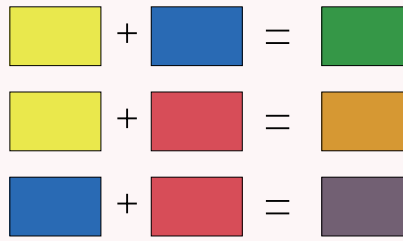Red + Green = Yellow
Red + Blue = Magenta
Green + Blue = Cyan
When all of the colors of the spectrum are combined, they add up to white light.

Subtractive color

8 This type of color is what is used in the art and design world. When learning basic color theory, art students typically use familiar colors like red, yellow, and blue.

9 Subtractive color processes work by blocking out parts of the spectrum. The idea of subtractive color is to reduce the amount of undesired color reaching the eye. If, for example, you want a yellow image, you would need to have a dye that would let red and green reach the eye, and block out blue. The additive secondaries become the printer's subtractive primaries, because each of the additive secondaries will reflect two of the additive primaries, and absorb one of the additive primaries.

10 The three primaries on the artists' color wheel are red, yellow, and blue. Example 2 illustrates subtractive color by showing how primary colors mix on a piece of white paper.

Example 2: subtractive principle of color combining (pigment)

Painting primaries mixing chart

Yellow + Blue = Green

Yellow + Red = Orange

Blue + Red = Violet

When all of the colors are combined, they create black pigment.

Color	Reflect	Absorb
Yellow	Red and Green	Blue
Magenta	Red and Blue	Green
Cyan	Green and Blue	Red

Subtractive primaries / additive secondaries absorption chart

11   With this information, if we wanted red, we would mix magenta and yellow. Magenta would absorb green, and yellow would absorb blue, leaving only red to be reflected back to the eye. For black, a combination of all three would be used, which should block out all light in theory. Printers use black as well, since the dyes used in printing are not perfect, and some light from other parts of the spectrum gets through.

For printers' mixing:

Yellow + Cyan = Green

Yellow + Magenta = Red

Cyan + Magenta = Blue
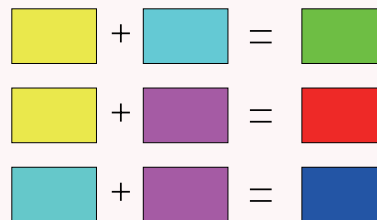
Subtractive primaries mixing chart

Description of color

12   **Hue:** the name of the color itself, the dominant wavelength of light or the choice of pigment.

Lightness (brightness): the lightness or darkness of the color, or the amount of light reflected or transmitted.

Saturation: the level of white, black or grey, ranges from neutral to brilliant (from pastel to full color).

Tint: base color plus white.

Tone: base color plus grey.

Shade: base color plus black.

Value: How light or dark a color is.

Aggressive – aka "warm": the colors of yellow, orange, and red, etc. These come toward the eye more (spatially) and are generally "louder" than passive colors.

Passive – aka "cool": the colors of green, blue, and violet, etc. These recede from the eye more (spatially) and are generally "quieter" than the aggressive colors.

Color schemes

13   **Achromatic:** An achromatic color scheme is one that is colorless – using black, white and gray.

Complementary: A complementary color scheme is one that uses colors directly across from each other on the color wheel. This can be accomplished by using two colors or hues that are opposites such as red and green or violet and yellow. Black and white can also be used. Since you can choose from varying colors and hues which can give a bold and dramatic effect, this color scheme is best used for dramatic, strong, or bold statements.

An example of a complimentary color scheme

Monochromatic: A monochromatic color scheme is a one-color color scheme. However, the color can be neutralized by adding its complement to lower the intensity of the color. Black and white can also be used to darken and lighten the value of the color. It is achieved by using one color or hue, utilizing that color's various tints, tones and shades. Using a monochromatic scheme with multiple textures creates character and maintains unity.

An example of a monochromatic color scheme

Analogous: An analogous color scheme is any three adjacent primary, secondary, or tertiary colors on the color wheel. These schemes can be warm or cool. Each can be neutralized by use of its complement, and black and white can be used. Analogous colors "harmonize" well and produce a definite mood to a composition. This can create a very harmonious color scheme.

An example of an analogous color scheme

Color triad: A triadic color scheme is colors that are equally distant from each other on the color wheel. Any three colors equidistant around the color wheel form a triad and can be used in this color scheme (e.g. red, yellow and blue).

