1 HTML Headings

1.1 HTML heading levels

Headings are defined with the `<h1>` to `<h6>` tags.

- `<h1>` defines the most important heading.
- `<h6>` defines the least important heading.

Example 1.1. Here are the six levels of headings.

```
<h1>Heading 1</h1>
<h2>Heading 2</h2>
<h3>Heading 3</h3>
<h4>Heading 4</h4>
<h5>Heading 5</h5>
<h6>Heading 6</h6>
```

Remark 1.2. Browsers automatically add some white space (a margin) before and after a heading.

1.2 Importance of headings

Search engines use the headings to index the structure and content of your web pages.

Users skim your pages by its headings. It is important to use headings to show the document structure.

`<h1>` headings should be used for main headings, followed by `<h2>` headings, then the less important `<h3>`, and so on.

Remark 1.3. Use HTML headings for headings only. Don't abuse headings to make text BIG or **bold**.

1.3 Make headings bigger

Each HTML heading has a default size. However, you can specify the size for any heading with the style attribute, using the CSS font-size property:

Example 1.4. Here is how you do this using style attribute:

```
<h1 style="font-size:60px;">Heading 1</h1>
```

1.4 HTML horizontal rules

The <hr> tag defines a thematic break in an HTML page, and is most often displayed as a horizontal rule.

Example 1.5. The <hr> element is used to separate content (or define a change) in an HTML page:

```
<h1>This is heading 1</h1>
<p>This is some text.</p>
<hr>
<h2>This is heading 2</h2>
<p>This is some other text.</p>
<hr>
```

1.5 The HTML <head> element

A common misconception is that the HTML head is related to the HTML headings. The truth is that the HTML <head> element has nothing to do with HTML headings.

- The <head> element is a *container* for *metadata*.
- HTML metadata is data about the HTML document.
- Metadata is not displayed.

Example 1.6. The <head> element is placed between the <html> tag and the <body> tag:

```
<!DOCTYPE html>
<html>

<head>
  <title>My First HTML</title>
  <meta charset="UTF-8">
</head>

<body>
.
.
.
```

Remark 1.7. Metadata typically define the document title, character set, styles, links, scripts, and other meta information.

1.6 How to view HTML source?

This subsection can also be renamed as: "what is behind the scene?".

Have you ever seen a Web page and wondered "Hey! How did they do that?"

1.6.1 View HTML source code

Right-click in an HTML page and select "View Page Source" (in Chrome) or "View Source" (in IE), or similar in other browsers. This will open a window containing the HTML source code of the page.

1.6.2 Inspect an HTML element

Right-click on an element (or a blank area), and choose "Inspect" or "Inspect Element" to see what elements are made up of (you will see both the HTML and the CSS). You can also edit the HTML or CSS *on-the-fly* in the Elements or Styles panel that opens.

1.7 Exercises

On the web page `https://www.w3schools.com/html/html_headings.asp` attempt the four exercises.

1.8 HTML tag reference

Tag reference contains additional information about these tags and their attributes.

You will learn more about HTML tags and attributes in the next chapters of this tutorial.

Tag	Description
`<html>`	Defines the root of an HTML document
`<body>`	Defines the document's body
`<head>`	A container for all the head elements (title, scripts, styles, meta information, and more)
`<h1>` to `<h6>`	Defines HTML headings
`<hr>`	Defines a thematic change in the content

Table 1: Some important HTML tags

2 HTML paragraphs

2.1 HTML paragraphs

Example 2.1. The HTML `<p>` element defines a paragraph:

```
<p>This is a paragraph.</p>
<p>This is another paragraph.</p>
```

Remark 2.2. Browsers automatically add some white space (a margin) before and after a paragraph.

2.2 HTML display

You cannot be sure how HTML will be displayed.

Large or small screens, and resized windows will create different results.

With HTML, you cannot change the output by adding extra spaces or extra lines in your HTML code.

Example 2.3. The browser will remove any extra spaces and extra lines when the page is displayed:

```
<p>
This paragraph
contains a lot of lines
in the source code,
but the browser
ignores it.
</p>

<p>
This paragraph
contains         a lot of spaces
in the source         code,
but the        browser
ignores it.
</p>
```

2.3 Don't forget the end tag

Most browsers will display HTML correctly even if you forget the end tag:

Example 2.4. Try the following codes:

```
<p>This is a paragraph.
<p>This is another paragraph.
```

The example above will work in most browsers, but do not rely on it.

