Name _____ Date _____ Per_____

Reaction time activity: Think Fast Act Fast!

100 Points _____Final Stamp

Introduction

Every day you react to the huge amount of stimuli that bombards your senses. Sight, smell, hearing, taste, and touch communicate the wonders of the world and make the body respond. These reactions allow us to complete our everyday activities, but the speed at which our nervous system reacts also allows humans to complete amazing tasks. Race car drivers navigate safely past opponents at 200 mph. Baseball players make contact with lightning-quick fastballs. Bullfighters twist out of the way of a charging beast. Think about the sequence of events that must occur to manage events that seem to pass with the blink of an eye. We need a solid number for both time of reaction and time of distraction but for this activity we are focusing on how fast your reaction time can be. Good luck!

Equipment

- Ruler, Calculator w/ a square root function and

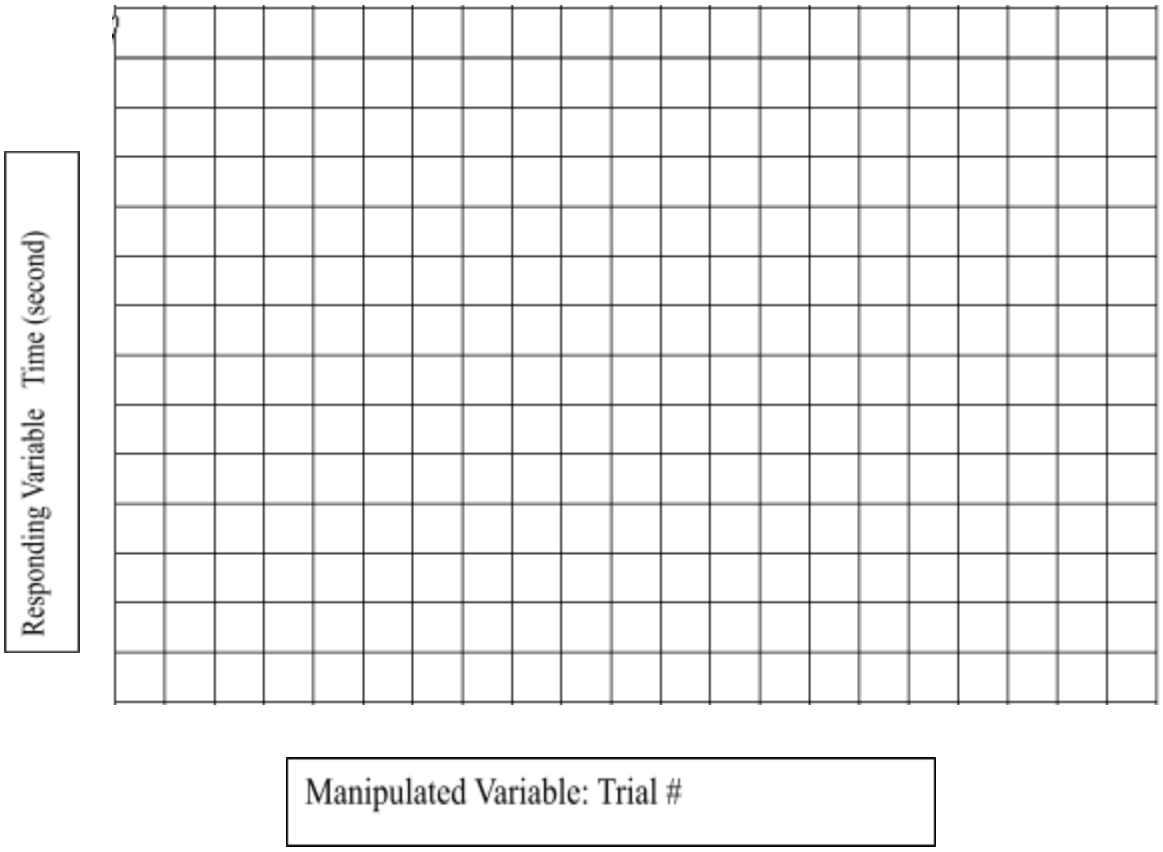
Procedure

Activity 1 Think Fast Act Fast:

