Busting The Brackets: A Guide to Conquering The Madness that is March

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Grades 4th-6th

07/26/2018

Introduction

Rationale

Why are the skills, content, and concepts presented in this unit important for students to learn?

This information presented to students in this unit is very important for them to learn. Students are introduced to the concept of probability and use it to gauge and shape their own decisions. People use probability every day to help them make informed decisions. Some examples include the weather, sports, insurance, prediction algorithms, card games, video games, and daily decision making. These are only a few examples in real life where people use probability. The skills, content, and concepts that the students learn in this unit help them to become skilled at taking in a multitude of information and using it to make choices. In addition, it is important for students to learn this information because they will become more skilled at questioning, reasoning, conjecturing, and solving real-world problems. These are skills that the students will take with them and be able to use for the rest of their lives in the real world. These are all reasons why these skills, concepts, and content are important for the students to learn in this unit.

Differentiation

What elements of this unit make it particularly beneficial or appropriate for gifted learners? (Be sure to discuss the dimensions of differentiation: Content, Process, Product, and Learning Environment AND the features of differentiation: Complexity, Challenge, Depth, Creativity, and Acceleration)

Gifted learners are unique and different. Therefore lessons and content should appropriately address their needs. In this unit, there are a variety of ways that this is done. First, the processes that students will be doing have been thought out to meet these needs. The teacher will be asking questions that promote critical and creative thinking, emphasizing questions that require students to analyze, synthesize, and evaluate, posing different levels of questions based on knowledge and understanding of the topic, and having students participate in a simulation to experience essential understanding and concept. By using these processes, gifted learners will be challenged in their thinking and experiences. Next, the content will be extended beyond the regular curriculum to capture the "big idea." Finally, the product that students produce will be self-evaluated. Using these differentiation strategies will help make content more challenging and meaningful for students. After that, lessons are complex and challenging. Students need to actively think and make sound, informed decisions. The curriculum is not only meeting the standards that this unit addresses but going deep into content to further understanding and capture the "big picture." Next, lessons in this unit are creative and fun for students. They will get to participate in a live simulation as well as have many hands-on learning experiences. Finally, this unit addresses a variety of concepts and topics over only a few days. Normally, these concepts are presented over weeks and/or months. All of these methods used are purposefully thought out to meet all the various needs of gifted learners.

Goals and Outcomes

Content Goal

To understand what probability is.

Outcomes

Students will be able to:

- Compare an independent event from a dependent event
- Calculate all the possibilities of rolling two dice and figure out the percentage of rolling them
- Define a certain event and impossible event
- Calculate real-time probability

Process Goal

To develop decision-making skills based on changes.

Process Outcomes

Students will be able to:

- Analyze matchups in order to make predictions
- Estimate outcomes
- Use problem solving and reasoning
- Use probability to inform decisions
- Make predictions about the probability of an event occurring

Concept Goal

To develop an understanding of how probability influences daily decisions.

Concept Outcomes

Students will be able to:

- Explain situations in everyday life where probability is used to make decisions
- Describe times when they use probability to shape their decisions or predict when they will for future ones
- Predict outcomes that are not predetermined
- Use simulation to connect to real-world experiences

Assessment Plan

What evidence will show that students understand? Describe formative assessments and summative assessment (performance task) that will be used to monitor student progress in meeting established goals throughout unit. Include student work samples (copies and/or photos) that demonstrate student content knowledge, skill development, and understanding of the unit's concept.

There are multiple assessments throughout this unit to monitor student understanding. First, every day the teacher will be using specific questioning that is directly aligned with the learning goals of the students. This will also allow the teacher to gauge what students already know about topics and concepts and adapt instruction accordingly. Next, there are several formative assessments throughout the unit. All of these assessments have been carefully constructed for students to find meaning in the fact that probability influences choice.

On Day 1, there is a formative assessment by means of an exit ticket that answers three main questions: 1.) How can pictures and images tell a story? 2.) In what ways does probability shape everyday decisions? Give a specific example or examples. 3.) How does probability shape decisions in basketball? These questions assess how using a visual thinking strategy can help thinking as well as the overall concept, how does probability influence choice.