Remark 2.5. Dropping the end tag can produce unexpected results or errors.

2.4 HTML line breaks

The HTML `<br>` element defines a *line break*.

Example 2.6. Use `<br>` if you want a line break (a new line) without starting a new paragraph:

```
<p>This is<br>a paragraph<br>with line breaks.</p>
```

Task 2.7. Remind one another about the reason why the `<br>` tag has no end tag.

2.5 The poem problem

Example 2.8. This poem will display on a single line:

```
<p>
  My Bonnie lies over the ocean.

  My Bonnie lies over the sea.

  My Bonnie lies over the ocean.

  Oh, bring back my Bonnie to me.
</p>
```

Task 2.9. What is a likely reason for this occurrence?

2.6 The HTML `<pre>` element

The HTML `<pre>` element defines *preformatted text*.

Example 2.10. The text inside a `<pre>` element is displayed in a fixed-width font (usually Courier), and it preserves *both* spaces and line breaks:

```
<pre>
  My Bonnie lies over the ocean.

  My Bonnie lies over the sea.

  My Bonnie lies over the ocean.

  Oh, bring back my Bonnie to me.
</pre>
```

2.7 Exercises

On the web page `https://www.w3schools.com/html/html_paragraphs.asp` attempt the four exercises.

2.8 HTML tag reference

Up till this chapter, we have encountered in addition the following HTML tags.

Tag	Description
`<p>`	Defines a paragraph
` `	Inserts a single line break
`<pre>`	Defines pre-formatted text

Table 2: Additional HTML tags

3 HTML styles

In this section, we look at the topic of HTML styles. Below is a result of modifying styles.

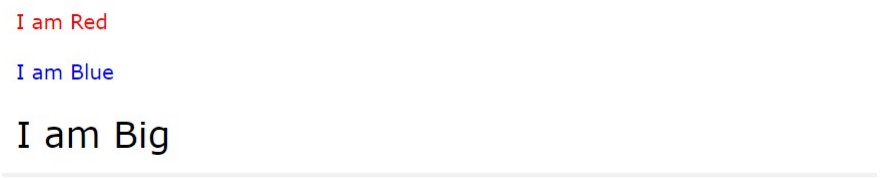

Figure 1: Instances of modifying styles

3.1 The HTML style attribute

Setting the *style* of an HTML element, can be done with the *style attribute*.

The HTML style attribute has the following syntax:

```
<tagname style="property:value;">
```

The property is a CSS *property*. The value is a CSS *value*. CSS stands for *Cascading Style Sheets*.

Remark 3.1. You will learn more about CSS later in this tutorial.

3.2 HTML background color

The *background-color property* defines the *background color* for an HTML element.

Example 3.2. This example sets the background color for a page to powderblue:

```
<body style="background-color:powderblue;">

<h1>This is a heading</h1>
<p>This is a paragraph.</p>

</body>
```

3.3 HTML text color

Other than the background color, you may also change the *text color*.

Example 3.3. Try change the text color as follows.

```
<h1 style="color:blue;">This is a heading</h1>
<p style="color:red;">This is a paragraph.</p>
```

3.4 HTML fonts

Part of styling has to do with *fonts*.

Example 3.4. The *font-family* property defines the font to be used for an HTML element:

```
<h1 style="font-family:verdana;">This is a heading</h1>
<p style="font-family:courier;">This is a paragraph.</p>
```

3.5 HTML text size

We can also alter the *text size*.

Example 3.5. The *font-size property* defines the text size for an HTML element:

```
<h1 style="font-size:300%;">This is a heading</h1>
<p style="font-size:160%;">This is a paragraph.</p>
```

3.6 HTML text alignment

Sometimes, we need to adjust the text alignment on a webpage.

Example 3.6. The text-align property defines the horizontal text alignment for an HTML element:

```
<h1 style="text-align:center;">Centered Heading</h1>
<p style="text-align:center;">Centered paragraph.</p>
```

Task 3.7. How do you align the text to the right, i.e., flushing right? Can we perform full justification for text alignment? Record your response in this box below:

Alignment of the text to the right...

