AP Statistics Summer Packet

Frequency Tables

Frequency means how often something occurs. A frequency chart is a table that shows the number of times something happens

ex: The following data points represent how many push-ups Curt did each night last week.

25, 23, 24, 25, 25, 25, 25

Using this data, create a frequency table.

Number of push-ups	Number of nights
23	1
24	1
25	5

1. The data below shows how old each of Brad's eight kids were when they started kindergarten.

4	4	5	4
5	4	3	4

Using this data, create a frequency table.

Age (in years)	Number of kids
3	
4	
5	

2. The following data points represent the number of pictures that Kai has had published in each of the local newspapers.

$$4, 3, 0, 3, 1, 0$$

Using this data, create a frequency table.

Number of pictures	Number of newspapers
0	
1	
2	
3	
4	

3. Tank is a car salesman at EH Auto Dealer. The data below shows how many cars he sold in each of the last nine months.

29	30	29
29	31	28
28	31	28

Using this data, create a frequency table.

Number of cars sold	Number of months
28	
29	
30	
31	

4. The following data points represent the number of players on the Russian Bears volleyball team that were injured in each match this year.

$$1, 2, 2, 1, 2, 1$$

Using this data, create a frequency table.

Number of injured players	Number of matches
0	
1	
2	

5. The data below shows the number of wheels that are on each of the nine vehicles in Bora's Auto Service Shop.

2	1	4
4	4	4
2	3	3

Using this data, create a frequency table.

Number of wheels	Number of vehicles
1	
2	
3	
4	

Creating Bar Graphs

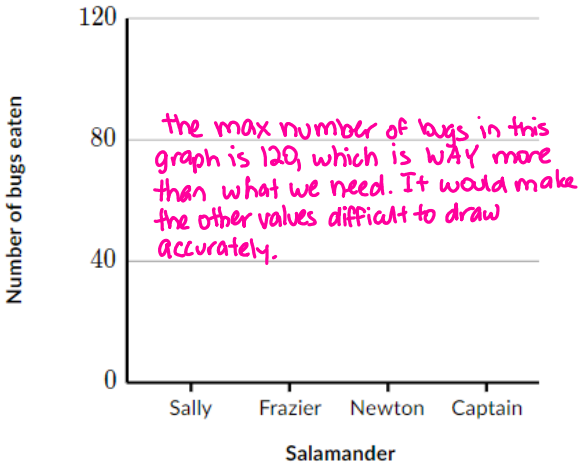
Bar Graph - a diagram in which the numerical values of variables are represented by the height or length of the line or rectangles of equal width

Ex: The table below shows the number of bugs eaten by 4 different salamanders.

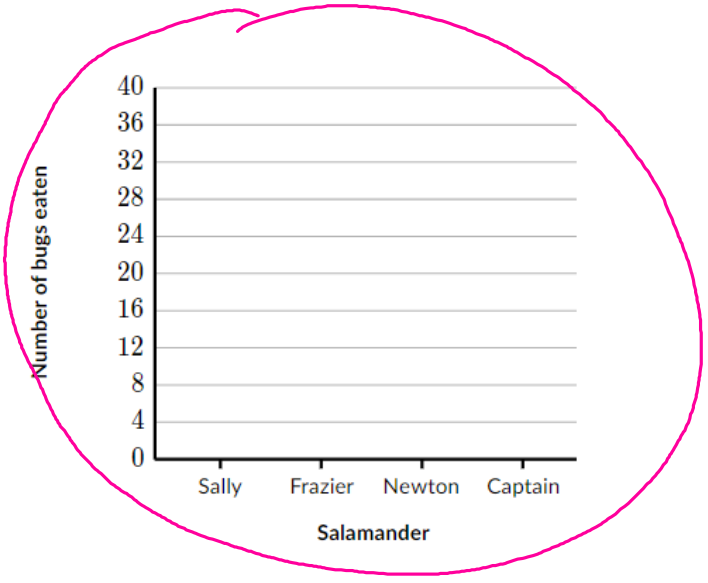
Salamander name	Number of bugs eaten
Sally	24
Frazier	22
Newton	30
Captain	40

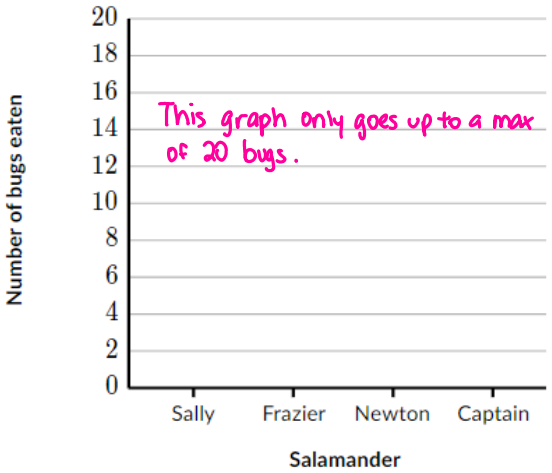
min number of bugs eaten: 22
max number of bugs eaten: 40

Which graph below shows the most *reasonable* scale for the information in the table?



the max number of bugs in this graph is 120, which is WAY more than what we need. It would make the other values difficult to draw accurately.





This graph only goes up to a max of 20 bugs.

6. To prepare her grocery list, Ivy asked everyone coming to the family reunion what their favorite fruit is. She created a cha

Create a bar graph with the information she collected in the table.

Fruit	Number of votes
Banana	50
Apple	55
Kiwi	10
Grapes	35
Mango	25

7. Mr. Smith assigned a special project about the ocean to the students in his Earth Science class. He asked the students how much time they spent completing their projects.

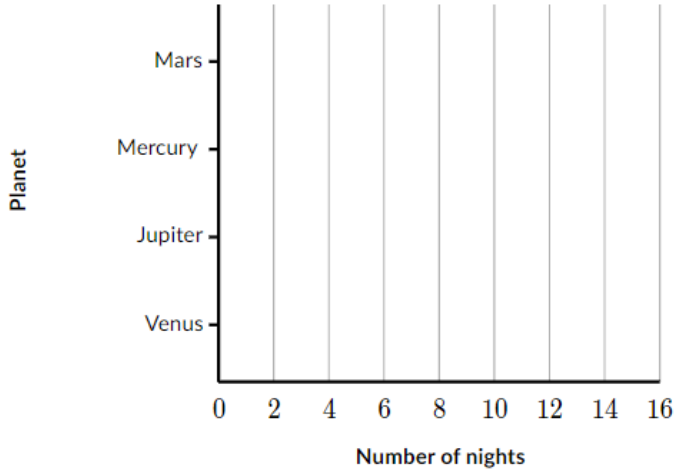
Create a bar graph to show how much time each student spent completing the ocean project.