On Day 2, the students will engage in the assessment of one another. This will be done during the Socratic seminar. The students will be paired up with someone who they will assess as well as be assessed by. Next, students will play a game called BEANO. They will then answer the following:

<u>Evaluation Questions</u>

1. Based on your graph, which outcome is most likely? What is the probability of rolling the dice and getting that sum?

2. During the actual game, which 3 outcomes appeared most often?

3. Describe the way your strategy changed over the course of the game.

4. After playing this game, what does probability mean to you? If you want to win, should you arrange your beans to match your graph?

The students will use this game and these questions to help prove that probability or chance will shape decisions through the playing of the game. Finally, the last question that the students will answer will show how well the students are understanding the overarching concept.

On Day 3, the students will be creating their own decision-making matrix on something that they would like to make a decision about. This directly leads the students to use probability or likelihood of a certain event and all the outcomes that influence it. Next, the students will be doing

Part 1 of the Performance Assessment. The performance assessment is a summative assessment that will gauge student understanding throughout the entire unit. The students will be asked to use what they have been doing on previous days to inform their decision making.

On day 4, the students will be asked to complete Part 2 of the Performance Assessment. They will be grading their own brackets to see how well they did overall. The last part of the assessment for this day is having the students write 3 things they learned, 2 things that they found interesting, and 1 question that they have. The teacher will lead students in a discussion using this data and students will be able to get any questions that they had answered. This will allow students to get a deeper understanding of the overall picture during the week.

Again, all of these assessments are leading students to the understanding that probability influences choice. This happens all around us every day as well as in a basketball game and basketball tournament.

http://web.mit.edu/mitstep/sites/default/files/Beano.pdf

*Assessment on pages 7-9

https://www.nwabr.org/sites/default/files/SocSem.pdf

*Assessment on pages 5-7

Performance Task:

Joe Lunardi is sick and needs your help! You are tasked with taking his place and being a basketball specialist in this year's NCAA tournament. You will evaluate the top NCAA teams and present your findings to the selection committee for analysis. Then you will fill out your own sample bracket to prove that you know your stuff. Do you have what it takes to be an expert bracketologist?

First, you will need to pick the 68 best teams from the year and rank them, starting with the strongest. There will also be several teams who receive automatic bids for winning their conference tournaments - you must place them as well. Use the data sheets given that are labeled **Part #1** to help you with this element. When you finish ordering the teams, you will then assess yourself using the rubric given.

Second, you will fill out a sample bracket based on what you know about the teams and their actual rankings. Use the information provided in the folder labeled **Part #2**. Remember to use the skills that you learned during this unit when making your decisions. Once you are finished, you will compare your results to the actual results of the tournament. Again, use the rubric provided to assess how well your results compared to the actual tournament.

TEACHER NAME
Jesse Morrison

GRADE LEVEL
5th-7th

NC CURRICULUM STANDARDS
7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. NC.7.SP.5 Describe the probability of events occurring as possible or impossible. NC.7.SP.1 Answer a question related to the collected data from an experiment, given a model of data, or from data collected by the student. 7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

CONCEPT
Probability

ESSENTIAL UNDERSTANDING
Probability Influences Choice

ESSENTIAL QUESTION
How does probability influence choice?

CRITICAL CONTENT - Students will know that...

- Probability is the likelihood that an event will happen
- The odds of predicting a perfect bracket are one in 9.2 quintillion
- A compound event is one with more than one possible outcome
- Probability influences everyday decisions
- Probability can be expressed as a number from 0-1 or a percent from 0%-100%
- An impossible event is something that will never happen (for example, you roll a 7 on a 6 sided die)

PROCESS SKILLS - Students will be able to...