3.7 Chapter summary

In this chapter, we have encountered the following:

- Use the style attribute for styling HTML elements.
- Use background-color for background color.
- Use color for text colors.
- Use font-family for text fonts.
- Use font-size for text sizes.
- Use text-align for text alignment.

3.8 Exercises

On the web page `https://www.w3schools.com/html/html_styles.asp` attempt the six exercises.

4 HTML formatting

In this section, we shall be dealing with text formatting. A sample of effects of text formatting is shown below.

Figure 2: A sample of text formatting

4.1 HTML formatting elements

In the previous chapter, you learned about the HTML style attribute.

HTML also defines special elements for defining text with a special meaning.

HTML uses elements like `<b>` and `<i>` for *formatting* output, like **b**old or *i*talic text.

Formatting elements were designed to display special types of text:

- `<b>`: Bold text
- `<strong>`: Important text
- `<i>`: Italic text
- `<em>`: Emphasized text
- `<mark>`: Marked text
- `<small>`: Small text
- `<del>`: Deleted text
- `<ins>`: Inserted text
- `<sub>`: Subscript text
- `<sup>`: Superscript text

In what follows, we shall elaborate how each of these operations of text formatting can be done.

4.2 HTML `<b>` and `<strong>` elements

Example 4.1. The HTML `<b>` element defines *bold* text, without any extra importance.

```
<b>This text is bold</b>
```

What if the text requires bolding that emphasises on its importance?

Example 4.2. The HTML `<strong>` element defines *strong* text, with added semantic "strong" importance.

```
<strong>This text is strong</strong>
```

Task 4.3. What is the physical difference between bold and strong?
Record the difference observed below:

I observe that the difference is...

4.3 HTML `<i>` and `<em>` elements

The HTML `<i>` element defines *italic* text, without any extra importance.

Example 4.4. Here is how you italicise text:

```
<i>This text is italic</i>
```

Example 4.5. The HTML `<em>` element defines *emphasised* text, with added semantic importance.

```
<em>This text is emphasized</em>
```

Remark 4.6. Browsers display `<strong>` as `<b>`, and `<em>` as `<i>`. However, there is a difference in the meaning of these tags: `<b>` and `<i>` defines bold and italic text, but `<strong>` and `<em>` means that the text is "important".

4.4 HTML `<small>` element

Example 4.7. The HTML `<small>` element defines smaller text.

```
<h2>HTML <small>Small</small> Formatting</h2>
```

4.5 HTML `<mark>` element

Sometimes, you want to emulate the use of a 'highlighter' on the text of a webpage.

Example 4.8. The HTML `<mark>` element defines *marked* or *highlighted* text:

```
<h2>HTML <mark>Marked</mark> Formatting</h2>
```

4.6 HTML `<del>` element

We may wish to perform a "strikethrough" kind of deletion occasionally.

Example 4.9. The HTML `<del>` element defines *deleted* (removed) text.

```
<p>My favorite color is <del>blue</del> red.</p>
```

4.7 HTML `<ins>` element

The HTML `<ins>` element defines *inserted* (added) text. Such an inserted text appears as an underscored text.

Example 4.10. The HTML `<ins>` element defines inserted (added) text.

```
<p>My favorite <ins>color</ins> is red.</p>
```

4.8 HTML `<sub>` element

You may wish to put some text in subscripted position.

Example 4.11. The HTML `<sub>` element defines *subscripted* text.

```
<p>This is <sub>subscripted</sub> text.</p>
```

4.9 HTML `<sup>` element

You may wish to put some text in superscripted position.

Example 4.12. The HTML `<sup>` element defines *superscripted* text.

```
<p>This is <sup>superscripted</sub> text.</p>
```

4.10 Exercises

On the web page `https://www.w3schools.com/html/html_styles.asp` attempt the six exercises.

4.11 HTML text formatting elements

The table below summarises all the tags relevant to text formatting:

Tag	Description
<b>	Defines bold text
	Defines emphasized text
<i>	Defines italic text
<small>	Defines smaller text
	Defines important text
<sub>	Defines subscripted text
<sup>	Defines superscripted text
<ins>	Defines inserted text
<del>	Defines deleted text
<mark>	Defines marked/highlighted text

Table 3: Tags for text formatting

5 HTML quotation and citation elements

In this section, we shall create the following effect for quotation and citation.

