Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Partner(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date & Period : \_\_\_\_\_\_\_\_\_ , \_\_\_\_

**Break a Sweat**!

Measuring your cardiovascular response to exercise

**A. Introduction**:

**Vital Signs:**

Body temperature

Pulse (heart rate)

Respiration rate

Blood pressure

This module briefly introduces the *health benefits of routine exercise* (particularly for youth) and highlights how *measuring vital signs* (e.g., heart rate) can be key to personalized cardiovascular training success. You will learn how to measure several basic vital signs without specialized equipment, how to calculate your own target heart rate, and will have the opportunity to choose different types, durations, and intensities of physical activity to try to reach and maintain your target heart rate for a minimum of 5 minutes.

1. **Measuring Resting Heart Rate (HRRest) and Respiratory Rate (RRRest)**
2. **HRRest**
   1. While working with a partner, calmly resting & sitting upright, measure your partners pulse by counting the number of beats over 15s through palpation of the carotid or radial arteries
   2. Alternatively, you can determine HRR­ using a heart rate monitor
   3. Repeat this measurement three times, and take an average

**Trial 1**: \_\_\_\_ beats/min, **Trial 2**: \_\_\_\_ beats/min, **Trial 3**: \_\_\_\_ beats/min

**Average HRRest**: \_\_\_\_ beats/min

1. **RRRest**
   1. Working with partner count the total number of breaths (as seen as a rise & fall of the chest) taken in 30 seconds and multiply by 2, while at rest
   2. Repeat this measurement three times, and take an average

**Trial 1**: \_\_\_\_ breaths/min, **Trial 2**: \_\_\_\_ breaths/min, **Trial 3**: \_\_\_\_ breaths/min

**Average RRRest**: \_\_\_\_ breaths/min

1. **Calculating your Target Heart Rate (HRTarget) Zone**

Calculate your target heart rate zone for cardiovascular fitness from the following equations. This assumes that maximum fitness is achieved with exercise levels between 60 and 80% of maximum heart rate (HRMax).

Target Heart Rate (HRTarget) = [(220 – age – HRR­est) x % effort] + HRRest

**Minimum:** Target Heart Rate (HRTarget) = [(220 – \_\_\_\_ – \_\_\_\_ ) x 0.6] + \_\_\_\_ = \_\_\_\_ beats/min

**Maximum:** Target Heart Rate (HRTarget) = [(220 – \_\_\_\_ – \_\_\_\_ ) x 0.8] + \_\_\_\_ = \_\_\_\_ beats/min

My Target Heart Rate Zone is \_\_\_\_\_\_ to \_\_\_\_\_\_ beats per minute.

**B. Data Collection**

With your partner, design an experiment that tests how vital signs will respond to changes in activity duration or intensity.

**C. Graphical Hypotheses**

Graphical hypotheses are tools to help you plan your investigation by thinking about your question, which variables you intend to compare, what you need to measure, and what your predicted outcomes will be. They also help you determine which variables are independent and which are dependent.

**EXAMPLE** (done together in class)

We will measure how \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (duration or intensity of exercise…independent variable/X-axis) affects \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (vital sign…dependent variable/Y-axis). Our prediction, shown in the figure below, is that:

**“as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ increases, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (increase, decrease, or not change).”**

Independent Variable (X): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dependent Variable (Y): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Prediction (full sentence): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**YOUR EXPERIMENT** (done with your partner)

Our pair will measure how \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (duration or intensity of exercise…independent variable/X-axis) affects \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (vital sign…dependent variable/Y-axis). Our prediction, shown in the figure below, is that:

**“as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ increases, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (increase, decrease, or not change).”**

Independent Variable (X): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dependent Variable (Y): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Prediction (full sentence): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**C. Data Table**

**Reminder:** My Target Heart Rate Zone is \_\_\_\_\_\_ to \_\_\_\_\_\_ beats per minute.

**EXAMPLES OF DATASHEET SET-UPS:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Duration** | **Heart Rate** | **Respiration Rate** |  | **Intensity** | **Heart Rate** | **Respiration Rate** |
| 1 MINUTE |  |  |  | 5 per minute |  |  |
| 2 MINUTES  **EXAMPLE** |  |  |  | 10 per minute  **EXAMPLE** |  |  |
| 3 MINUTES |  |  |  | 15 per minute |  |  |
| 4 MINUTES |  |  |  | 20 per minute |  |  |
| 5 MINUTES |  |  |  | 25 per minute |  |  |
| Dependent  Variable  Independent  Variable |  |  | Independent  Variable | Dependent  Variable |  |  |
|  |  |  |  |  |  |  |
| **Duration** |  | Choose one or the other, based on the dependent variable you are measuring. |  | **Intensity** |  |  |
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**E. Break a Sweat! Report Description**

To complete the assignment, turn in a formal report of your investigation on how your cardiovascular system responded to exercise. Provide sections with the following information:

* + 1. Introduction
* Explain why physical activity is important to achieving and maintaining health
* Describe how active you typically are…explain how often you currently exercise, what exercises you perform, and for how long
  + 1. Calculations & Graphical Hypotheses (turn in this completed handout with your lab report)
* Calculations
  + Describe how you measured your resting heart rate and respiratory rate
  + Prove your target heart rate zone and how you calculated the range
* Graphical Hypotheses
  + Complete the *graphical hypotheses* listed previously in this report
  + You need to complete both graphical hypotheses & you may include more if you tested more than 2 unique hypotheses and actually measured data to try to answer them
    1. Methods & Reflection
* Describe the type, duration, and intensity of each of the physical activities tested. Create a graph of your data
* Explain how your hypothetical graph and your actual graph compared
* Explain how difficult AND enjoyable the physical activity was, and whether the you plan to engage in this exercise more regularly as a result of this lab
* Provide at least one example of something you learned through this exercise project
* If you did not reach your target heart rate range, come up with some explanation as to why. Was the exercise not intense enough? Did you not exercise long enough?

*Report Requirements:*

* Single spaced
* 12pt font
* At least one full page
* Remember to refer to each of the following where appropriate:
  + your measurements (HRrest , RRrest)
  + your calculations (HRtarget)
  + your graphical hypotheses
* HAVE FUN!

**Great job breaking a sweat!**