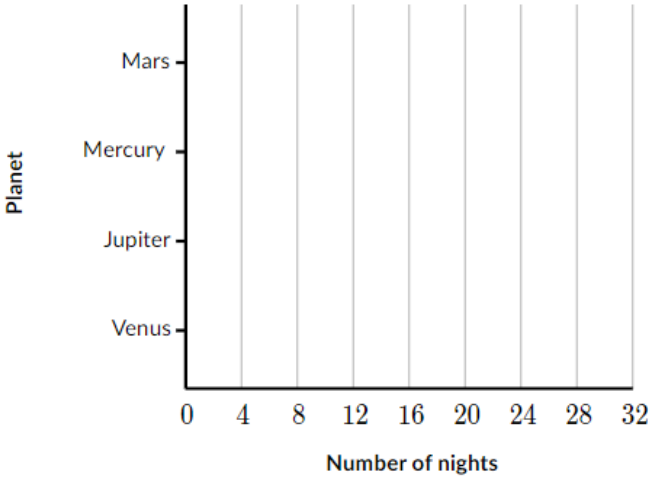
Student	Time
James	36 minutes
Eiji	54 minutes
Minli	36 minutes
Simone	30 minutes
Kiran	12 minutes

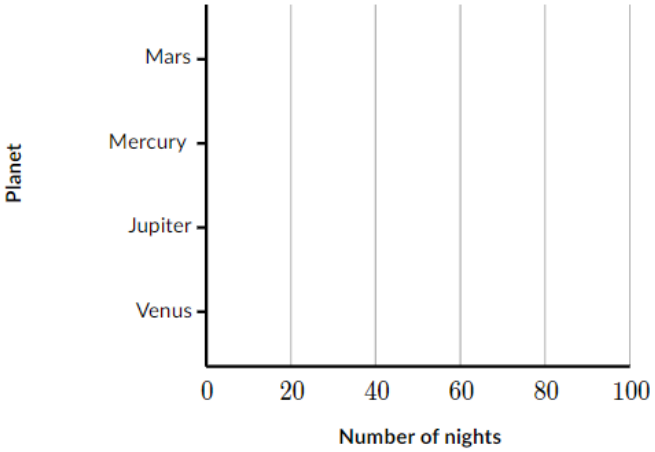
8. The table below shows the number of nights Steve saw different planets with his telescope.

Planet	Number of nights
Mars	14
Mercury	22
Jupiter	8
Venus	26

Which graph below shows the most *reasonable* scale for the information in the table?

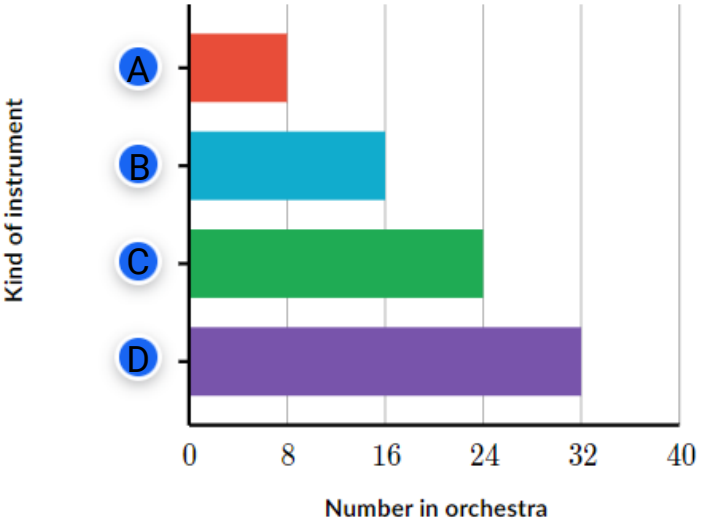






9. The conductor created a chart and a bar graph to show how many of each type of instrument were in the orchestra.

Kind of instrument	Number in orchestra
String	32
Brass	16
Woodwind	24
Percussion	8



Label each bar on the bar graph.

A.

C.

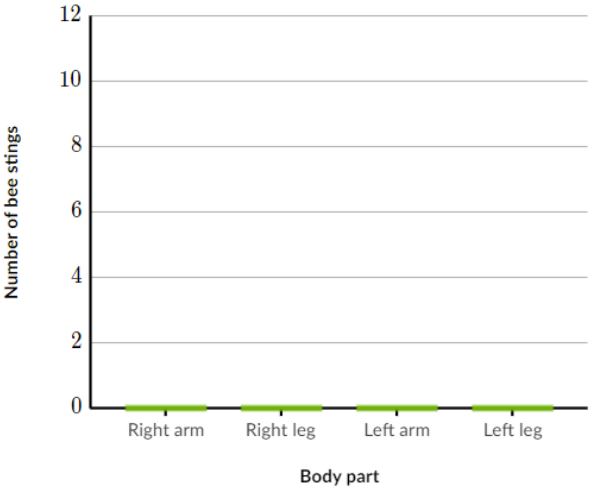
B.

D.

10. Bailey Bear could not help himself and reached right into a beehive to get some honey. Ouch! Now he has bee stings all over.

Create a bar graph to show how many bee stings he has on each leg and arm.

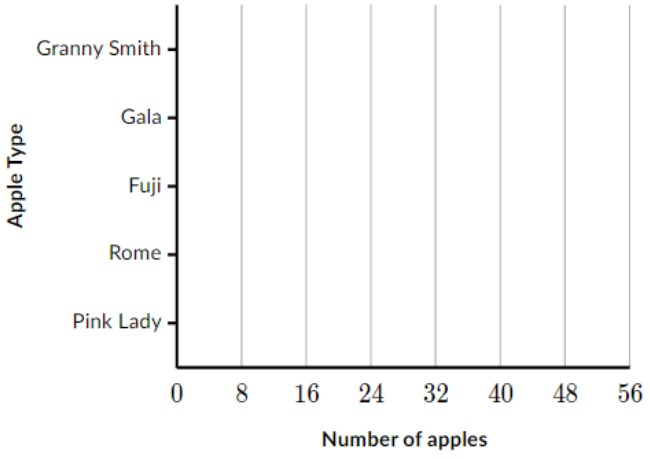
Body part	Number of bee stings
Right arm	10
Right leg	2
Left arm	8
Left leg	4

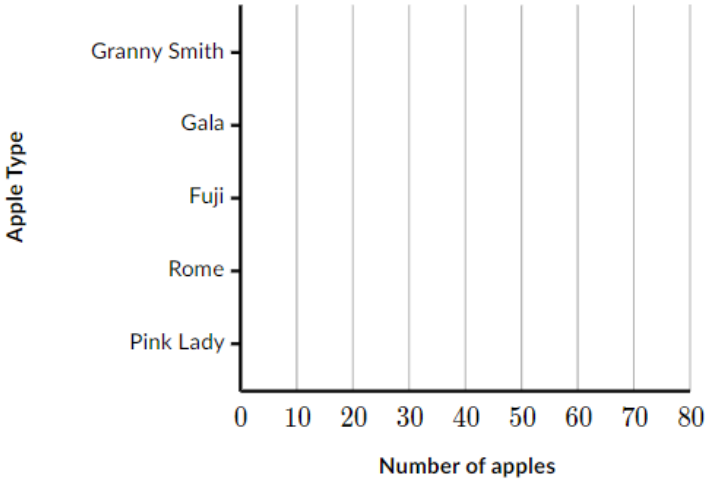


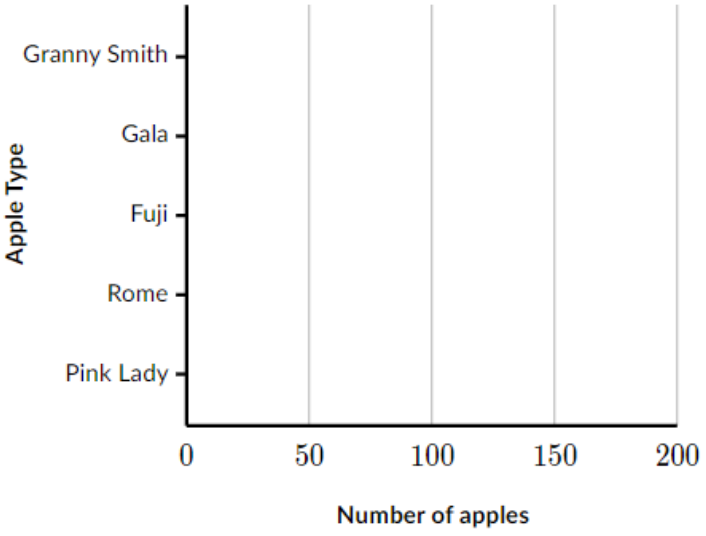
11. The table below shows different types of apples in Pitt's Apple Orchard.

