PIPER

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Assessment
Car Race

1) What is the main purpose of using Beam Break Sensors in the tutorial?
   a) To measure the weight of the cars
   b) To count the number of laps completed by the cars
   c) To determine which car wins the race
   d) To change the color of the LEDs

2) What does "IR" stand for in IR Beam?
   a) Infrared
   b) Instant Reaction
   c) Internal Resistance
   d) Immediate Response

3) Which component turns on when infrared light shines on it?
   a) LED
   b) Resistor
   c) Phototransistor
   d) Breadboard

4) How do you stop the code from looping once a car passes through the Beam Break Module?
   a) Using a wait block
   b) Using an exit loop block
   c) Turning off the LEDs
   d) Disconnecting the power supply

5) What is the purpose of the "ready set go lights" function in the code?
   a) To measure the time it takes for the cars to finish the race
   b) To control the LEDs and indicate the start of the race
   c) To determine the winner of the race
   d) To reset the Beam Break Sensors

6) Explain how you could use Beam Break Sensors in a real-world application outside of racing toy cars. Provide an example and describe its benefits.

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7) Imagine you are designing a similar project but for a different purpose. Describe how you would use the components (Beam Break Sensors, LEDs, Pico, etc.) to create a system that counts the number of people entering a room.

8) Look at the Python code you completed using Blockly. The code currently prints the winning car and the time it took to finish the race. Can you modify the code to print a special message for the winning car? For example, if "race car 1" wins, it should print "Congratulations, race car 1!" and if "race car 2" wins, it should print "Great job, race car 2!". Write the code to include these new messages.

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Answer Key

Car Race

1) C - To determine which car wins the race

2) A - Infrared

3) C - Phototransistor

4) B - Using an exit loop block

5) B - To control the LEDs and indicate the start of the race

6) *Example:* Beam Break Sensors can be used in security systems to detect intruders. For instance, placing these sensors at entry points like doors and windows can help trigger an alarm if an intruder breaks the beam, enhancing home security by providing real-time alerts and preventing unauthorized access.

7) *Example:* I would set up Beam Break Sensors at the room's entrance. When a person walks through, they break the beam, triggering a signal to the Pico. The Pico would then increment a counter each time the beam is broken. LEDs could be used to display the count, with different colors indicating different ranges (e.g., green for 1-10 people, yellow for 11-20, and red for over 20). This system helps in managing room capacity and ensuring safety in crowded places.

8) Example:

```
## ---- Imports ---- ##
import board
from piper_blockly import *
import time
from digitalio import Pull

## ---- Definitions ---- ##
winner = None
start_time = None
GP15 = piperPin(board.GP15, "GP15")

try:
  set_digital_view(True)
except:
  pass
```

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```
GP14 = piperPin(board.GP14, "GP14")
GP13 = piperPin(board.GP13, "GP13")
# Describe this function...
def ready_set_go_lights():
  global winner, start_time
  GP15.setPin(1)
  time.sleep(2)
  GP15.setPin(0)
  GP14.setPin(1)
  time.sleep(2)
  GP14.setPin(0)
  GP13.setPin(1)

_clock_start = time.monotonic() + 0.09 # adjust for startup time
def chip_clock():
  global _clock_start
  return time.monotonic() - _clock_start

GP6 = piperPin(board.GP6, "GP6")
GP11 = piperPin(board.GP11, "GP11")
# Describe this function...
def determine_winner():
  global winner, start_time
  while True:
    if GP6.checkPin(Pull.UP):
      winner = 'race car 1'
      break
    elif GP11.checkPin(Pull.UP):
      winner = 'race car 2'
      break

    time.sleep(0.002)
  return winner

## ---- Code ---- ##
ready_set_go_lights()
start_time = chip_clock()
winner = determine_winner()
print(winner)
if winner == 'race car 1':
  print("Congratulations, race car 1!")
elif winner == 'race car 2':
  print("Great job, race car 2!")
GP13.setPin(0)
print(chip_clock() - start_time)
print('seconds')
```