Digital Lesson.com Presents

# Marvelous Middle School Math

## Statistics, Data Analysis, and Probability Activities

By Mark P. Tully

Mark Tully is a mathematics teacher at Oak Middle School in the Los Alamitos Unified School District, Los Alamitos, California. He has been teaching for about 25 years and during that time has served as Mathematics Department Chairman and as a Mathematics Mentor Teacher. He enjoys developing activities that are designed to present the prescribed mathematics curriculum and standards in a way that is active and engaging.

Mark's website, **www.DigitalLesson.com**, is designed to meet the needs of middle school math teachers. It specializes in providing instant, inexpensive, and engaging math lessons and projects to enhance the middle school math program. Also included on the site are other math resources tailored to the middle school math teacher.

Mark also publishes the ***Middle School Math Treasures*** newsletter. The newsletter includes resources, ideas, and activities for middle school math teachers. A subscription ***to Middle School Math Treasures*** is free! Sign up on the home page of Digital Lesson.com. Unsubscribe at any time. We will never rent or sell your e-mail address. Enjoy this great, free resource!

We would love to hear about your experiences using this book, *Statistics, Data Analysis, and Probability Activities*, in your classroom. Please e-mail us with any comments at digitallesson@yahoo.com.

A publication of Digital Lesson.com

# Preface

Digital Lesson.com is dedicated to being a valuable resource for middle school math teachers who not only want to excel in the teaching of mathematics, but also want to deliver the mathematical curriculum in a manner that engages and involves students. The collection of lessons and projects in this book strive to place mathematics into an active context that is inherently interesting.

**Instant**

The lessons and projects at Digital Lesson.com are instantly available. Upon receipt of payment, your lesson or project is automatically sent to you via e-mail. Save your lesson file to your computer for later use. Then, just "Print and Present" your lesson. No more waiting for delivery and no shipping costs.

**Engaging**

Our math lessons and projects offer students an interesting way to connect to the mathematics prescribed by your required curriculum. Hands-on activities and contextual lessons heighten the sense of usefulness and purpose students find in their mathematics.

**Teacher Friendly**

All blackline masters for the math lessons and projects are included. We have seen far too many great ideas for lessons on the internet that would take hours of time and effort to format before actually being able to use them. All of our lessons come ready to implement in your classroom immediately. Just make a few copies and get ready to inspire your students!

*Teacher Tips* are provided with each lesson to eliminate as many of the "Oh, I'll do that differently next time," moments as possible. The goal of the *Teacher Tips* is to make you an expert in the lesson BEFORE you teach it, not after. Too many lesson plans and projects that we have seen and received over the years leave it up to teachers to use trial and error before they ever teach the lesson effectively. The tips will immediately empower the teacher to teach the lesson more effectively.

**Standards Based**

Finally, the math lessons and projects on Digital Lesson.com have been designed to specifically meet the NCTM math standards and state math standards that teachers are expected to teach. Our intent is to provide more engaging activities, while still covering the same mathematical standards as the textbook. The lessons are intended to be served a la carte, to fill in curriculum holes or just to infuse some excitement and activity into your classroom as you teach a familiar math standard.

Wishing you inspiration and motivation to be the best math teacher you can be!

Mark P. Tully

 

# Table of Contents



 

# Rock, Paper,


# Scissors

# Rock, Paper, Scissors

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**Theoretical and Experimental Probability**

## Background Information

Rock, Paper, Scissors is a game of chance that can be used to make decisions such as "Who gets the last piece of pizza?" or " Who has to take out the garbage?". Some people have even created a sport out of Rock, Paper, Scissors (RPS) and hold tournaments complete with prize money. Others will play RPS just for the fun of it. However you have played it, RPS is known by just about everyone.

## Theoretical Probability of Rock, Paper, Scissors

| Person A Choice | Person B Choice | Winner |
|---|---|---|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

In the chart above list all of the possible combinations that can be chosen by persons A and B as well as the winner of each RPS game. Determine the theoretical probability of each person winning the game and of a tie. Round to the nearest percent. Is RPS a fair game? How do you know?

P (A wins) = _____ ( _____ %) P (B wins) = _____ ( _____ %) P (tie) = _____ ( _____%)

## Experimental Probability of Rock, Paper, Scissors

Individual Data (playing against partner)

Wins _____ ( _____ %) Losses _____ ( _____ %) Ties _____ ( _____ %)

Classroom Data (record all games played)

Wins _____ ( _____ %) Losses _____ ( _____ %) Ties _____ ( _____ %)

How did the theoretical probability of RPS compare to the experimental probability? _____

_____

# Rock, Paper, Scissors

_____

_____

_____

**Rock, Paper, Scissors for Three**

**Creating a Fair Game**

Use the chart below to determine all the possible outcomes when a three-person version of Rock, Paper, Scissors (RPS) is played. Use R (rock), P (paper), and S (scissors) to complete the chart. Then, find the theoretical probability of each player winning. Round to the nearest percent. A tree diagram is a useful tool to help make an organized list of all the outcomes.