An example of a color triad

Color tetrad: The tetradic or rectangle color scheme uses four colors arranged into two complementary pairs.
Color diad: A diadic color scheme is one using two colors that are two colors apart on the color wheel (e.g. red and orange).
Split complementary: A split complimentary color scheme is similar to the complimentary one. But instead of just two colors directly opposite on the color wheel, in the split complimentary color scheme, two of the three colors are adjacent to one of the colors that is opposite.
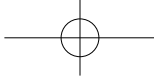
New words and expressions

magenta /məˈdʒentə/ *n.* 洋红色

cyan /ˈsaɪæn/ *n.* 青绿色

subtractive /səbˈtræktɪv/ *adj.* 减色法的

synthesis /ˈsɪnθɪsɪs/ *n.*
the combination of two or more elements or components to create something new 综合；结合

retina /ˈretɪnə/ *n.* 视网膜

sensor /ˈsensə(r)/ *n.* 传感器；感应器

rod /rɒd/ *n.* 视杆

cone /kəʊn/ *n.* 视锥

intensity /ɪnˈtensətɪ/ *n.*
the strength of light that can be measured（光的）强度

resolve /rɪˈzɒlv/ *v.*
to make clearly visible 分辨

perception /pəˈsepʃən/ *n.*
the ability to see, hear or understand 感知能力；认识能力

spectral /ˈspektrəl/ *adj.* 谱的；光谱的

derivation /ˌderɪˈveɪʃən/ *n.*
the origin of something 起源；由来

spectrum /ˈspektrəm/ *n.* 光谱

pigment /ˈpɪgmənt/ *n.* 色料

dye /daɪ/ *n.*
substance used for dyeing 染料

absorb /əbˈsɔːb/ *vt.*
to take in 吸收；吸进

absorption /əbˈsɔːpʃən/ *n.*
the process of a liquid, gas or other substance being taken in 吸收

hue /hjuː/ *n.*
color 颜色

wavelength /ˈweɪvleŋkθ/ *n.* 波长

saturation /ˌsætʃəˈreɪʃən/ *n.* 色饱和度

neutral /ˈnjuːtrəl/ *adj.* 非彩色的；不鲜艳的

pastel /ˈpæstəl/ *n.*
a pale soft color 淡而柔和的颜色

tint /tɪnt/ *n.* 色温；色彩

tone /təʊn/ *n.* 色调；影调

aka
also known as 又名；亦称

spatially /ˈspeɪʃəli/ *adv.*
concerning or existing in space 空间地

recede /rɪˈsiːd/ *vi.*
appear to be more distant 变模糊；变淡

scheme /skiːm/ *n.*
ordered system 组合

achromatic /ˌækrəʊˈmætɪk/ *adj.* 无色的

complementary /ˌkɒmplɪˈmentərɪ/ *adj.* 补充的

monochromatic /ˌmɒnəʊkrəʊˈmætɪk/ *adj.* 单色的

analogous /əˈnæləgəs/ *adj.*
similar to another situation or thing so that a comparison can be made 类似的；相似的

adjacent /əˈdʒeɪsənt/ *adj.*
next to or near something 邻近的；毗连的

triad /ˈtraɪəd/ *n.*
a group or set of three related people or things 三人或三物的组合

equidistant /ˌiːkwɪˈdɪstənt/ *adj.*
at an equal distance 等距离的

tetrad /ˈtetræd/ *n.*
a group or set of four related people or things 四个一组

diad /ˈdaɪæd/ *n.* 一对；一双

primary color 原色

secondary color 二级色；间色

tertiary color 三级色；复色

printing press 印刷机

spectral distribution 光谱分布

base color 基本色

color scheme 色系

color wheel 色轮；色环

triadic color 三色

tetradic color 四色

diadic color 双色
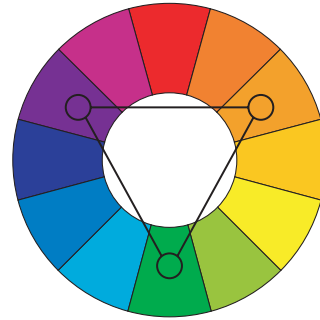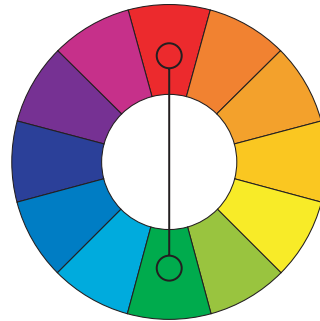
Reading comprehension