- Compare an independent event from a dependent event
- Calculate all the possibilities of rolling two dice and figure out the percentage of rolling them
- Make predictions about the probability of an event occurring
- Define a certain event and impossible event
- Explain situations in everyday life where probability is used to make decisions
- Look at a piece of art and decipher the deeper meaning

MATERIALS

- VTS Pictures
  https://cdn-s3.si.com/s3fs-public/images/64-unc-michigan-state-2012-fs.jpg
  https://wallpapertag.com/wallpaper/full/1/f/1/762768-download-free-kobe-vs-jordan-wallpaper-hd-3840x2160.jpg
- Round Robin Tournament Matchups - One per student and one large one written or projected
  https://www.printyourbrackets.com/images/18-round-robin.pdf
- https://static.bigideasmath.com/protected/content/pe/red_pe_ch_10.pdf see page 401 Rock Paper Scissors (Hook)
- Random Group Generator https://www.randomlists.com/team-generator
- Simulation Guidelines Page
- Ping Pong Balls
- Bucket
- Sticks with student names
- Cards to go along with simulation page for student use

GUIDING QUESTIONS

Pre-Lesson Questions	During Lesson Questions	Post Lesson Question

• What influences the probability that a given event will occur? • How do you think probability is used in the real world? Make a list of things where probability is used. • Where might we see probability in basketball? • Explain a situation where choices are influenced by probability in a basketball game.	• What factors will influence the ball handler to shoot, pass, dribble, etc.? • How does home-court advantage play a role in a basketball game? • Infer the results of a 11-4 record team vs a 7-8 record team then predict what would happen if a star player was injured during the basketball game • How do chances change what a person or people do? Give a concrete example.	• In what ways did you use probability to make a decision today? • Evaluate the likelihood of being late to class tomorrow. What aspects shaped your conclusion? • Persuade your parents to let you do something fun this weekend. What factors determine the things you thought about asking to do? (such as a birthday party, beach trip, etc.) • How does probability influence your decisions?

PLANNED LEARNING EXPERIENCES

1.) Introduction - 10 minutes

The teacher will introduce him/herself as well as any assistants. Then the teacher will go over the call and response (When I say "basket", you say "ball"). This will be used to get students attention. Another response will be macaroni and cheese, they say "everybody freeze". The teacher will then lead the group in a get to know you activity. The students will be given a task to do around the room such as skipping, hopping, tip-toeing. When the teacher stops, the students will greet someone near them. The teacher will also come up with a greeting such as a handshake, high five, dab greeting, or anything else they or the students choose. The students should greet each other by NAME. The teacher will then give another activity around the room and greeting. Continue this for about 5 minutes until many of the students have greeted one another. Also, challenge students to find a new person each time.

2.) Hook - 15 minutes

*Students will use the handout provided (page 401) to play rock, paper, scissors against a partner. They will then answer the questions on the page. Once students are finished, they will be asked why did they choose rock, paper, or scissors? See pre-lesson questions to have a short discussion with students.

3.) **Visual Thinking Strategy** - 45 minutes

The students will be shown the first picture and asked to look

over it for a few minutes without talking. They will then be asked to share what they see in the picture. When they do, ask what makes you say that? What else do you see? Keep probing students to delve deeper into the picture and elicit the deeper images within it. This should take the first 15 minutes. After that, use the during lesson questions to help guide a student conversation (try to keep the focus around how probability influences choice). This part should take about 8 minutes. When time is up, move on to the second picture and do the exact same thing that you did for the first one.

3.) Introductory Reading Passage about Probability - 10 minutes

4.) Basic Probability Worksheet - 20 minutes

Students will need a deck of cards and two dice for this activity. Have students work through the worksheet. For question #4, **do not** go into depth too much, especially about the chart. After most students finish, begin going over answers with students. As you do, use questioning to gauge how much students are understanding about probability.

5.) Round Robin Tournament (Beginning of Simulation) - 75 minutes

The teacher will pass out a round robin tournament page to each student. This will show students who they will be playing against for each round. Use simulation guidelines page to help go through a sample game. Students should get through 6 rounds which means they will play against 6 different people. As the teacher, you are the super moderator. You should be stopping play at random times for students to roll their 12 sided

dice to earn or lose cards. In addition, you should be drawing a student name from the "hat" to take a shot at the bucket using a ping-pong ball. The ball must stay in the bucket for it to count. You can make up a word such as "buckets" when you draw the name so that students know that to do.

6.) Assessment and Discussion - 10 minutes

The teacher should use the post-lesson questions to lead a discussion with students about what they learned today. They will also complete the exit ticket during this time.

ASSESSMENTS

1.) Exit Ticket: Answer the following:

A.) How can pictures/images tell a story?

B.) In what ways does probability shape everyday decisions?

