

Introduction to Multimedia

- **A museum hires you to create a digital exhibit. One part is a welcome video that loops all day on a screen, while the other is a touch-screen map where visitors can click on different rooms to read about artifacts.** How would you classify each of these two multimedia experiences based on user interaction, and why?
- **You are creating a digital brochure for a travel agency.** How does this project fit the definition of "multimedia," and what specific elements might you include to demonstrate this?
- **An online training module requires employees to watch a safety video and then click on branching scenarios to test their responses.** Explain how this module transitions from linear to non-linear multimedia.

Computer Graphics

- **A graphic designer is creating a company logo that needs to look crisp when printed on a small pen, but also flawless when blown up on a massive highway billboard.** Should the designer use bitmapped (raster) graphics or vector-drawn graphics? Explain your reasoning.
- **You are converting a colored photograph into a stylistic, pure black-and-white graphic for a newspaper advertisement.** Which bit-depth category of bitmapped graphics are you using, and how many bits per pixel does it require?
- **A photographer is printing a poster-sized image and notices it looks very blocky and pixelated, even though it looked fine on their computer monitor.** Explain the difference between ppi and dpi, and how a mismatch in spatial resolution caused this issue.
- **You are creating a retro-style video game that can only display 256 colors on the screen at once.** How does the technique of indexing (using color palettes) work to display your game's graphics within this limitation?
- **A digital artist designs a bright, neon poster on their computer monitor, but when they print it out on paper, the colors look much duller.** Explain how the additive (RGB) and subtractive (CMYK) color processes differ and why this color shift happens.
- **While editing a photograph of a smooth sunset, a student notices harsh, distinct bands of color in the sky instead of a smooth transition.** What is this phenomenon called, and how does color resolution (bit-depth) contribute to it?
- **A hospital database needs to store hundreds of digital X-rays where absolute pixel-perfect accuracy is critical for medical diagnoses.** Should the hospital use lossy or lossless compression for these files? Explain why.
- **You are building a website and need a geometric pattern for the background and a photograph for the team page.** Between SVG and JPEG, which file format should you use for which task, and why?

- **A graphic designer needs to display a smooth purple gradient on an older system, but the exact shades of purple are not available in the system's color palette.** How can the designer use dithering to solve this problem?
- **A developer creates an interactive map using Cartesian coordinates.** How does this vector approach ensure device independence if a user views the map on a tiny smartphone versus a massive desktop monitor?

Drawing on the HTML5 Canvas

- **You have placed a <canvas> element in your HTML file to build a web-based drawing app, but the canvas alone is just a blank container.** Conceptually, what is the "2D Context" in JavaScript, and why is it absolutely essential to access it before you can draw any shapes or lines?
- **A developer wants to draw a red brick wall for a 2D web game.** Explain the general two-step process required in JavaScript canvas drawing to first define the appearance (the color/style) of a shape, and then actually render the rectangular bricks onto the screen.
- **You are programming a digital signature pad using the HTML5 Canvas.** Explain how the concepts of beginning a path, moving the "pen" to a starting coordinate, and drawing a line to a new coordinate work together in JavaScript to trace a user's mouse movements.
- **Your web game features a custom spaceship graphic saved as an external PNG file.** Describe the necessary, two-part process in your JavaScript code required to first load this external image object into the browser's memory, and then render it onto the canvas.
- **A student is trying to draw a complex, spinning gear on a canvas. Instead of mathematically calculating the changing coordinates for every single tooth of the gear as it spins,** how can the developer use canvas transformation techniques (specifically, translating the grid) to make this rotation much easier to program?
- **While creating a data dashboard, you write JavaScript to draw a thick, dashed, purple line for a specific graph, but you want to ensure the very next graph goes back to standard thin, solid, black lines.** How do the canvas state management functions (saving and restoring) prevent your custom styles from accidentally bleeding into the rest of your drawing?
- **A developer draws a series of 1-pixel thin black grid lines on their canvas, but complains they look blurry and greyish on the monitor.** Conceptually, what causes this blurring regarding pixel boundaries, and how must the developer adjust their plotting logic to achieve crisp, sharp lines?
- **A common bug in canvas game development is that background images sometimes fail to appear the very first time the page loads, but appear perfectly after the user refreshes.** Explain why JavaScript must be programmed to wait for an image object to fully load before attempting to execute the canvas drawing command.

Product Overview and Design Specifications

- **Your team is starting a massive project to build an educational tablet app for kindergarteners.** Why is it essential to write a detailed specification document outlining hardware requirements and media elements *before* any programmer begins writing code?
- **A designer is mapping out how a user will navigate from the home screen of a mobile app to their profile settings.** Explain how visual planning tools, specifically storyboards or Spidergrams, are used to clearly map out this navigational flow for the development team.
- **You are designing two websites: a highly professional banking portal and a dynamic, high-energy promotional site for a music festival.** Contrast these two layouts by explaining why symmetrical balance is better suited for the bank, and asymmetrical balance is better suited for the festival to achieve the desired visual movement.
- **Your development team has just finished building a fully functional, working prototype of a multimedia encyclopedia.** Why is it crucial to conduct usability testing with actual target users (like students and teachers) rather than just relying on the development team's internal feedback?
- **A client wants an interactive video experience where viewers can make choices on the screen that branch off and affect the story.** Explain how creating a storyboard helps the production team understand the program's required functionality and logic before the camera crew begins filming.

HTML

- What is the Document Object Model (DOM) in the context of the browser's rendering engine, and how does it differ from the static HTML source code? In your answer, explain how the DOM functions as a "Live API" that allows scripts to alter the document structure after the initial download is complete.
- Conceptually, what occurs to the "Global Coordinate System" when a developer executes a **Translation** command? Rather than thinking of it as "moving a shape," why this is an essential.

- **Scenario: The Interactive Logo**

The HTML provided:

HTML

- `<canvas id="game" width="400" height="400"></canvas>`
- **Logical Flow:** Explain the necessity of the `id="game"` attribute in the HTML for the JavaScript to successfully locate the drawing surface.
- **The Code:** Write the complete JavaScript code required to locate the element, and **draw a blue box 100x100**

Drawing a Path (Lines)

You want to draw a simple "V" shape on your canvas. To do this, you need to tell the computer where to start, where to move the pen, and then tell it to actually draw the line.

- **The Question:** Explain the difference between `moveTo(x, y)` and `lineTo(x, y)`. Once you have defined the points of your "V" shape, which command must you call to make the lines actually appear on the screen?

Rectangles: Borders vs. Fills

You are designing a simple user interface. You need one box that is just an empty blue outline, and another box next to it that is a solid blue square.

- **The Question:** Name the two different JavaScript methods used to create these: one for drawing a **solid** rectangle and one for drawing just the **outline** of a rectangle.