



## Measuring Target Heart Rate

4th Grade Mathematics & Physical Education

Common Core Standard PE 4.3.8—Measure and record changes in aerobic capacity and muscular strength, using scientifically based health-related physical fitness assessments.

Common Core Standard 4.OA.2—Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

Did you know that when we exercise, it is recommended that we make our hearts beat at a certain **rate**? By rate I mean a certain number of heartbeats in each minute. The rate is expressed as beats per minute, or BPM. However, that rate is different for all of us because it depends on our age. That rate that is specific to each of us is called our **target heart rates**.

Why do we have target heart rates? Well, if our hearts aren't beating fast enough while we exercise, then we may not be getting all the benefits, or good things, for our bodies that we could be getting if we exercised harder. If our hearts are beating too fast, this can be bad for our bodies. Don't worry, you'd have to be working pretty hard to get your heartrate up that high. So lets learn about our target heart rates and how to measure them! This is going to be a lot of new and confusing information, so we'll walk through it together.

### **Materials:**

- Pen or pencil
- Piece of paper
- Calculator (if you'd like)

**Developmental Objectives/Domains:** By completing this activity, you will

- 1.) Develop two new skills in understanding measurements of physical activity and algebraic concepts.
- 2.) Understand how algebra can be used in real life situations and how to use guidelines to shape our decisions.
- 3.) Enhance your mathematic skills and quality of exercise plans.

**Procedure:**

1. The calculation for our target heart rate is a big word problem. We'll start by reading through it, and then we'll go through all the steps together.
  - According to Jennifer Brown, an exercise physiologist of Henry Ford Allegiance Health, a person's target heart rate should be at least 60% (or  $\frac{3}{5}$ ) of his or her maximum heart rate (Henry, 2012). A person's maximum heart rate can be calculated by subtracting the person's age from 220. What is a 15-year-old's target heart rate?
2. The first thing we need to understand is that we have a **maximum heart rate**, which is the greatest number of heartbeats in a minute that our bodies can handle. Again, this rate is different for all of us depending on our age. It's a simple calculation. The problem states that the maximum heart rate can be calculated by subtracting the person's age from the number 220. In this case, the person for whom we are calculating is 15 years old. So...

$$220 - 15 = 205 \text{ BPM.}$$

This means that a 15-year-old person should not let their heart beat more than 205 times in a minute.

3. So, if a 15-year-old's maximum heart rate is 205 BPM, what is his or her target heart rate? Well let's look at the rest of the problem. It says that a target heart rate should be at least 60% of the person's maximum heart rate. You probably haven't learned percentages yet, so for now, just know that 60% is the same thing as  $\frac{3}{5}$ . What do we do now?

$$205/1 \times \frac{3}{5} = 615/5 = 123 \text{ BPM.}$$

That's it! A 15-year-old's target heart rate is at least 123 beats per minute. So now let's make this a bit more complicated. \*If you're using a calculator, multiply  $205 \times .6$

4. Let's calculate *your* target heart rate this time. There's an equation we can use to simplify this process, but again, this is probably not something you have learned yet. Still, let's introduce ourselves to it and try to understand it. **Algebra** is a form of

mathematics that helps us represent situations in which some things are unknown, often using letters called **variables**. Yeah...what? Well, let me break that down.

- In this situation, something changes depending on whose heartrate we are calculating. What changes is the age. We can represent the age with a variable. Let's use "y" for our variable.
- We can represent the maximum heart rate in an equation using the variable and 220. The first calculation we made in step 2 above was 220 minus the age. How do we represent that algebraically? Well, if we replace the age with a y, we get...

$$220 - y$$

- Now, finding the maximum heart rate is a calculation in itself, and we have to complete that calculation before we move on to step 3, multiplying by  $\frac{3}{5}$ . So, we'll put parentheses around it...

$$(220 - y)$$

When you have parentheses around a calculation, you read it as, "the **quantity of...**" and you solve the equation in parentheses first. This is also something you probably haven't learned, yet, so don't worry too much about it. For the time being, just take it for fact and follow the steps as outlined here.

- Lastly, we multiply  $\frac{3}{5}$  by the quantity of  $(220 - y)$ . So, our equation to find target heart rate looks like this:

$$(220 - y) \times \frac{3}{5} = \text{Target Heart Rate (BPM)}$$

Let's try together. If you're 10 years old, your equation looks like this:

\* Again, if you use a calculator, find  $220 - 10$  first. Then multiply that answer by .6

$$(220 - 10) \times \frac{3}{5} = \text{Target Heart Rate (BPM)}$$

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$$210 \times \frac{3}{5} = \text{Target Heart Rate (BPM)}$$

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$$210/1 \times \frac{3}{5} = \text{Target Heart Rate (BPM)}$$

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$$630/5 = 126 \text{ BPM}$$

Nicely done! Now go check out the [4<sup>th</sup> Grade Physical Education](#) tab on CPP KARES and watch the video "Measuring Your Active Heart Rate" in the Physical Education tab to learn how to feel/count your heart rate.

**Resources:**

Henry Ford Allegiance Health. (2012). *Simple Exercise to Reach Your Target Heart Range*.  
[https://www.youtube.com/watch?v=rh7ZtJ\\_6\\_48](https://www.youtube.com/watch?v=rh7ZtJ_6_48).