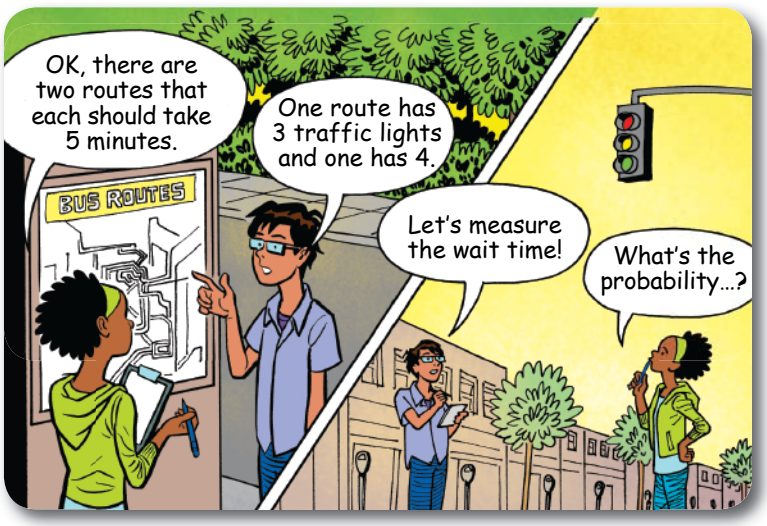
The Case of the Tardy Transportation

Athena and Rick have received an e-mail from the school's transportation director. One of the school's buses is almost always late and she needs to find a solution. "Can you help?"

There are two possible routes the bus can take. If there were no traffic lights, either route would take five minutes. The bus currently takes Elm Street, which has three traffic lights. An alternate route using Washington Road has four lights. "Three lights must be faster than four," suggests the director, but Rick and Athena want to investigate.



Rick first goes to each intersection and measures how long each red light stayed red. Athena then uses the average lengths of the red and green lights to determine the probability of each light being red or green and the average wait time at a red light. Here are their findings:

Elm Street Route		
Intersection	Average Wait Time for a Red Light	Probability of a Red Light
Main Street	2 minutes	1/2
Post Road	2 minutes	1/2
Fairview Avenue	2 minutes	1/2

Washington Road Route		
Intersection	Average Wait Time for a Red Light	Probability of a Red Light
Village Road	1 minute	1/10
Prospect Road	1 minute	1/10
Broad Street	1 minute	1/10
Market Street	1 minute	1/10

Athena knows that to find the total time each route would typically take, she needs to multiply the probability of a red light at each intersection by the average wait time at a red light. She then decides to add those times to the length of time it would take the bus to complete each route with no red lights.

WORK THE MATH

Show your work—use separate paper as needed.

1. **How long will it typically take to complete the Elm Street route? The Washington Road route?**
2. **On the Washington Road route, what is the probability of having the Village Road and Prospect Road lights both be green?**
3. **What is the probability of having all four lights be green on the Washington Road route?**

HINTS:

- To find the probability of more than one event happening, multiply the individual probabilities.
- The probability that a light will be red or green is 100%, or 1.0, expressed as a decimal. The probability of a light being green is 1 – the probability of it being red.