- Each person in your pair needs to complete 10 trials of the ruler drop reaction time test as the "catcher" while their partner is the "dropper." Follow the ruler-drop test instructions below and record the distances for each of your own trials Dropper: Read the number (in centimeters) at the bottom of the catcher's index finger on the ruler and measure to the nearest millimeter (hash mark) on the ruler. For example, if the bottom of the catcher's finger is three hash marks above the 12 centimeter number, the distance measurement would be 12.3 cm.

Trial Number	**Distance ruler dropped**	**CALCULATED REACTION TIME t= 0.0452√d (s)**
Trial #1		
Trial #2		
Trial #3		
Trial #4		
Trial #5		
Trial #6		
Trial #7		
Trial #8		
Trial #9		
Trial #10		
Trial Average	**Distance Ruler Dropped Average**	**Average Reaction Time**

Graph your data! Remember this is a bar graph by Trial #



Part 1: Conclusion Questions answer these two questions individually using your own reaction time test data:

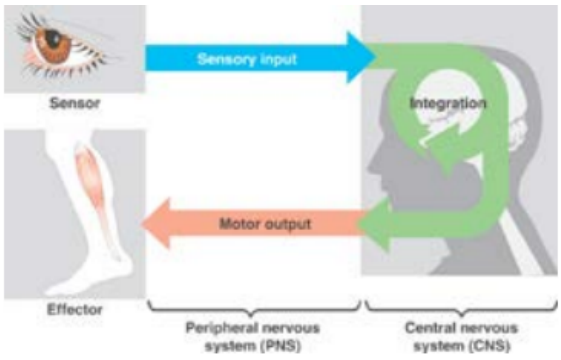
1. How did your reaction times vary across the 10 trials?

2. What trends, if any, do you see in your reaction times over the 10 trials? Answer these questions with your partner:

3. List at least 3 factors that might affect someone's reaction time.

4. Identify at least 3 examples of distractions that might increase your visual or auditory reaction time while driving.

5. An individual's reaction time is determined by the actions of several human body systems working together in response to a stimulus and this response occurs in three stages. Analyze Figure below and write a maximum three-sentence description of how sensory organs (such as the eyes), the nervous system, and muscles work together during the reaction time process.



2

Research Question

Use your own personal average reaction time test result to answer these three questions: Imagine you are driving straight ahead at a speed of 105 km/hour (65 miles per hour) and an incident forces you to quickly react and step on your brakes. Complete the following calculations to determine how far your vehicle would travel during your personal reaction time. (To simplify the calculation, we will assume that the velocity of your vehicle does not change during the time it takes you to react and hit the brakes). Show your work in the spaces provided! The distance a vehicle will travel during a given reaction time can be found using the following equation: distance = velocity × time

6. Calculate in meters how far your vehicle would travel during your average reaction time using the following velocity conversion: 105 km/hr = 29 m/s.

7. In general, how might a brief distraction (such as glancing at a cell phone to read a text message) combined with your reaction time affect the distance your vehicle would travel while driving?

Activity 2: Fastball Reaction Time:

Complete the Fastball Reaction Time activity found at the Exploratorium site **Science of Baseball**. In your laboratory journal, record your time for 10 trials. Circle your best time.

Trial #1	Trial #2	Trial #3	Trial #4	Trial #4	Trial #5	Trial #7	Trial #8	Trial #9	Trial #10
RT (ms) _____	RT (ms) _____	RT (ms) _____	RT (ms) _____	RT (ms) _____	RT (ms) _____	RT (ms) _____	RT (ms) _____	RT (ms) _____	RT (ms) _____

Average Reaction Time:_____

Activity 3: Complete the reaction time for the following website: The Reaction Time Test

	Reaction time
Trial #1	
Trial #2	
Trial #3	
Trial #4	
Average	

Activity 4: Go to this website and https://faculty.washington.edu/chudler/java/redgreen.html

	Reaction time
Trial #1	
Trial #2	
Trial #3	
Trial #4	
Average	

1. **Question: Which activity do you think resembles reacting in a T&D situation?**

2. **What was the reaction time for that activity _____?**

If time allows we can watch the following video when physics meets biology

Name _____ Date _____ Per_____

Determining Time of Distraction!