C.) How does probability shape decisions in basketball?

DIFFERENTIATION

CONTENT

PROCESS
Ask questions that promote critical and creative thinking.

PRODUCT

LEARNING ENVIRONMENT

TEACHER NAME
Jesse Morrison

GRADE LEVEL
5th-7th

NC CURRICULUM STANDARDS
NC.7.RP.1 Model part-to-whole and part-to-part ratios to compare two measures of the same type. NC.7.SP.5 Describe the probability of events occurring as possible or impossible. NC.7.SP.1 Answer a question related to the collected data from an experiment, given model of data, or from data collected by the student.

CONCEPT
Probability

ESSENTIAL UNDERSTANDING
Probability Influences Choice

ESSENTIAL QUESTION
How does probability influence choice?

CRITICAL CONTENT - Students will know that...

- an event is a thing that happens, especially one of importance
- an outcome is a way a thing turns out; a consequence
- probability can be measured using percents, fractions, and decimals
- personal judgment can play a role in probability

PROCESS SKILLS - Students will be able to...

- determine the outcomes and probabilities for experiments
- write a ratio of probable and improbable events
- distinguish between an event and an outcome of an experiment
- begin to understand how to make a guess at the frequency of an outcome
- describe times when they use probability to shape their decisions or predict when they will for future ones

MATERIALS

- Reading Passages for Socratic Seminar (One about probabilities in everyday life and one about basketball, see two bullets below)
- https://www.betfirm.com/seeds-national-championship-odds/ Math in Basketball
- http://catalogimages.wiley.com/images/db/pdf/0471751413.excerpt.pdf Probability in everyday life
- Round Robin Tournament Matchups - One per student and one large one written or projected (Same as Day 1)
- Lollipops for students (at least 20)
- Dice Activity Page:
- Close Reading Help Page https://nieonline.com/tbtimes/downloads/CCSS_reading.pdf
- Socratic Seminar Guidelines https://www.nwabr.org/sites/default/files/SocSem.pdf
- Website for comparing strength of schedule to to tournament results https://www.ncaa.com/news/basketball-men/bracketiq/2018-01-22/march-madness-what-having-hardest-strength-schedule-means
- RPI Team Comparison (UNC vs Kentucky) https://www.cbssports.com/collegebasketball/bracketology/team-comparison/UNC/UK
- Beano Activity - http://web.mit.edu/mitstep/sites/default/files/Beano.pdf
- Bag of Beans, deck of cards, 2 dice for each student

- Simulation Guidelines Page
- Ping Pong Balls
- Bucket
- Sticks with student names
- Cards to go along with simulation page for student use

GUIDING QUESTIONS

Pre-Lesson Questions	During Lesson Questions	Post Lesson Question

- How is probability used in everyday life?
- What is your opinion on a teacher giving grades based on one test or one assignment?
- If 50% of students in a class said they like rap music, what percentage of the whole school likes rap music?
- How would you determine if someone is a good shooter in basketball?
- If it were going to rain, how high percent chance would it have to be for

- Why is data collected and analyzed?
- How do people use data to influence others?
- How can predictions be made based on data?
- Why is accurate decision making important?
- What chances do you have of choosing a certain color lollipop without looking?

- What choice would you have made if there was an accident on your route to work?
- What data is used to make the conclusion that a person is a good free throw shooter?
- What choice would you have made if you were a basketball coach and down by 3 points with little time left in the game?
- How does probability influence your everyday decisions?

you to bring an umbrella for the day? Why?		

PLANNED LEARNING EXPERIENCES

1.) Intro/Hook - 10 minutes

The teacher will then ask students to draw a lollipop from a bag that they cannot see into. They will be asked after they each drew one what the probability was that they drew a certain flavor (students should ask how many flavors there are, if not let them know that that is something that they will need to know to figure out their chances; they will also need to know the total number of lollipops). Students will need time to discuss and figure out what their chances were. The teacher will write a ratio on the board and ask students to come up with the different probabilities for each. For example, if there are 30 total lollipops and 5 are grape, you have a 5 in 30 chance (1 in 6 when simplified) of drawing that flavor. What about the other flavors? The teacher will then ask would the probability have changed if they knew that they were allowed to trade their lollipop? Allow students to then trade lollipops with one another if they would like. Did the chances of you getting the flavor you wanted improve? What were the constraints or limitations? What were they? How did your chances affect your choice of trading your lollipop? The students will then be able to eat their lollipops while they do part two of the dice activity.

