

3rd Grade Statistics and Probability

Data Display: The student demonstrates an ability to classify and organize data by:

[3] S&P-1 [Designing an investigation and collecting, recording L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., literature, self, or family), using bar graphs, and [Venn diagrams L] (M6.1.1, M6.1.2, & M6.1.5)

1. Ben went dipnetting for salmon four days in a row. These are the number of fish he caught on each day.

Tuesday: 4 salmon
Wednesday: 4 salmon
Thursday: 8 salmon
Friday: 10 salmon

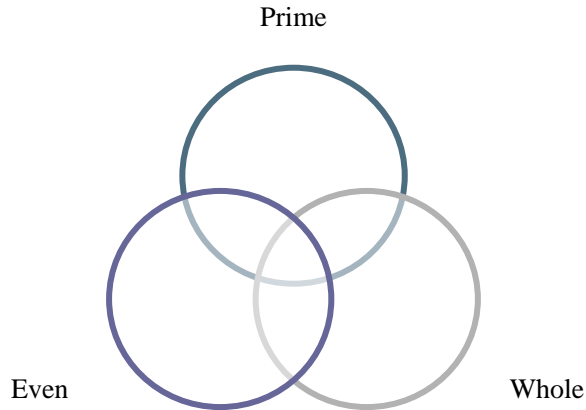


If:  = 2 salmon, fill in the pictograph below to show how many fish Ben caught each day.

Ben's Fish

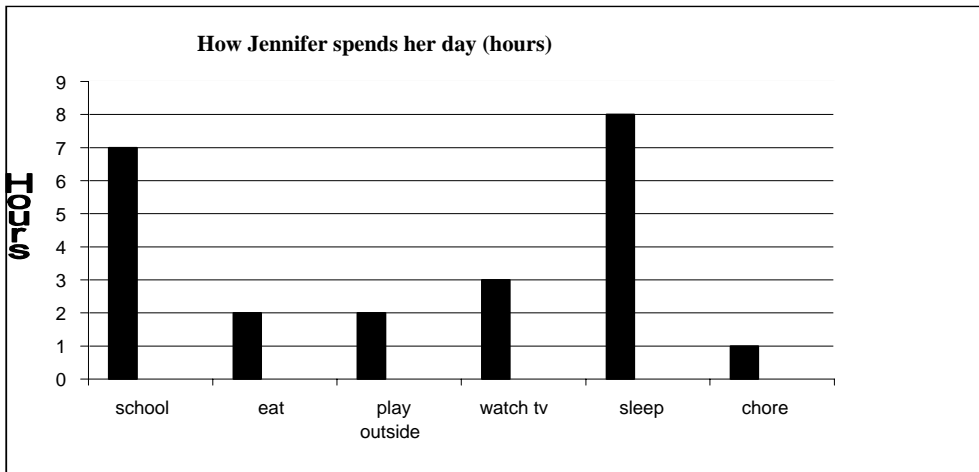
| | | | | | |
|-----------|--|--|--|--|--|
| Tuesday | | | | | |
| Wednesday | | | | | |
| Thursday | | | | | |
| Friday | | | | | |

2. Shade the area of the Venn diagram where the number 13 belongs.



Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, or justifying conclusions) by:

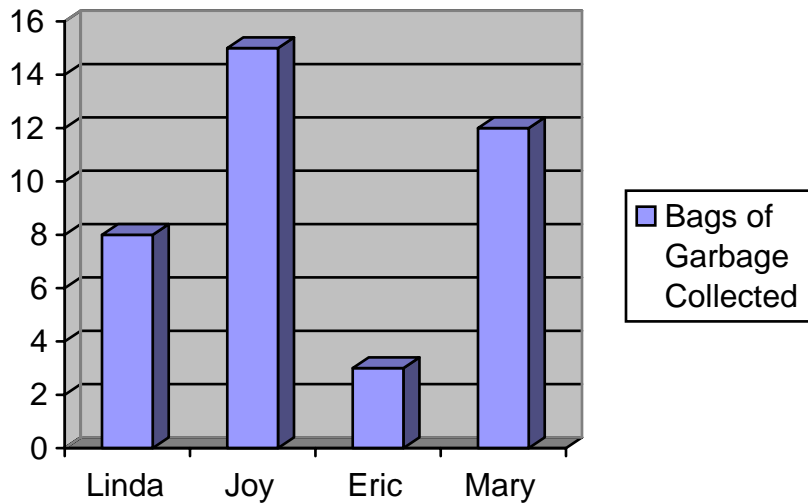
[3] S&P-2 Using information from a variety of displays (tallies, tables, pictographs, bar graphs, or [Venn diagrams L]



1. Question: The chart above shows how Jennifer spends the hours of a typical school day. Answer the following using the chart above:

1. What does she spend the most time doing? _____
2. How much time does she play outside? _____
3. T or F: She spends 8 hours in school. _____

2. Linda, Joy, Eric, and Mary helped during village clean-up day. Use the graph below to answer the questions.



a. How many bags of garbage did each person collect?

Linda _____

Joy _____

Eric _____

Mary _____

[3] S&P-3 Using the terms “maximum” or “minimum” (M6.1.3)

Using the information from the graph above, answer these questions.

1. What was the minimum number of bags collected? _____

2. What was the maximum number of bags collected? _____

Probability: The student demonstrates a conceptual understanding of probability by:

[3] S&P-4 (L) Explaining the differences between chance and certainty or recognizing events that may be certain or chance events (M6.1.4)

1. Kenny has a die that is blue on all sides. Sarah has a die that has one blue side and the rest of the sides are yellow.
2. When Kenny rolls his die it comes up blue. Was that a certainty or a chance? _____
3. When Sarah rolls her die it comes up blue. Was that a certainty or a chance? _____

[3] S&P-5 [Finding and recording L] and making predictions about the likelihood of outcomes of a simple probability experiment (e.g., spinner, tossing a coin) (M6.1.4)

Get a die from your teacher. Roll the die. Record the number you get in the table below. Do this ten times.

| Roll | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------|---|---|---|---|---|---|---|---|---|----|
| # | | | | | | | | | | |

1. What number did you roll the most? _____
2. What numbers did you not roll (if any)? _____
3. Is there an equal chance of rolling a 5 or a 2? _____
4. Explain your answer to number 3. _____

Get a bag of three cubes (2 red and 1 white) from your teacher. Without looking, pull a cube out of the bag. Record the color of the cube and put the cube back in the bag. Do this ten times.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------|---|---|---|---|---|---|---|---|---|----|
| cube color | | | | | | | | | | |

1. Which color did you record the most? _____

2. Which color would you have expected to pull out the next time?

3. Explain your answer to number 2. _____

3rd Grade Statistics and Probability Answer Key

Data Display: The student demonstrates an ability to classify and organize data by:

[3] S&P-1 [Designing an investigation and collecting, recording L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., literature, self, or family), using bar graphs, and [Venn diagrams L] (M6.1.1, M6.1.2, & M6.1.5)














1. Ben went dipnetting for salmon four days in a row. These are the number of fish he caught on each day.

Tuesday: 4 salmon
Wednesday: 4 salmon
Thursday: 8 salmon
Friday: 10 salmon

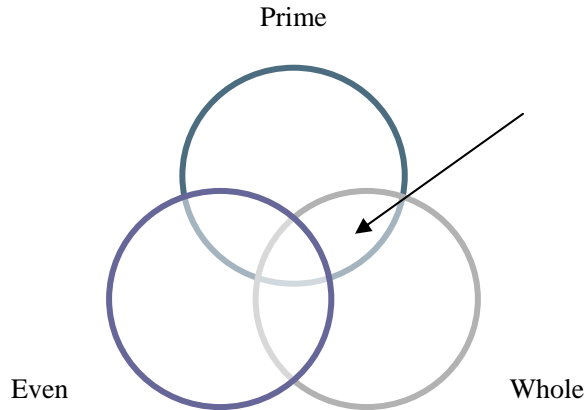


If:  = 2 salmon, fill in the pictograph below to show how many fish Ben caught each day.

Ben's Fish

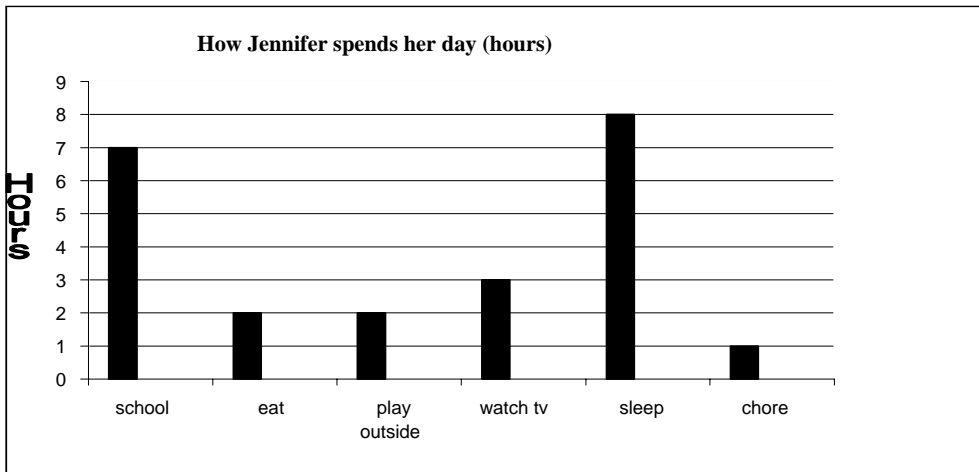
| | | | | | |
|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Tuesday |  |  | | | |
| Wednesday |  |  | | | |
| Thursday |  |  |  |  | |
| Friday |  |  |  |  |  |

2. Shade the area of the Venn diagram where the number 13 belongs.



Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, or justifying conclusions) by:

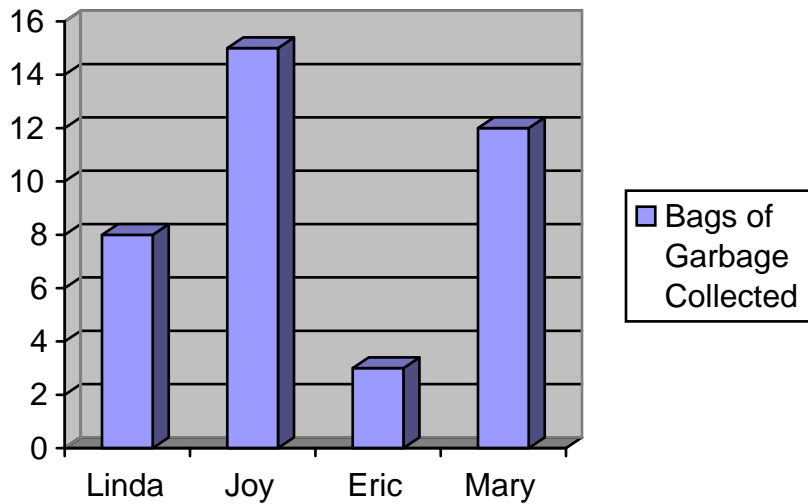
[3] S&P-2 Using information from a variety of displays (tallies, tables, pictographs, bar graphs, or [Venn diagrams L]



1. Question: The chart above shows how Jennifer spends the hours of a typical school day. Answer the following using the chart above:

1. What does she spend the most time doing? *Sleeping*
2. How much time does she play outside? *2 hours*
3. T or F: She spends 8 hours in school. *F*

2. Linda, Joy, Eric, and Mary helped during village clean-up day. Use the graph below to answer the questions.



a.. How many bags of garbage did each person collect?

Linda 8

Joy 15

Eric 3

Mary 12

[3] S&P-3 Using the terms “maximum” or “minimum” (M6.1.3)

Using the information from the graph above, answer these questions.