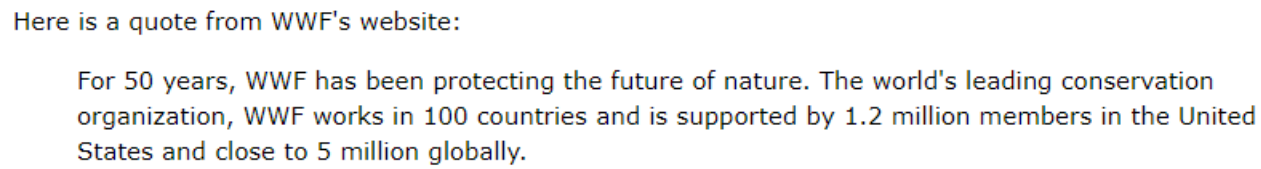

Figure 3: A sample of quotation/citation

5.1 HTML <q> for short quotations

The HTML <q> element defines a *short quotation*.

Example 5.1. Browsers usually insert quotation marks around the <q> element.

```
<p>WWF's goal is to:
<q>Build a future where people live in harmony with nature.</q></p>
```

5.2 HTML <blockquote> for quotations

The HTML <blockquote> element defines a section that is quoted from another source.

Example 5.2. Browsers usually indent <blockquote> elements.

```
<p>Here is a quote from WWF's website:</p>
<blockquote cite="http://www.worldwildlife.org/who/index.html">
For 50 years, WWF has been protecting the future of nature.
The world's leading conservation organization,
WWF works in 100 countries and is supported by
1.2 million members in the United States and
close to 5 million globally.
</blockquote>
```

5.3 HTML <abbr> for abbreviations

The HTML <abbr> element defines an *abbreviation* or an *acronym*.

Example 5.3. Marking abbreviations can give useful information to browsers, translation systems and search-engines.

```
<p>The <abbr title="World Health Organization">WHO</abbr> was founded in 1948.</p>
```

5.4 HTML <address> for contact information

The HTML <address> element defines *contact information* (author/owner) of a document or an article.

Example 5.4. The <address> element is usually displayed in *italic*. Most browsers will add a line break before and after the element.

```
<address>
Written by John Doe.<br>
Visit us at:<br>
Example.com<br>
Box 564, Disneyland<br>
USA
</address>
```

5.5 HTML <cite> for work title

The HTML <cite> element defines the *title of a work*.

Example 5.5. Browsers usually display <cite> elements in italic.

```
<p><cite>The Scream</cite> by Edvard Munch. Painted in 1893.</p>
```

5.6 HTML <bdo> for bi-directional override

The HTML <bdo> element defines *bi-directional override*.

Example 5.6. The <bdo> element is used to override the current text direction:

```
<bdo dir="rtl">This text will be written from right to left</bdo>
```

5.7 HTML quotation and citation elements

The table below summarises the tags used for quotation and citation purposes:

Tag	Description
`<abbr>`	Defines an abbreviation or acronym
`<address>`	Defines contact information for the author/owner of a document
`<bdo>`	Defines the text direction
`<blockquote>`	Defines a section that is quoted from another source
`<cite>`	Defines the title of a work
`<q>`	Defines a short inline quotation

Table 4: Tags for quotation and citation

6 HTML comments

In this section, we shall deal with the topic of HTML comments, and how these can be inserted. In common programming practice, inserting remarks that serve as reminders or explanations for the programmer or anyone who reads the code(s) later is important. Comments will be skipped by the compiler, and are only for the information for the programmer. Thus, comments will be ignored by the compiler and will not be displayed on the webpage.

6.1 HTML comment tags

Example 6.1. You can add comments to your HTML source by using the following syntax:

```
<!-- Write your comments here -->
```

Notice that there is an exclamation point (!) in the opening tag, but not in the closing tag.

Remark 6.2. Comments are not displayed by the browser, but they can help document your HTML source code.

Example 6.3. With comments you can place notifications and reminders in your HTML:

```
<!-- This is a comment -->

<p>This is a paragraph.</p>

<!-- Remember to add more information here -->
```

Example 6.4. Comments are also great for debugging HTML, because you can comment out HTML lines of code, one at a time, to search for errors:

```
<!-- Do not display this at the moment

<img border="0" src="pic_trulli.jpg" alt="Trulli">

-->
```

6.2 Exercises

On the web page `https://www.w3schools.com/html/html_comments.asp` attempt the two exercises.