2.) Beano - 30 minutes

Beano Activity
- http://web.mit.edu/mitstep/sites/default/files/Beano.pdf

Follow the instructions on the handout and play the game with students. When you finish playing, have the students answer

the questions.

Finish the game and answer discussion questions.

3.) **Socratic Seminar** with Reading Passage - 45 minutes

The students will be given the first reading passage about finding probability in everyday life. They should employ Close Reading during the text. The teacher should model this on the first page. (see Close Reading attachment for help). The teacher will lead a Socratic seminar (see guidelines in materials section). The teacher will facilitate the discussion, however, he/she should be careful not to dominate it as this should be student driven. The underlying thing to get students to understand is that probability influences choice. Try to keep the topic centered around this element. During the seminar, there should be an inner circle, where students are discussing, and an outer circle where students are quietly observing. Give the first inner circle 8 minutes to discuss, then switch and do the same for the other group. If time permits at the end, have students simply read the other article. If students do not get to the second article, it should be used throughout the rest of the week to give to early finishers.

***Note: depending upon the size of the group, you could give half the class one passage to read and the other half the other one.

4.) Lesson: Analyzing Strength of Schedule - 30 minutes

The teacher should first show the page that compares UNC/Duke's strength of schedules and records vs top teams. This can be analyzed and looked at to help make predictions in

the NCAA tournament. For instance, how likely is it that a very low seed can upset a higher one? Have they done it in the past? If so, how many times? What were their best wins and worst losses? The teacher should then post the Strength of schedule page (see materials) on the board. He/she will scroll down to each of the boxes and analyze what they are trying to say. The point of showing students this is to show that teams do want a tough schedule, but not the toughest one there is. Why do the students think this is?

5.) Round Robin Tournament Day 2 - 60 minutes

The students will keep progressing through the round robin tournament just as they did yesterday. Today they will be playing with 5 different people.

6.) Assessment - 5 minutes

Give each student a notecard. Write the following question on the board and ask them to answer it: How does probability influence choice?

ASSESSMENTS
1.) Socratic Seminar Discussion Question Page (remember to think about How does probability influence choice?) 2.) Beano Assessment Page (see materials) 3.) Notecard Assessment at the end of the lesson

DIFFERENTIATION

CONTENT
Extending ideas and topics beyond the regular curriculum to capture the "big idea."

PROCESS
Emphasize questions that require students to analyze, synthesize, and evaluate.

PRODUCT

LEARNING ENVIRONMENT

TEACHER NAME
Jesse Morrison

GRADE LEVEL
5th-7th

NC CURRICULUM STANDARDS
7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

CONCEPT
Probability

ESSENTIAL UNDERSTANDING
Probability Influences Choice

ESSENTIAL QUESTION
How does probability influence choice?

CRITICAL CONTENT - Students will know that...

- A hierarchy is a system or organization where people or groups are ranked one above another according to status or authority.
- A decision-making matrix is something that compares different aspects of things
- An outcome is a way something turns out or happens.
- Not all outcomes occur as expected.
- Independent events are not affected by the results of a previous event, dependent events are affected by previous outcomes.

PROCESS SKILLS - Students will be able to...

- Analyze matchups in order to make predictions
- Estimate outcomes
- Use problem solving and reasoning
- Calculate real-time probability
- Predict outcomes that are not predetermined

MATERIALS

- Part 1 of Performance Assessment
- Decision-Making Matrix Page
- Round Robin Tournament Matchups - One per student and one large one written or projected (Same as Day 1 and 2)
- Deal or No deal Site http://www.agame.com/game/deal-or-no-deal-iwin
- Decision Making Matrix Powerpoint http://slideplayer.com/slide/4929098/
- Simulation Guidelines Page
- Ping Pong Balls
- Bucket
- Sticks with student names
- Cards to go along with simulation page for student use