1. What was the minimum number of bags collected? 3

2. What was the maximum number of bags collected? 15

Probability: The student demonstrates a conceptual understanding of probability by:

[3] S&P-4 (L) Explaining the differences between chance and certainty or recognizing events that may be certain or chance events (M6.1.4)

1. Kenny has a die that is blue on all sides. Sarah has a die that has one blue side and the rest of the sides are yellow.
2. When Kenny rolls his die it comes up blue. Was that a certainty or a chance? **certainty**
3. When Sarah rolls her die it comes up blue. Was that a certainty or a chance? **chance**

[3] S&P-5 [Finding and recording L] and making predictions about the likelihood of outcomes of a simple probability experiment (e.g., spinner, tossing a coin) (M6.1.4)

Get a die from your teacher. Roll the die. Record the number you get in the table below. Do this ten times.

| Roll | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------|---|---|---|---|---|---|---|---|---|----|
| # | | | | | | | | | | |

1. What number did you roll the most? _____
2. What numbers did you not roll (if any)? _____
3. Is there an equal chance of rolling a 5 or a 2? _____
4. Explain your answer to number 3. _____

Get a bag of three cubes (2 red and 1 white) from your teacher. Without looking, pull a cube out of the bag. Record the color of the cube and put the cube back in the bag. Do this ten times.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------|---|---|---|---|---|---|---|---|---|----|
| cube color | | | | | | | | | | |

1. Which color did you record the most? _____

2. Which color would you have expected to pull out the next time?

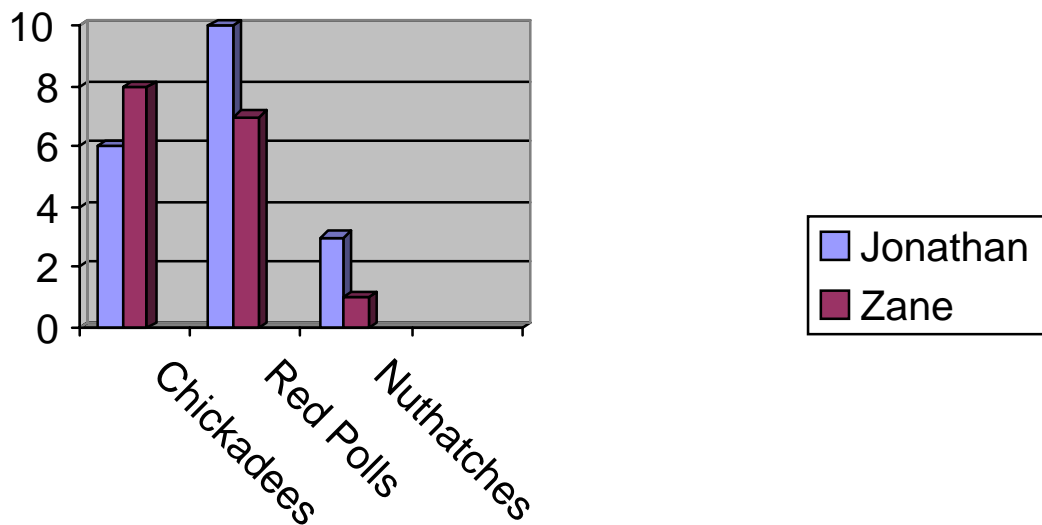
3. Explain your answer to number 2. _____

4th Grade Statistics and Probability

Data Display: The student demonstrates an ability to classify and organize data by:

[4] S&P-1 [Designing an investigation and collecting L]; organizing or displaying, using appropriate scale; using data in real-world problems (e.g., social studies, friends, or school); using bar graphs, tables, charts, or diagrams with whole numbers up to 25 (M6.2.1 & M6.2.2)

Jonathan and Zane counted birds at their feeders. The bar graph below shows how many of each type of bird they saw.



1. Which table shows the same information as the bar graph?

a.

| | Chickadees | Red Polls | Nuthatches |
|----------|------------|-----------|------------|
| Jonathan | 3 | 10 | 6 |
| Zane | 1 | 7 | 8 |

b.

| | Chickadees | Red Polls | Nuthatches |
|----------|------------|-----------|------------|
| Jonathan | 6 | 10 | 3 |
| Zane | 8 | 7 | 1 |

c.

| | Chickadees | Red Polls | Nuthatches |
|----------|------------|-----------|------------|
| Jonathan | 8 | 7 | 1 |
| Zane | 6 | 10 | 3 |

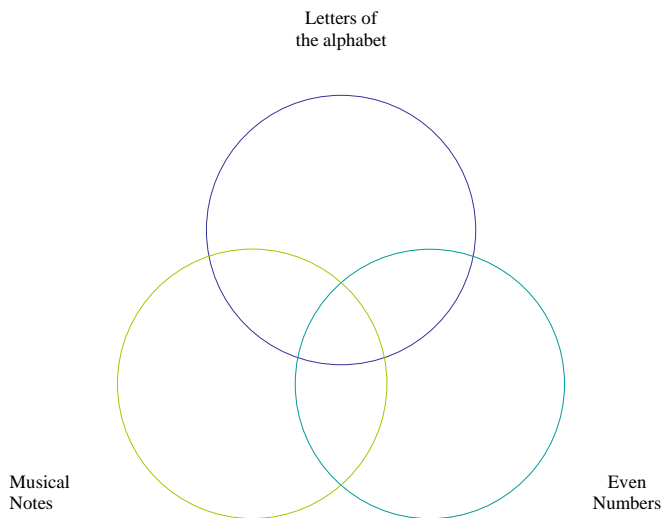
d.

| | Chickadees | Red Polls | Nuthatches |
|----------|------------|-----------|------------|
| Jonathan | 10 | 6 | 1 |
| Zane | 7 | 8 | 3 |

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, or drawing or justifying conclusions by:

[4] S&P-2 Using information from a variety of displays (tables, bar graphs, or Venn diagrams) (M6.2.2)

1. In the Venn diagram, where does 'c' go?



[4] S&P-3 Using mode or range with up to 5 pieces of data with a value of 10 or less each (M6.2.3)

1. Use the following set of numbers to answer the questions.

7, 2, 8, 8, 6

The mode is 7. True or False

The range is 6. True or False

2. Five friends counted how many pets each of them had and made this chart.

| Name | Number of pets |
|----------|----------------|
| Cassie | 5 |
| Daniel | 2 |
| Jonathan | 8 |
| Tina | 3 |
| Tim | 1 |

What is the range of the number of pets?

- a. 2
- b. 5
- c. 7
- d. 8

Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:

[4] S&P-4 Predicting or explaining the probability of all possible outcomes in a simple experiment (e.g., spinners, dice, coins) (M6.2.4)

1. Kenny has a die that is blue on all sides and a die that has two blue sides, two red sides, and two yellow sides. What is the probability that Kenny will roll the dice and have two blues?

- a. 1: 6
- b. 1: 3
- c. 2: 5
- d. 1: 5

[4] S&P-5 Determining possible combinations in a given situation involving up to 3 items (e.g., how many ways can you choose two fruits out of a basket containing oranges and bananas? –three ways: two bananas; one orange and one banana; and two oranges) (M6.2.5)

1. A box contains 1 red, 1 yellow, and 1 purple scarf. Which shows all the possible combinations if 2 scarves are pulled out of the box?

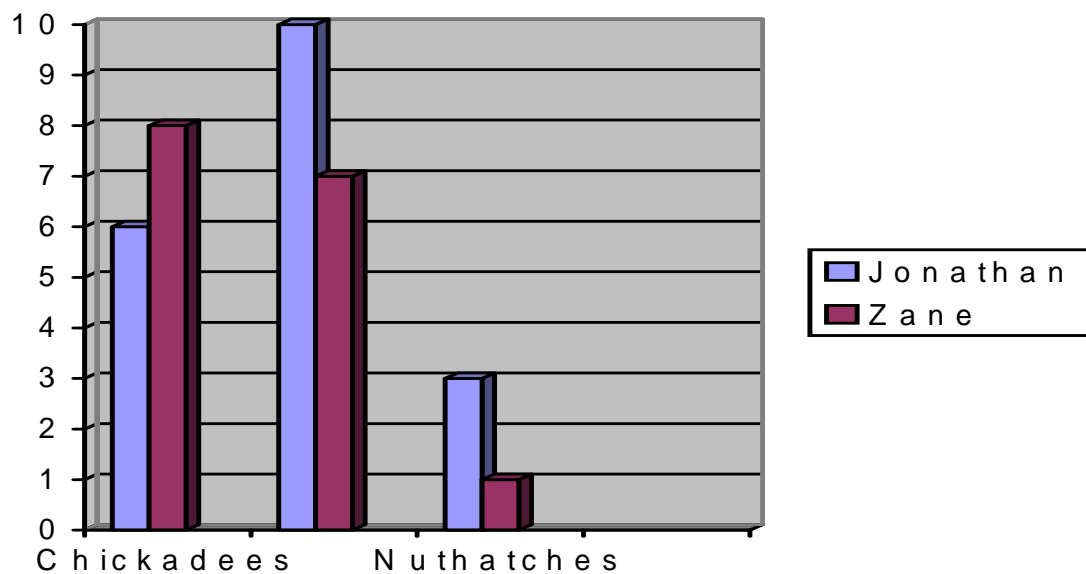
- a. Red/yellow, red/purple
- b. Red/yellow, yellow/purple, red/purple
- c. Yellow/purple, purple/yellow, red/purple
- d. Purple/red, yellow/red

4th Grade Statistics and Probability Answer Key

Data Display: The student demonstrates an ability to classify and organize data by:

[4] S&P-1 [Designing an investigation and collecting L]; organizing or displaying, using appropriate scale; using data in real-world problems (e.g., social studies, friends, or school); using bar graphs, tables, charts, or diagrams with whole numbers up to 25 (M6.2.1 & M6.2.2)

Jonathan and Zane counted birds at their feeders. The bar graph below shows how many of each type of bird they saw.



1. Which table shows the same information as the bar graph?

a.

| | Chickadees | Red Polls | Nuthatches |
|----------|------------|-----------|------------|
| Jonathan | 3 | 10 | 6 |
| Zane | 1 | 7 | 8 |

*b.**

| | Chickadees | Red Polls | Nuthatches |
|-----------------|-------------------|------------------|-------------------|
| Jonathan | 6 | 10 | 3 |
| Zane | 8 | 7 | 1 |

c.

| | Chickadees | Red Polls | Nuthatches |
|----------|------------|-----------|------------|
| Jonathan | 8 | 7 | 1 |
| Zane | 6 | 10 | 3 |

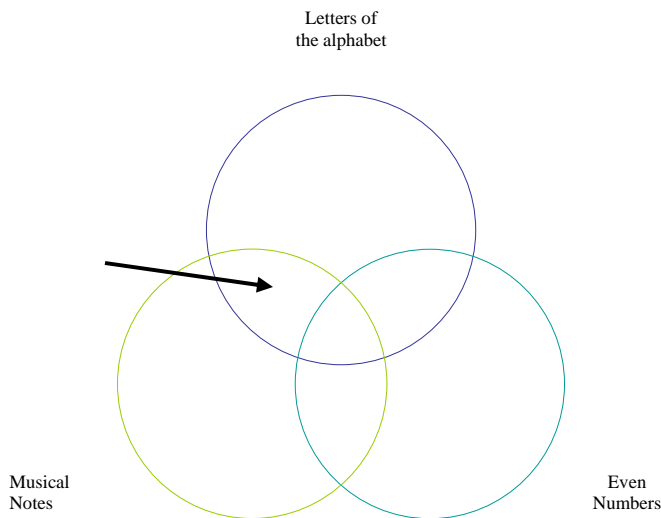
d.

| | Chickadees | Red Polls | Nuthatches |
|----------|------------|-----------|------------|
| Jonathan | 10 | 6 | 1 |
| Zane | 7 | 8 | 3 |

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, or drawing or justifying conclusions by:

[4] S&P-2 Using information from a variety of displays (tables, bar graphs, or Venn diagrams) (M6.2.2)

1. In the Venn diagram, where does 'c' go?



[4] S&P-3 Using mode or range with up to 5 pieces of data with a value of 10 or less each (M6.2.3)

1. Use the following set of numbers to answer the questions.

7, 2, 8, 8, 6

The mode is 7. True or ***False***

The range is 6. ***True*** or False

2. Five friends counted how many pets each of them had and made this chart.

| Name | Number of pets |
|----------|----------------|
| Cassie | 5 |
| Daniel | 2 |
| Jonathan | 8 |
| Tina | 3 |
| Tim | 1 |

What is the range of the number of pets?