There are eight color schemes mentioned in Text A. Give the names of the color schemes the following pictures symbolize and find the phrases or sentences which help you get the answer from Text A.
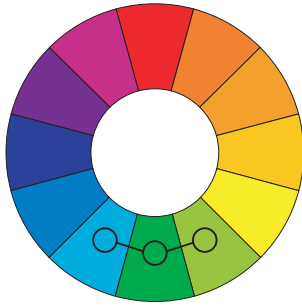

Name: _____

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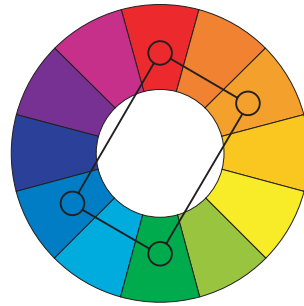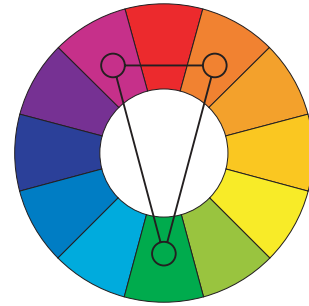
Name: _____

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_____

_____

Language focus

1 Match the Chinese on the left and right with the English words in the middle and compare their meanings. Complete the following sentences with appropriate words in the middle. Change the form if necessary.

1. 侵略的	shade	A.（色彩的）明暗程度
2. 安静的	value	B. 暖色调的
3. 作文	aggressive	C. 加色的
4. 价值	additive	D. 暗淡的
5. 背阴处	composition	E. 阴影
6. 添加物	quiet	F. 构图

1. The organization of foreground, middle ground, and background; perspective, cropping, movement, and depth; as well as subject placement and body posture is important in the process of _____.

2. Combining _____ colors creates lighter colors, so adding all three primary colors results in a color so "light" that it's actually seen as white.

3. Those women dress in _____ colors so as not to call attention to themselves when they go out.

4. _____ is a measure of how light or dark a color is, without any consideration for its hue.

5. To human eyes, orange is a very hot color, so it gives the sensation of heat. Nevertheless, orange is not as _____ as red.

6. A(n) _____ is simply any color with black added. It is deep, powerful and mysterious. Be careful not to use too much black as it can get a little overpowering.

2 Study the prefixes of numbers. Try to use the correct form of the italicized words given below to complete the following sentences. Change the form if necessary.

one – uni / mono	e.g. *unity*, *monochromatic*
two – di / bi	e.g. *diad*, *bicycle*
three – tri	e.g. *triad*, *triangle*
four – tetra / quadr	e.g. *tetrad*, *quadrangle*
five – penta	e.g. *pentagon*
six – sex	e.g. *sexfoil*
seven – sept	e.g. *septilateral*
eight – octo	e.g. *octopus*
nine – nona	e.g. *nonary*
ten – deca	e.g. *decade*
half – semi / hemi	e.g. *semi-neutral*, *semispherical*, *hemisphere*

1. A(n) _____ color scheme uses colors that are evenly spaced around the color wheel. It tends to be quite vibrant, even if you use pale or unsaturated versions of your hues.

2. In Vincent van Gogh's *Self-Portrait*, both the figure and the background are so overwhelmingly soaked in a pale cornflower blue that the painting is almost a(n) _____ study of dull, cerulean emotion.

3. In the art class, the teacher showed to the students how to draw a(n) _____, a regular five-sided figure, and asked them to draw one by themselves.

4. The _____ of the brains have separate and distinct functions.

5. After years of research, Swedish designers have released the "Hövding", an innovative _____ helmet design in which an airbag is housed

within a stylish collar and engineered to inflate and encompass a cyclist's head during a collision.

6. The _____ color scheme uses four colors arranged into two complementary pairs. This rich color scheme offers plenty of possibilities for variation.

3 Complete the following sentences with the words given below. Some of the words may not be used. Change the form if necessary.

subtractive   composition   tint   saturation   intensity
complementary   shade   additive   lightness

1. If we are working on a computer, the colors we see on the screen are created with light using the _____ color method. When we mix colors using paint, or through the printing process, we are using the _____ color method.

2. A color can be toned down, neutralized, or desaturated by adding a bit of the _____ color (opposite on the color wheel) to it. For example, red can be made less vivid by adding a bit of green to it.