Player A wins if all three players display the same hand sign.
Player B wins if all three players display different hand signs.
Player C wins if two players display the same hand sign.

| Possible Outcomes | Winner | Possible Outcomes | Winner |
|---|---|---|---|
| 1) ____ ____ ____ | ____ | 15) ____ ____ ____ | ____ |
| 2) ____ ____ ____ | ____ | 16) ____ ____ ____ | ____ |
| 3) ____ ____ ____ | ____ | 17) ____ ____ ____ | ____ |
| 4) ____ ____ ____ | ____ | 18) ____ ____ ____ | ____ |
| 5) ____ ____ ____ | ____ | 19) ____ ____ ____ | ____ |
| 6) ____ ____ ____ | ____ | 20) ____ ____ ____ | ____ |
| 7) ____ ____ ____ | ____ | 21) ____ ____ ____ | ____ |
| 8) ____ ____ ____ | ____ | 22) ____ ____ ____ | ____ |
| 9) ____ ____ ____ | ____ | 23) ____ ____ ____ | ____ |
| 10) ____ ____ ____ | ____ | 24) ____ ____ ____ | ____ |
| 11) ____ ____ ____ | ____ | 25) ____ ____ ____ | ____ |
| 12) ____ ____ ____ | ____ | 26) ____ ____ ____ | ____ |
| 13) ____ ____ ____ | ____ | 27) ____ ____ ____ | ____ |
| 14) ____ ____ ____ | ____ | | |

P (A wins) = ____ (_____ %) P (B wins) = ____ (_____ %) P (C wins) = ____ (_____%)

Is the game above fair? _____ Why? _____

**<u>Fill in the spaces below to make this a fair game.</u>**

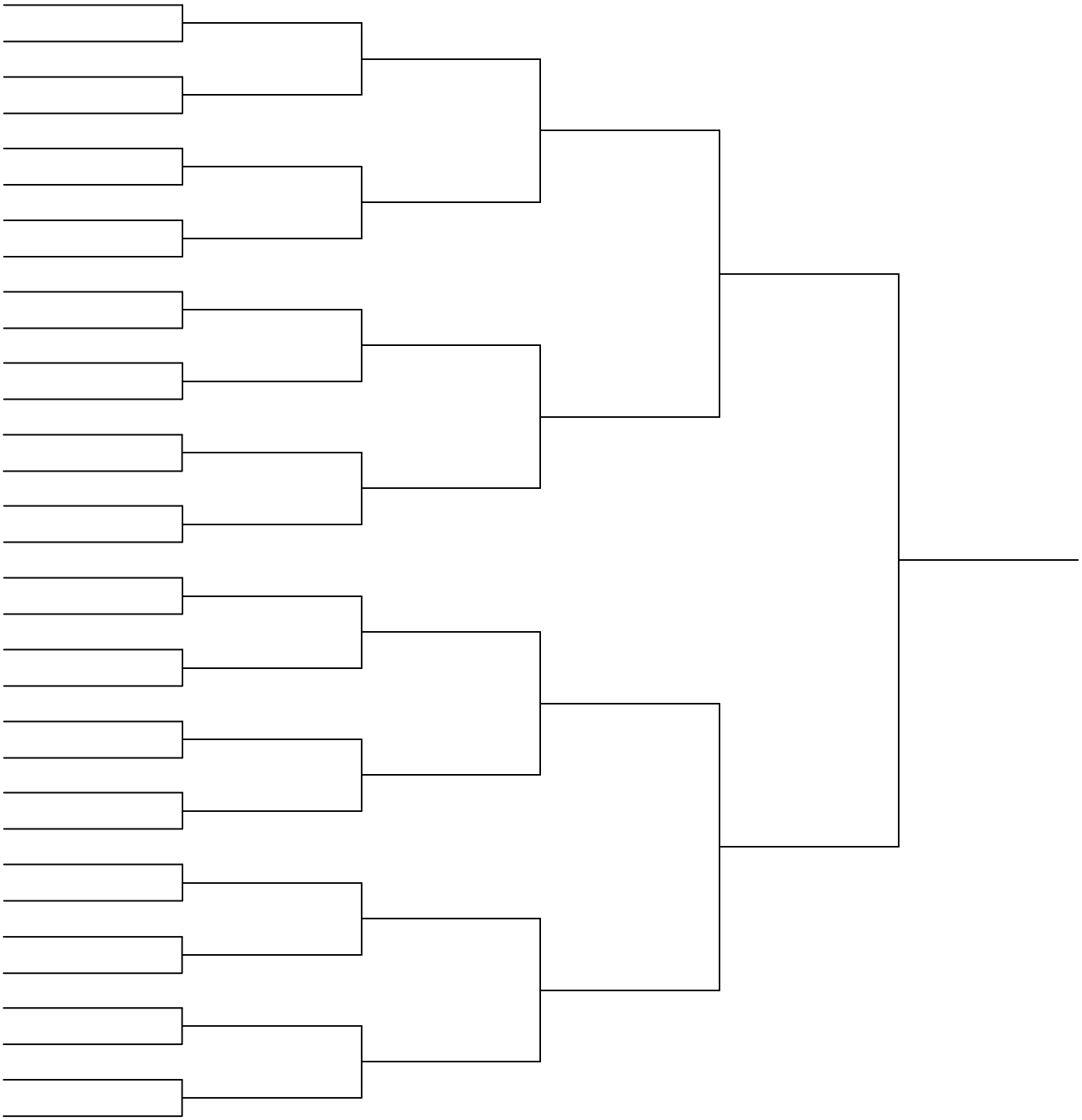
Player A scores _____ point(s) if all three players display the same hand sign.
Player B scores _____ point(s) if all three players display different hand signs.
Player C scores _____ point(s) if two players display the same hand sign.