- a. 2
- b. 5
- c. 7*
- d. 8

Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:

[4] S&P-4 Predicting or explaining the probability of all possible outcomes in a simple experiment (e.g., spinners, dice, coins) (M6.2.4)

1. Kenny has a die that is blue on all sides and a die that has two blue sides, two red sides, and two yellow sides. What is the probability that Kenny will roll the dice and have two blues?

- a. 1: 6
- b. 1: 3*
- c. 2: 5
- d. 1: 5

[4] S&P-5 Determining possible combinations in a given situation involving up to 3 items (e.g., how many ways can you choose two fruits out of a basket containing oranges and bananas? –three ways: two bananas; one orange and one banana; and two oranges) (M6.2.5)

1. A box contains 1 red, 1 yellow, and 1 purple scarf. Which shows all the possible combinations if 2 scarves are pulled out of the box?

- a. Red/yellow, red/purple
- b. Red/yellow, yellow/purple, red/purple***
- c. Yellow/purple, purple/yellow, red/purple
- d. Purple/red, yellow/red

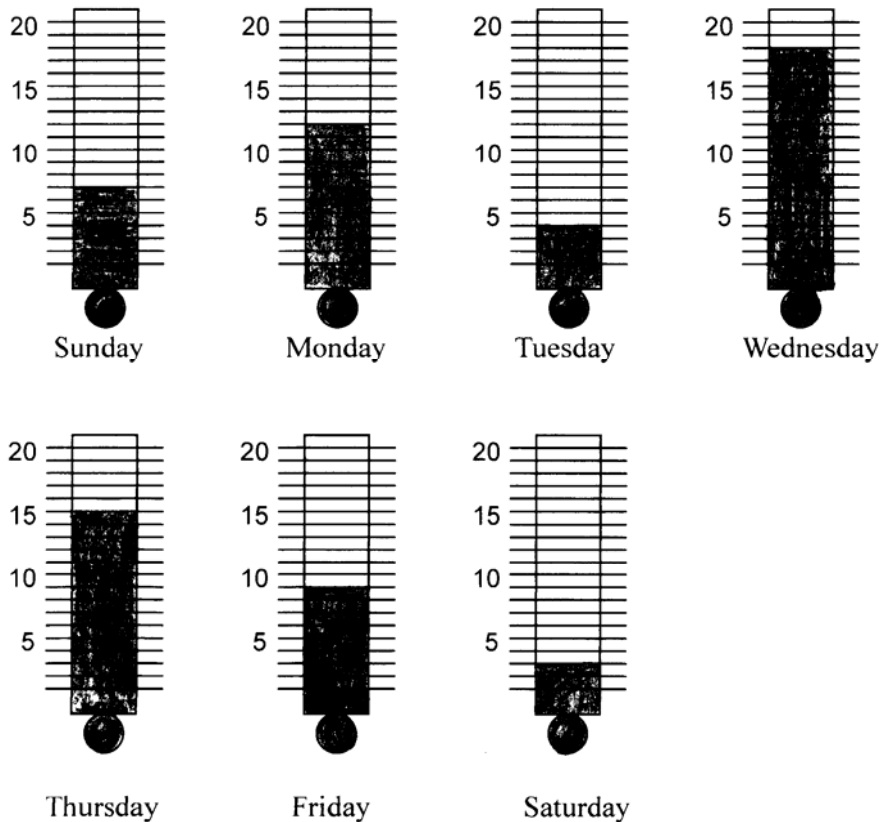
5th Grade Statistics and Probability

Data Display: The student demonstrates an ability to classify and organize data by:

[5] S&P-1 [Designing an investigation and collecting L], organizing, or displaying; using appropriate scale, using data in real-world problems (e.g., social studies, friends, or school), using bar graphs, tables, charts, diagrams, or line graphs with whole numbers up to 50 (M6.2.1 & M6.2.2) and

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; or drawing or justifying conclusions) by:

[5] S&P-2 Using information from a variety of displays (tables, bar graphs, line graphs, or Venn diagrams) (M6.2.2)



1. Using the above temperatures, plot each temperature in both a table and a line graph. Label your table, and label and give the scale for each axis on your line graph.

[5] S&P-3 Using mode, median, or range with up to 10 pieces of data with a value of 10 or less each (M6.2.3)

1. Using the temperatures given above, what is the:

Range of the Temperature? _____

Median Temperature? _____

Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:

[5] S&P-4 Predicting or explaining the probability of all possible outcomes in an experiment using ratios or fractions to describe the probability (M6.2.4)

1. There are five blue cubes, seven yellow cubes, and two white cubes in a bag. What is the probability that the cube drawn from the container will be:

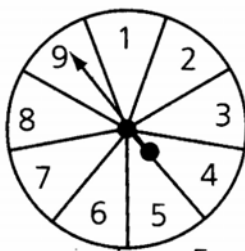
Blue _____

Yellow _____

White _____

What fraction tells the probability that the cube drawn will *not* be white?

2. Present probability data using simple fractions.



a. Use the spinner to find the probability of spinning a 6.

b. Use the spinner to find the probability of spinning an even number.

c. Use the spinner to find the probability of spinning an odd number.

d. Use the spinner to find the probability of spinning a 1,2, or 3.

e. Use the spinner to find the probability of not spinning a 7.

[5] S&P-5 Solving or identifying solutions to problems involving money combinations (e.g., how many ways can you make 25 cents using nickels, dimes, or quarters?) (M6.2.5)

Marsha bought a book a book at the store. She should get 43 cents back in change. Are the following true or false?

1. ____ The least number of coins she can get is seven coins.
2. ____ The greatest number of coins she can get is eleven coins.
3. ____ She can get her change all in one type of coin.
4. ____ She can get her change in two types of coins.

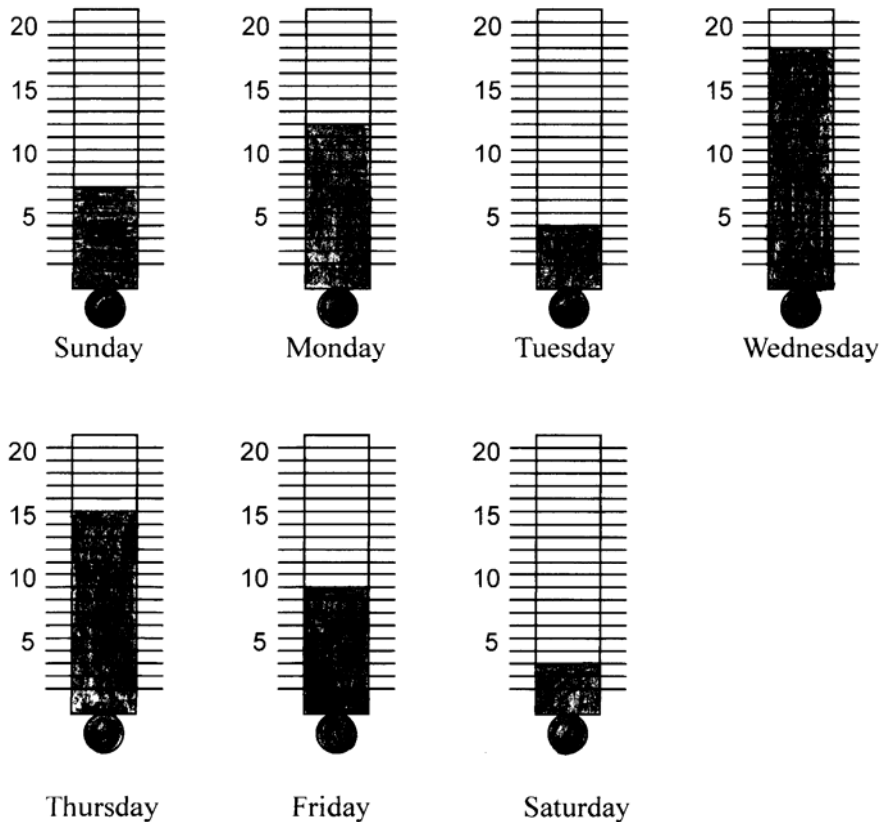
5th Grade Statistics and Probability

Data Display: The student demonstrates an ability to classify and organize data by:

[5] S&P-1 [Designing an investigation and collecting L], organizing, or displaying; using appropriate scale, using data in real-world problems (e.g., social studies, friends, or school), using bar graphs, tables, charts, diagrams, or line graphs with whole numbers up to 50 (M6.2.1 & M6.2.2) and

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; or drawing or justifying conclusions) by:

[5] S&P-2 Using information from a variety of displays (tables, bar graphs, line graphs, or Venn diagrams) (M6.2.2)



1. Using the above temperatures, plot each temperature in both a table and a line graph. Label your table, and label and give the scale for each axis on your line graph.

Example chart

| <i>Day</i> | <i>Temperature</i> |
|-----------------|--------------------|
| <i>Sunday</i> | <i>7 degrees</i> |
| <i>Monday</i> | <i>12 degrees</i> |
| <i>Tuesday</i> | <i>4 degrees</i> |
| <i>Wednes.</i> | <i>18 degrees</i> |
| <i>Thursday</i> | <i>15 degrees</i> |
| <i>Friday</i> | <i>9 degrees</i> |
| <i>Saturday</i> | <i>3 degrees</i> |

[5] S&P-3 Using mode, median, or range with up to 10 pieces of data with a value of 10 or less each (M6.2.3)

1. Using the temperatures given above, what is the:

Range of the Temperature? $18-3=15$

Median Temperature? 9

Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:

[5] S&P-4 Predicting or explaining the probability of all possible outcomes in an experiment using ratios or fractions to describe the probability (M6.2.4)

1. There are five blue cubes, seven yellow cubes, and two white cubes in a bag. What is the probability that the cube drawn from the container will be:

Blue $5/14$

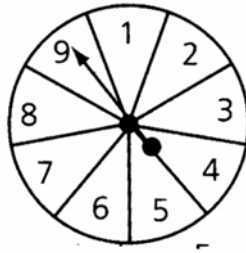
Yellow $7/14$ or $1/2$

White $2/14$ or $1/7$

What fraction tells the probability that the cube drawn will *not* be white?

$12/14$ or $6/7$

2. Present probability data using simple fractions.



a. Use the spinner to find the probability of spinning a 6.

$1/9$

b. Use the spinner to find the probability of spinning an even number.

$4/9$

c. Use the spinner to find the probability of spinning an odd number.

$5/9$

d. Use the spinner to find the probability of spinning a 1,2, or 3.

$1/3$ or $3/9$

e. Use the spinner to find the probability of not spinning a 7.

$8/9$

[5] S&P-5 Solving or identifying solutions to problems involving money combinations (e.g., how many ways can you make 25 cents using nickels, dimes, or quarters?) (M6.2.5)

Marsha bought a book at the store. She should get 43 cents back in change. Are the following true or false?