Apple Type	Number of apples
Granny Smith	48
Gala	36
Fuji	60
Rome	44
Pink Lady	72

Which graph below shows the most *reasonable* scale for the information in the table?

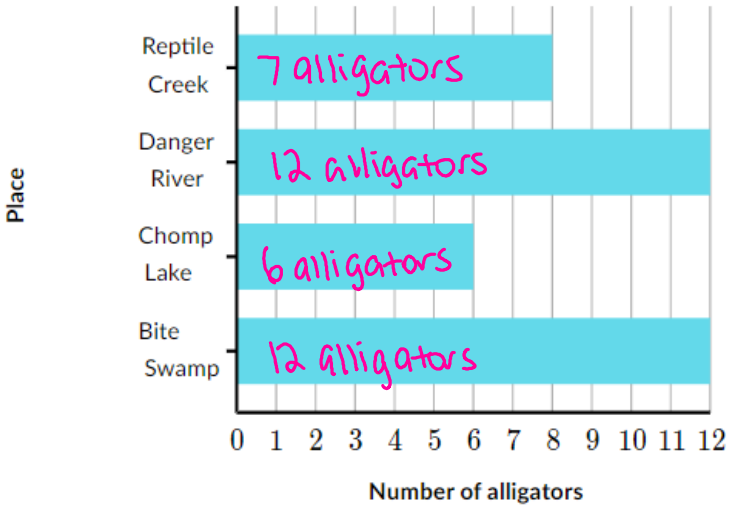






Solve Problems with Bar Graphs

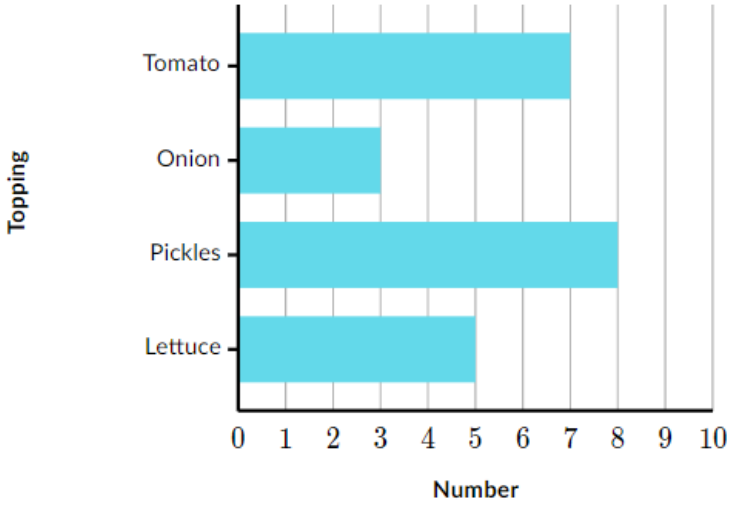
ex: James counted the number of alligators in various local bodies of water and graphed the results.



What bodies of water had the same number of alligators?

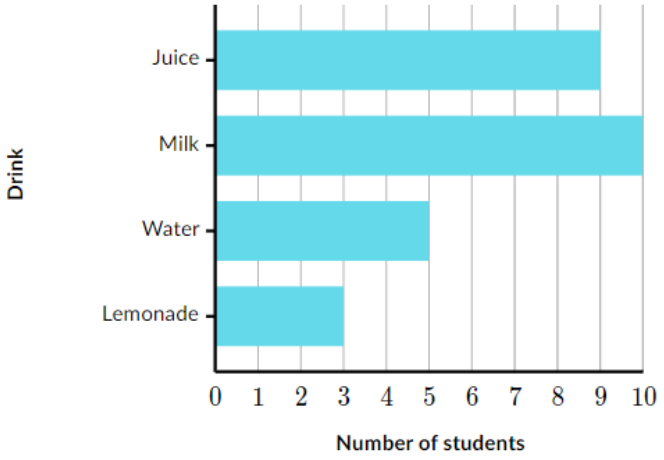
Danger River and Bite Swamp have the same number of alligators.

12. A restaurant counted how many toppings go on their jumbo burger.



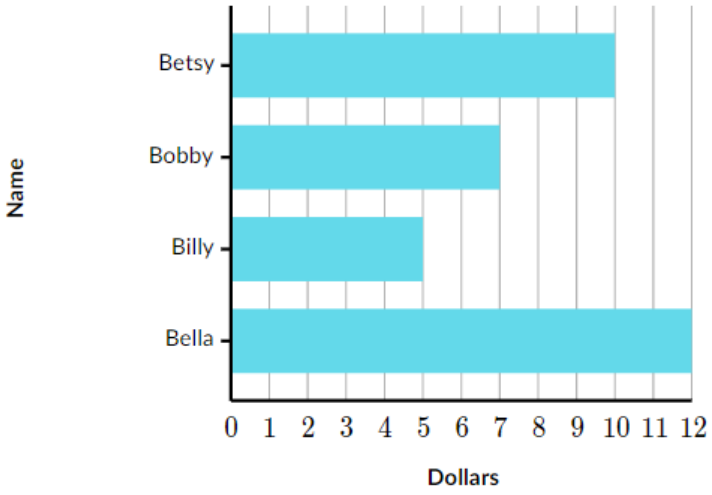
How many more pickles than onions are there on the jumbo hamburger?

13. A group of students graphed their favorite type of drink.



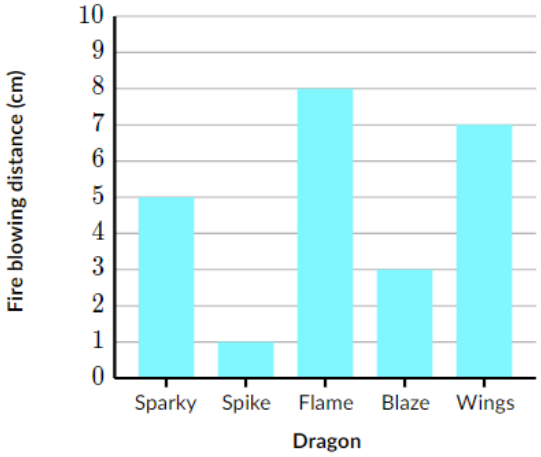
How many total students voted for milk or juice as their favorite type of drink?

14. A group of friends graphed how many dollars they earned mowing grass.



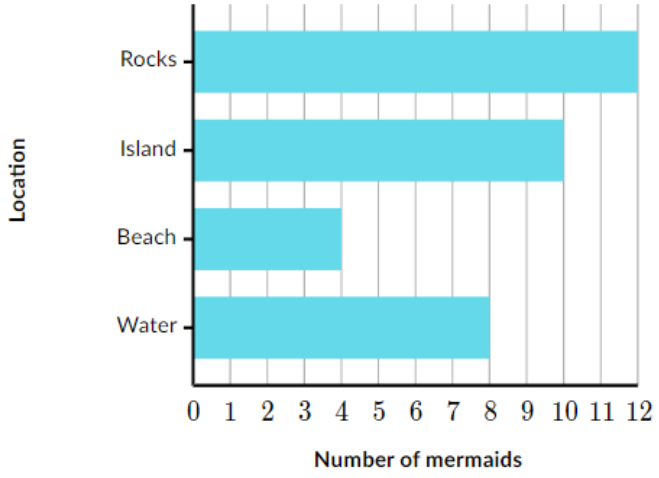
How many dollars do the friends have all together?