3. Value is how light or dark a color is in terms of a black and white scale. You can lighten or _____ a color by adding white; you can darken or _____ a color by adding black.

4. In the case of two-dimensional images, _____ describes the way that different elements are positioned within the frame, with respect to each other and to the viewer, to create a particular impression.

5. In the Munsell color system, zero represents neutral grey, and depending on the hue, the numbers 10 to 16 represent complete _____.

6. _____ is the brightness or dullness of a hue. One may lower the _____ by adding white or black.

4 Translate the following paragraph into English.

当谈到色光，颜色是加色法，意指添加更多的色光使颜色更明亮。当把所有的色光原色混合在一起时，得到的就是白色色光。色光的原色是红、绿和蓝。这些跟我们视网膜里的受体细胞（receptor cell）是相对应的。当谈到色料（pigment）时，颜色是减色法，意指光被吸收了，添加了更多的色料使得颜色变暗。当所有的色料原色混合在一起时，得到的就是黑色。色料的原色是洋红、黄和青绿。

Critical thinking

1 Read the sentence in italics and discuss the following questions in groups.

"Blue is the only color which maintains its own character in all its tones. Take blue in all its nuances, from the darkest to the lightest – it will always stay blue." – Raoul Dufy

1. There are many kinds of blue, for example cyan as we mentioned in Text A. Name as many blue as you can and write them down on the following wheel.
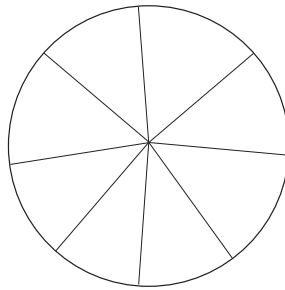
2. What do you associate with the color blue?

2 Look at the following picture. What colors are used in it and how do you feel about the colors?

Research task

Academic skill: Searching for information

Information can come from virtually anywhere — media, blogs, personal experiences, books, journal and magazine articles, expert opinions, encyclopedias, and web pages, etc.

1. Types of information

Type	Use
Magazine	• To find information or opinions about popular culture. • To find up-to-date information about current events. • To find non-scholarly articles about topics of interest within the subject of the magazine.
Academic journal	• To get help for your scholarly research. • To find out what has been studied on your topic. • To find bibliographies that point to other relevant research.
Database	• To find articles on specific topics. • To find online journals or news articles.
Newspaper	• To find editorials, commentaries, expert or popular opinions. • To find current local, national or world news.
Library catalog	• To find virtually any topic. • To find hard copies of current or back issue of journals, books, newspapers or magazines.
Website	• To find information from all levels of government — central to local. • To find expert or popular opinions. • To find information of various types of media, e.g. illustrations, audio and video information.

2. Searching for information

Author / Title search

Searching by author and / or title obviously assumes that you are searching for a particular author, book or article, probably in either a database or a library catalog. Here are some tips:

• When searching by author, put the author's last name first, e.g. "Kotler, Philip", not "Philip Kotler", if he is from an English-speaking country. Search the author's full name in Chinese order if he is a Chinese. Sometimes, the

author could be an organization, so give the full name of the organization as it commonly appears, e.g. "World Bank".

- When searching by title, it helps if you enter the title as correctly as possible.

Keyword search

It is basically a way of searching through subject or topic. Most library catalogs and databases will include an option to search by keyword as an alternative to author and title. The first step of keyword search is to decide the key word(s) or phrase(s). Normally, the word(s) or phrase(s) which can cover the topic you search can be selected as keyword(s). A good research topic usually contains two or three concepts. For example, you need to write a paper on "The Impact of Cognitive Styles on Design Students' Spatial Knowledge". We can break the topic into concepts, like "cognitive styles" and "spatial knowledge", which can be used as keywords. Then type them in a search bar in a database, EBSCOhost for instance. In a database, there are usually two ways of search, i.e., basic search and advanced search.

Basic search (see Fig. 1) generates a large number of sources for you to differentiate, which is an exhausting task. But advanced search (see Fig. 2), which provides more choices for further conditioning, can make the work lighter. There are many variables that can be chosen to refine the search. And you can define the relationship between the keywords by choosing "and", "or" or "not" based on the results you intend to obtain.