F 1. The least number of coins she can get is seven coins.

F 2. The greatest number of coins she can get is eleven coins.

T 3. She can get her change all in one type of coin.

T 4. She can get her change in two types of coins.

6th Grade Statistics and Probability

Data Display: The student demonstrates an ability to classify and organize data by:

[6] S&P-1 [Designing an investigation and collecting L], organizing, or displaying, using appropriate scale for data displays (tables, bar graphs, line graphs, or circle graphs), data in real-world problems (e.g., social studies, friends, or school), with whole numbers up to 100 (M6.2.1 & M6.2.2) and

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; or drawing or justifying conclusions) by:

[6] S&P-2 Using information from a variety of displays (tables, bar graphs, line graphs, circle graphs, or Venn diagrams) (M6.2.2) and

[6] S&P-3 Using mean, median, mode, or range (M6.2.3)

1. Design a line graph using the following data. You may use the chart on the next page to help you. Be sure to include labels and a title.

Points per game

| Game # | Points |
|---------------|---------------|
| 1 | 23 |
| 2 | 21 |
| 3 | 18 |
| 4 | 29 |
| 5 | 15 |
| 6 | 27 |
| 7 | 25 |
| 8 | 21 |
| 9 | 15 |
| 10 | 24 |

2. Using the data, calculate the following:

Mean _____ Median _____ Mode _____

3. What is the **range** of the data? _____

Points per game

| | | | | | | | | | | |
|----|---|---|---|---|---|---|---|---|---|----|
| 30 | | | | | | | | | | |
| 29 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 27 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 23 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 21 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 19 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 17 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 15 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 1 | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Game

Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:

[6] S&P-4 (L) Analyzing whether a game is mathematically fair or unfair by explaining the probability of all possible outcomes (M6.2.4)

Predict whether a game is mathematically fair or unfair.

1. Helen and Anna are playing a spinner game. The spinner is divided into seven sections that are labeled 1-7. If the spinner lands on a number less than four, Helen wins. If the spinner lands on four or greater, Anna wins. Is this game fair? Explain your answer.

2. Jeff and Tammy are tossing a pair of pennies. Jeff earns one point when both coins land heads up or heads down. Tammy earns one point when one coin lands heads up and one lands tails up. Do you think this is a fair game? Explain your answer.

3. Jami and Susan roll two numbered cubes numbered 1-6. Jami wins if the number on each cube is the same. Susan wins if each cube comes up with a different number. Who do you think will win more often? Why?

[6] S&P-5 Solving or identifying solutions to problems involving possible combinations (e.g., if ice cream sundaes come in 3 flavors with 2 possible toppings, how many different sundaes can be made using only one flavor of ice cream with one topping?) (M6.2.5)

1. You and your friends want to order a pizza. After looking at the menu, you decide that there are several combinations you may choose. You may have thin crust or deep dish; for a topping you may have pepperoni, sausage, or Canadian bacon. How many different pizzas can you order if you just choose one crust and one topping?

- a. 1
- b. 6
- c. 3
- d. 4

2. Julie is making sandwiches. She can choose to use white or wheat bread. For meat, she can use ham, bologna, salmon, or turkey. For a condiment, she can use mayonnaise or mustard. Find the number of different sandwiches Julie can make.

- a. 8
- b. 24
- c. 10
- d. 16

6th Grade Statistics and Probability Answer Key

Data Display: The student demonstrates an ability to classify and organize data by:

[6] S&P-1 [Designing an investigation and collecting L], organizing, or displaying, using appropriate scale for data displays (tables, bar graphs, line graphs, or circle graphs), data in real-world problems (e.g., social studies, friends, or school), with whole numbers up to 100 (M6.2.1 & M6.2.2) and

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; or drawing or justifying conclusions) by:

[6] S&P-2 Using information from a variety of displays (tables, bar graphs, line graphs, circle graphs, or Venn diagrams) (M6.2.2) and

[6] S&P-3 Using mean, median, mode, or range (M6.2.3)

1. Design a line graph using the following data. You may use the chart on the next page to help you. Be sure to include labels and a title.

Points per game

| Game # | Points |
|---------------|---------------|
| 1 | 23 |
| 2 | 21 |
| 3 | 18 |
| 4 | 29 |
| 5 | 15 |
| 6 | 27 |
| 7 | 25 |
| 8 | 21 |
| 9 | 15 |
| 10 | 24 |

2. Using the data, calculate the following:

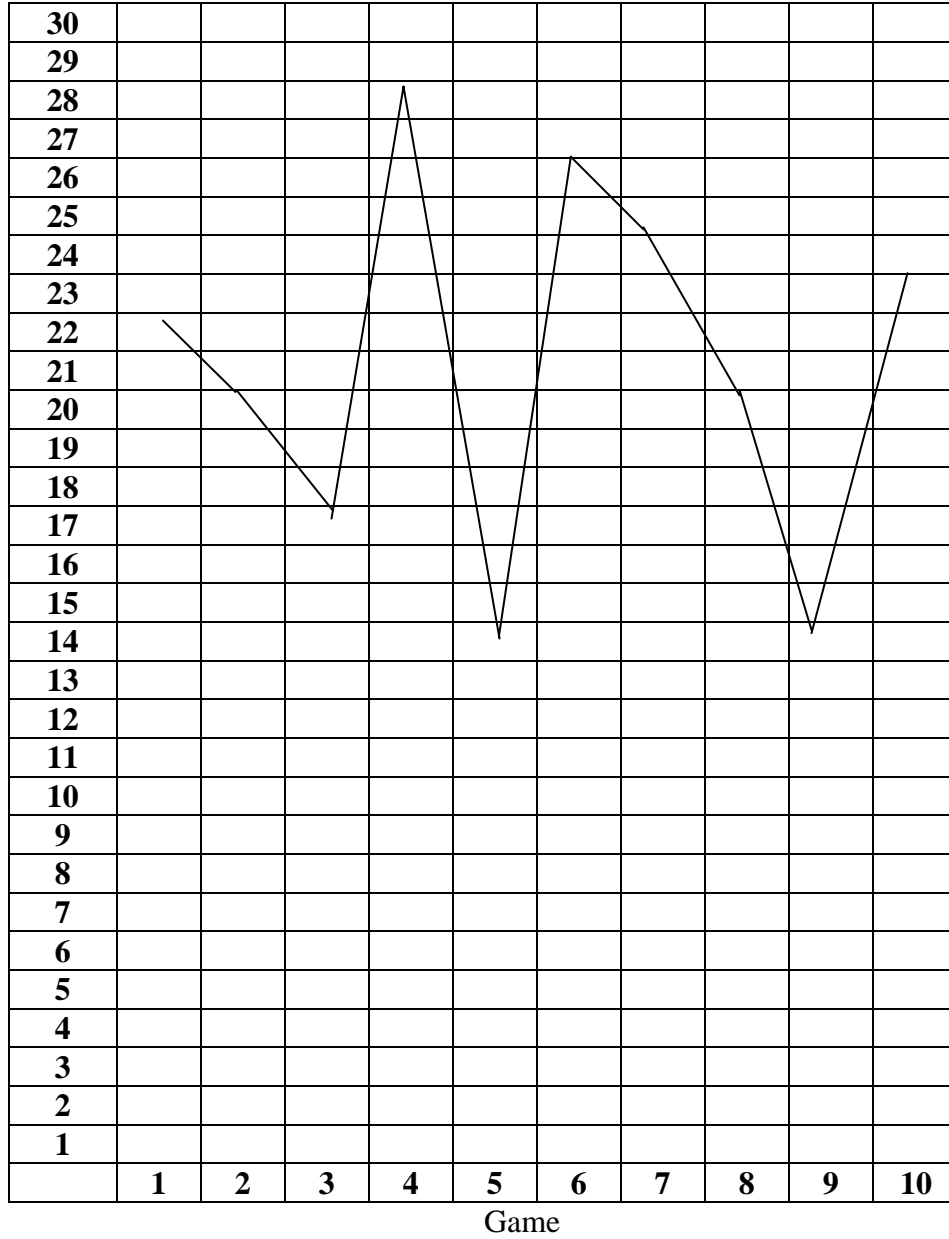
Mean 21.8

Median 22

Mode 15, 21

3. What is the **range** of the data? 15 – 29

Points per game



Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:

[6] S&P-4 (L) Analyzing whether a game is mathematically fair or unfair by explaining the probability of all possible outcomes (M6.2.4)

Predict whether a game is mathematically fair or unfair.

1. Helen and Anna are playing a spinner game. The spinner is divided into seven sections that are labeled 1-7. If the spinner lands on a number less than four, Helen wins. If the spinner lands on four or greater, Anna wins. Is this game fair? Explain your answer.

The game is not fair because Helen has more spaces on the spinner (4) and Anna only has 3 sections. Helen will win more than Anna.

2. Jeff and Tammy are tossing a pair of pennies. Jeff earns one point when both coins land heads up or heads down. Tammy earns one point when one coin lands heads up and one lands tails up. Do you think this is a fair game? Explain your answer.

Yes, this game is fair. Because both outcomes with the penny would be 50%. , both people have the same chance of winning.

3. Jami and Susan roll two numbered cubes numbered 1-6. Jami wins if the number on each cube is the same. Susan wins if each cube comes up with a different number. Who do you think will win more often? Why?

Susan will win much more often because the probability of both die coming up with the same number is $1/6 \times 1/6 = 1/36$, and the rest of the times the dice would have two different numbers.

[6] S&P-5 Solving or identifying solutions to problems involving possible combinations (e.g., if ice cream sundaes come in 3 flavors with 2 possible toppings, how many different sundaes can be made using only one flavor of ice cream with one topping?) (M6.2.5)

1. You and your friends want to order a pizza. After looking at the menu, you decide that there are several combinations you may choose. You may have thin crust or deep dish; for a topping you may have pepperoni, sausage, or Canadian bacon. How many different pizzas can you order if you just choose one crust and one topping?

- a. 1
- b. 6***
- c. 3
- d. 4

2. Julie is making sandwiches. She can choose to use white or wheat bread. For meat, she can use ham, bologna, salmon, or turkey. For a condiment, she can use mayonnaise or mustard. Find the number of different sandwiches Julie can make.

- a. 8
- b. 24
- c. 10
- d. 16***

7th Grade Statistics and Probability

Data Display: The student demonstrates an ability to classify and organize data by:

[7] S&P-1 [Collecting, L] displaying, organizing, or explaining the classification of data in real-world problems (e.g., science or humanities, peers or community), using circle graphs, frequency distributions, stem and leaf, [or scatter plots L] with appropriate scale (M6.3.1)

1. The following is a list of unit car and truck sales made by the Ford Motor Company in North America over the past 9 years. Make a scatter plot of the information. Does the scatter plot show a *positive*, *negative*, or *no correlation*? Draw a trend line. If the trend continues, make a prediction as to the number of sales that will be made in 2005. Is this an accurate prediction? What might influence the sales of Ford autos during future years?

| | | | | | | | | | | |
|-----------------|------|------|------|------|------|------|------|------|------|------|
| Year | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Amount Millions | 3.1 | 3.3 | 4.3 | 4.4 | 4.7 | 5.0 | 4.0 | 3.7 | 3.4 | 3.3 |

[7] S&P-1 [Collecting, L] displaying, organizing, or explaining the classification of data in real-world problems (e.g., science or humanities, peers or community), using circle graphs, frequency distributions, stem and leaf, [or scatter plots L] with appropriate scale (M6.3.1) and

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating or making predictions; or drawing or justifying conclusions) by:

[7] S&P-3 Determining range, mean, median, or mode (M6.3.3)

The following data represent the number of trucks sold during a three-week period at a large auto dealer in a big city.