Play RPS twenty-seven times and keep track of your points. Discuss the results. Is the game fair?

Player A total points: _____ Player B total points: _____ Player C total points: _____

# Rock, Paper, Scissors

**Rock, Paper, Scissors Tourney**



# Likely


# Letters

# Likely Letters

_____

_____

_____

**Statistics and Probability Project**

Whether you are watching the game show Wheel of Fortune or playing Hangman with a friend, it helps to know which letters have the highest probability of use in words. During this project you will conduct an experiment and collect statistical data to discover which letters are the most commonly used in written English language.

Probability, or the likelihood that a specific event will occur, can be determined theoretically or experimentally. Theoretical probability is a ratio that compares the number of specific outcomes to the total number of outcomes possible. For example, to calculate the probability of rolling the number 2 on a number cube, divide 1 (the number of specific outcomes that are a 2) by 6 (the number of total possible outcomes) to determine the theoretical probability of 1/6 or about 16.7%. Theoretical probability can only be determined by mathematical calculation.

Experimental probability is based on performing an actual experiment to collect data. To determine the experimental probability simply divide the number of times that an actual event occurs by the number of times that the experiment is done. For instance, if you flip a coin and it lands on tails 27 out of 50 times, then the experimental probability of getting tails is 27/50 or 54%.

If we took the 26 letters of the alphabet and placed them in a hat and then asked you to choose one without looking, the theoretical probability of choosing each letter would be 1 out of 26 or about 3.8%. However, if we choose a letter at random out of a book or other written material, does each letter still have an equal probability of being chosen? Explain.

_____

_____

To find the probability of choosing any letter in the alphabet (at random) out of a book or other written source, would you use theoretical or experimental probability? Why?

_____

_____

To find the experimental probability of each letter in the alphabet being used, you will collect 100 letters randomly by selecting a small reading passage and then recording your data on the following page. Use 100 consecutive letters. Do not skip around on the page.

Before beginning, **predict** what you think the **top five most-used letters** will be.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐

# Likely Letters

_____

_____

_____

**Data Entry Sheet**

Using the 100 letters from your randomly selected reading passage, fill in the individual data in the chart below. Then enter the data for your group. Finally, enter the data for the entire class.

| | **Individual** | | | **Group** | | | **Class** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Letter** | Number In Sample | % of __**100**__ Letters | Letter Rank | Number In Sample | % of _____ Letters | Letter Rank | Number In Sample | % of _____ Letters | Letter Rank |
| A | | | | | | | | | |
| B | | | | | | | | | |
| C | | | | | | | | | |
| D | | | | | | | | | |
| E | | | | | | | | | |
| F | | | | | | | | | |
| G | | | | | | | | | |
| H | | | | | | | | | |
| I | | | | | | | | | |
| J | | | | | | | | | |
| K | | | | | | | | | |
| L | | | | | | | | | |
| M | | | | | | | | | |

# Likely Letters

## ***Teacher Tips***



**Lesson Description:** Likely Letters is a statistics and probability project that requires students to use experimental probability to determine the letters with the highest frequency of use in written English. The students differentiate between theoretical and experimental probability, make predictions, collect and organize data, and analyze their results to discover which letters of the alphabet are used the most.

**Math Content:** Statistics; Probability; Predicting; Collecting, Organizing, and Analyzing Data; Drawing Conclusions based on their data

**Time Required:** 1-2 Class Periods

**Likely Letters includes:**

* 2 Likely Letters assignment sheets
* 2 Likely Letters Data Entry Sheets
* 3 Likely Letters Teacher Tips pages
* 1 Likely Letters Cover Page

