Superhero Scratch™

Create a superhero, design their superpowers, and defeat the enemy. Become a computer programmer as you code your own superhero game using Scratch™!

TEKS:

TECH K-2.1 C: The student is expected to explore virtual environments, simulations, models, and programming languages to enhance learning.

TECH K-2.6 A: The student is expected to use appropriate terminology regarding basic hardware, software applications, programs, networking, virtual environments, and emerging technologies.

TECH 6.6 A: The student is expected to define and use current technology terminology appropriately.

TECH 8.6 N: The student is expected to integrate two or more technology tools to create a new digital product.

Materials:

- Computer or tablet with internet access
- Superhero Scratch ™ Programming Outline (attached)

How To:

Part 1: Getting started

1. Go to scratch.mit.edu on your computer or tablet.
2. In the upper right corner, click "Sign In" and sign in using your login information. If you have not used Scratch™ before, have an adult help you create a login.
3. In the top left corner of the screen, click "Create."
4. Click on the top blue bar where it says "Untitled" and rename your project to "Superhero Game."

Part 2: Creating a sprite

1. In Scratch™, the characters are called "sprites." A sprite is a character with specific rules/behavior.
2. Delete the current sprite on the screen (orange cat) by clicking on the small blue trash can in the top right corner of the sprite.
3. Find the "Sprite" button in the bottom right corner. It is a small blue circle with a kitten face in the middle!

4. A pop-up bar will appear, where you can pick between several choices:
   a. Magnifying Glass = "Choose a sprite" - This allows you to pick your character from images in the Scratch™ Library.
   b. Paint Brush = "Paint" - This allows you to draw your own character.
   c. Stars = "Surprise" - This picks the character for you.
5. After deciding whether you want to choose a sprite, paint one, or have one picked for you, click on that option and a new sprite will be added to your sprite area. Hint: Even if you use a pre-created sprite from the library, you can go to the "Costumes" tab and personalize your character.
6. Rename your new sprite by clicking on the white oval that lists the name of the sprite and type in "Superhero." This is your superhero sprite!
7. Repeat steps 3-6 to create the following sprites. Be sure to name each sprite according to their character.
   a. Superhero: The main character of your game. You created this sprite in step 6.
   b. Superpower: This is what your character shoots at their rivals to make them stay away.
   c. Sidekick: Superhero's helper.
   d. Rival 1: Watch out! This is enemy #1.
   e. Rival 2: Watch out! This is enemy #2.
   f. Game Over Screen: This is what shows up if a player loses the game.
   g. Winning Screen: This is what shows up if a player wins the game!
      i. To create the sprites for the Game Over Screen and Winning Screen, click on the same "Choose a Sprite" button, but be sure to select "Paint." This will bring you to the "Costumes" screen for the sprite. On this screen, you can use a paintbrush, text box, eraser, and more to design a personalized Game Over Screen and Winning Screen.
8. You should now have a total of seven sprites. Make sure that their names are exactly the same as your storyboard! This will make it easier to program your game.

Part 3: Choosing the background
1. Find the "Choose a Backdrop" button in the bottom right-hand corner. It is a small blue circle with a mountain in the middle!
2. A pop-up bar will appear, where you can pick between several choices:
   a. Magnifying Glass = "Choose a background" - This allows you to pick your background from pre-created images in the Scratch™ Library.
   b. Paint Brush = "Paint" - This allows you to draw your own background.
   c. Stars = "Surprise" - This picks the background for you.
3. After deciding whether you want to choose a background, paint one, or have one picked for you, click on that option and a background will appear on your game screen. Hint: Even if you decide to "choose a background" from the library, you can click on the smaller image of the background (bottom right corner), then click on the "Backdrops" tab in the top left, and it will let you personalize your background.
4. Once you have all your sprites and background created, you are ready to start programming your game!