10 3 18 22 24 29 17 6 24 28 15 18 30 26 11

1. Using the following chart, make a frequency distribution of the data.

| Interval | Tally | Frequency |
|----------|-------|-----------|
| 0-9 | | |
| 10-19 | | |
| 20-29 | | |
| 30-39 | | |

2. Make a stem-and-leaf plot of the data.

| Stem | Leaf |
|------|------|
| | |

3. What is the mode?
4. What is the mean?
5. What is the median?
6. Which is the best representation of the data? Why?

The table below contains the price of a hamburger at several different restaurants.

| Restaurant | A | B | C | D | E | F | G | H | I |
|------------|------|------|------|------|------|------|------|------|------|
| Price (\$) | 1.00 | 1.25 | 1.37 | 2.35 | 1.99 | 1.99 | 1.85 | 2.60 | 3.50 |

6. What is the mean price of a hamburger?
7. What is the mode of this set of data?
8. What is the median price of the number of hamburgers?
9. What is the best indicator (the mean, median, or mode) of the price of a hamburger? Why is this the best representation of the data?

| |
|------------------------------------------------------------------------------|
| Probability: The student demonstrates an ability to problem solve by: |
|------------------------------------------------------------------------------|

[7] S&P-4 Determining the [experimental L] and theoretical probability of a simple event (M6.3.5)

1. A bag contains eight red marbles, six blue marbles, five yellow marbles, and two green marbles. One marble is chosen randomly. What is the theoretical probability that the marble is blue? Write the probability in simplest form.

- a. $\frac{6}{21}$
- b. $\frac{2}{7}$
- c. $\frac{1}{21}$
- d. $\frac{6}{15}$

[7] S&P-5 Using a systematic approach to finding sample spaces or to making predictions about the probability of independent events (M6.3.5)

1. Laura orders an ice cream sundae at her favorite snack shop. She could choose from vanilla, mint, or fudge ripple ice cream; chocolate, strawberry or butterscotch topping; M&Ms, chopped peanuts, jelly beans. or crushed cookies for a topping. How many different ice cream sundaes can she chose using these ingredients?

- a. 10
- b. 36
- c. 13
- d. 21

2. Dave is making sandwiches. He can choose to use white, rye, or wheat bread. For meat he can use ham, bologna, salmon, or turkey. For a condiment, he can use mayonnaise or mustard. Find the number of different sandwiches Dave can make.

- a. 24
- b. 9
- c. 12
- d. 10

3. A number cube is rolled once. Find the probability of rolling a number that is more than four.

- a. $\frac{1}{3}$
- b. $\frac{2}{3}$
- c. $\frac{1}{2}$
- d. $\frac{1}{6}$

4. The spelling contest awards four prizes. Tim, Sam, Jen, and Kate all made it to the final round. In how many ways can first, second, third, and fourth place be assigned?

- a. 24 ways
- b. 16 ways
- c. 25 ways
- d. 12 ways

[7] S&P-6 (L) Designing and conducting a simulation to study a problem and communicate the results (M6.3.6)

1. Design and conduct an experiment that uses the basic counting technique and probability to solve a problem. List all of the possible outcomes.

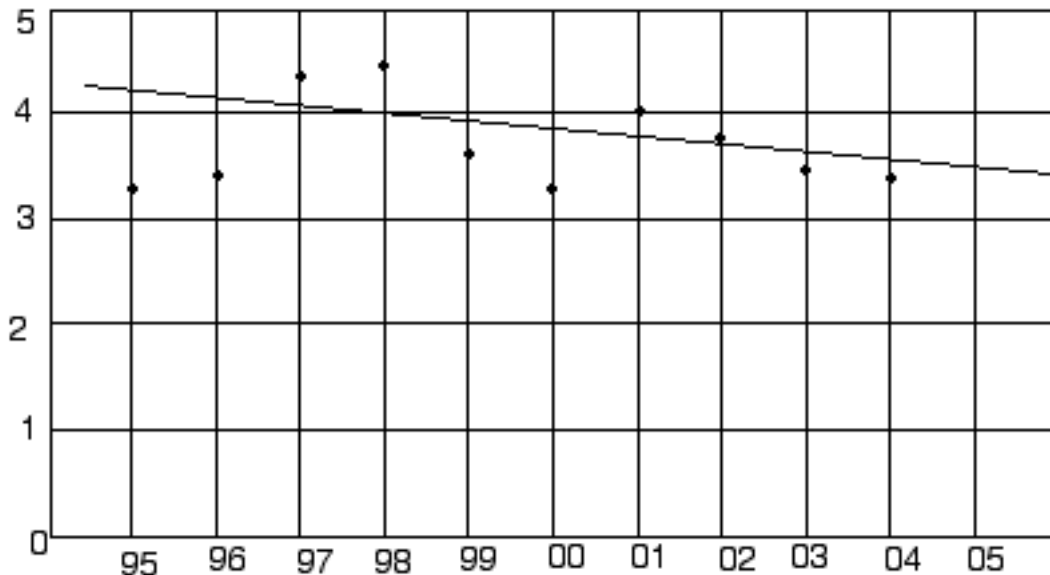
7th Grade Statistics and Probability Answer Key

Data Display: The student demonstrates an ability to classify and organize data by:

[7] S&P-1 [Collecting, L] displaying, organizing, or explaining the classification of data in real-world problems (e.g., science or humanities, peers or community), using circle graphs, frequency distributions, stem and leaf, [or scatter plots L] with appropriate scale (M6.3.1)

1. The following is a list of unit car and truck sales made by the Ford Motor Company in North America over the past 9 years. Make a scatter plot of the information. Does the scatter plot show a *positive*, *negative*, or *no correlation*? Draw a trend line. If the trend continues, make a prediction as to the number of sales that will be made in 2005. Is this an accurate prediction? What might influence the sales of Ford autos during future years?

| Year | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|-----------------|------|------|------|------|------|------|------|------|------|------|
| Amount Millions | 3.1 | 3.3 | 4.3 | 4.4 | 4.7 | 5.0 | 4.0 | 3.7 | 3.4 | 3.3 |



There is a negative correlation. Prices may go up or down, gas prices may influence the consumers' choices, style may influence the consumers' purchases, etc.

[7] S&P-1 [Collecting, L] displaying, organizing, or explaining the classification of data in real-world problems (e.g., science or humanities, peers or community), using circle graphs, frequency distributions, stem and leaf, [or scatter plots L] with appropriate scale (M6.3.1) and

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating or making predictions; or drawing or justifying conclusions) by:

[7] S&P-3 Determining range, mean, median, or mode (M6.3.3)

The following data represent the number of trucks sold during a three-week period at a large auto dealer in a big city.

10 3 18 22 24 29 17 6 24 28 15 18 30 26 11

1. Using the following chart, make a frequency distribution of the data.

| Interval | Tally | Frequency |
|----------|--------|-----------|
| 0-9 | // | 2 |
| 10-19 | //// / | 6 |
| 20-29 | //// / | 6 |
| 30-39 | / | 1 |

2. Make a stem-and-leaf plot of the data.

| Stem | Leaf |
|------|-------------|
| 0 | 3 6 |
| 1 | 0 1 5 7 8 8 |
| 2 | 2 4 4 6 8 9 |
| 3 | 0 |

3. What is the mode? **18 and 24**

4. What is the mean? **18.7333**

5. What is the median? **18**

6. Which is the best representation of the data? Why?

Median and/or mean because 18 represents the average of all the numbers and it is the middle number after putting the numbers in order.

The table below contains the price of a hamburger at several different restaurants.

| Restaurant | A | B | C | D | E | F | G | H | I |
|------------|------|------|------|------|------|------|------|------|------|
| Price (\$) | 1.00 | 1.25 | 1.37 | 2.35 | 1.99 | 1.99 | 1.85 | 2.60 | 3.50 |

7. What is the mean price of a hamburger?

\$1.99

8. What is the mode of this set of data?

1.99

9. What is the median price of the number of hamburgers?

\$1.99

10. What is the best indicator (the mean, median, or mode) of the price of a hamburger?

Why is this the best representation of the data?

All are the same, so either one will work.

| |
|------------------------------------------------------------------------------|
| Probability: The student demonstrates an ability to problem solve by: |
|------------------------------------------------------------------------------|

[7] S&P-4 Determining the [experimental L] and theoretical probability of a simple event (M6.3.5)

1. A bag contains eight red marbles, six blue marbles, five yellow marbles, and two green marbles. One marble is chosen randomly. What is the theoretical probability that the marble is blue? Write the probability in simplest form.

a. $\frac{6}{21}$

b. $\frac{2}{7}$ *

c. $\frac{1}{21}$

d. $\frac{6}{15}$

[7] S&P-5 Using a systematic approach to finding sample spaces or to making predictions about the probability of independent events (M6.3.5)

1. Laura orders an ice cream sundae at her favorite snack shop. She could choose from vanilla, mint, or fudge ripple ice cream; chocolate, strawberry or butterscotch topping; M&Ms, chopped peanuts, jelly beans. or crushed cookies for a topping. How many different ice cream sundaes can she chose using these ingredients?

- a. 10
- b. 36***
- c. 13
- d. 21

2. Dave is making sandwiches. He can choose to use white, rye, or wheat bread. For meat he can use ham, bologna, salmon, or turkey. For a condiment, he can use mayonnaise or mustard. Find the number of different sandwiches Dave can make.

- a. 24***
- b. 9
- c. 12
- d. 10

3. A number cube is rolled once. Find the probability of rolling a number that is more than four.

- a. $\frac{1}{3}$ *
- b. $\frac{2}{3}$
- c. $\frac{1}{2}$
- d. $\frac{1}{6}$

4. The spelling contest awards four prizes. Tim, Sam, Jen, and Kate all made it to the final round. In how many ways can first, second, third, and fourth place be assigned?

- a. 24 ways***
- b. 16 ways
- c. 25 ways
- d. 12 ways

[7] S&P-6 (L) Designing and conducting a simulation to study a problem and communicate the results (M6.3.6)

1. Design and conduct an experiment that uses the basic counting technique and probability to solve a problem. List all of the possible outcomes.

*Many possible answers.**

2. What is the median of the data? _____

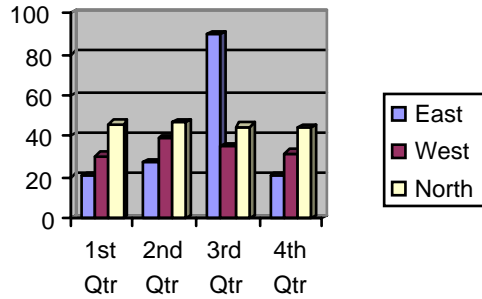
3. What is the first quartile? _____

4. What is the third quartile? _____

5. Make a box and whiskers plot of the data.

[8] S&P-2 Using information from a variety of displays or analyzing the validity of statistical conclusions found in the media (M6.3.2)

Perfect Attendance Awards



1. The frequency graph above shows the number of perfect attendance awards received by students in three high schools, East, West, and North, during one school year. For each of the following statements, circle true if the statement is an accurate interpretation of the information presented on the graph or false if the information is not an accurate interpretation of the information presented on the graph.