**Materials Needed:** Reading materials (books, magazines, etc.) for data collection

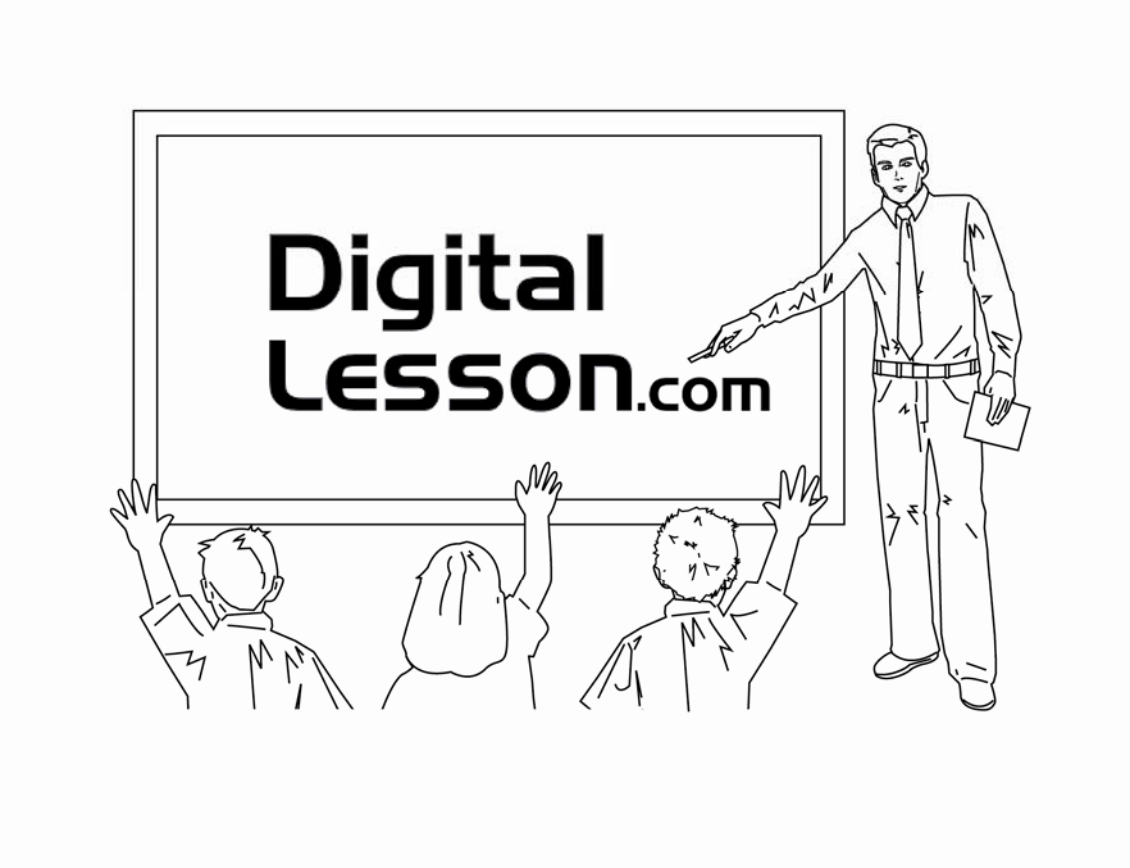
**Suggested Grade Level:** 5th - 8th

**Teacher Testimonial:**
Likely Letters is a lesson that makes statistics and data collection relevant to the students. Most students have watched Wheel of Fortune or played the game Hangman. Both games require a knowledge of letters that are likely to be used in the unknown words. This gives purpose to the data collection. You can also add suspense to the assignment by posting a covered list of the most frequently used letters that will only be revealed after the students complete their investigation.

**Teacher Tips:**

* On the Data Entry Sheet the students will write in the number of each letter found in their written English sample of 100 letters.
* Make sure that students understand how to fill in the total number of letters in their collected data where it says **"Percent of _____ Letters"** in the middle column of their data sheet. The number **100** has already been filled in under the "Individual" column since each student is recording the data for 100 letters. If there are three other students in their group then **400** would be written under the "Group" column. Finally, if the number of students in the class is 32, then **3200** would be written in under the "Class" column.
* Students will calculate the "Percent of _____ Letters" column by taking the number of each letter that they have recorded (from the first column under each heading) and dividing it by the total number of letters recorded. Have students convert the decimal to a percent and **round the percent probability on their data entry sheets to the nearest tenth** of a percent.

