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TEACHER PAGE

1. Probability All Around Us

Context

daily life

Maths Topic

random events

Overview

Probabilistic events affect everyday life in innumerable ways. In this activity, students are asked to make observations about events that have a random component.

Objectives

Students will be able to:

- describe a random event
- state random and nonrandom properties of events

Materials

- one copy of the Activity 1 handout for each student

Teaching Notes

To get students thinking about probability, ask them to come up with a list of events, games and other everyday occurrences that have a perceived random property.

Discuss the concept of random events. If students are asked to name events in which the results are random, they should be able to come up with coin flips, dice rolls, playing card deals, lottery draws and so on. These kinds of common events are certainly one type of phenomenon that can be considered, but many other phenomena have random components. In fact, nearly any observation of daily activities reveals some underlying randomness.

Emphasise that the outcome of a single random event or experiment of chance cannot be exactly predicted. The variability of a single event makes exact prediction of the outcome impossible. There is no way to know if a coin flip will yield heads or tails or if the weather will be rainy on a particular day six months from now. However, for a large set of repeated random events, there is a useful regularity. This regularity can be expressed by probability. Probabilities express the mathematical likelihood of each possible outcome of a random event. It must be strongly emphasised that probabilities may be measured only for large sets of repetitions. Using a corresponding probability model, mathematics may be used to make useful decisions about events having a random component.

Answers

1. The entries in the table on page 3 are meant to be concise. You might expound on the individual items in a class discussion. Answers will vary, but may include those given on the next page.

2. The term *random* describes events that have underlying variability. Single random events cannot be predicted absolutely. However, using probability and probability models, it is possible to predict the frequencies of outcomes in a large set of random events.

(continued)

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1. Probability All Around Us

Event	Nonrandom Property	Random Property
weather	seasonal change, local climate	precipitation, temperature on specific days
car accidents	safe or unsafe driving practices	specific cars or conditions met on the road
class marks	amount of study and preparation	appearance of specific questions on tests
customers at supermarket	hours open, time of day	specific pattern of customer arrival
state lottery	decisions about games offered, prizes	numbers drawn or winning patterns on tickets

Extension Activity

Have students spend a day or more observing events with random properties and report back to class.

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Name _____ Date _____

1. Probability All Around Us

After your third cricket match in a row is rained out, you are talking with your teammates. One of them says, "Some things just seem to happen. We scheduled these games months ago, but who could have predicted so much rain?"

You ask, "I wonder if this is what my maths teacher means by 'random events'?"

Then you all start thinking about how many situations in daily life seem to happen randomly.

1. The table below lists five common events that have both random and nonrandom aspects. Explain what is random and what is not random about each. Then come up with five examples of your own.

Event	Nonrandom Property	Random Property
1. weather		
2. car accidents		
3. class marks		
4. customers at the supermarket		
5. state lottery		
6.		
7.		
8.		
9.		
10.		

2. Describe what is meant by *random event.* Explain the relationship between probability and randomness.

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10. Two Dice: When Will Doubles Occur?

Answers

1. a. 36

   b. 6

   c. 1/6

2. Student results will vary and will be analysed in Activity 12.

Extension Activities

- Students may study games of chance that involve dice and report on the probabilities of various outcomes in the games.
- Students may expand their study to games with three or more dice.

Name _____ Date _____

10. Two Dice: When Will Doubles Occur?

You love to play Monopoly®, but you hate to land in jail. You need to roll doubles to get out. How long might you have to wait in jail? Complete this activity to find out.

1. a. How many total outcomes are in the sample space for two dice?

   b. How many outcomes are doubles?

   c. What is the probability of rolling doubles on a single roll?

2. Conduct a series of trials in which you roll two dice repeatedly. Use the table below to record your results. A trial will consist of counting the number of rolls until doubles occurs. Record the number of rolls you count for each trial in the table. Start the next trial and count the number of rolls until doubles occurs again. If you don't get doubles after the twentieth roll, call the count 20 and start a new trial. Perform 30 to 60 trials, depending on the amount of time available.

Trial number	Number of Rolls	Trial number	Number of Rolls	Trial number	Number of Rolls	Trial number	Number of Rolls	Trial number	Number of Rolls	Trial number	Number of Rolls
1		11		21		31		41		51	
2		12		22		32		42		52	
3		13		23		33		43		53	
4		14		24		34		44		54	
5		15		25		35		45		55	
6		16		26		36		46		56	
7		17		27		37		47		57	
8		18		28		38		48		58	
9		19		29		39		49		59	
10		20		30		40		50		60	

Follow your teacher's instructions to report and analyse your data.

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11. Two Dice: Sums

Context

games

Maths Topic

waiting times

Overview

Activity 10, Activity 11 and Activity 12 are designed to work together. You may do Activity 10 and Activity 12, Activity 11 and Activity 12, or all three activities. These activities allow students to study the probabilities of the possible outcomes of rolling a pair of dice.

Objectives

Students will be able to:

- understand that when independent events are repeated, outcomes do not depend on previous results
- measure waiting times for discrete, independent events

Materials

- one copy of the Activity 11 handout for each student
- two standard six-sided dice for each student
- calculator

Teaching Notes

Students should first complete the chart showing the sums of all the possible outcomes for rolling a pair of dice. Each outcome has a probability of 1 in 36. Students should be able to add up the number of outcomes that represents each sum.

Next, each student should do his or her own trials. The results are easy to record because there is only one value to write down for each trial: the number of rolls it takes to get a chosen sum. Sixty trials should take about 30 minutes, but you may adjust the number of trials to accommodate the allotted time.

Students are directed to wait for instructions after the trials. You may either go to Activity 10 to collect more data concerning waiting for doubles or go directly to Activity 12 to analyse the data.

Make sure students keep their data sheets for Activity 12. To get a larger sample size, combine everyone's data from this activity and use Activity 12 as a whole-class activity to analyse the data.

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