

## Activity Datasheet Answers

**Instructions:** Answer the four questions below by selecting sensor/port 1, 2, 3 or 4, which represents answers a, b, c or d. When answered correctly, the EV3 intelligent brick displays a smiley face. When not yet answered or answered incorrectly, it remains on the question number. Thus, you can only proceed to the next question when the right answer has been selected. Have each group member answer and read one question each.

*Tip: Your main objective for this section is to become familiar with your sensor attachments and how they feel because to answer the questions in the next section, you will need to know—without using your eyes—which attachment connects to which port. The haptic feedback is in your sense of touch and identifying each of the attachments uniquely. Once you recognize their distinctive sensory characteristics, you can then match them to their attached port.*

1. John is a 72-year-old who has arthritis and struggles to hold a pencil or type on a keyboard, but he still likes to write letters to his friends. Capacitive touchscreens are very sensitive, but resistive touchscreens tend to be more durable. For John, which would be the better kind of screen, considering his arthritis limitations?
  - a. capacitive touchscreen
  - b. resistive touchscreen
2. In the dark, without being able to see, Sandra is trying to find the light switch at her friend's house in order to use get a drink in the kitchen. She remembers it being close to the door, but definitely cannot see anything. Which of her remaining four senses is most helpful to her in finding the switch?
  - a. hearing
  - b. taste
  - c. touch
  - d. smell
3. An EV3 touch sensor works similarly to resistive touchscreens—when a pressure is applied to a point, it completes a circuit and activates. For resistive touchscreens, this is done when the layers touch each other, and similarly, when the sensor is fully pressed, released or toggled (pressed and released). If you were to make a resistive touchscreen out of EV3 touch sensors, how many would you need to build one that has the greatest precision possible?
  - a. 50
  - b. 500
  - c. 2,000
  - d. as many as possible
4. Jordan is seven years old, and likes to use her father's tablet for games. She was born with autism, which affects how she interacts with the world. She is much more inclined and interested in things she can touch and feel. Is it an advantage to having haptic feedback on the tablet for the game, when considering Jordan's type of autism?
  - a. yes
  - b. no

**Instructions:** Please answer questions 5-8 with your eyes closed or blindfolded. Have another student in your group read the question aloud to the group. Have each group member answer and read one question each. When answered correctly, the EV3 brick displays a check mark. When not yet answered or answered incorrectly, it remains on the question number.

*Tip: In the previous section, you become familiar with the way your sensor attachments feel, how they are uniquely different, and being able to identify each associated port. If you need time to become more familiar with your attachments, please do so now.*

5. Xun is 24 and she has ALS, which causes her to be wheelchair bound, very similar to Stephen Hawking's health condition. She has problems controlling her muscles, which makes it difficult for her to apply adequate pressure to use certain types of touchscreens. Which is not the best type of touchscreen for her to use when considering that she may not be able to place accurate pressure to activate the screen?
  - a. capacitive touchscreen
  - b. resistive touchscreen**
  
6. Jamaal is Maria's three-year-old son. He likes to lick the screen of her phone. When Jamaal is licking the phone, he is using which sense, and is this an example of haptic feedback?
  - a. smell and no
  - b. taste and no**
  - c. touch and yes
  - d. taste and yes
  
7. Jun's favorite console game is a racing simulator. She enjoys it because she feels immersed in the action. This is because the steering wheel she uses vibrates like the steering wheel in a real car. Is this a form of haptic feedback?
  - a. yes**
  - b. no
  
8. Matthia is 13 years old and blind. His impairment limits him from reading printed books since he cannot see, but he reads every day using haptics, through the use of braille. If a touchscreen could produce the same sensations that braille does, what is one thing Matthia still could not easily do with a tablet that a kid with vision is able to do?
  - a. read a book
  - b. check his email
  - c. listen to music
  - d. watch a movie**

**Instructions:** Please answer questions 9-12 individually, and without the use of the EV3 robot.

9. Do you think using the EV3 robot to simulate haptic feedback is a good method?

- a. yes
- b. no

10. Seven-year-old Jordan who is mentioned in question 4 has autism that specifically is highly functioning when she can feel and touch something. Why would having haptic feedback in the games she plays on the tablet be advantageous to her?

*Example answer:* Jordan's specific type of autism makes her more inclined and interested in things she can touch and feel, thus she would be more inclined to play a game with haptic feedback instead of a game without it. Though this may not be absolute, it certainly would help her appreciate the game more because of it.

11. Do you think haptic feedback will be used more in the future, especially when considering medical applications?

- a. yes
- b. no

12. When you did not have the use of your eyes, did haptic feedback help you answer the questions? Please explain and justify your answer.

*Example answer:* Haptics helped me answer the questions because I was able to figure out which touch sensor was a, b, c or d (or 1, 2, 3 or 4) because they felt different from one another and distinctive. I would not have been able to select the correct answer/sensor if the attachments all felt the same.