Part 4: Creating the program
1. Look at the left side of the screen. It has 9 different categories of block code: Motion (blue), Looks (purple), Sound (pink), Events (yellow), Control (orange), Sensing (blue), Operators (green), Variables (orange), and My Blocks (pink).
2. First, you need to create a variable called "score."
   a. Click on the Variables (orange) circle.
   b. Select "Make a Variable", and enter "score" for your new variable name in the pop-up window.
   c. Be sure the option "For all sprites" is selected (ignore this step if you don't see this option).
   d. Press OK.
   e. This will create a new block called "score" that you will use in your program.
3. Next, you will need to create different messages for your program.
   a. Click on the Events (yellow) circle.
   b. Find the block that says "broadcast message1."
   c. Click the drop-down menu on that block and select "New Message."
   d. Enter "Start" as your new message in the pop-up window. Press OK.
   e. Repeat these steps to create two more messages: "Win" and "Game Over."
4. Now you are ready to drag and drop blocks of code into your workspace! Starting with your Superhero sprite, copy the codes from the Programming Outline (attached).
5. To begin, click on the small Superhero sprite on the right side of the screen - it should be highlighted blue. This means you are working on the sprite you selected.
6. Go to the "Code" tab in the top left corner, go to the Events section, and find the yellow "when green flag clicked" code block. Drag and drop this block of code onto your workspace.
7. Find the blue "go to x:# y:#" block in the Motion section, drag it into the workspace, and connect it to the first yellow block like a puzzle piece.
8. Adjust the numbers for the x- and y-coordinates to match those in the Programming Outline by clicking on the white circles on the block and changing it to say "go to x: -12 y: -41". This block of code is telling your Superhero sprite to be at the x-coordinate: -12 and y-coordinate: -41 on the screen at the very beginning of the game.
9. Find the orange "set my variable to 0" block in the Variables section. Add it below the blue block and then adjust the block to say "set score to 0" by using the dropdown menu.
10. Find the yellow "broadcast message" block in the Events section, add it below the orange block, and use the dropdown menu to change the block to say "broadcast Start." Great job! You've completed your first set of blocks!
11. To move onto programming the next sprite, click on the small sprite on the right side of the screen, making sure it is highlighted blue. Continue to copy the codes from the Programming Outline (attached) in your workspace for each sprite. Check out the Programming Tips (attached) if you need additional help.

Part 5: Playing the game
1. Once you've coded all the instructions for each sprite, you can start to play your game by clicking the green flag above where your program runs.
2. Test that your Superhero sprite works by pressing the up, down, left, and right arrow keys. Your Superhero should move in the same direction as the keys that you press.

31 Days of STEM Fun!

3. Test that your Superpower sprite works by pressing the spacebar. You may have to hold the spacebar for several seconds to ensure that your Superpower reaches the edge and then disappears.
4. Continue to test that each sprite works! Do your Rivals disappear when they touch your Superpower? Do you also get a point added to Score when a Rival touches your Superpower? Does the Game Over Screen pop up if your Superhero touches a Rival? How about if you get 5 points, does the Winning Screen pop up?
5. If your sprites are not doing what they are expected to do, then stop running your game by pressing the red stop sign next to the green flag. Go back to each sprite and make sure their program matches the Programming Outline exactly.
6. Once your Superhero defeats the Rivals and scores 5 points, the Superhero challenge is complete!

STEM Explanation:

Scratch™ is a free, online programming community where users can create their own interactive games. Programming is another word for coding, and both are a set of instructions that a computer follows to complete a task. It can seem difficult at first, but programming can be as simple as learning how to break tasks down into really small steps and communicating them in the correct order.

One of the components of programming is conditional statements, also known as "IF…THEN…" statements. "IF…THEN…" statements are basic statements, or rules, that tell the computer what to do when a certain condition or situation happens. The conditions are the "IF" part of the statement. For example: IF you are hungry… This IF sets up the condition, or situation, for the rest of the scenario. What would you tell someone to do IF they are hungry? The actions are the "THEN" part of the statement. So, to finish the example, IF you are hungry…THEN make a sandwich. This THEN tells the listener what to do if they are hungry. It gives them a solution to the situation. In this activity, you used IF…THEN… statements to program the superhero game. One of your conditional statements said IF the left arrow key is pressed THEN the superhero sprite will point in a certain direction and move 10 steps.

