

# Investigating Probability and Risk

Cynthia Peters



**BEFORE YOU READ:** Learn about the “Keeling Curve” and “parts per million” (ppm) on p. 7 and think about these words:  
**CATASTROPHE:** a violent and sudden change  
**PROBABILITY:** the likelihood that something will happen  
**RISK:** the possibility of loss or injury

Compare your answers with those of your classmates. What are the areas of agreement and disagreement? What other **probabilities** do you calculate in your life? What **risks** do you consider?

If the weather report says there is a 20% chance of rain, would you carry an umbrella? What if there is a 50% chance of rain? An 80% chance?

What would you think about when you made your decision? If you were dressed in your best clothes and you were going to a wedding, would you bring an umbrella? What if you were dressed in a T-shirt and shorts and you were running to the corner store and back? Look at the chart below and put a check mark in the square if you would bring an umbrella.

Climate science is like the weather report. It deals in probabilities, not in certainties. But the consequences for all of us are much greater than possibly getting wet during a rainstorm. You and I (and the governments that represent us) have to decide how to respond to climate change.

Average global temperature has risen 1.3 degrees Fahrenheit since about 1850. Recently, it has started getting hotter faster. Scientists believe that if the average temperature goes up by more than 3.6 degrees Fahrenheit (from the 1850 level), the **risk of catastrophic** climate change rises sharply.

When you make your decision, you are thinking about probability and risk:

1. What is the **probability** that it will rain? The answer is a percent or a rank (low, medium, or high).
2. What **risks** do you run if you get wet? To answer this question, weigh the consequences of getting wet. Will it ruin your good clothes? Will you be uncomfortably cold and wet?

	<b>LOW PROBABILITY</b> 20% chance of rain	<b>MEDIUM PROBABILITY</b> 50% chance of rain	<b>HIGH PROBABILITY</b> 80% chance of rain
I am on my way to a wedding.			
I am on my way to a job interview.			
I am walking the dog around the block.			
It's cold outside and I have been sick.			
I can easily change clothes.			

If nations around the world can work together to limit *carbon emissions*, we can slow the rate that we are putting carbon into the *atmosphere*.

If we can decrease *greenhouse gas* concentrations to 350 ppm, then we have a “low probability” of experiencing drastic changes in our climate. If we stabilize greenhouse gases at 450 ppm, then we have a 50% chance of experiencing drastic changes in our climate. If we stabilize greenhouse gases at 550 ppm, then we have an 80% chance of experiencing drastic changes in our climate.

Protecting yourself from climate change is not like protecting yourself from rain. You need more than an umbrella. You need to organize with others to convince your local and federal government to make sweeping changes in how we use energy. What level of probability would cause you to take action (and to join with others to take action) to protect yourself and the planet from the consequences of climate change? Put a check mark in the box if you would take action.

As you weigh the **probability** and **risks** of climate change, think about how it is different from weighing the probability and risks of dealing with other “chances” you might take in life.

**Sources:** Human Development Report: 2007/2008, UN, pp. 34-35; <<http://oceanworld.tamu.edu>>; “Target atmospheric CO<sub>2</sub>” by James Hansen et al., June 18, 2008, <<http://arxiv.org/abs/0804.1126>>.

Cynthia Peters is the editor of *The Change Agent*. Illustration by Ann Cleaves.

**Activity:  
Games of Chance**

50% = 50/100 = 5/10 = 1/2  
Flip a coin. Is it heads or tails? You have a 50% (1 in 2) chance of guessing correctly.



20% = 20/100 = 2/10 = 1/5  
Close your eyes. Ask someone to hold up 1 finger. Guess which finger she is holding up. You have a 20% (1 in 5) chance of guessing correctly.



80% = 80/100 = 8/10 = 4/5  
Ask 5 people to stand up. Close your eyes. Ask 4 of them to raise their hands. Name one person whose hand is up. You have an 80% (4 in 5) chance of guessing correctly.



Try these games a few times. Keep a chart showing how often you guess correctly. Calculate the % of correct answers. Make up new games of chance and calculate the percentage of times you win. Can you create games that give someone a 0% chance of guessing correctly? How about a 100% chance?

	<b>LOW PROBABILITY</b> of catastrophic climate change	<b>MEDIUM PROBABILITY</b> of catastrophic climate change	<b>HIGH PROBABILITY</b> of catastrophic climate change
Sea levels rise; millions lose their homes.			
Drought. Shortage of crops and fresh water.			
Not enough food; higher food prices.			
Many species are extinct. Eco-systems change.			
More cases of malaria and dengue fever.			



**EXPLORE THE GOAL**  
of reaching 350 ppm  
in this 90-seconds/  
no words animation  
[www.350.org](http://www.350.org)