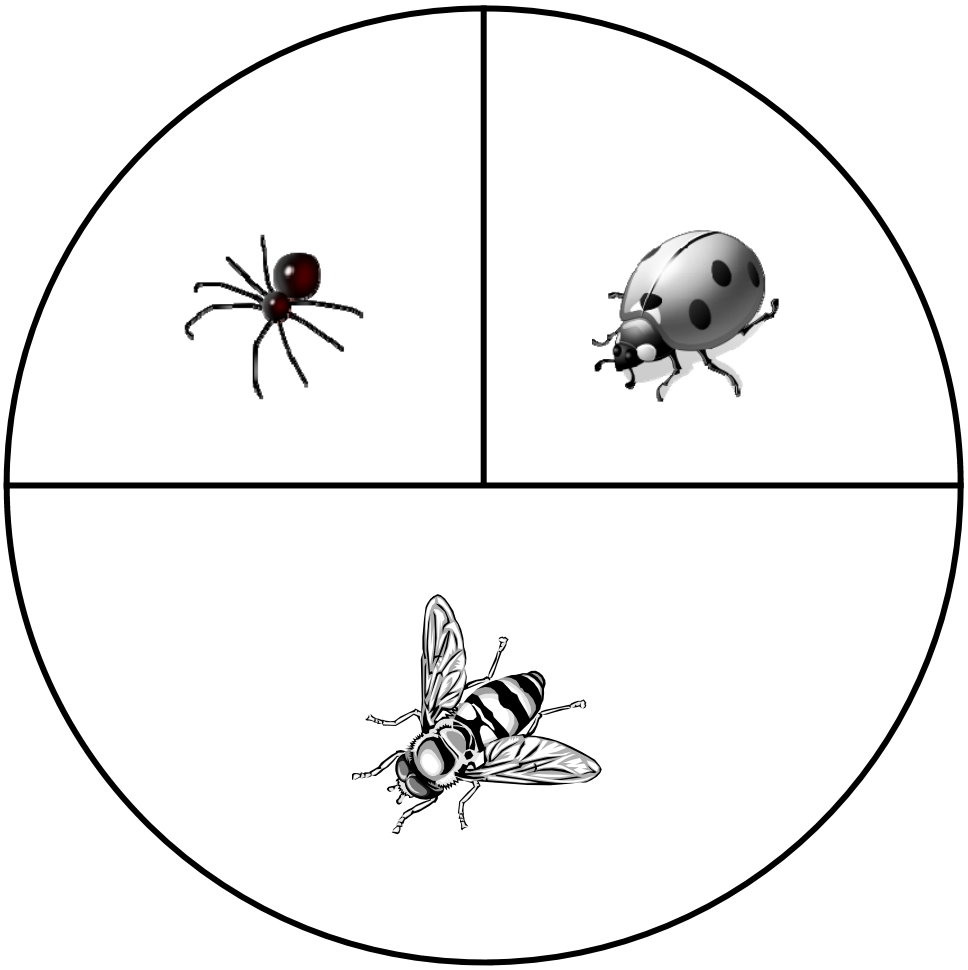
# Super



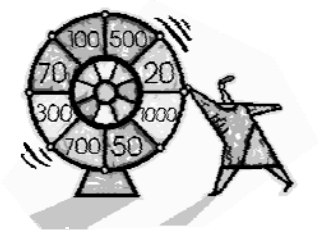

# Spinners

# Super Spinners

**Bugs Spinner**



| | Theoretical Probability | | Experimental Probability | | | Difference |
|---|---|---|---|---|---|---|
| Outcome | Fraction | Percent | Tally | Fraction | Percent | Percent |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |



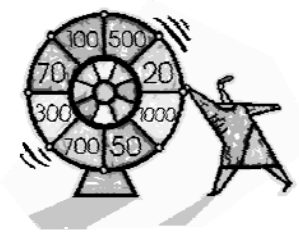
# Super Spinners

**Experimental Probability Data**

| | Individual Data | | Class Data | | Complete Data | |
|---|---|---|---|---|---|---|
| Outcome | Fraction | Percent | Fraction | Percent | Fraction | Percent |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |

| | Individual Data | | Class Data | | Complete Data | |
|---|---|---|---|---|---|---|
| Outcome | Fraction | Percent | Fraction | Percent | Fraction | Percent |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |

| | Individual Data | | Class Data | | Complete Data | |
|---|---|---|---|---|---|---|
| Outcome | Fraction | Percent | Fraction | Percent | Fraction | Percent |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |




# Super Spinners

## ***Teacher Tips***



**Lesson Description:** Super Spinners is a hands-on activity that requires students to analyze three themed spinners in order to compare the theoretical probability of each spinner outcome with the experimental probability from their trials. Students then collect and analyze data from their entire class (and possibly multiple classes) to draw conclusions about the accuracy of experimental probability data in relation to the number of trials completed.

**Math Content:** Theoretical (or Mathematical) Probability, Experimental Probability, Collecting Data, Analyzing Data, Fractions, Percents, Frequency Tables, Using Mathematical Charts, and Drawing Conclusions Based Upon Collected Data

**Time Required:** 1-2 Class Periods

**Super Spinners Probability Activity includes:**

* 3 Super Spinners student worksheets
* 3 Super Spinners student worksheet Answer Keys
* 1 Super Spinners Experimental Probability Data worksheet
* 2 Super Spinners Teacher Tips pages
* 1 Super Spinners Cover Sheet **10 pages in all!**

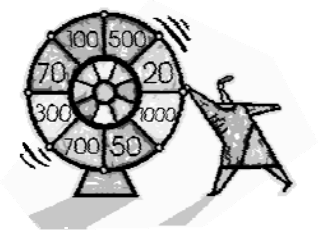
**Materials Needed:** Paper Clips

**Suggested Grade Level:** 5th - 8th

**Teacher Testimonial:** Super Spinners is an enjoyable, active way for students to internalize the concepts of Theoretical and Experimental Probability. The themed spinners allow students to spin for spiders, sports figures, and cell phones instead of less exciting outcomes like numbers or colors. As students collect the whole class data and the complete data from multiple classrooms they should clearly see that the Experimental Probability tends to move closer and closer to the Theoretical Probability as the number of trials increases.

**Teacher Tips:**

* Since the Super Spinners activity focuses on Theoretical Probability and Experimental Probability, it is important that students understand the difference at the start of the lesson.
* Theoretical Probability is the mathematical chance that something should happen. Experimental Probability is the result obtained by actually completing a number of trials of an event. For example, if a spinner section takes up one half of a circle, then the Theoretical Probability would be 1/2 or 50%. However, upon completing a certain number of spins, a student may come up with an Experimental Probability that differs (but is usually close to) the Theoretical Probability.
* To have students use the spinners, provide them with a paper clip and show them how to hold their pencils straight up in the center of the circle and then spin the paper clip with their finger.