15. Davi the dragon keeper measured how far each of his dragons can blow fire.



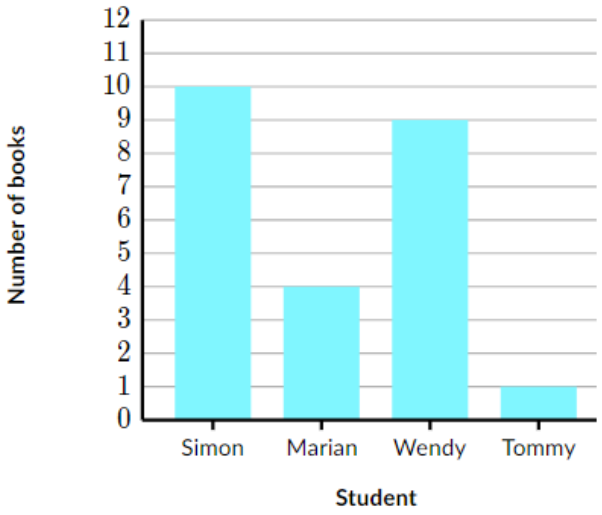
Which dragon blows fire farther than Sparky but not as far as Flame?

16. The bar graph shows how many mermaids were in different locations.



How many fewer mermaids are on the beach than on the island?

17. A group of students graphed how many books they read during the month of June.

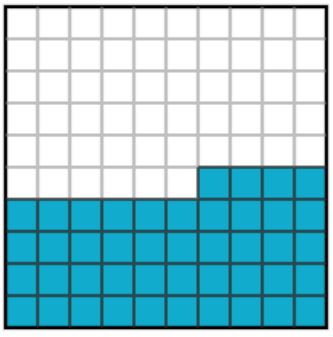


How many books did Marian and Wendy read in total?

Relate Fractions, Decimals, and Percents

The square below represents one whole.

Express the shaded area as a fraction, a decimal, and a percent of the whole.



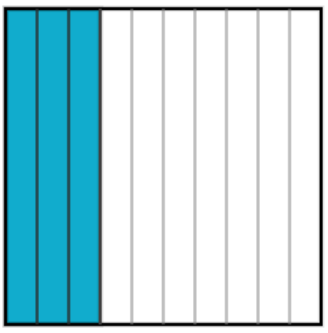
Fraction: $\frac{\text{part}}{\text{whole}} = \frac{\text{shaded}}{\text{all}} = \frac{44}{100}$

Decimal: 0.44

Percent: 44%

18. The square below represents one whole.

Express the shaded area as a fraction, a decimal, and a percent of the whole.



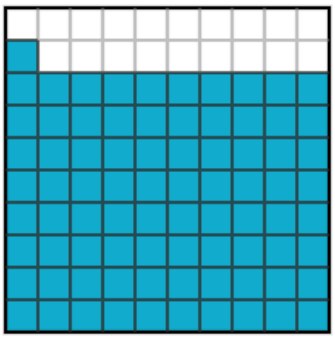
Fraction:

Decimal:

Percent:

19. The square below represents one whole.

Express the shaded area as a fraction, a decimal, and a percent of the whole.



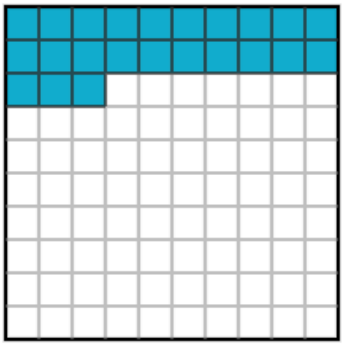
Fraction:

Decimal:

Percent:

20. The square below represents one whole.

Express the shaded area as a fraction, a decimal, and a percent of the whole.



Fraction:

Decimal:

Percent:

Equivalent representations of percent problems

ex: **Which of the following options have the same value as 75% of 96?**

75% of 96 = 0.75 × 96 = 72

Choose 3 answers:

- [x] $\frac{3}{4} \cdot 96$ = 72
- [x] $\frac{75}{100} \cdot 96$ = 72
- [x] $0.75 \cdot 96$ = 72
- [ ] D $\frac{4}{3} \cdot 96$ = 128
- [ ] E $75 \cdot 96$ = 7200

21. Which of the following options have the same value as 10% of 33?

Choose 3 answers:

- A $0.1 \cdot 0.33$
- B $10 \cdot 33$
- C $\frac{1}{10} \cdot 33$
- D $0.1 \cdot 33$
- E $\frac{10}{100} \cdot 33$

22. Which of the following options have the same value as 5% of 35?

Choose 2 answers:

- A $5 \cdot 35$
- B $\frac{5}{100} \cdot 35$
- C $0.5 \cdot 0.35$
- D $0.05 \cdot 35$
- E $\frac{5}{10} \cdot 35$

23. Which of the following options have the same value as 96% of 25?

Choose 2 answers:

- A $\frac{96}{100} \cdot 25$
- B $0.96 \cdot 25$
- C $0.96 \cdot 0.25$
- D $\frac{96}{100} \cdot \frac{25}{100}$
- E $96 \cdot 25$

Finding Percents

24. What is 22% of 400?

25. 52 is what percent of 200?

26. 28 is what percent of 50?

27. is 75% of what number?

28. 12 is 60% of what number?

29. What is 84% of 300?

30. What is 90% of 20?

Percent word problems

31. Samuel has a collection of toy cars. His favorites are the 27 red ones, which make up 60% of his collection. How many toy cars does Samuel have?

32. Challenger Elementary School has 800 students. Every Wednesday, 12% of the students stay after school for Chess Club. How many students attend Chess Club on Wednesdays?

33. There are 25 students in Ms. Nguyen's second grade class. In the class election, 4 students voted for Benjamin, 12 voted for Sahil, and 9 voted for Maria. What percentage of the class voted for Maria?

34. Anastasia is grocery shopping with her father and wonders how much shopping is left to do. "We already have 60% of the items on our list," her father says. Anastasia sees 12 items in the cart. How many grocery items are on the list?

35. Elmer has a collection of 300 fossils. Of these, 21% are fossilized snail shells. How many fossilized snail shells does Elmer have?

Creating Dot Plots

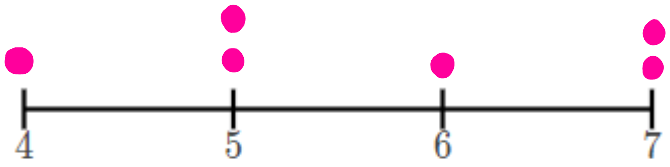
A dot chart or dot plot is a statistical chart consisting of data point plotted on a fairly simple scale, typically using filled in circles

Lola is the coach for the Golden County football team. Below are the number of wins that the football team had in each of the last six seasons.

$5, 4, 7, 6, 7, 5$

4 → 1 season 7 → 2 seasons
5 → 2 seasons
6 → 1 season

Using this data, create a dot plot where each dot represents a season.

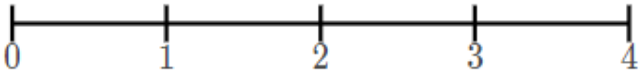


Number of wins

35. The frequency table below shows the number of pets Jamal's classmates own.

Number of pets	Number of classmates
0	3
1	4
2	3
3	0
4	1

Using this data, create a dot plot where each dot represents a classmate.

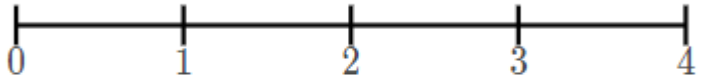


Number of pets

36. The following data points represent the number of jars of honey Sandy the Bear consumed each day this week.

$$1, 4, 2, 3, 0, 3, 2$$

Using this data, create a dot plot where each dot represents a day.

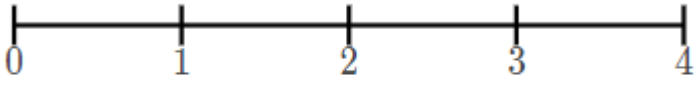


Number of jars of honey

37. Quarterback Susie has a bad attitude and often gets fined for bad sportsmanship. Below are the costs of each of the six fines assessed to her this season (in thousands of dollars).