7 HTML colors

The last section in this chapter will deal with the topic of colors.

HTML colors are specified using predefined color names, or RGB, HEX, HSL, RGBA, HSLA values.

7.1 Color names

In HTML, a *color* can be specified by using a *color name*:

Figure 4: A panel of color names, together with colors

HTML supports 140 standard color names. A complete list of all theses standard color names can be found at the following website:

`https://www.w3schools.com/colors/colors_names.asp`

7.2 Background color

You can set the *background color* for HTML elements:

Figure 5: A sample of using background color

Example 7.1. The above can be achieved as follows:

```
<h1 style="background-color:DodgerBlue;">Hello World</h1>
<p style="background-color:Tomato;">Lorem ipsum...</p>
```

Remark 7.2. A word of caution: Sometimes, the bad choice of background color can affect adversely the readability of the text.

7.3 Text color

There are times you wish to set the *color of text*:

- First set of text is tomato.
- Next set of text is blue.
- Last set of text is blue.

```
Hello World

Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam nonummy nibh
euismod tincidunt ut laoreet dolore magna aliquam erat volutpat.

Ut wisi enim ad minim veniam, quis nostrud exerci tation ullamcorper suscipit
lobortis nisl ut aliquip ex ea commodo consequat.
```

How do you do that?

Example 7.3. Here is how we can do so:

```
<h1 style="color:Tomato;">Hello World</h1>
<p style="color:DodgerBlue;">Lorem ipsum...</p>
<p style="color:MediumSeaGreen;">Ut wisi enim...</p>
```

7.4 Border color

The border can be made less boring by adding colors.

Example 7.4. You can set the *color of borders*:

```
<h1 style="border:2px solid Tomato;">Hello World</h1>
<h1 style="border:2px solid DodgerBlue;">Hello World</h1>
<h1 style="border:2px solid Violet;">Hello World</h1>
```

The effect of the above commands is shown below:

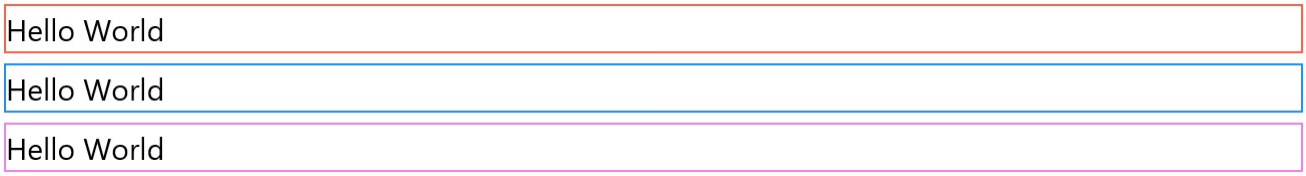

Figure 6: A sample of three border colors

7.5 Color values

In HTML, other than via color names, colors can also be specified using RGB values, HEX values, HSL values, RGBA values, and HSLA values.

Example 7.5. The following color values give rise to the same color as the color name "Tomato":

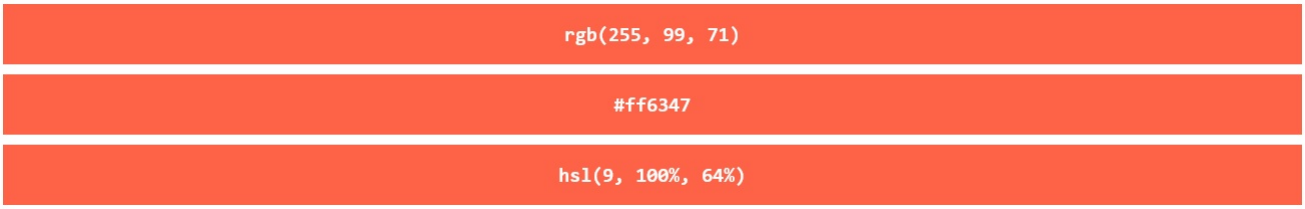

Figure 7: "Tomato" effected by color values: RGB, HSL, RGBA and HSLA

You can control the degree of transparency too, while maintaining the same color.