# Super Spinners

## ***Teacher Tips***



**Teacher Tips (continued):**

* If a paper clip ends up in two sections it should be counted in the section with more than half of the paper clip. If the paper clip is exactly in the center of two sections the students should spin again. You might also require that the paper clip travels around the circle at least one time on each spin.
* For the Experimental Probability data collection, I recommend having each student spin 50 times for each spinner that you use. This number gives enough trials to allow for meaningful conclusions and it is easily translated into a percent.
* There are three themed spinners provided for this activity. You might do the first "Bugs Spinner" as a whole class activity and then assign the other two as classwork/ homework.
* (Optional) Once individual students have collected their data you may want to compile all of the data for each spinner on the board and have students use calculators to add up the class data. Then, if you have completed this activity with other classes, you can gather all of the data together. Use the Experimental Probability Data student worksheet to track this data. Usually, the more data that is collected the closer that the Experimental Probability will be to the Theoretical or Mathematical Probability.
* Answer keys are provided for each themed spinner worksheet. The Theoretical Probability answers are correct. However, remember that the Experimental Probability answers provided are just a sample of the data that students might collect. Finally, the Difference (Percent) column measures the variation from the Theoretical Probability.
* Notice that the total of the positive and negative percent differences should always equal zero. If you flip a coin 100 times and get 54% heads (+4% from the Theoretical Probability) then you will get 46% tails (-4% from the Theoretical Probability).
* As a final activity you might have students write a paragraph or two explaining the difference between Theoretical and Experimental Probability and having them analyze their data to see if the Experimental Probability got closer to the Theoretical Probability as the Class Data and the Complete Data (multiple classes) were compiled.



**Middle School Math Treasures Newsletter:**
To receive DigitalLesson.com's Middle School Math Treasures newsletter please visit our website at www.DigitalLesson.com and enter your e-mail address in the subscription box . You will then become eligible to receive new lesson updates, math resources and ideas, and a **free printable math game** with **each** newsletter. You may unsubscribe at any time using the link in our newsletter.

**Enjoy your activity!!**
**Mark**

# Quirky


# Quiz

# Quirky Quiz

_____

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**Multiple Choice Quiz**

Complete the multiple choice quiz below. There are no problems to solve or questions to answer.

Simply select A, B, C, or D for each of the ten items below.

Place the correct letter in the answer column.

| | Answer Column | Correct Answer |
|---|---|---|
| 1) …….. | _____ | _____ |
| 2) …….. | _____ | _____ |
| 3) …….. | _____ | _____ |
| 4) …….. | _____ | _____ |
| 5) …….. | _____ | _____ |
| 6) …….. | _____ | _____ |
| 7) …….. | _____ | _____ |
| 8) …….. | _____ | _____ |
| 9) …….. | _____ | _____ |
| 10) …… | _____ | _____ |

# Quirky Quiz

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**Multiple Choice Quiz Probability 1**

For each quiz below list the possible answer combinations and the probability of that combination, assuming that the student has no knowledge of the subject. Round to the nearest tenth of a percent.

| One-Problem Quiz | Combinations | Probability | Percent |
|---|---|---|---|
| | 1) Correct (C) | 1/4 | 25% |
| | 2) Incorrect (I) | 3/4 | 75% |
| | | 4/4 | 100% |

| Two-Problem Quiz | Combinations | | Probability | Percent |
|---|---|---|---|---|
| 1) | C | C | 1/4 * 1/4 = 1/16 | 6.25% |
| 2) | C | I | 1/4 * 3/4 = 3/16 | 18.75% |
| 3) | I | C | 3/4 * 1/4 = 3/16 | 18.75% |
| 4) | I | I | 3/4 * 3/4 = 9/16 | 56.25% |
| | | | 16/16 | 100% |

| Three-Problem Quiz | Combinations | | | Probability | Percent |
|---|---|---|---|---|---|
| Combinations | 1) ____ | ____ | ____ | ____ ____ ____ = _____ | _____ |
| | 2) ____ | ____ | ____ | ____ ____ ____ = _____ | _____ |
| | 3) ____ | ____ | ____ | ____ ____ ____ = _____ | _____ |
| | 4) ____ | ____ | ____ | ____ ____ ____ = _____ | _____ |
| | 5) ____ | ____ | ____ | ____ ____ ____ = _____ | _____ |
| | 6) ____ | ____ | ____ | ____ ____ ____ = _____ | _____ |
| | 7) ____ | ____ | ____ | ____ ____ ____ = _____ | _____ |
| | 8) ____ | ____ | ____ | ____ ____ ____ = _____ | _____ |
| | | | | / | % |

# Quirky Quiz

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**Multiple Choice Quiz Probability 2**

For each quiz below list the possible answer combinations and the probability of that combination, assuming that the student has no knowledge of the subject. Round to the nearest tenth of a percent.