Cost of fine	Number of fines
1	1
2	4
3	1

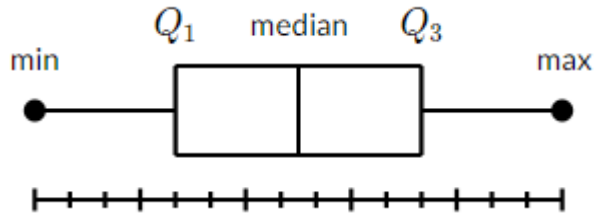
Using this data, create a dot plot where each dot represents a fine.



Cost of fine in thousands of dollars

Creating Box Plots

A box and whisker plot-also called box plot-displays the five number summary of a set of data. The five number summary is the minimum, first quartile, median, third quartile, and maximum. In a box plot we draw a box from the first quartile, Q1, to the third quartile, Q3. A vertical line goes through the box at the median. The whiskers go from each quartile to the minimum or maximum. The median is the middle of the numbers (see next section for more explanation on median). The first quartile is the median of the data points to the left of the median. The third quartile is the median of the numbers to the right of the median.



Ex: The data below represents the number of workouts each member of Big Muscles Gym attended last month.

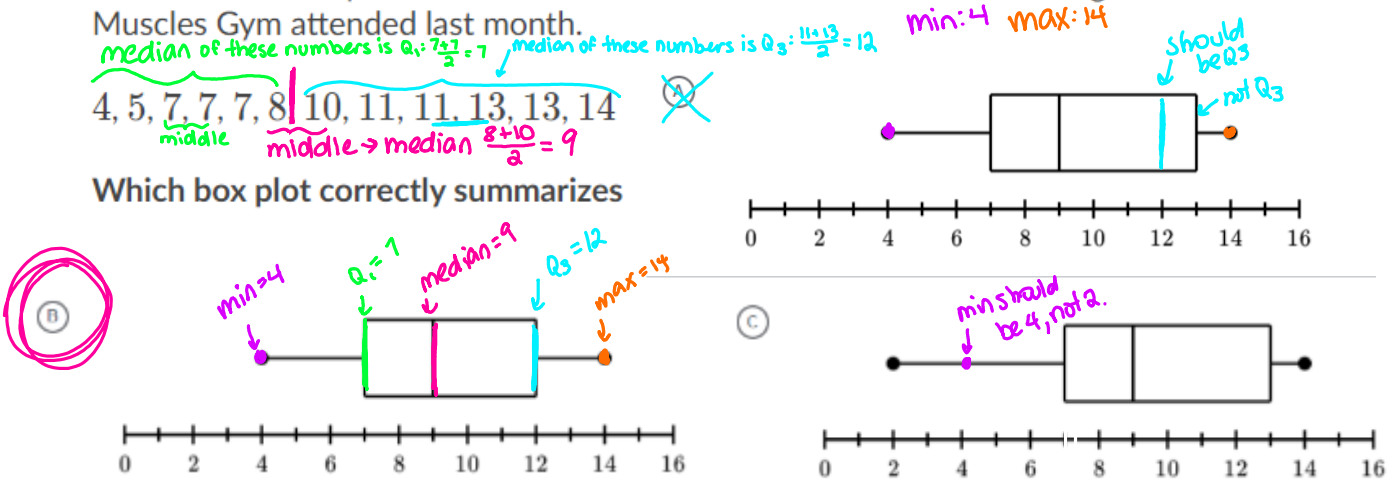
median of these numbers is Q_1: $\frac{7+7}{2}=7$ | median of these numbers is Q_3: $\frac{11+13}{2}=12$

4, 5, 7, 7, 7, 8 | 10, 11, 11, 13, 13, 14

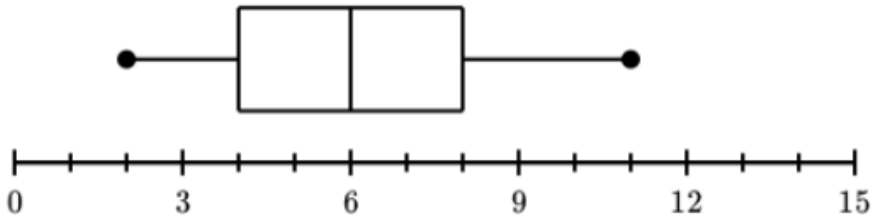
middle | middle → median $\frac{8+10}{2}=9$

min: 4 max: 14

Which box plot correctly summarizes



38. Which data set could be represented by the box plot shown below?



Choose 1 answer:

(A) 2, 3, 5, 5, 7, 7, 8, 10, 11

(B) 2, 3, 5, 5, 6, 7, 8, 8, 11

(C) 2, 3, 5, 5, 6, 7, 8, 10, 11

(D) 3, 3, 5, 5, 6, 7, 8, 9, 11

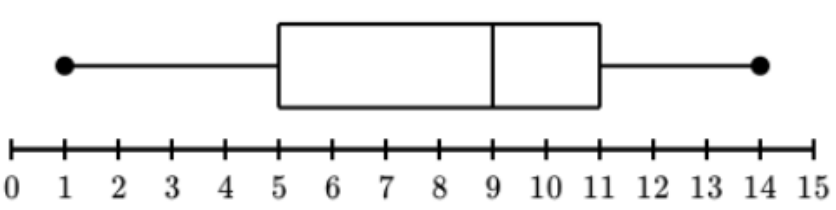
39. The data below represents the number of guests staying on each floor of the Luxed Hotel.

1, 3, 5, 7, 9, 9, 11, 11, 13, 14

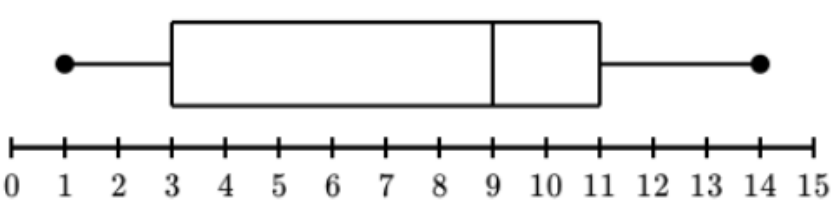
Which box plot correctly summarizes the data?

Choose 1 answer:

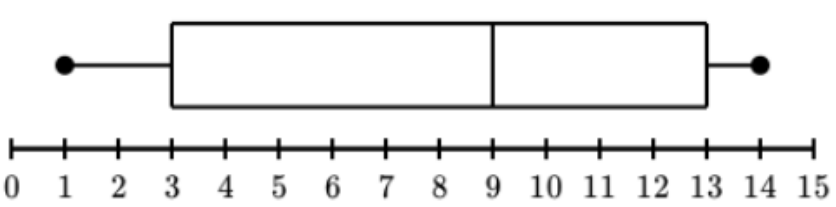
(A)



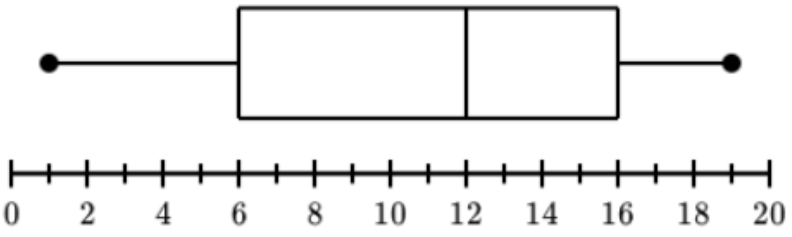
(B)



(C)



40. **Which data set could be represented by the box plot shown below?**



Choose 1 answer:

