Name: _____

Assessment

Resistor Piano

1) What is the purpose of using Resistors in the circuit described in the tutorial?
    a) To generate sound waves
    b) To limit the flow of electricity
    c) To connect the Pico to the computer
    d) To change the color of LEDs

2) Which pin on the Pico is not connected to the voltage divider made with the Resistors?
    a) GROUND
    b) 3.3V
    c) A2
    d) Digital pin 10

3) What does the tutorial explain is the purpose of using a voltage divider with multiple Resistors?
    a) To create different colors of LEDs
    b) To divide the voltage and produce different voltages
    c) To play different notes on the Pico
    d) To connect multiple Picos together

4) How does the program determine which note to play on the Pico?
    a) By counting the number of Resistors
    b) By checking the color of the Jumper wires
    c) By reading the voltage from pin A2 and performing calculations
    d) By pressing different buttons on the Breadboard

5) Understanding voltage dividers and analog inputs, like those used in this tutorial, could be most beneficial in which real-world application?
    a) Monitoring soil moisture levels in agriculture
    b) Sending text messages between smartphones
    c) Controlling the temperature of a refrigerator
    d) Using a remote control to control a television

6) Describe how you could modify the circuit from the tutorial to play more than nine different notes. What additional components or changes would you need to make?

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7) Imagine you are designing an electronic toy that uses a similar circuit to the Resistor Piano. How could you enhance the toy's functionality to make it more engaging for users?

8) Look at the Python code provided. How could you modify this code to change the musical instrument sound played? Explain what changes you would make and why.

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Answer Key

Resistor Piano

1) B - To limit the flow of electricity

2) D - Digital pin 10

3) B - To divide the voltage and produce different voltages

4) C - By reading the voltage from Pin A2 and performing calculations

5) A - Monitoring soil moisture levels in agriculture

6) *Example:* To play more than nine notes, you could add more Resistors to the voltage divider circuit, creating additional distinct voltage levels. Each Resistor adds another potential voltage node, allowing for more notes in the musical scale. Additionally, you would need to expand the note list in the program to correspond to the new voltage levels generated by the added Resistors.

7) *Example:* One enhancement could be adding buttons that, when pressed, change the octave range of the notes played by adjusting the voltage levels or by switching between different sets of Resistors. This would allow users to explore other musical ranges and create more complex melodies. Additionally, incorporating visual feedback, such as LEDs that light up corresponding to each note played, could enhance the interactive experience.

8) *Example:*
To change the musical instrument sound played, you can adjust the `note_list` variable. Each number in the `note_list` represents a frequency in Hertz (Hz) corresponding to a musical note. For example, to play higher-pitched notes, you can increase the values in the `note_list`. Conversely, to play lower-pitched notes, you can decrease these values. Remember to ensure that the `note_played` variable, which determines which note from `note_list` is played, aligns correctly with any modifications made to the `note_list`. Here's an example modification to play a different set of notes:

```
note_list = [523.25, 493.88, 466.16, 440, 415.32, 392, 369.99, 349.24, 329.63]
```

Explanation:
In this modified `note_list`, each number corresponds to a different musical note frequency, allowing the Python code to play a different set of musical tones.