Four-Problem Quiz

| | Combinations | Probability | Percent |
|---|---|---|---|
| 1) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 2) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 3) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 4) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 5) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 6) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 7) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 8) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 9) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 10) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 11) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 12) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 13) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 14) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 15) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| 16) | ____ ____ ____ ____ | ____ ____ ____ ____ = _____ | _____ |
| | | / | % |

# Quirky Quiz

_____

_____

_____

**Multiple Choice Quiz Probability 3**

For each quiz below list the possible answer combinations and the probability of that combination, assuming that the student has no knowledge of the subject. Round to the nearest tenth of a percent if possible or to the leading non-zero digit. A few problems have been completed showing the use of exponents.

| Five-Problem Quiz | Combinations | Probability | Percent |
|---|---|---|---|
| 1) All Correct (C) | C*C*C*C*C | 1/4*1/4*1/4*1/4*1/4 = 1/1024 | 0.1% |
| 2) All Incorrect (I) | I*I*I*I*I | 3/4*3/4*3/4*3/4*3/4 = 243/1024 | 23.7% |

| Six-Problem Quiz | Combinations | Probability | Percent |
|---|---|---|---|
| 1) All Correct (C) | C*C*C*C*C*C | $(1/4)^6 = 1/4096$ | 0.02% |
| 2) All Incorrect (I) | _____ | _____ | _____ |

| Seven-Problem Quiz | Combinations | Probability | Percent |
|---|---|---|---|
| 1) All Correct (C) | _____ | _____ | _____ |
| 2) All Incorrect (I) | $I^7$ | $(3/4)^7 = 2187/16384$ | 13.3% |

| Eight-Problem Quiz | Combinations | Probability | Percent |
|---|---|---|---|
| 1) All Correct (C) | _____ | _____ | _____ |
| 2) All Incorrect (I) | _____ | _____ | _____ |

| Nine-Problem Quiz | Combinations | Probability | Percent |
|---|---|---|---|
| 1) All Correct (C) | _____ | _____ | _____ |
| 2) All Incorrect (I) | _____ | _____ | _____ |

| Ten-Problem Quiz | Combinations | Probability | Percent |
|---|---|---|---|
| 1) All Correct (C) | _____ | _____ | _____ |
| 2) All Incorrect (I) | _____ | _____ | _____ |

# Quirky Quiz

Quirky Quiz Class Statistics

## Student Quiz Scores

| Student Quiz Scores | Tally | Class Frequency |
|---|---|---|
| 0 | | |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

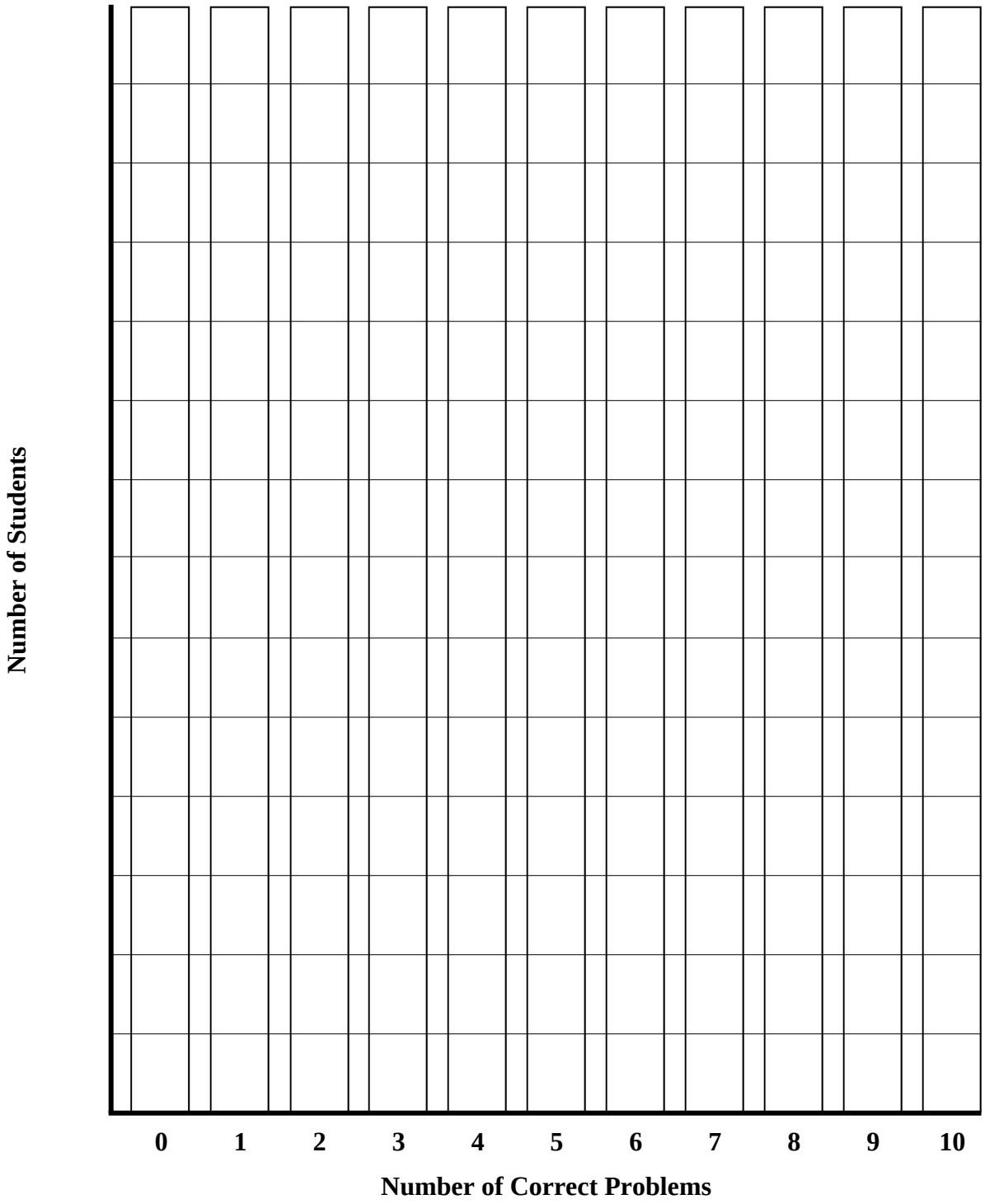
## Number of Students Who Got Each Problem Correct