GUIDING QUESTIONS

Pre-Lesson Questions	During Lesson Questions	Post Lesson Question

• Are all choices considered fair? • What makes it more likely that you will keep trying for a higher prize? • What affects the choice you make to stop or keep playing? • Does playing on a team persuade you to think differently than if you were by yourself? • How does probability influence the decisions that you make in the game?	• What is a hierarchy and what are the benefits of creating one in the march madness bracket? Who does it favor? • How is a hierarchy determined in the NCAA tournament? • Do outcomes always occur as expected? • What determines hierarchical seeds in the NCAA tournament? • How can decision-making matrices help us predict outcomes?	• Does creating a hierarchy in sports always generate the expected results? Why? • Is it probable that only number one seeded teams will make it to the final game? • Are outcomes determined by independent or dependent events in an NCAA bracket? • How does hierarchy affect probability? • How likely is it that a team will produce an upset?

PLANNED LEARNING EXPERIENCES

1.) Intro/Hook - 15 minutes

Group the students into 2 teams using the random group generator. Tell them that they will be playing the game, Deal or No Deal. They will compete against one another in teams. Tell them that the winning team will be rewarded with a treat (you will give everyone one, just livens the competitive spirit). You will then ask students how we can decide what team goes first. They will play through the game and try to make the best deal that they can (get the most money). Use the pre-lesson questions to help guide student thoughts.

2.) Lesson: Decision Making Matrix - 45 minutes

***This is where the **questioning lesson** fits in

1. The teacher will begin the lesson by giving students a list of basketball teams that are each on a separate notecard. On the card will be the team, their record, and some key wins and losses. The students will be asked to rank teams from best to worst using only what is on their notecards. They should be given 10 minutes.
2. After students have finished, ask them how did they rank their choices. What made a team better than another? Next, have a class discussion using the during-lesson questions.
3. Next, students will each draw one of the teams that they ranked in order from a bag. The teacher will then rank students the same way that they did at the beginning of the activity with the notecards. The teacher will ask students

where teams should be put in the empty bracket. Why should teams be placed this way? The teacher will also continue with the pre-lesson questions and the applicable during lesson questions.

4. After that, students will be shown what a decision-making matrix is, you can see the example in materials list and project it. Work through the powerpoint and discuss the various elements of what a decision matrix is. Then, the teacher should pose the question: How could a decision-making matrix be used to choose winning teams in the NCAA tournament?
5. Students will then be given a blank decision matrix. They will then be given a list of teams with various statistics. They will be asked to use the matrix to analyze teams and predict who they think would win based on the data. They will be asked to do this for 3 separate matchups.
6. Finally, students will be asked how the combined probability of these matchups lead them to the choices they made.

3.) Round Robin Tournament Day 3 - 75 minutes

Today, students will finish playing against the other opponents who they have not played. This can be found on their round-robin sheets that they have been filling out (should be 6 more games) At the conclusion of this,

4.) Performance Assessment Part 1 - 40 minutes

Joe Lunardi is sick and needs your help! You are tasked with taking his place and being a basketball specialist in this year's NCAA tournament. You will evaluate the top NCAA teams and

present your findings to the selection committee for analysis. Then you will fill out your own sample bracket to prove that you know your stuff. Do you have what it takes to be an expert bracketologist?

First, you will need to pick the 68 best teams from the year and rank them, starting with the strongest. There will also be several teams who receive automatic bids for winning their conference tournaments - you must place them as well. Use the data sheets given that are labeled Part #1 to help you with this element. When you finish ordering the teams, you will then assess yourself by comparing your results to the actual results. You will then turn this page in.

5.) Assess and Discuss - 10 min

Students will make their own decision matrix based on something that they have wanted to decide such as what video game to buy or what food they want for dinner.

ASSESSMENTS

1.) Performance Assessment Part 1

2.) Decision Matrix Assessment

DIFFERENTIATION

CONTENT

PROCESS
Pose different levels of questions based on knowledge and understanding of the topic.

PRODUCT

LEARNING ENVIRONMENT

TEACHER NAME
Jesse Morrison

GRADE LEVEL
5th-7th

NC CURRICULUM STANDARDS
7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. NC.6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers

CONCEPT
Probability

ESSENTIAL UNDERSTANDING
Probability Influences Choice

ESSENTIAL QUESTION
How does probability influence choice?

