

## MS SEP Review

Zach is seeking to perfect his bottle-flipping skills. He has noticed that the amount of water in the bottle seems to have an effect on whether or not the bottle lands upright. He decides to conduct a scientific investigation.



1. Write 3 questions he might ask to guide his scientific investigation? SEP 1
  - a.
  - b.
  - c.
2. Write a hypothesis for this investigation. Be sure to include a quantitative reference in the hypothesis statement. SEP 3

**Zach plans to use four 12oz soda bottles and fill 3 of them with different amounts of water. One bottle will be flipped empty, the others will contain 25mL, 50mL, and 100mL of water. He will flip each bottle 5 times (5 trials) and record his data.**

3. Which of the following are the necessary controlled variables for this experiment? Mark all that apply. SEP 3
  - All bottles must be the same size and have previously contained the same drink.
  - Each flip must land on the same surface.
  - Each bottle must contain the same amount of water.
  - The same person must execute each flip in the same manner.
4. Use a straightedge to design a data chart for Zach to collect his data. SEP 2, SEP 3

5. His data are below. Fill in your chart with ✓ or ✗, then calculate the success percentage for each amount of water. SEP 5

0mL landed 0 of 5 times upright \_\_\_\_\_

25mL landed 2 of 5 times upright. \_\_\_\_\_

50mL landed 4 of 5 times upright. \_\_\_\_\_

100mL landed 4 of 5 times upright. \_\_\_\_\_

6. Zach's teacher looked at his data and questioned the design of his experiment. This is what she said, "Zach, I like your experiment, but I am wondering about your control. I see that you flipped an bottle empty, and you flipped with different amounts of water. The bottle is a 12oz bottle which would be 355mL. Can you think of another test you should perform that would also be a control?" Help Zach answer this question. SEP 3

7. Zach wants to make a YouTube video about how to be a great bottle-flipper. What are 3 pieces of advice should he offer to viewers based on his data? SEP 6, SEP 7

a.

b.

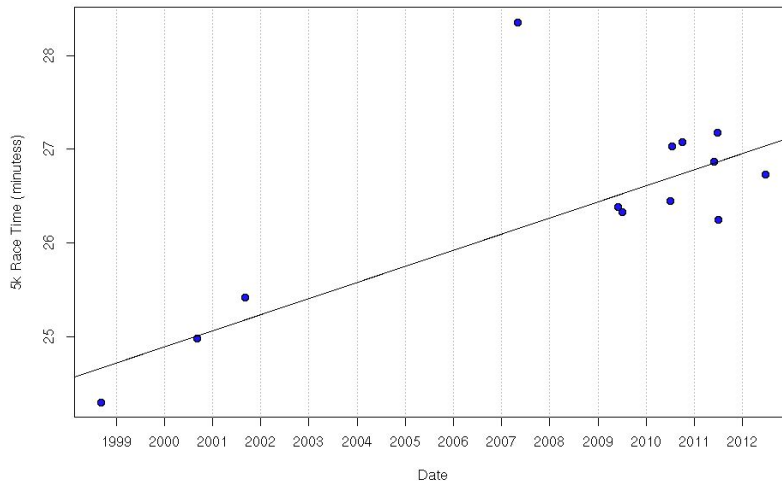
c.

8. Bottle-flipping isn't as easy as it seems. Think of an activity you could design for beginners to help them get started. SEP 9



Morgan’s mom is her school’s coach for the Girls’ running group. The girls are not focussed on competition, their coach is competitive. She has been running 5K races since 1998 and has charted average race times and her personal time since she began. The line on the graph is the average finishing time each year for all of the

participants, and the blue dots are Morgan’s mother’s times when they were beyond the average range.



8. According to the graph people are running 5K races \_\_\_\_\_ than in past years. SEP 4
9. In what year was the average 5K finishing time 25min? SEP 4 \_\_\_\_\_
10. In what year was the average 5K finishing time 26min? SEP 4 \_\_\_\_\_
11. In what year was Morgan’s mom much slower than average? SEP 4 \_\_\_\_\_
12. How many times in 2010 did Morgan’s mom run faster than the average? SEP 4 \_\_\_\_\_
13. If 1 mile is equal to 1.609 kilometers, which is a greater distance, a mile or a kilometer? SEP 5
14. What distance, in miles, is equal to 5 kilometers? SEP 5

## 5K Training Tips

- Add speedwork: If you want to run a faster 5K, you have to practice running faster.
- Add short uphill: Hills require strength and endurance, so if you practice them during your training, you'll develop speed and muscle power
- Incorporate strength training moves that target your shins, calves, quads, glutes, and core. Running alone won't increase your speed. You need to strengthen the muscles that make you move so your actions will be more powerful and more efficient.
- Become familiar with the route: Obtain a map of the 5K course, and if possible, practice running it to familiarize yourself with the hills, curves, and mile markers. Knowing the course in advance will give you confidence and an added advantage over runners who are running it for the first time.

Source: <http://www.shape.com/fitness/training-plans/how-run-faster-5k>

15. Which of the tips are physical (directly related to running faster)? Mark all that apply? SEP 8

- Add speedwork
- All short uphill
- Incorporate strength training
- Become familiar with the route

### Can Running too much Ruin Young Runners?

Mark Hadley has heard it all. The father of junior high phenom Alana, who ran 40–50 miles per week as a 12-year-old and is now up to 70–75 per week as a 14-year-old, has been told that she'll damage her joints, destroy her health, wear out, burn out. One local coach even said, "That's it. You've ruined her. She won't grow any more running all those miles."

While not questioning the concern and good intent of these reactions, we wondered whether they had any scientific validity. There is, of course, the example of African youth, who, while they may not run as much as some legends suggest, put in far more miles, simply as transportation, than most American youth even in aggressive training programs. Elite coach Joe Vigil often estimates that, by the time they reach high school, Kenyan youth have run as much as 10,000 miles more than their American counterparts.

Are American kids different than Kenyan kids, we wondered? How much can kids safely run? Or might this concern for kids' health be more like the notion, 100 years ago, that marathons would make you "go stale" and break down your health, or 30 years ago that women would damage their reproductive organs by running long, or even the persistent myth that running will ruin your knees and give you arthritis? Source:

<http://www.runnersworld.com/high-school/should-kids-run-long>

16. List 4 ways in which opponents say running too much can ruin young runners. SEP 7

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_

17. What is the primary explanation offered by proponents of running at a young age? SEP 7

18. Which side of this scientific argument do you most agree? Why? SEP 7