Career Connection:

Computer programmers develop the instructions for software programs, like games or apps, for technology devices to understand and run. They write and test codes to solve problems until the program works effectively and efficiently.

Resource:

https://scratch.mit.edu/

Programming Tips

Program the correct sprite: Be sure that you are programming in the correct workspace for each sprite! Remember: click on the small sprite on the right side of the screen and make sure it is highlighted blue before you start programming anything for that sprite. Another way to double check that you're working on the correct sprite is that a small image of it will be on the top right corner of your workspace.

If your program is not working: Make sure you do not have any extra blocks in your workspace. This can confuse your program. Also, check that every block is programmed exactly the same as the Programming Outline.

Sounds: To add different sounds to your sprite, you can go to the "Sounds" tab and then click the "Sound" button. Remember, the volume icon is on the bottom left. This will bring you to the Scratch™ Sound library. You can then choose a sound and it will be added to the sounds you can choose from in the dropdown menus in your coding blocks. Feel free to use whatever sound you like for the pink "start sound" blocks!

Score: To see your score while playing your game, make sure that the score variable is checked off in the Variables (orange) blocks.

Add code blocks within blocks: Certain blocks have open spaces in them, so you can add blocks within them to create specific instructions. Make sure the blocks you are putting within other blocks are the correct shape. Also, you can put several coding blocks into one another.

Superhero Scratch™ Programming Outline

Sprite	Program
Superhero	

Sidekick

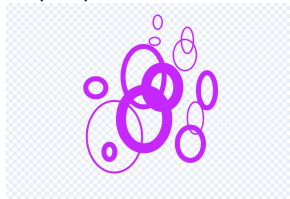```
when [flag] clicked

go to x: (pick random (-200) to (200)) y: (160)

forever
    wait (3) seconds
    set size to (40) %
    show
    glide (3) secs to x: (pick random (-200) to (200)) y: (160)
    point in direction (180)
    turn ↻ (pick random (-60) to (60)) degrees
    repeat (200)
        if < touching (Superpower ▼) ? > then
            broadcast (Game Over ▼)
            hide
            wait (3) seconds
            set (Score ▼) to (0)
            broadcast (Start ▼)
        else
            move ((1) + (Score)) steps
    hide
```

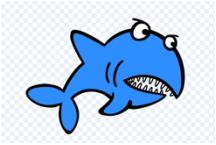Superpower

```
when 🏳 clicked
forever
    hide
    set size to 20 %
    point in direction 0
    repeat until  key space ▾ pressed?
        go to x:  x position ▾ of Superhero ▾ + 0  y:  y position ▾ of Superhero ▾ + 10
    go to front ▾ layer
    show
    repeat 10
        move 10 steps
        change color ▾ effect by 25
        if  touching edge ▾ ? then
            hide
```

Rival 1

```
when 🏳 clicked
forever
    set size to (40) %
    show
    glide (3) secs to x: (pick random (-200) to (200)) y: (160)
    point in direction (180)
    turn ↻ (pick random (-60) to (60)) degrees
    repeat (200)
        if < touching (Superpower ▾) ? > then
            repeat (20)
                change size by (2)
            change (Score ▾) by (1)
            start sound (pop ▾)
            hide
        else
            move ((1) + (Score)) steps
    hide
```

Rival 2

```
when 🚩 clicked
forever
    set size to 40 %
    show
    glide 3 secs to x: pick random -200 to 200 y: 160
    point in direction 180
    turn ↻ pick random -60 to 60 degrees
    repeat 200
        if touching Superpower ? then
            repeat 20
                change size by 2
            change Score by 1
            start sound pop
            hide
        else
            move 1 + Score steps
    hide
```

Game Over Screen	
GAME OVER!	when I receive [Start ▾] hide when I receive [Game Over ▾] go to [front ▾] layer start sound [Alien Creak2 ▾] show when I receive [Win ▾] hide

Winning Screen	
Congratulations! *You Win!!*	when I receive [Start ▾] hide when I receive [Game Over ▾] hide when I receive [Win ▾] go to [front ▾] layer start sound [Dance Funky ▾] show