(A) 1, 3, 6, 8, 10, 12, 13, 13, 16, 18, 19

(B) 1, 3, 6, 8, 10, 12, 13, 13, 16, 18, 20

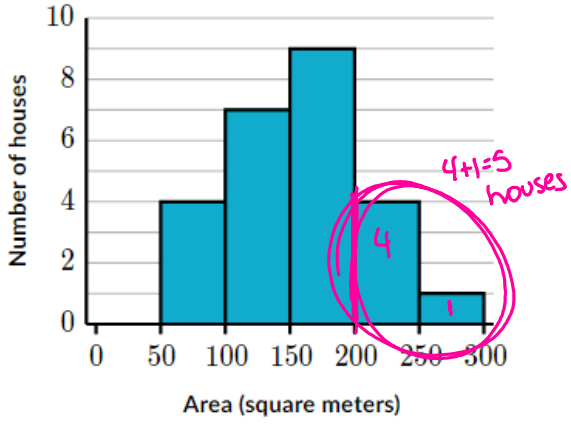
(C) 1, 3, 6, 8, 10, 11, 13, 13, 18, 18, 19

(D) 1, 3, 6, 8, 10, 11, 13, 13, 16, 18, 19

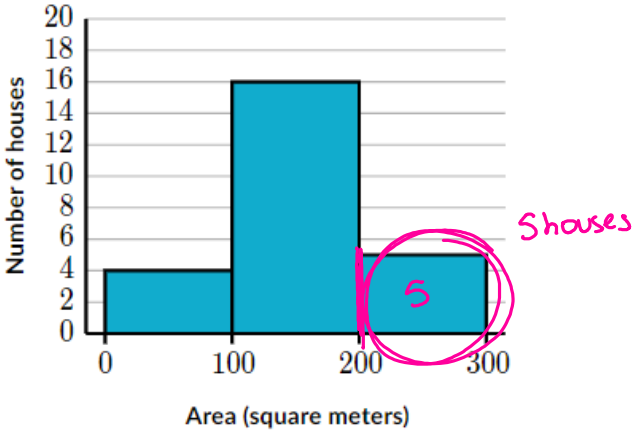
Comparing Data Displays

ex: Regina recorded the area of each house on Prince Street. She then made two histograms with different bucket sizes using the same data:

Histogram A



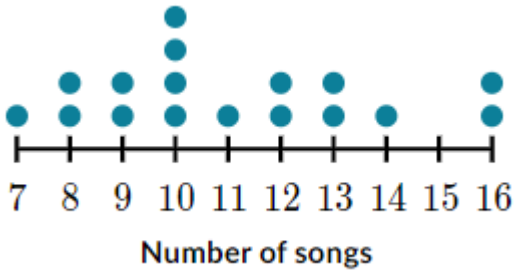
Histogram B

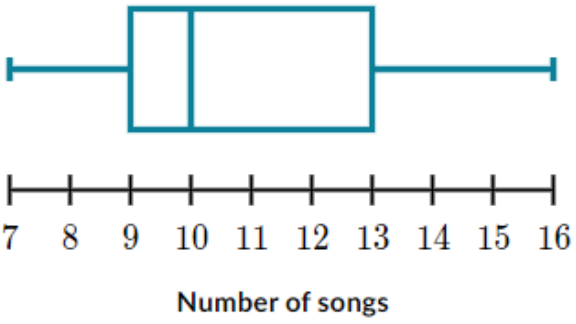


Which histogram can be used to find how many houses had areas greater than 200 square meters?

Both A and B!

41. Sal counted the number of songs on each album in his collection. He created both a dot plot and a box plot to display the same data:

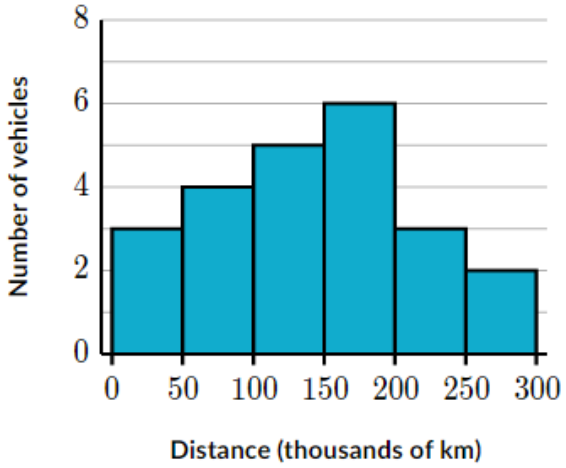


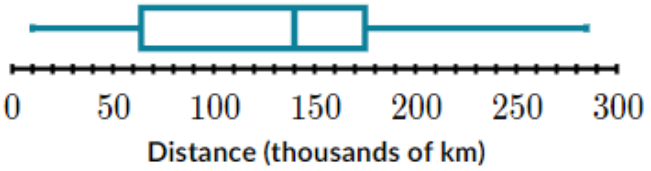


Which display makes it easier to see that the median is 10 songs?

Which display allows us to see that the mode is 10 songs?

42. Nam owns a used car lot. He checked the odometers of the cars and recorded how far they had driven. He then created both a histogram and a box plot to display the same data:

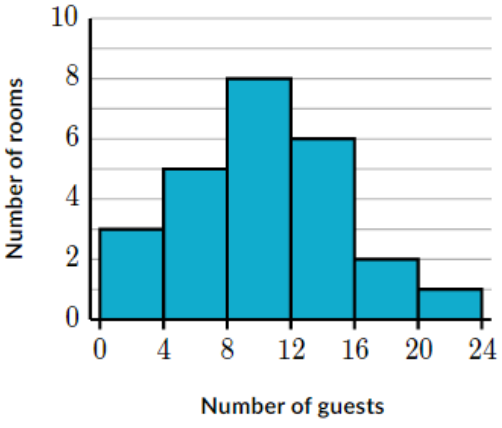


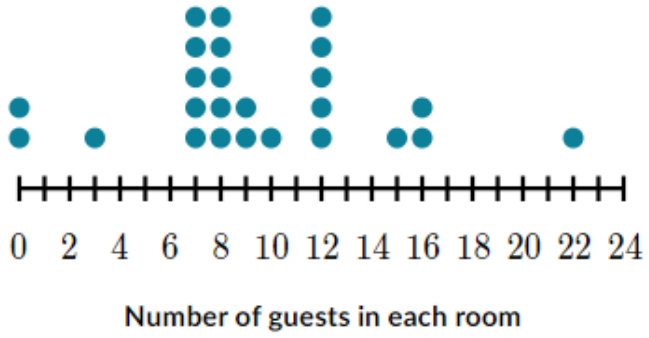


Which display is more useful for approximating the minimum distance?

Which display can be used to find that there were 23 vehicles at Nam's Used Car Lot?

43. Leo owns a hostel and counted the number of guests staying in each room. He then created both a histogram and a dot plot to display the same data:





Which display can be used to find the maximum number of guests in a room?

Which display makes it clear that there were no rooms with 1 guest?

Calculating the Mean

You find the mean (informally called the average) by adding up all the numbers in a set and then dividing by how many values there are.

ex: The Gabrielsons ran a family relay race. The distance run by each family member (in kilometers) is listed below.

$11, 4, 8, 2, 5$

1 2 3 4 5

$\frac{11+4+8+2+5}{5} = 6$

Find the mean distance. 6 km

44. Jose tracks how many times he got fast food each month. He got fast food 12 times in January, 10 times in February, 18 times in March, 4 times in April, and 2 times in May.

Find the mean number of times Jose got fast food.

____ times getting fast food

45. The following table shows the number of words that each student found in a word search puzzle.

Student	Fenyang	Yasemin	Luke
Number of words	28	26	24

____ words

Find the mean number of words.

46. The following table shows the number of alligators in each body of water near Tom's house.

Body of water	Number of alligators
Bite Swamp	7
Chomp Lake	0
Danger River	11
Reptile Creek	10

____ alligators

Calculating the median

When are arrange a set of values from smallest to largest, the median is the one in the middle. If there are two values in the middle, the median is the mean (average) of the two values.

ex: The following data points represent the number of apples on each apple tree in Craig's backyard.