CRITICAL CONTENT - Students will know that...

- A simulation an imitation of a situation
- Simulations can model outcomes but are not 100% accurate
- Past outcomes help determine future results
- Upsets in the tournament happen but are not likely

PROCESS SKILLS - Students will be able to...

- Use simulation to connect to real-world experiences
- Analyze data to determine predictions
- Use probability to inform decisions
- Accurately predict the outcomes of a sample bracket

MATERIALS

- 2 sets of dice for each group
- simulation guidelines page (see attached)
- Basketball upset statistics page https://www.printyourbrackets.com/ncaa-tournament-records-by-seed.html
- 18 Seeded bracket to post on large paper or project https://www.printyourbrackets.com/fillable-brackets/18-seeded-single-fillable.pdf
- Final Activity (time permitting)

  https://www.ncaa.com/news/basketball-men/bracketiq/2018-03-04/march-madness-7-signs-you-picked-too-many-ncaa-tournament

GUIDING QUESTIONS

Pre-Lesson Questions	During Lesson Questions	Post Lesson Question

- What is a simulation? How can it be useful?
- How will our simulation be an accurate representation of what happens in the NCAA tournament bracket?
- What other kinds of things could be simulated in life outside of sports?
- What things do you simulate in your head about life? For example, maybe the day you'll have or how well you will do on your test or

- How can a simulation model an expected outcome 100% of the time?
- Why is it fair that some people have more chance cards than others during the simulation?
- During each of the rolls, what are the most probable things to happen in the simulation?
- In real life, how will human error affect the results?

- How likely are you to fill out a perfect NCAA bracket?
- Why are simulations not 100% accurate?
- How does probability influence choice in basketball? In everyday life?
- How are your decisions going to change in the future from taking this course?

assignment.		

PLANNED LEARNING EXPERIENCES

1.) Intro/Hook - 15 minutes

Watch the videos and have a fun discussion with students about the fun and excitement of the NCAA tournament.

https://www.youtube.com/watch?v=bwAlS32dXmE

https://www.ncaa.com/news/basketball-men/bracketiq/2018-03-13/what-march-madness-ncaa-tournament-explained

2.) Performance Assessment Part 2 - 45 minutes

Joe Lunardi is sick and needs your help! You are tasked with taking his place and being a basketball specialist in this year's NCAA tournament. You will evaluate the top NCAA teams and present your findings to the selection committee for analysis. Then you will fill out your own sample bracket to prove that you know your stuff. Do you have what it takes to be an expert bracketologist?

Second, you will fill out a sample bracket based on what you know about the teams and their actual rankings. Use the information provided in the folder labeled Part #2. Remember to use the skills that you learned during this unit when making your decisions. Once you are finished, you will compare your results to the actual results of the tournament. Again, use the rubric provided to assess how well your results compared to the actual tournament.

3.) **Simulation** - 75 minutes

1. Students will be placed on a sample bracket according to their results from the round robin tournament. The

simulation rules are still the same as the round robin tournament. Students should still have cards from the week as they have been collecting them.

2. The teacher will go to the board and place the winners into the next round. (Students will be finishing the tournament as the week progresses; losers will play against each other in the NIT tournament for fun). Students will be asked to analyze the results.

   Simulation Rules: See Simulation Guidelines Page https://docs.google.com/document/d/1jLGUQGB4QIBTgMM0BXQas2Pqmh1aOTuksXT4Mw3Ze3Q/edit

4.) Closure Activity and discussion 30-45 minutes (This depends on the timing of simulation). If no time for the activity that is okay. The teacher should use the post-lesson questions to wrap up the unit (at least 15 minutes)

-Activity if needed:

NCAA tournament by the numbers. Students will be shown some articles and video clips. This should lead to a discussion about how to choose teams accordingly when filling out a bracket. If you're able, make sure to incorporate how probability influences their choices. See Materials list for these resources.

Lead a discussion using the post-lesson questions.

ASSESSMENTS

1.) The teacher will assess students formatively as they engage in the simulation and ask questions.