- | | | |
|------------------------------------------------------------------------------------------------|------|-------|
| a. East High school had the most perfect attendance awards given that year. | True | False |
| b. There were more awards given out during the third quarter than any other quarter that year. | True | False |
| c. West High School received the fewest perfect attendance awards overall that year. | True | False |
| d. The perfect attendance at North High School was the most variant of all three schools. | True | False |
| e. Perfect attendance awards were fairly consistent in each of the 3 schools. | True | False |
| f. A total of over 80 perfect attendance awards were given from all 3 schools each quarter. | True | False |

Data Display: The student demonstrates an ability to classify and organize data by:

[8] S&P-1 [Designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers or community), using histograms, scatter plots, or box and whisker plots with appropriate scale [or with technology L] (M6.3.1)

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, making predictions, or describing trends; or drawing, formulating, or justifying conclusions) by:

[8] S&P-3 Determining or justifying a choice of range, mean, median, or mode as the best representation of data for a practical situation (M6.3.3)

The manager at a compact disc store kept track of the total number of discs sold during each hour by keeping the results in the following table. Complete the last row of data, and answer the following questions.

| | | | | | | |
|-----------------------------------------|---|---|---|---|---|---|
| Number of customers | 2 | 1 | 3 | 4 | 3 | 1 |
| Number of discs each customer purchased | 3 | 1 | 2 | 1 | 1 | 3 |
| Total discs sold | 6 | 1 | 6 | | | |

1. What is the mean number of total discs sold each hour rounded to the nearest whole number?

- a. 2
- b. 3
- c. 4
- d. 5

2. What is the median of the data set of the total number of discs sold?

- a. 5
- b. 3.5
- c. 3
- d. 4

3. What is the mode of the data set of the total number of discs sold?

- a. 4
- b. 6 and 3
- c. 3.5
- d. 1 and 3

[8] S&P-4 Determining or comparing the experimental and/or theoretical probability of simple events (M6.3.5)

The table represents the sums of rolling two dice. The numbers at the top represent the numbers on one die and the numbers on the left represent the other die.

| + | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |

1. When 2 dice are tossed, what is the theoretical probability that the sum will be a multiple of 2?

- a. $\frac{1}{2}$
- b. $\frac{1}{4}$
- c. $\frac{18}{48}$
- d. $\frac{1}{36}$

2. When 2 dice are tossed, what is the theoretical probability that the sum will be a multiple of 6?

a. $\frac{1}{6}$

b. $\frac{5}{36}$

c. $\frac{1}{2}$

d. $\frac{1}{36}$

3. When two dice are tossed, what is the theoretical probability that the sum will be a multiple of 2, 3, or 4?

a. $\frac{2}{3}$

b. $\frac{1}{6}$

c. $\frac{1}{3}$

d. $\frac{23}{36}$

4. Toss two dice 36 times. Keep a frequency table recording the number of sums for each toss. Answer the same questions above. Was your information the same? Why or why not?

[8] S&P-5 Using a systematic approach to finding sample spaces or to making predictions about the probability of independent events and using the information to solve real-world problems (M6.3.5)

1. Students at our school can earn tickets for a drawing when they complete their work in class. The following ten students put their tickets into a bowl for a chance to win a gift certificate to their favorite store.

| <u>Student</u> | <u>Tickets</u> |
|----------------|----------------|
| Sam | 6 |
| Kim | 10 |
| Jon | 16 |
| Laura | 8 |
| Scott | 12 |
| David | 8 |
| Tom | 9 |
| Barb | 5 |
| Mabel | 7 |
| Katie | 14 |

If one name is drawn from the bowl, what are the chances that the name will be Kim?

- a. $\frac{5}{19}$
- b. $\frac{2}{19}$
- c. $\frac{1}{10}$
- d. $\frac{1}{95}$

2. . The ratio of boys to girls in a class is 2:3. If a student is chosen at random to be on the student council, what is the probability it will be a girl?

- a. $\frac{2}{3}$
- b. $\frac{2}{5}$
- c. $\frac{3}{2}$
- d. $\frac{3}{5}$

3. Four friends want to order a pizza. After looking at the menu, they decide that there are several combinations to choose. The choices are:

Crust: thin or deep dish

Toppings: pepperoni, sausage, or Canadian bacon

Extras: extra cheese or extra sauce

How many different pizzas can be ordered if only one crust, one topping, and one extra are chosen?

- a. 12
- b. 7
- c. 5
- d. 10

4. Two brothers and four friends will be going on a canoe trip. They will rent 2 canoes that seat three people each. What are the chances that the two brothers will be in a canoe together?

- a. $\frac{1}{10}$
- b. $\frac{1}{2}$
- c. $\frac{1}{3}$
- d. $\frac{2}{5}$

[8] S&P-6 (L) Designing and conducting a simulation to study a problem and communicate the results (M6.3.6)

1. A spinner for a game has 6 sections; each one is a different color: red, yellow, blue, green, orange, and white. The red, yellow, and blue sections are twice as big as the other 3 sections. Sam wins the game if he spins a green, yellow, or orange, and Josh wins the game if he spins a red, blue, or white. What are the odds of each of them winning the game? Is this game fair? Explain.

8th Grade Statistics and Probability Answer Key

Data Display: The student demonstrates an ability to classify and organize data by:

[8] S&P-1 [Designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers or community), using histograms, scatter plots, or box and whisker plots with appropriate scale [or with technology L] (M6.3.1)

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, making predictions, or describing trends; or drawing, formulating, or justifying conclusions) by:

[8] S&P-2 Using information from a variety of displays or analyzing the validity of statistical conclusions found in the media (M6.3.2)

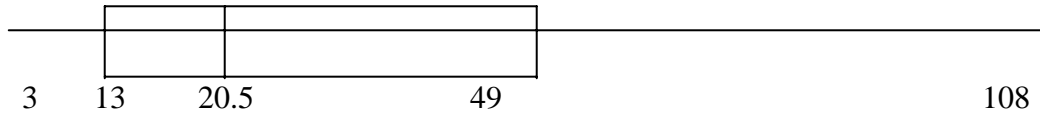
[8] S&P-3 Determining or justifying a choice of range, mean, median, or mode as the best representation of data for a practical situation (M6.3.3)

1. The following list of numbers represents the centimeters of snow that fell during 18 days in February on a mountain in Alaska. Make a stem-and-leaf graph of the data. Then create a box-and-whiskers plot of the data.

21 5 20 16 39 55 14 13 7
3 11 14 28 108 84 67 45 49

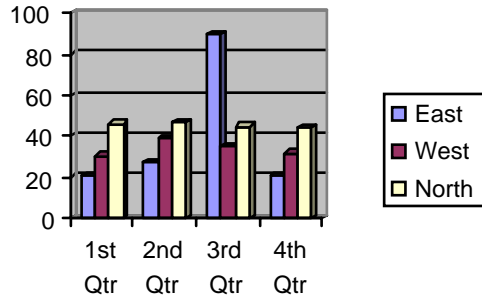
| STEM | LEAF |
|------|-----------|
| 0 | 3 5 7 |
| 1 | 1 3 4 4 6 |
| 2 | 0 1 8 |
| 3 | 9 |
| 4 | 5 9 |
| 5 | 5 |
| 6 | 7 |
| 7 | |
| 8 | 4 |
| 9 | |
| 10 | 8 |

2. What is the median of the data? 20.5
3. What is the first quartile? 13
4. What is the third quartile? 49
5. Make a box and whiskers plot of the data.



[8] S&P-2 Using information from a variety of displays or analyzing the validity of statistical conclusions found in the media (M6.3.2)

Perfect Attendance Awards



1. The frequency graph above shows the number of perfect attendance awards received by students in three high schools, East, West, and North, during one school year. For each of the following statements, circle **true** if the statement is an accurate interpretation of the information presented on the graph or **false** if the information is not an accurate interpretation of the information presented on the graph.

- | | | |
|------------------------------------------------------------------------------------------------|--------------|---------------|
| a. East High school had the most perfect attendance awards given that year. | True | False* |
| b. There were more awards given out during the third quarter than any other quarter that year. | True* | False |
| c. West High School received the fewest perfect attendance awards overall that year. | True* | False |
| d. The perfect attendance at North High School was the most variant of all three schools. | True | False* |
| e. Perfect attendance awards were fairly consistent in each of the 3 schools. | True | False* |
| f. A total of over 80 perfect attendance awards were given from all 3 schools each quarter. | True* | False |

Data Display: The student demonstrates an ability to classify and organize data by:

[8] S&P-1 [Designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers or community), using histograms, scatter plots, or box and whisker plots with appropriate scale [or with technology L] (M6.3.1)

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, making predictions, or describing trends; or drawing, formulating, or justifying conclusions) by:

[8] S&P-3 Determining or justifying a choice of range, mean, median, or mode as the best representation of data for a practical situation (M6.3.3)

The manager at a compact disc store kept track of the total number of discs sold during each hour by keeping the results in the following table. Complete the last row of data, and answer the following questions.

| | | | | | | |
|-----------------------------------------|---|---|---|----------|----------|----------|
| Number of customers | 2 | 1 | 3 | 4 | 3 | 1 |
| Number of discs each customer purchased | 3 | 1 | 2 | 1 | 1 | 3 |
| Total discs sold | 6 | 1 | 6 | 4 | 3 | 3 |

1. What is the mean number of total discs sold each hour rounded to the nearest whole number?

- a. 2
- b. 3
- c. **4***
- d. 5

2. What is the median of the data set of the total number of discs sold?

- a. 5
- b. **3.5***
- c. 3
- d. 4

3. What is the mode of the data set of the total number of discs sold?
- a. 4
 - b. 6 and 3 ***
 - c. 3.5
 - d. 1 and 3

[8] S&P-4 Determining or comparing the experimental and/or theoretical probability of simple events (M6.3.5)

The table represents the sums of rolling two dice. The numbers at the top represent the numbers on one die and the numbers on the left represent the other die.

| + | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |

1. When 2 dice are tossed, what is the theoretical probability that the sum will be a multiple of 2?
- a. $\frac{1}{2}$ ***
 - b. $\frac{1}{4}$
 - c. $\frac{18}{48}$
 - d. $\frac{1}{36}$

2. When 2 dice are tossed, what is the theoretical probability that the sum will be a multiple of 6?

- a. $\frac{1}{6}$ *
- b. $\frac{5}{36}$
- c. $\frac{1}{2}$
- d. $\frac{1}{36}$

3. When two dice are tossed, what is the theoretical probability that the sum will be a multiple of 2, 3, or 4?

- a. $\frac{2}{3}$ *
- b. $\frac{1}{6}$
- c. $\frac{1}{3}$
- d. $\frac{23}{36}$

4. Toss two dice 36 times. Keep a frequency table recording the number of sums for each toss. Answer the same questions above. Was your information the same? Why or why not?

Students' answers will vary.

[8] S&P-5 Using a systematic approach to finding sample spaces or to making predictions about the probability of independent events and using the information to solve real-world problems (M6.3.5)

1. Students at our school can earn tickets for a drawing when they complete their work in class. The following ten students put their tickets into a bowl for a chance to win a gift certificate to their favorite store.

| <u>Student</u> | <u>Tickets</u> |
|----------------|----------------|
| Sam | 6 |
| Kim | 10 |
| Jon | 16 |
| Laura | 8 |
| Scott | 12 |
| David | 8 |
| Tom | 9 |
| Barb | 5 |
| Mabel | 7 |
| Katie | 14 |

If one name is drawn from the bowl, what are the chances that the name will be Kim?

- a. $\frac{5}{19}$
- b. $\frac{2}{19}$ ***
- c. $\frac{1}{10}$
- d. $\frac{1}{95}$

2. The ratio of boys to girls in a class is 2:3. If a student is chosen at random to be on the student council, what is the probability it will be a girl?

- a. $\frac{2}{3}$
- b. $\frac{2}{5}$
- c. $\frac{3}{2}$
- d. $\frac{3}{5}$ ***

3. Four friends want to order a pizza. After looking at the menu, they decide that there are several combinations to choose. The choices are:

Crust: thin or deep dish

Toppings: pepperoni, sausage, or Canadian bacon

Extras: extra cheese or extra sauce

How many different pizzas can be ordered if only one crust, one topping, and one extra are chosen?