Have you ever witnessed someone blindly bump into somebody or something while trying to text and walk? While somewhat annoying and possibly harmful in a school hallway, this and other distracting behaviors can become part of a lethal combination when driving. As inexperienced drivers, teens are particularly vulnerable to distractions while driving. In this activity you will investigate the distracted driving behaviors in the safety of your classroom.

Materials:
2.2 SRS Sheet

Procedures (Click on the video):

1. **List any 6 examples of driving distractions?**

VOLUNTARY DRIVING DISTRACTIONS	

2. Rank below which type of distraction would be the least (Rank 1) to the most (Rank 4). Please explain your reasoning.

TYPES OF DRIVING DIRECTIONS	Ranking	Reasoning
Visual = looking at something other than the road		
Auditory = listening to something not related to driving		
Manual = manipulating something other than the wheel		
Cognitive = thinking about something other than driving		

3. Using a stopwatch, measure the time it takes you to complete two practice runs with Touch Track #1. Record your time to the nearest hundredth of a second in Table 1. You will need your SRS (Student Resource Sheet).

PRACTICE RUN	TIME TO COMPLETE TOUCH TRACK #1 (IN SECONDS)
1	
2	

4. Review and agree on role assignments with your group members (see chart below). The "Driver" must complete all of the distractions. You then rotate assignments so everyone becomes a Driver to obtain your own data!

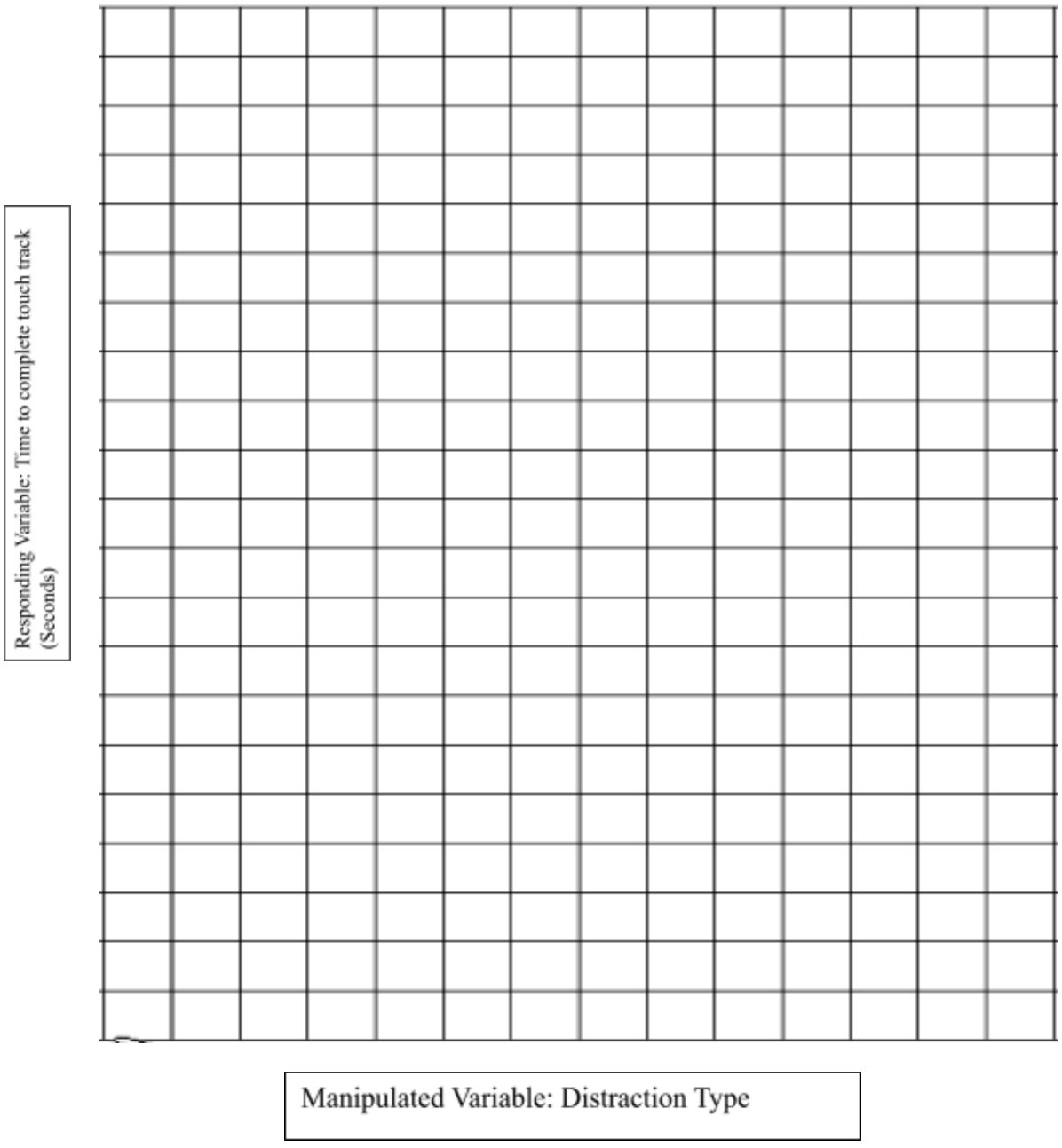
GROUP MEMBER ROLES*	RESPONSIBILITIES
Driver	Drives the Touch Track by touching all numbers in the correct sequence using the index finger on their dominant hand
Checker	Observes Driver to ensure he/she touches the numbers on the Touch Track in the correct sequence
Timer	Uses stopwatch to measure and record the time it takes the Driver to touch all numbers in the correct sequence
Distractor	Distracts the Driver by following the directions in Chart 2.