2.) The teacher will give everyone a sticky note at the end of the lesson. On the sticky note, each person will write three things they learned, two things that they found interesting, and one question that they still have about the week. After students finish, the teacher will give students a chance to ask the questions that they wrote and have a classroom discussion.

3.) Performance Assessment Part 2

DIFFERENTIATION

CONTENT

PROCESS
Students will experience essential understanding and concept through participation in a simulation.

PRODUCT
Have students self-evaluate their work.

LEARNING ENVIRONMENT

Unit Resources

Provide a listing of books, Web sites, videos, and/or other instructional materials that are intended to supplement the unit. Include resources intended for both teacher and student use. Be sure to use APA style for books/articles and provide a brief (1-2 sentence) annotation for Web sites and instructional materials.

Unit Resources:

APA Citations:

What is Probability? How Does It Shape Our Lives? (n.d.). Retrieved from http://www.mathworksheetscenter.com/mathtips/probability.html

*Short reading passage of basic probability in everyday life.

D. (2012, February 29). Odds of a perfect NCAA Basketball Bracket - DePaul Expert, Professor Jeff Bergen. Retrieved from https://www.youtube.com/watch?v=O6Smkv11Mj4

*Video of a math professor explaining the odds of picking a perfect bracket.

History of Records By Seed in the NCAA Tournament. (n.d.). Retrieved from https://www.betfirm.com/seeds-national-championship-odds/

*Reading passage for the Socratic seminar about the history of the records by seed in the NCAA.

NCAA Tournament Records By Seed - 1st Round Upset Chances. (n.d.). Retrieved from https://www.printyourbrackets.com/ncaa-tournament-records-by-seed.html

*Page describing some interesting facts about the NCAA tournament.

Wilco, D. (2018, March 02). March Madness: What having the hardest strength of schedule means for your NCAA tournament hopes. Retrieved from https://www.ncaa.com/news/basketball-men/bracketiq/2018-01-22/march-madness-what-having-hardest-strength-schedule-means

*Analysis of what strength of schedule means in the NCAA tournament. Notes how the past 10 teams have fared in the tournament with the strongest season schedules.

College Basketball RPI Team Comparison. (n.d.). Retrieved from https://www.cbssports.com/collegebasketball/bracketology/team-comparison/UNC/UK

*Comparing Two Similar Teams.

Deal or No Deal. (n.d.). Retrieved from http://www.agame.com/game/deal-or-no-deal-iwin

*Deal or No Deal Game for Ice-Breaker.

Decision-Making Matrix Taking a Close Look at Preliminary Ideas. - ppt download. (n.d.). Retrieved from https://slideplayer.com/slide/4929098/

Decision-Making Matrix Powerpoint.

Taylor, C. (n.d.). What Are the Probabilities for Rolling Two Dice? Retrieved from https://www.thoughtco.com/probabilities-of-rolling-two-dice-3126559

Outcomes of rolling two dice chart. You will only use the chart about halfway down the page.

PDF Attachments:

https://www.printyourbrackets.com/images/18-round-robin.pdf

This is for the round robin tournament. Students should keep track of their scores and records on this page.

https://www.printyourbrackets.com/fillable-brackets/18-seeded-single-fillable.pdf

*This is for the round robin tournament. Use it on the last day after students have been seeded.

http://web.mit.edu/mitstep/sites/default/files/Beano.pdf

*Beano Game

https://www.nwabr.org/sites/default/files/SocSem.pdf

Socratic Seminar Guidelines and page for students to fill out as part of an assessment.

https://www.ohio.k12.ky.us/userfiles/1132/Prob2.pdf

*Basic probability worksheet with dice and cards.

https://wallpapertag.com/wallpaper/full/1/f/1/762768-download-free-kobe-vs-jordan-wallpaper-hd-3840x2160.jpg

*Picture for Visual Thinking Strategy

https://cdn-s3.si.com/s3fs-public/images/64-unc-michigan-state-2012-fs.jpg

*Picture for Visual Thinking Strategy

http://catalogimages.wiley.com/images/db/pdf/0471751413.excerpt.pdf

*Probability in everyday life. Passage for Socratic Seminar.

https://www.teamrankings.com/ncaa-tournament/NCAA-Tournament-Printable-Bracket-2012.pdf

*2011 fillable bracket for Performance Assessment.