- a. 12*
- b. 7
- c. 5
- d. 10

4. Two brothers and four friends will be going on a canoe trip. They will rent 2 canoes that seat three people each. What are the chances that the two brothers will be in a canoe together?

- a. $\frac{1}{10}$
- b. $\frac{1}{2}$
- c. $\frac{1}{3}$
- d. $\frac{2}{5}$ *

[8] S&P-6 (L) Designing and conducting a simulation to study a problem and communicate the results (M6.3.6)

1. A spinner for a game has 6 sections; each one is a different color: red, yellow, blue, green, orange, and white. The red, yellow, and blue sections are twice as big as the other 3 sections. Sam wins the game if he spins a green, yellow, or orange, and Josh wins the game if he spins a red, blue, or white. What are the odds of each of them winning the game? Is this game fair? Explain.

The game is not fair. Josh has an edge of $\frac{5}{9}$ rather than $\frac{4}{9}$ since the red, yellow, and blue sections are twice as big.

9th Grade Statistics and Probability

Data Display: The student demonstrates an ability to classify and organize data by:

[9] S&P-1 [Designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers, community, or careers) using information from tables or graphs that display two sets of data [or with technology L] (M6.4.1) and

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, making predictions, or, describing trends; or drawing, formulating, or justifying conclusions) by:

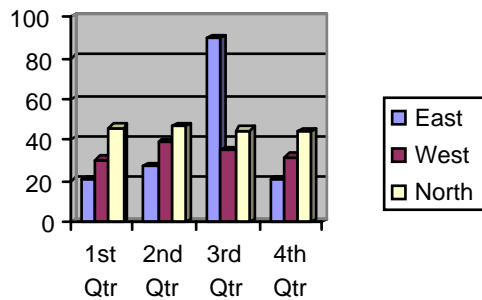
[9] S&P-4 Identifying and/or showing the meaning of a best fit line (M6.4.2) (with [9] PS-5)

Comparing wages from 2000-2005 for two or more careers

1. Research to find career wages from 2000-2005.
2. Organize your information and graph each career.
3. Draw a line that best fits the data for each career.
4. Make a prediction of what the wages of the careers chosen would be in 2010.

[9] S&P-2 Using information from a variety of displays or analyzing the validity of statistical conclusions found in the media (M6.4.1)

Perfect Attendance Awards



1. The frequency graph above shows the number of perfect attendance awards received by students in three high schools, East, West, and North, during one school year. For each of the following statements, circle **true** if the statement is an accurate interpretation of the information presented on the graph or **false** if the information is not an accurate interpretation of the information presented on the graph.

- | | | |
|------------------------------------------------------------------------------------------------|------|-------|
| a. East High school had the most perfect attendance awards given that year. | True | False |
| b. There were more awards given out during the third quarter than any other quarter that year. | True | False |
| c. West High School received the fewest perfect attendance awards overall that year. | True | False |
| d. The perfect attendance at North High School was the most variant of all three schools. | True | False |
| e. Perfect attendance awards were fairly consistent in each of the 3 schools. | True | False |
| f. A total of over 80 perfect attendance awards were given from all 3 schools each quarter. | True | False |

[9] S&P-3 Using range and measures of central tendency to determine the best representation of the data for a practical situation (M6.4.3)

David recorded the lowest temperature of each of the first 15 days of the month of November. Temperatures in Fahrenheit degrees: {0, 2, 5, 16, 17, 18, 18, 19, 19, 20, 21, 21, 23, 23, 23}

1. Which measure (mean, median, mode, or range) gives the most typical low temperature for a day in November?

- a. mean
- b. median
- c. mode
- d. range

Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:

[9] S&P-5 Determining or comparing the experimental and/or theoretical probability of independent or dependent events (M6.4.5)

1. Tara has a bag with 3 white marbles, 2 black marbles, and 5 gray marbles. She takes out two marbles without looking. What is the probability that the marbles are both white?

- a. $\frac{1}{15}$
- b. $\frac{9}{100}$
- c. $\frac{3}{5}$
- d. $\frac{2}{9}$

[9] S&P-6 Making predictions about the probability of independent or dependent events and using the information to solve problems (M6.4.5) (with [9] PS-4, [9] PS-3, and [9] PS-2)

1. Out of which bag would George most likely pick two white marbles?

| BAG 1 | BAG 2 |
|-----------------|-----------------|
| 5 white marbles | 3 white marbles |
| 4 black marbles | 2 black marbles |

2. Explain how you chose which bag would give George the best probability to pick two whites.

[9] S&P 7 (L) Designing, conducting, analyzing, and communicating the results of a probability experiment (M6.4.6) (with [9] PS-4)

Going to the Fair. Is it a Fair Game?

1. Make up a game that is fair and that could be used at a carnival, then find the probability of winning.

9th Grade Statistics and Probability Answer Key

Data Display: The student demonstrates an ability to classify and organize data by:

[9] S&P-1 [Designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers, community, or careers) using information from tables or graphs that display two sets of data [or with technology L] (M6.4.1) and

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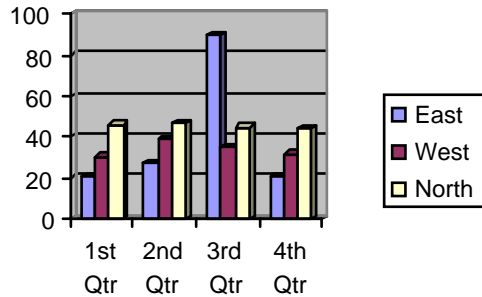
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- | | | |
|------------------------------------------------------------------------------------------------|--------------|---------------|
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| b. There were more awards given out during the third quarter than any other quarter that year. | True* | False |
| c. West High School received the fewest perfect attendance awards overall that year. | True* | False |
| d. The perfect attendance at North High School was the most variant of all three schools. | True | False* |
| e. Perfect attendance awards were fairly consistent in each of the 3 schools. | True | False* |
| f. A total of over 80 perfect attendance awards were given from all 3 schools each quarter. | True* | False |

[9] S&P-3 Using range and measures of central tendency to determine the best representation of the data for a practical situation (M6.4.3)

David recorded the lowest temperature of each of the first 15 days of the month of November. Temperatures in Fahrenheit degrees: {0, 2, 5, 16, 17, 18,18,19, 19, 20, 21, 21, 23, 23, 23}

1. Which measure (mean, median, mode, or range) gives the most typical low temperature for a day in November?

a. mean

b. median*

c. mode

d. range

Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:

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a. $\frac{1}{15}$ *

b. $\frac{9}{100}$

c. $\frac{3}{5}$

d. $\frac{2}{9}$

[9] S&P-6 Making predictions about the probability of independent or dependent events and using the information to solve problems (M6.4.5) (with [9] PS-4, [9] PS-3, and [9] PS-2)

1. Out of which bag would George most likely pick two white marbles? **Bag 2**

| BAG 1 | | BAG 2 |
|-----------------|--|-----------------|
| 5 white marbles | | 3 white marbles |
| 4 black marbles | | 2 black marbles |

2. Explain how you chose which bag would give George the best probability to pick two whites.

$$\text{Bag one } \frac{5}{9} \bullet \frac{4}{8} = \frac{5}{18}$$

$$\text{Bag two } \frac{3}{5} \bullet \frac{2}{4} = \frac{3}{10}$$

[9] S&P 7 (L) Designing, conducting, analyzing, and communicating the results of a probability experiment (M6.4.6) (with [9] PS-4)

Going to the Fair. Is it a Fair Game?

1. Make up a game that is fair and that could be used at a carnival, then find the probability of winning.

Students should show the probability of winning times the cost of the game.

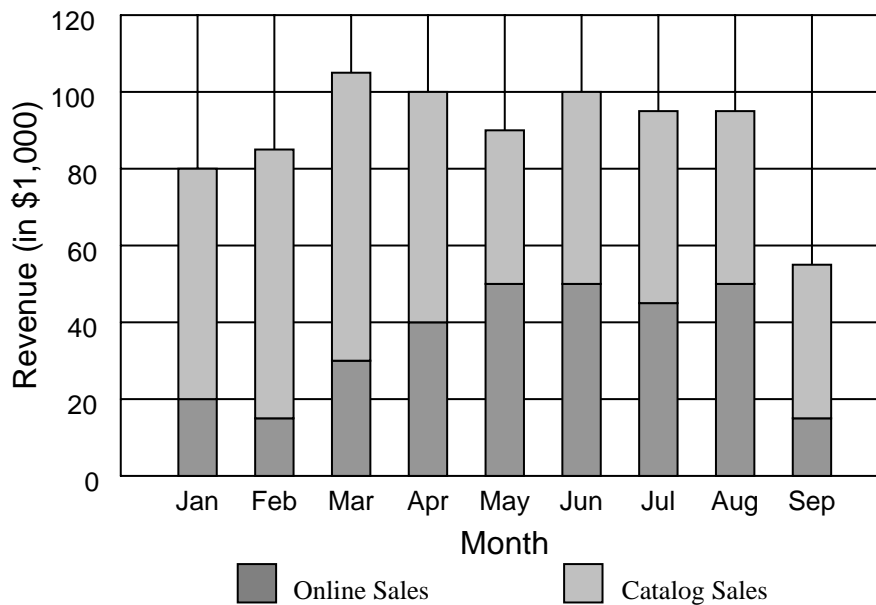
10th Grade Statistics and Probability

Data Display: The student demonstrates an ability to classify and organize data by:

[10] S&P-1 [Designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers, community, or careers), using information from tables or graphs that display two or more sets of data [or with technology L] (M6.4.1)

1. Use the information from the stacked bar graph below to complete the table below.

Monthly Revenue Totals for 2003



Monthly Revenue Totals for 2003

(In \$1,000)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---------|--------|--------|--------|---------|--------|---------|--------|--------|--------|
| Online | 20,000 | | 30,000 | 40,000 | 50,000 | | 45,000 | 50,000 | |
| Catalog | 60,000 | | 75,000 | | 40,000 | 50,000 | | 45,000 | 40,000 |
| Total | 80,000 | 85,000 | | 100,000 | 90,000 | 100,000 | | | |

Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, making predictions, or describing trends; or drawing, formulating, or justifying conclusions) by:

[10] S&P-2 Using information from a display to solve a problem or analyzing the validity of statistical conclusions (M6.4.1 & M6.4.4)

1. While summarizing payroll reports for her company, Ms. Walthers noticed that the mean salary in the firm was \$32,500 while the median salary was only \$28,200. What must be true regarding paychecks at this company?
 - a. There is at least one paycheck that is significantly less than the median payroll amount.
 - b. There is at least one paycheck that is significantly greater than the median payroll amount.
 - c. All paychecks in the company are relatively similar.
 - d. The mode must be between \$28,200 and \$32,500.

2. Based on the frequency table to the right, what is the median number of riders on Bus 43?

- a. 65
- b. 68
- c. 72
- d. 74

| Ridership: Bus 43 | |
|--------------------------|----|
| Mon | 65 |
| Tues | 77 |
| Wed | 65 |
| Thur | 68 |
| Fri | 74 |
| Sat | 78 |
| Sun | 75 |

[10] S&P-3 Using and justifying range and measures of central tendency to determine the best representation of the data for a practical situation (M6.4.3)

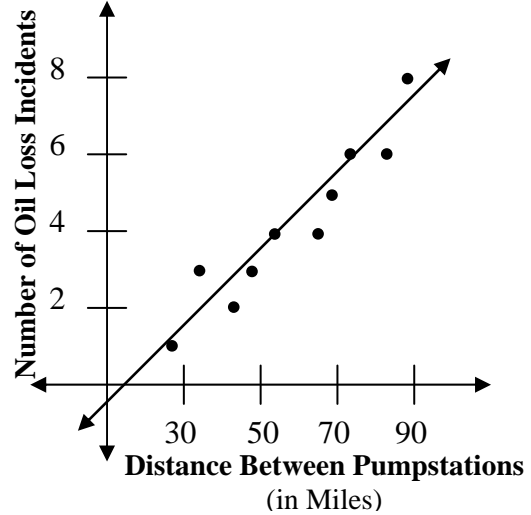
1. Fred has the following test scores at the end of the semester: 71, 74, 81, 88, 92, & 93. Which measure of central tendency should he report to his teacher in order to receive the highest possible grade?
 - a. The mean.
 - b. The median
 - c. The mode
 - d. The range

[10] S&P-4 Using a best fit line to describe trends and make predictions about data (M6.4.2)

1. The trendline at the right shows _____ association between the distance from pumpstations and the number of oil loss incidents recorded for that section of pipeline.