Example 7.6. Same as color name "Tomato", but 50% transparent:

```
<h1 style="background-color:rgb(255, 99, 71);">...</h1>
<h1 style="background-color:#ff6347;">...</h1>
<h1 style="background-color:hsl(9, 100%, 64%);">...</h1>

<h1 style="background-color:rgba(255, 99, 71, 0.5);">...</h1>
<h1 style="background-color:hsla(9, 100%, 64%, 0.5);">...</h1>
```

We now explain each of the color values format in the subsequent subsections.

7.5.1 RGB value

In HTML, a color can be specified as an *RGB value*, using this formula:

```
rgb(red, green, blue)
```

Each parameter `(red, green, blue)` defines the intensity of the color between 0 and 255.

For extreme examples as illustration:

- `rgb(255, 0, 0)` is displayed as red, because red is set to its highest value 255 and the others are set to 0.
- To display the color black, all color parameters must be set to 0, like this: `rgb(0, 0, 0)`.
- To display the color white, all color parameters must be set to 255, like this: `rgb(255, 255, 255)`.

Use the color palette applet available on

`https://www.w3schools.com/html/html_colors.asp`

to experiment with the mixing of colors via the RGB values vectors.

Task 7.7. Predict what happens when one uses RGB values of the form:

```
rgb(x, x, x)
```

where x is an integer, and $0 \leq x \leq 255$.
Use the computer to test your conjecture.

7.6 HEX value

In HTML, a color can be specified using a *hexadecimal value* in the form:

```
#rrggbb
```

where `rr` (red), `gg` (green) and `bb` (blue) are hexadecimal values between `00` and `ff` (same as decimal $0 - -255$).

For example, `#ff0000` is displayed as red, because red is set to its highest value `(ff)` and the others are set to the lowest value (00).

Task 7.8. Google to find out the meaning of a hexadecimal number system.
Express each of the following decimal numbers in hexadecimal form:

(i) 45

(ii) 144

7.6.1 HSL value

In HTML, a color can be specified using *hue*, *saturation*, and *lightness* (HSL) in the form:

```
hsl(hue, saturation, lightness)
```

We now explain each of the components of the HSL vector.

- Hue is a degree on the color wheel from 0 to 360: 0 is red, 120 is green, and 240 is blue.
- Saturation is a percentage value, 0% means a shade of gray, and 100% is the full color.
- Lightness is also a percentage, 0% is black, 50% is neither light or dark, and 100% is white.

Hue is measured in degree on a color wheel (see Figure 8).

Saturation can be described as the intensity of a color.

- 100% is pure color, no shades of gray.
- 50% is 50% gray, but you can still see the color.
- 0% is completely gray, you can no longer see the color.

The lightness of a color can be described as how much light you want to give the color, where

Figure 8: Parameter of hue in a color wheel

- 0% means no light (black);
- 50% means 50% light (neither dark nor light); and
- 100% means full lightness (white).

7.7 RGBA value

RGBA color values are an extension of RGB color values with an *alpha channel* which specifies the *opacity* for a color.

Example 7.9. An RGBA color value is specified with:

```
rgba(red, green, blue, alpha)
```

The alpha parameter is a number between 0.0 (fully transparent) and 1.0 (not transparent at all):

```
<!DOCTYPE html>
<html>
<body>

<h1 style="background-color:rgba(255, 99, 71, 0);">rgba(255, 99, 71, 0)</h1>

<h1 style="background-color:rgba(255, 99, 71, 0.2);">rgba(255, 99, 71, 0.2)</h1>

<h1 style="background-color:rgba(255, 99, 71, 0.4);">rgba(255, 99, 71, 0.4)</h1>

<h1 style="background-color:rgba(255, 99, 71, 0.6);">rgba(255, 99, 71, 0.6)</h1>

<h1 style="background-color:rgba(255, 99, 71, 0.8);">rgba(255, 99, 71, 0.8)</h1>

<h1 style="background-color:rgba(255, 99, 71, 1);">rgba(255, 99, 71, 1)</h1>

<p>You can make transparent colors by using the RGBA color value.</p>

</body>
</html>
```

7.8 HSLA value

HSLA color values are an extension of HSL color values with an alpha channel which specifies the opacity for a color.

Example 7.10. An HSLA color value is specified with:

```
hsla(hue, saturation, lightness, alpha)
```

Task 7.11. Carry out experiments to test out the effect on background color using the HSLA vector.

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