GEOMETRIX: Full Layout & Testing Design Report

1. Layout Design Justification

The layout of the GEOMETRIX website is designed to balance functionality with visual comfort.
At the core is a two-column layout, using a fixed-width sidebar on the left and a flexible main content area on the right.
This is a common and effective structure for educational websites because it clearly separates navigation from learning content,
making it easy for users to find what they need without feeling overwhelmed.
The layout adapts well to smaller screens by stacking the sidebar above the main content, ensuring accessibility on all devices.

The color palette-primarily composed of soft blues and light gradients-was carefully chosen to create a calm, focused learning environment.
Blue is a color strongly associated with trust, intelligence, and clarity, which makes it ideal for a math education website.
The gradient background prevents the design from feeling too flat, while maintaining a sense of professionalism and modernity.
The sidebar uses slightly deeper shades of blue to create contrast, guiding the user's eyes toward navigation without making the page visually noisy.

In terms of typography, fonts like Verdana and Trebuchet MS are used because they are sans-serif, highly legible, and web-safe.
These fonts maintain clarity at various screen sizes and ensure that students can read explanations and questions without strain.

Larger headings use bold weights to establish hierarchy, helping users navigate through titles, subtitles, and paragraph content intuitively.
Font sizes are defined using relative units like em and percentages to ensure scalability across devices.

Spacing and padding throughout the site follow consistent units, providing breathing room between elements such as text blocks,
form inputs, and navigation items. This use of white space enhances readability and prevents user fatigue, especially important for a platform
where users may be reading and interacting for extended periods.

The design is also responsive. Through the use of Flexbox (and optionally CSS Grid if needed), the layout adjusts seamlessly across desktop
and mobile devices, ensuring users have a consistent and pleasant experience regardless of the device they're using.

2. Layout Testing: Grid vs Flexbox

The layout was tested using both CSS Grid and Flexbox. Grid was ideal for strict multi-column designs:

```
.container {
  display: grid;
  grid-template-columns: 1fr 4fr;
}
```

However, Flexbox was chosen for GEOMETRIX because it is simpler for 1D layouts like a sidebar and content area.

It also adapts better to mobile with flex-direction changes and fewer media queries. Flexbox's dynamic stacking on smaller screens made the layout more fluid and readable.

3. Responsive Design Testing

Responsive behavior was tested using browser tools (Chrome DevTools, Firefox Responsive Design Mode).

At max width, content is side-by-side; at smaller widths, Flexbox reflows the layout vertically.

Text, buttons, and forms adapt using % widths and relative units (vh/em) for consistency.

Media queries modify padding and element spacing to ensure readability and usability on mobile.

4. JavaScript Interaction Testing

Tested interactions:

- Post form shows a live character countdown.
- Submitting the form with <10 characters shows an alert.
- Page content fades in smoothly on load.
- Level labels animate with scale effect on click.

Each feature was tested in real-time and with dev tools, confirming input behaviors, alert triggers, and CSS transitions.

All features enhance user interaction, visual engagement, and form usability.