5. First, complete Touch Track #2 as quickly as possible without distractions to establish a baseline performance time. Later, you will compare this time with your distracted "driving" times. Record your times to the nearest hundredth of a second in the table below. Then please complete a bar graph with your average times below for each distraction going from the least time of distraction to the most.

DISTRACTION TYPE	TIME TO COMPLETE TOUCH TRACK #2 (IN SECONDS)*			
	TRIAL 1	TRIAL 2	TRIAL 3	AVERAGE TIME
WITHOUT DISTRACTIONS				
WITH DISTRACTIONS				
Visual				
Auditory				
Manual				
Cognitive				
All of the above				

***Directions for distraction types are in your second packet labeled SRS!**
***Report time in seconds NOT minute/second combinations.(For example: 1 minute and 15 seconds would be recorded as 75 seconds.)**

Title of Experiment:_____ (Bar Graph)



Analysis Questions:

1. Review your data and rank the three types of sensory distractions from most distracting (longest completion time) to least distracting (shortest completion time). Compare your actual results with your earlier predictions in item 2.

2. What are some possible explanations for the ways different types and combinations of distractions affect the driver's ability to complete the Touch Track?

3. Imagine you are an engineer trying to design an automated in-the-car system to detect distracted driving. As part of the engineering design process you must first clearly define the problem: distracted driving. Work with your team members to create a comprehensive yet brief (one-sentence) definition of distracted driving.

Crash Question:

You are driving a steady 89 km/hr (55 mph) on a highway and you receive a text from a friend. You decide to read the text and text back to your friend while driving. Subtract the time average of your "Without Distraction" trials from the time average of your "All of the Above" Distractions trials to determine the average amount of time sending and receiving a text could distract you and then use this time measurement and your velocity to calculate the distance traveled while distracted. Show your calculations in the box below.

Time Average "Without Distraction" - Time Average "All of the Above" =

Show your calculations here.

Lab 2 Stamp_____Great work!