正在检索：Academic Search Complete, 显示全部丨选择数据库

| Cognitive Styles Spatial Knowledge | × | 搜 索 | 创建快讯 |

检索选项 ▶　　基本检索　高级检索　搜索历史纪录

Fig. 1 Basic search

正在检索：Academic Search Complete, 显示全部丨选择数据库

	选择一个字段（可选）▼	搜 索	创建快讯	清 除
AND ▼		选择一个字段（可选）▼
AND ▼		选择一个字段（可选）▼	⊕ ⊖

基本检索　高级检索　搜索历史纪录

Fig. 2 Advanced search

As "cognitive styles" is a broader topic and "spatial knowledge" is more specific, they can be typed in the upper and middle search bars respectively. More relevant results will appear. You can then refine the search by selecting a specific variable. In this case, "subject" (主题语) can be chosen to filter the results (See Fig. 3).

正在检索：Academic Search Complete, 显示全部 | 选择数据库

| Cognitive Styles | SU 主题语 ▼ | 搜 索 创建快讯 清 除 |

| AND ▼ | Spatial Knowledge | 选择一个字段（可选）▼ |

| AND ▼ | | 选择一个字段（可选）▼ | ⊕ ⊖

基本检索 高级检索 搜索历史纪录

精确搜索结果

当前检索 ▼

布尔逻辑词组：
SU cognitive styles
AND spatial knowledge

检索结果：1-9（共 9 个）

1. The Impact Of Cognitive Styles On Design Students' Spatial Environments

Fig. 3

Snowball search

It is a good way if your topic has a key work or author. You can trace the citations of that author using a specialized citation database, such as the Social Science Citation Index to obtain other key works or authors. You will follow the stream of research up to the near present and see the way in which the work or the author has influenced the subsequent studies.

3. Evaluating information

Once you have found information that satisfies the requirements of your research, you should evaluate it. Evaluating information encourages you to think critically about the reliability, validity, accuracy, authority, timeliness, point of view or bias of information.

When evaluating information, you can use the five criteria AAOCC, namely, Authority, Accuracy, Objectivity, Currency and Coverage. They can be applied to check all information.

1) Authority of information
   - Who published it?
   - What institution published it?
   - Does the publisher list his or her qualifications?

2) Accuracy of information
   - Who provided it, and can you contact him or her?
   - Does it provide enough details?
   - Has it been cited correctly?
3) Objectivity of information
   - What is the purpose of it, or why was it published?
   - Is it biased?
   - What opinions (if any) are expressed by the author?
4) Currency of information
   - When was it published?
   - When was it updated?
   - How up-to-date is it?
5) Coverage of information
   - Do citations in it complement the research?
   - Is it all text or a balance of text and image?
   - Is it free or is there a fee to obtain it?

Task

The picture is Pierre-Auguste Renoir's Dance at Bougival. Search some basic information about the picture on the Internet (the author, the creation background) and then work in groups and discuss the colors used in this picture and complete the following table.

Author		
Creation background		
Color	Color	Function
	Suit and dress	
	Hat	
	Palette	
	Background	

Section B

Reading strategy

Dealing with unknown words (Part I)

The ability to deal with unknown words is a key reading skill in the reading process. It is a vital skill because you are almost certain to find unknown or unfamiliar words in any text. The skill is not necessarily to "know" the words, but to guess the meaning of them so that you can read and understand the whole text. Here are several different ways that can help you guess the meaning of an unknown word.

Guessing by explanation

Sometimes, you will find that the meaning of an unfamiliar word is given to you in the text. Typically, the phrase or sentence immediately before or after the unfamiliar word may give you a hint about the word. In this case, what you need to do is keep on reading and do not stop at the moment when you find the unfamiliar word, and then guess the meaning from the context. For example:

> An <u>achromatic</u> color scheme is one that is colorless – using blacks, whites and grays.

"Achromatic" may be unfamiliar to you. However, if you read the sentence above "… is one that is colorless – using blacks, whites and grays", it is obvious that "achromatic" should mean "colorless".

Guessing by synonyms and antonyms

This is a very useful skill to learn. What you should do here is look at other words which relate to that word and work out what it may mean. These words may be either synonyms (words with a similar meaning) or antonyms (words with an opposite meaning). For example:

> <u>Aggressive</u> – aka "Warm": …

Here you can work out the meaning of "aggressive" by its synonym "warm". All you need to do is to read the rest part of the sentence and think of the meaning of it.

Guessing by the part of speech of a word

This is the weakest skill in that it gives you the least amount of information about the word. However, it can sometimes help to know whether you are looking at a verb, noun, adverb or adjective. For example:

> Example 1 shows how the light from red, green and blue <u>flashlights</u> would appear if shone on a dark wall.

