PROFESSIONAL

C21: BULLETS AND WALLS

WhiteHat Jr
Live Online Coding for Kids

INSTRUCTIONS:

Goal of the Project:

In class 21 you learned how to extend the feature of collisions and created your own library which allows you to try collisions with more than one object.

In this project, you will have to practice and apply what you have learned in the class and test the reliability of the walls when bullets hit them.

** Please complete Project 20 before attempting this project. **

Story:

The Military saw your Car collision project and they were interested in assigning you another project. They have given you $1000 to test the reliability of walls when bullets hit them.

They test the effectiveness of walls against bullets, amongst other things. All walls are made of concrete material. If the damage to the wall from the bullet exceeds a certain value, the material used to make the wall is rejected.

***This is just for your reference. We expect you to apply your own creativity in the project.**

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Getting Started:

1. Make a copy of your C20 project folder and add it as a different folder on your computer.
2. Rename the folder as **Project 21.**
3. **Import** this folder **into VS Code**.
4. Start editing your code in **sketch.js**.

Specific Tasks to complete the Project:

1. The canvas is 1600 pixels wide and 400 pixels tall.
2. Change the **car** variable to a **bullet** variable.
3. Make the bullet a thin and slender object, which is **white** in color.
4. Create a new variable called **thickness**, which is outside the setup() function.

```
var wall, thickness;
var bullet,speed, weight;
```

5. Assign a **Random value** value to the **thickness** variable.
    - Range of wall thickness is from 22 to 83.

```
thickness=random(22,83)
```

6. Update the wall variable:
    - The height of the wall is half the height of the canvas.
    - The width is equal to the thickness variable.

```
wall=createSprite(1200, 200, thickness, height/2);
```

    - Keep this Wall at 1200 pixels distance from the left edge of the canvas.
    - Set the color of the wall to color (80,80,80).

7. Assign a **Random value** to the weight and speed variables.
    - Range of **Bullet weight** is 30 to 52
    - Range of **Bullet speed** is 223 to 321.

```
speed=random(223,321)
weight=random(30,52)
```

8. Collide this bullet with the stationary wall.
    - The bullet should come to a halt as it hits the wall.
9. Calculate the damage of the wall when the bullet collides with it according to the following formula.

$$\text{Damage} = \frac{0.5 \times \text{bulletWeight} \times \text{bulletSpeed} \times \text{bulletSpeed}}{(\text{Thickness of Wall} \times \text{Thickness of Wall} \times \text{Thickness of Wall})}$$

10. When the collision happens, based on damage calculations, determine the color of the wall as red or green. See the examples below.
    - If the damage is greater than 10, then the wall is not effective against the bullet.

Bullet Weight	Bullet Speed	Wall Thickness	Damage	Wall Color
32	223	70	3.68	Green
32	223	40	12.43	Red

11. Make sure the project works before you submit it.

*Refer to the images given above for reference.

Submitting the Project:

1. **Upload** your completed project to your own github account.
2. Enable **Github** pages for the repository.
3. Copy and paste the link to the github pages in the Student Dashboard against the correct class number.

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Hints:

1. The bullet is similar to the car of project C20.

2. Make sure to add a **hasCollided()** function which accepts two parameters - the bullet and the wall.

```
function hasCollided(lbullet, lwall)
{
    bulletRightEdge=lbullet.x +lbullet.width;
    wallLeftEdge=lwall.x;
    if (bulletRightEdge>=wallLeftEdge)
    {
        return true
    }
    return false;
}
```

3. Execute the **hasCollided**() function as shown:

```
if(hasCollided(bullet, wall))
{
  bullet.velocityX=0;
  var damage=0.5 * weight * speed* speed/(thickness *thickness *thickness);

  if(damage>10)
  {
      wall.shapeColor=color(255,0,0);

  }


  if(damage<10)
  {
      wall.shapeColor=color(0,255,0);
  }
```

REMEMBER... Try your best, that's more important than being correct.
After submitting your project your teacher will send you feedback on your work.

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