

STEM *Sims*™

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**Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.**

Start learning right now about how people prepare for natural and human-caused disasters. Take the following brief quiz to see how much you already know about the likelihood a disaster will strike a given region. See the bottom of page 4 to check your answers.

1. Which city has the *greatest* chance of a 5.0 or greater earthquake occurring within the next 50 years?
 - a. Orlando, Florida
 - b. Dallas, Texas
 - c. New York City, New York
 - d. Chicago, Illinois
2. Which city has the *greatest* chance of having a wildfire strike the region?
 - a. Orlando, Florida
 - b. Dallas, Texas
 - c. New York City, New York
 - d. Chicago, Illinois
3. Which city has the *smallest* chance of having a terrorist attack?
 - a. Orlando, Florida
 - b. Los Angeles, California
 - c. New York City, New York
 - d. Chicago, Illinois
4. In which city has the *greatest* number of flash floods occurred since 1953?
 - a. Orlando, Florida
 - b. Dallas, Texas
 - c. New York City, New York
 - d. Chicago, Illinois
5. Which city has the *greatest* chance of having a major bridge collapse?
 - a. Orlando, Florida
 - b. Dallas, Texas
 - c. New York City, New York
 - d. Chicago, Illinois



Playing the Odds

In many cases, preparing for disasters is much like gambling. Some events are more likely to happen than other events. For instance, if four cards are dealt from a normal deck and all four are aces, what is the likelihood that another ace will be dealt? Hopefully, you said that probability was zero, since the deck only has four aces and all have already been dealt. Those charged with preparing for natural and human-caused disaster use the laws of probability to plan for what resources and personnel should be placed in each region of the country. For instance, having landslide rescue teams stationed in Florida is not a good bet since no such event has ever happened in recorded history in that state. This doesn't mean that a landslide cannot happen in Florida, just that it's very unlikely.

Dice are great tools for studying probability. Answer each of the following questions about the likely outcomes from rolling a fair pair of dice. See the bottom of page 4 to check your answers.

1. What number(s) is/are most likely to be rolled using a pair of dice?
2. What is the probability of that most likely number being rolled?
3. What number(s) is/are least likely to be rolled using a pair of dice?
4. What is the probability of that least likely number being rolled?
5. Imagine that you own a casino and you wanted to invent a new dice game. Your new game will be called 6 to 5; in which casino chooses five numbers for a win and the players get the remaining six numbers for their win. If the player bets one dollar, they win one dollar if the roll comes as of their designated six numbers.
 - a. Which five numbers would you, the casino owner, choose?
 - b. At first glance players might think that this a good chance for them to win. Is it?
 - c. What is the real probability that a player has of winning your 6/5 game?



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Legalized Gambling

Insurance is big business in the United States. Home, auto, health, and life insurance are just a few of the policies offered to protect people from loss. Insurance companies make bets by looking at prediction tables to determine their company's risk in case they have to pay off to policyholders. Many companies have stopped writing policies in certain areas of the country since the risk of natural disaster occurring in the area is so high. For instance, only a few insurance companies write home hurricane policies for the people living in the state of Florida because hurricanes strike that state so often and the company's losses in the past have been too great.

Risk assessment is a tool frequently used by those involved with disaster preparedness. Risk assessment helps to determine the level of the risk related to a concrete situation and a possible threat or hazard. The greater the level of risk, the more likely disaster-specific resources and personnel would be needed in that particular area. Risk assessment always involves the potential loss and the probability of occurrence. Events that have extremely large potential losses, but with very small chances of happening must be prepared for differently than events with possible losses that have a very high probability of occurring. An asteroid colliding with Earth has a very small chance of happening in the near future, yet this event would be catastrophic and little could be done to prepare for this incident.



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Answers: Page 2 Answers: 1) c, 2) b, 3) a, 4) b, 5) c. Page 3 Playing the Odds Answers: 1) 7, 2) 1/6, 3) 2 or 12, 4) 1/36, 5a) 5, 6, 7, 8, and 9, 5b) Not fair for the players, 5c) 2/1 chance the casino will win.

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