Answer 2 questions about the data points.

1. **Sort the data from least to greatest.**

39	41	29	36	34	22

22, 29, 34, 36, 39, 41 (middle) median: $\frac{34+36}{2} = 35$

2. **Find the median number of apples.** 35 apples

47. The following data points represent the number of slices of pizza that each person at Thorton's birthday party ate.

Answer 2 questions about the data points.

1. **Sort the data from least to greatest.**

3	1	3	4	7	9	2

2. **Find the median number of slices.** _____ slices

48. The following data points represent the number of campsites that are vacant at each campground park along the Shinacook River.

Answer 2 questions about the data points.

1. **Sort the data from least to greatest.**

11	17	15	12	18	9

2. **Find the median number of campsites.** _____ campsites

49. The following data points represent the number of attendees at each of the private dance events hosted by Fenel Arrangements.

Answer 2 questions about the data points.

1. **Sort the data from least to greatest.**

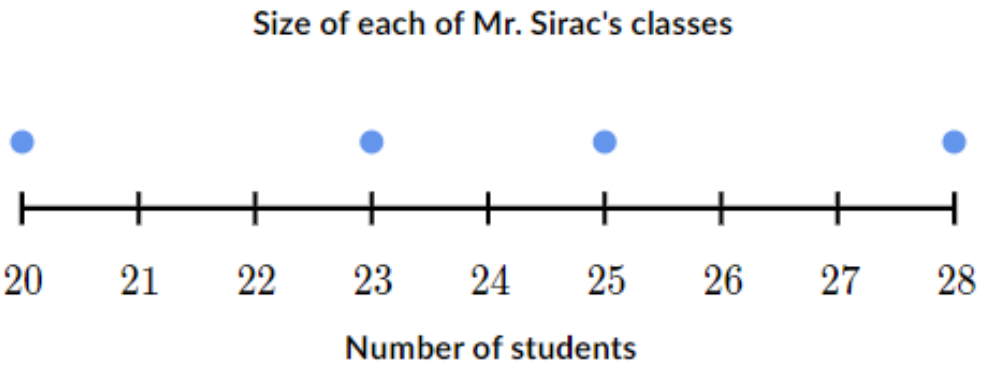
51	48	38	47	34	42	33	47	49

2. **Find the median number of attendees.** _____ attendees

Calculating Mean: Data Displays

50. **Find the mean of the data in the dot plot below.**

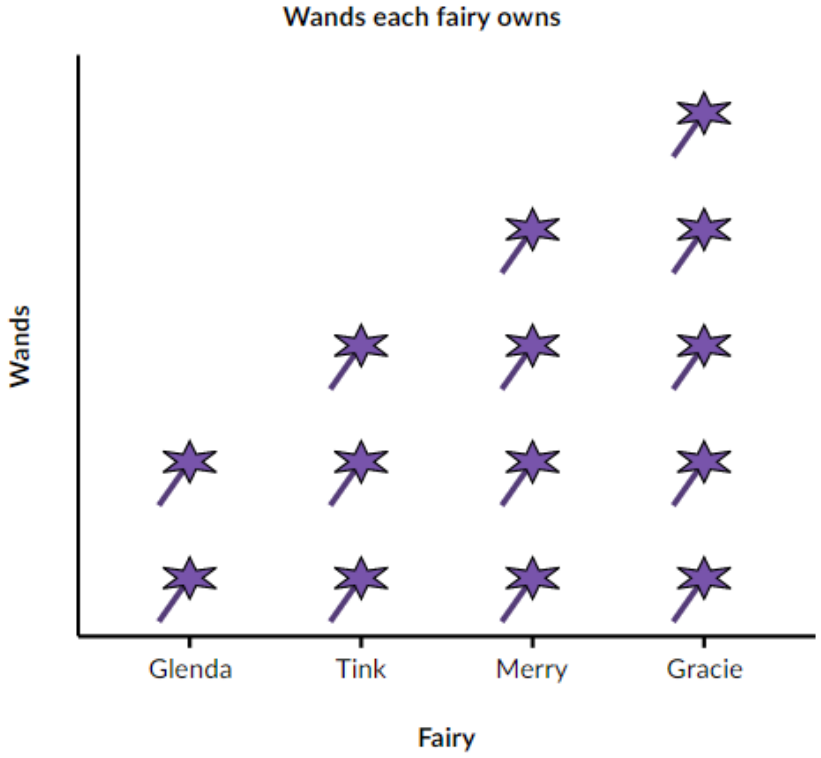
_____ students



51. Find the mean of the data in the pictograph below.

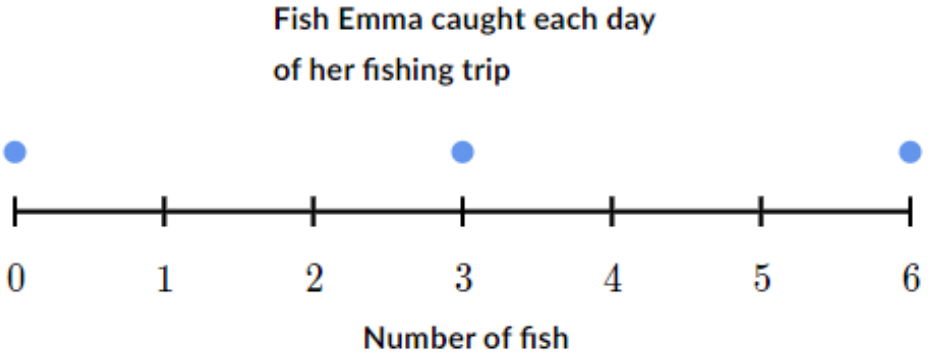
wands

= 2 wands



52. Find the mean of the data in the dot plot below.

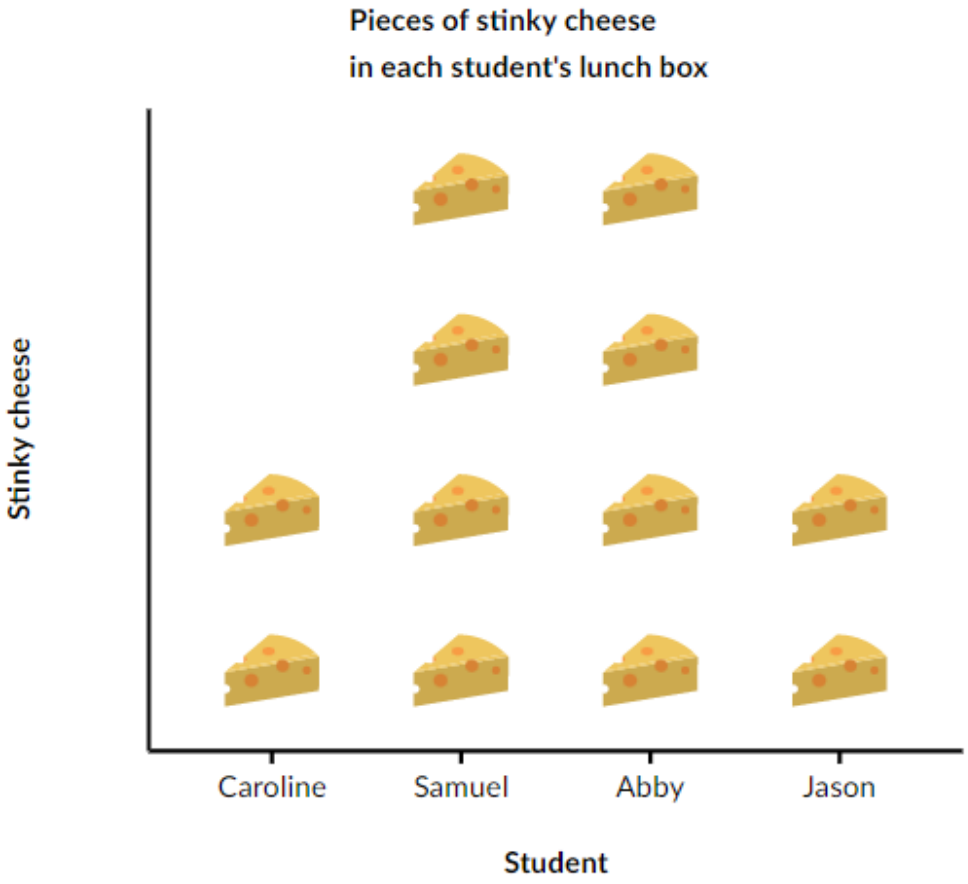
fish



53. **Find the mean of the data in the pictograph below.**

_____ pieces of stinky cheese

 = 1 piece of cheese



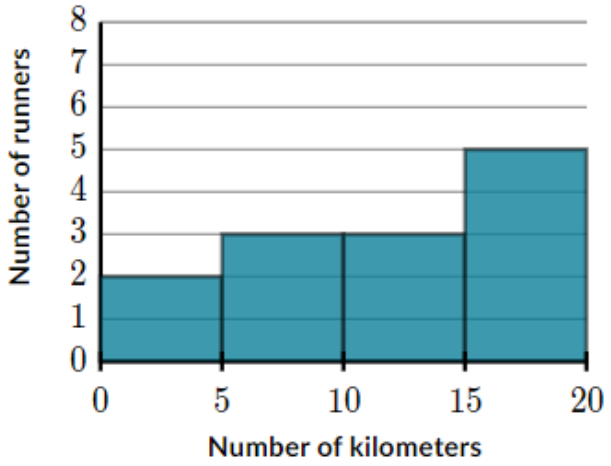
Calculating the Median: Data Displays

54. Lupe's dogs love to hide bones. Bubba hid 5 bones, Barry hid 4 bones, Larry hid 13 bones, and Goby hid 10 bones.

Find the median number of bones.

_____ bones

55. The following histogram shows the distance run by each member of a running club.



(A) 0 to 5

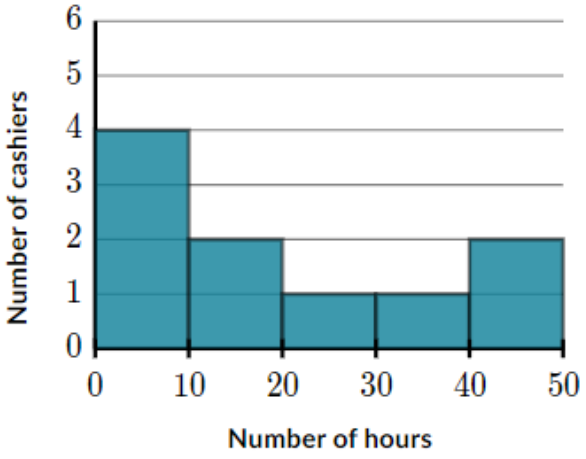
(B) 5 to 10

(C) 10 to 15

(D) 15 to 20

In which interval is the median distance?

56. The following histogram shows how many hours each cashier worked at a store last week.



(A) 0 to 10

(B) 10 to 20

(C) 20 to 30

(D) 30 to 40

In which interval is the median number of hours?