| Quiz Item Number | Tally | Class Frequency |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

# Quirky Quiz

Quiz Results Bar Graph 1

## Student Quiz Scores



# The Big


# Event


# The Big Event

_____

_____

_____

**Statistics Project - 1**

Have you ever stopped to consider all of the details that must be taken care of in order to put on a big event like a concert? It may surprise you! There are many potential sources on income but also many expenses that must be considered when organizing an event of this size.

**The Big Event:** In a group of three or four students, plan a realistic event to take place on your campus at a location chosen by your teacher. You will visit this location to determine the number of seats available and to discuss the sources of income and the expenses that will be a part of your event. Your goal is to make the maximum profit possible as a young entrepreneur. You will present your proposal to the class. Each student is required to turn in a unique project at the due date.

Type of Event: _____

Other Students in Group: _____

**Seating Chart:** Your group must determine the number of seats available for The Big Event and how much seats in the different sections will cost. Use these numbers to calculate the total income from ticket sales. We will assume that ALL tickets are sold. A color-coded seating chart with a price key will be included with your project.

**Income and Expenses:** Brainstorm ways to make money at your event (income) and the costs associated with putting on your event (expenses). You will do some research later to help you assign realistic numbers to the income sources and expenses.

Without giving away too many ideas, income might come from selling sodas at the event while hiring security guards might be an expense. Be creative and think through this event completely. Do not leave out obvious expenses or miss opportunities to make more income. Remember, the goal is to make the highest profit possible by maximizing income and minimizing expenses.

Sources of Income: _____

Expenses: _____

**Income and Expense Numbers:** After making your seating decisions and brainstorming the other sources of income and expense, get together in your group to determine reasonable numbers for these sources of income and expense. This may require a little research on your part. See your teacher if you have questions.

**Income and Expense Statements, Graphs, and Written Analysis:** Once you have determined the income and expense numbers you are ready to complete the assignments listed on the next page. The Income and Expense Statement should clearly show how your group arrived at each number. For example if you listed $500 for sodas you might explain that you sold 250 sodas at $2 each. Make sure to completely label and color your graphs and to include a well-written analysis of your Big Event.

# The Big Event

## ***Teacher Tips***



**Lesson Description:** The Big Event is a hands-on group project that allows students the freedom to creatively plan a major campus event, taking into account all of the sources of income and expense involved. They design seating charts, create income and expense statements, estimate costs, and make graphs (line, bar, circle, and picto-) to visually show the mathematical results of their planning. Finally, they analyze their project in writing.

**Math Content:** Statistics, Line Graphs, Bar Graphs, Circle Graphs, Pictographs, Income and Expense Statement, Estimating, Real-life Problem Solving Application, Writing about Mathematics

**Time Required:** About 3 Class Periods plus Homework

**The Big Event includes:**

* 2 Big Event assignment sheets
* 1 Big Event Teacher Project Notes
* 2 Big Event Teacher Tips pages
* 1 Big Event Grading Rubric
* 1 Big Event Cover Page

**Materials Needed:** None

**Suggested Grade Level:** 5th - 8th

**Teacher Testimonial:**
The Big Event was a big hit with my students. They enjoyed working in groups on a problem that was a little bit outside of the box. They have to determine the type of event, the seating charts, seat prices, sources of income, expenses, and actual costs before completing their assignment. Many students got excited about the math because they were planning a concert by their favorite group or a movie premier complete with movie stars. Their imaginations provided a backdrop for the mathematics that was used in the project.

**Teacher Tips:**

* This project assumes that students have been taught how to make a frequency table, line graph, bar graph, circle graph, and pictograph or that the teacher will cover this material during the project. The Big Event is designed primarily as an application project, not a skill-teaching project. You will most likely still have to discuss the concepts of income, expenses, and profit with the students and give guidance on the Income and Expense Statement.
* For this project I allow students to choose their groups. This makes it more likely that the type of event will be agreed upon easily and that students with similar interests will use their imaginations to create an outstanding event.