In this text, we have an unusual word "flashlight". You can tell the word must be a noun as it follows the three adjective "red, green and blue" and this helps you understand that it must be a thing of some sort.

Task

Read Text B and apply the skills above to deal with the underlined words.

Design sketch

1   Designers use different forms of visual expression in the design process. One of the most commonly used forms of visual expression is sketching or drawing. During the design process, sketches change in shape and content according to different purposes.

2   There are different classifications of the sort of sketches used in the design process. One of such classifications differentiates between the thinking sketch, the talking sketch and the prescriptive sketch. The thinking sketch refers to the sketch used to support the individual thinking process of designers. It focuses on the generation and development of ideas into concepts. The talking sketch refers to the sketch used to present and discuss ideas and concepts in design teams. The prescriptive sketch refers to the drawing used to communicate design decisions. The prescriptive sketch is used mostly in the latter (pre-manufacturing) stages of the design process. The prescriptive sketches are detailed drawings or technical drawings.

3　The followings are some of the classifications of different types of design sketches.

Idea sketches

4　Idea sketches are made in the early idea generation phase. The goal is to find many ideas based on the information from the problem analysis phase. Sketches are simple, with as little detail as possible and schematic. First ideas that come into mind often get stuck. Sketching in the early idea generation has the goal of relieving oneself of those early, stubborn ideas.

Concept sketches

5　After the early idea generation there is a need for more elaborate sketches. Concept sketches accompany the presentation of a concept. Integral solutions now come into being, based on a better understanding of the problems. Concept sketches provide information about average size, shapes and possible materials that could be used. But several solutions are still looked for. To make a valid decision, the concepts need to be judged according to the requirements. Therefore the concept sketches need to be on the same level of detail and from the same perspective. Concept sketches are different from idea sketches because they are in proportion, have more detail, and show material and color. Aspects such as construction, ergonomics and functionality are also being shown in concept sketches. Concept sketches are often annotated with remarks.

Detail sketches

6　The design is now globally defined, but many details need to be resolved and clarified. Detail sketches show details such as connections, form transitions, materials, final product and moving parts.

7　These aspects are developed in detail sketches with manufacturing and assembly in mind. Detail sketches show different points of perspective, and often include also two-dimensional sketches. Detail sketches need to be in scale.

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ergonomics *n.* 工效学；人类工程学

Dimension sketches

8 Before the formal technical drawings can be made, the design needs to be dimensioned. The exact sizes and measurements need to be determined in dimension sketches. Dimension sketches consist of two-dimensional sketches of the front, side, and top and different cross sections. Particular conventions are recommended such as the American Projection Method.

Technical drawings

9 From the dimension sketches there is enough information to produce technical drawings. Nowadays these kinds of drawings are just a part of the technical documentation (TecDoc) package which consists of digital three-dimensional models of parts and (sub-)assemblies (components, products) and derived animations, renderings and technical drawings. All these TecDoc items are made using software such as SolidWorks or AutoCAD. The three-dimensional model is the carrier which can be used for presentation, as an input model for simulations or the generation of technical drawings as mentioned.

10 The art of technical drawing has to be done according to international standards. Technical drawing systems include mono drawings, assembly drawings and often sub-assembly drawings. Technical drawings are for the final production of the design. They are also used to check the dimensions of the final product after production (quality control). This becomes more and more important nowadays for it's common to send three-dimensional geometries to computer controlled production machines.

Cross section drawings

11 Cross section drawings present a cross section of the product's geometry at different locations of the product. In order to make a cross section drawing, the geometry, layout and dimensions of the design have to be known. Cross section drawings allow designers to think through how the inside of the product

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geometry *n.* 几何形状；几何结构
cross section *n.* 横截面（图）；剖面（图）

is constructed. Cross section drawings can be made with the use of software (SolidWorks) but are preferably made by hand.

Presentation drawings

12 Presentation drawings are sketches that include aspects such as form, size, color, material, and surface <u>finishing</u> of the final product. Presentation drawings are sketches that provide rich information, preferably with information about its context of use and interaction. Presentation drawings could be used for marketing purposes and sales. A prototype and presentation drawing often conclude a design process, of which the presentation is a cheaper alternative to present the final product concept. Different points of view provide a presentation drawing with more information. One important aspect of products is that they often come in more than one color. A color study therefore could complement the presentation drawings. Important aspects when choosing the right color range are: tone of the color, brightness and saturation.