- a. positive
- b. negative
- c. no

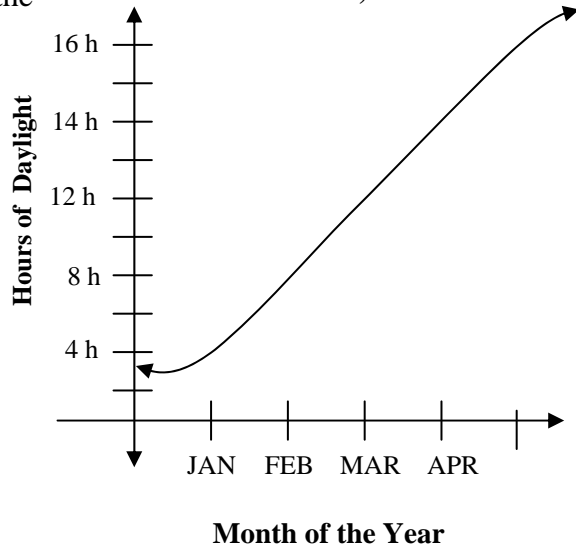
A Comparison of Oil Loss Incidents to Distance between Pumpstations



2. Based on the trendline given at the right, about how many hours of daylight can be expected in Talkeetna, Alaska, during the month of May?

- a. 13 hours
- b. 15 hours
- c. 16 hours
- d. 18 hours

Hours of Daylight Per Month Talkeetna, Alaska



Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:

[10] S&P-5 Explaining in words or identifying the difference between experimental and theoretical probability of independent or dependent events (M6.4.5)

1. Carol and Daphne determined that the probability of rolling a sum of 6 with two dice was $\frac{5}{36}$ but when they actually rolled the pair of dice 100 times, the sum of 6 occurred 18 times. Give a detailed explanation why this difference may occur. List several possibilities with examples.

[10] S&P-6 Analyzing data to make predictions about the probability of independent or dependent events as a basis for solving real-world problems (M6.4.5)

1. Austin recorded the following results of his free throw shooting. Based on this information, what is the probability that Austin will make his second shot if he makes his first shot?

- a. 50%
- b. 65%
- c. 80%
- d. 86.7%

| 1 st Shot | 2 nd Shot |
|----------------------|----------------------|
| Missed | Missed |
| Missed | Made |
| Made | Made |
| Made | Made |
| Made | Made |
| Missed | Made |
| Made | Missed |
| Made | Made |
| Missed | Missed |
| Missed | Missed |

[10] S&P-7 (L) Designing, conducting, analyzing, and communicating the results of a multi-stage probability experiment (M6.4.6)

Fran has been assigned the task of determining the probability of drawing 3 spades from a standard deck of 52 cards. Recall there are 4 suits (diamonds, hearts, spades, and clubs) of 13 cards each, in a deck. Each card is drawn one at a time and held until the remaining cards of the hand are drawn.

1. How many ways are there to draw the first card?
 - a. 1
 - b. 4
 - c. 13
 - d. 52

2. How many ways are there to draw the second card, after the first is drawn?
 - a. 1
 - b. 3
 - c. 12
 - d. 51

3. How many ways are there to draw the third card, after the first and second have been drawn?
 - a. 11
 - b. 12
 - c. 13
 - d. 50

4. Which expression gives the number of 3-card hands *of spades* from a standard deck of 52 cards?
- a. $2 \cdot 12 \cdot 13$
 - b. $13 \cdot 12 \cdot 11$
 - c. $52 \cdot 51 \cdot 50$
 - d. $52 \cdot 52 \cdot 52$
5. Which expression gives the total number of 3-card hands drawn from a standard deck of 52 cards?
- a. $1 \cdot 13 \cdot 13$
 - b. $13 \cdot 12 \cdot 11$
 - c. $52 \cdot 53 \cdot 54$
 - d. $52 \cdot 51 \cdot 50$
6. What is the probability of drawing a 3-card hand of spades from a standard deck of 52 cards?
- a. About 0.01%
 - b. About 0.05%
 - c. About 0.5%
 - d. About 1%

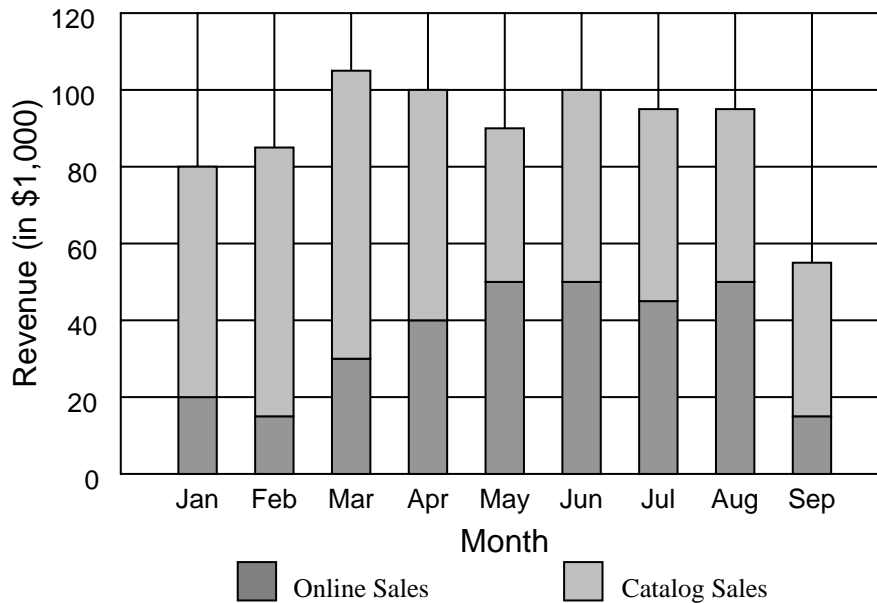
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| Catalog | 60,000 | 70,000 | 75,000 | 60,000 | 40,000 | 50,000 | 50,000 | 45,000 | 40,000 |
| Total | 80,000 | 85,000 | 105,000 | 100,000 | 90,000 | 100,000 | 95,000 | 95,000 | 55,000 |

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- b. 68
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- d. 74***

| Ridership: Bus 43 | |
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| Mon | 65 |
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| Sun | 75 |

[10] S&P-3 Using and justifying range and measures of central tendency to determine the best representation of the data for a practical situation (M6.4.3)

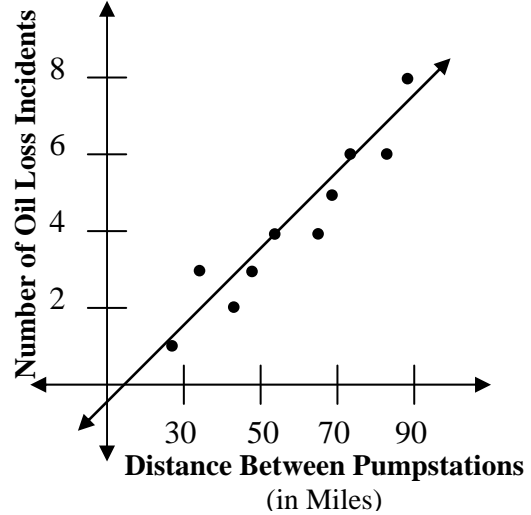
1. Fred has the following test scores at the end of the semester: 71, 74, 81, 88, 92, & 93. Which measure of central tendency should he report to his teacher in order to receive the highest possible grade?
 - a. The mean.
 - b. The median***
 - c. The mode
 - d. The range

[10] S&P-4 Using a best fit line to describe trends and make predictions about data (M6.4.2)

1. The trendline at the right shows _____ association between the distance from pumpstations and the number of oil loss incidents recorded for that section of pipeline.

- a. *positive**
- b. negative
- c. no

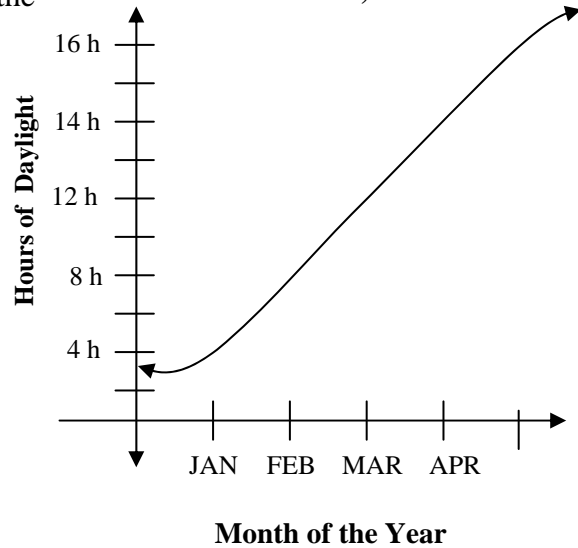
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2. Based on the trendline given at the right, about how many hours of daylight can be expected in Talkeetna, Alaska, during the month of May?

- a. 13 hours
- b. 15 hours
- c. *16 hours**
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Hours of Daylight Per Month Talkeetna, Alaska



Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:

[10] S&P-5 Explaining in words or identifying the difference between experimental and theoretical probability of independent or dependent events (M6.4.5)

1. Carol and Daphne determined that the probability of rolling a sum of 6 with two dice was $\frac{5}{36}$ but when they actually rolled the pair of dice 100 times, the sum of 6 occurred 18 times. Give a detailed explanation why this difference may occur. List several possibilities with examples.

$\frac{5}{36} = 13.888\%$ $\frac{18}{100} = 18\%$. *There are many reasons why the actual value may be*

different than the expected value. Though $\frac{5}{36} = \frac{13.8}{100}$, you can't roll 13.8 sums of 6!

You can only roll a whole number of times. So you might expect a sum of 6, fourteen or fifteen times. Or it may be that the die the girls used are not "fair," but loaded. So the sum of 6 showed up more often than expected.

[10] S&P-6 Analyzing data to make predictions about the probability of independent or dependent events as a basis for solving real-world problems (M6.4.5)

1. Austin recorded the following results of his free throw shooting. Based on this information, what is the probability that Austin will make his second shot if he makes his first shot?

- a. 50%
- b. 65%
- c. **80%***
- d. 86.7%

| 1 st Shot | 2 nd Shot |
|----------------------|----------------------|
| Missed | Missed |
| Missed | Made |
| Made | Made |
| Made | Made |
| Made | Made |
| Missed | Made |
| Made | Missed |
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| Missed | Missed |

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 - c. **13***
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 - b. 3
 - c. **12***
 - d. 51

- 3. How many ways are there to draw the third card, after the first and second have been drawn?
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 - b. 12
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 - d. 50

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6. What is the probability of drawing a 3-card hand of spades from a standard deck of 52 cards?
- a. About 0.01%
 - b. About 0.05%
 - c. About 0.5%
 - d. About 1% * $(13/52 \cdot 12/51 \cdot 11/50)$**