57. Santino tried to find the median from the following table, which shows the number of internet users in 2012 for the highest using countries. However, he made a mistake.

Country	China	United States	Japan	India	Brazil
Number of internet users (in millions)	568	254	101	152	100

Here is Santino's work:

"The numbers are 568, 254, 101, 152, and 100.

There are 5 values, so the middle value is the 3^{rd} value, 101. The median is 101 million internet users."

What mistake did Santino make?

(A) Santino calculated the mean instead of the median.

(B) Santino should have ordered the numbers from least to greatest before picking the middle number.

(C) Santino should have averaged the middle 2 values instead of using just 1 value.

(D) Santino should have repeated some of the values in his list.

Mean Absolute Deviation (MAD)

The mean absolute value deviation of a dataset is the average distance between each data point and the mean. It gives an idea about the variability in a dataset.

Here's how to calculate the mean absolute deviations.

Step1: Calculate the mean
Step 2: Calculate how far away each data point is from the mean positive distances. These are called absolute deviations.
Step 3: Add those deviations together.
Step 4: Divide the sum by the number of data points

$$\text{MAD} = \frac{\sum |x_i - \bar{x}|}{n}$$

each data point — mean — number of data points

Ex: Find the mean absolute deviation (MAD) of the data in the pictograph below.

Step 1: Calculate the mean $\frac{4+6+8+10}{4} = \frac{28}{4} = 7$

Step 2: Find absolute deviations. (How far each data point is from the mean, use positive distances)

$|4-7| = 3$

$|6-7| = 1$

$|8-7| = 1$

$|10-7| = 3$

Step 3: Add the distances together

$3+1+1+3 = 8$

Step 4: Divide the sum by the number of data points

$\frac{8}{4} = 2$

MAD = 2

2 wands

= 2 wands

58. The following table shows the distance from Tessa's house to several different locations.

Location	School	Library	Park	Movie theater
Distance from Tessa's house (in kilometers)	3	5	4	4

Find the mean absolute deviation (MAD) of the data set.

km

59. Below are the distances that each of Davi the Dragon Keeper's four dragons can blow fire (in meters).

0.9	0.5	0.3	1.1

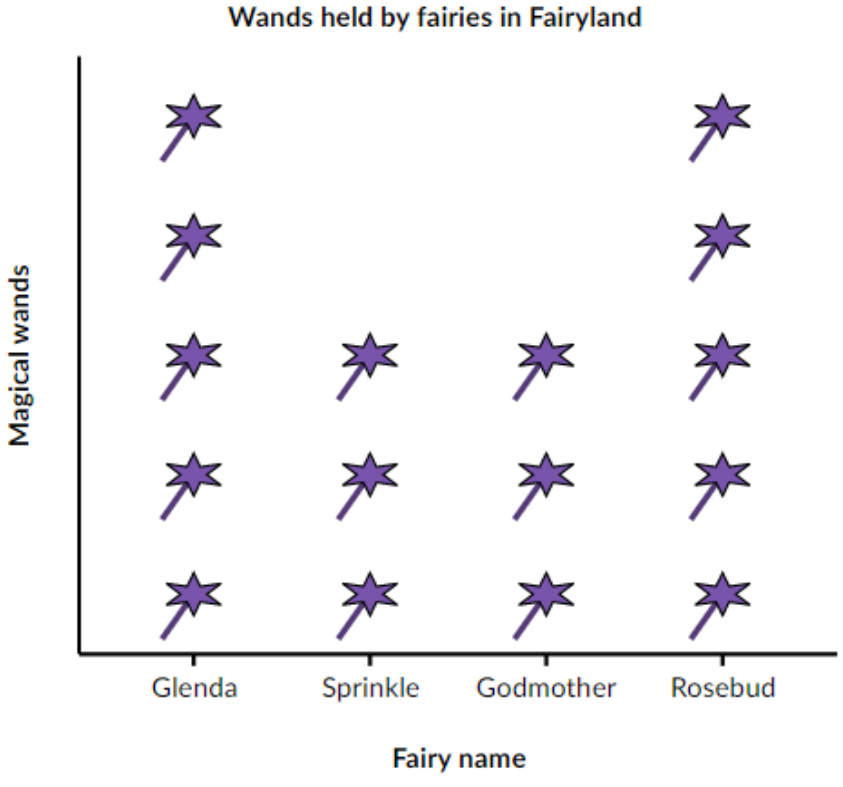
Find the mean absolute deviation (MAD) of the data set.

_____ m

60. **Find the mean absolute deviation (MAD) of the data in the pictograph below.**

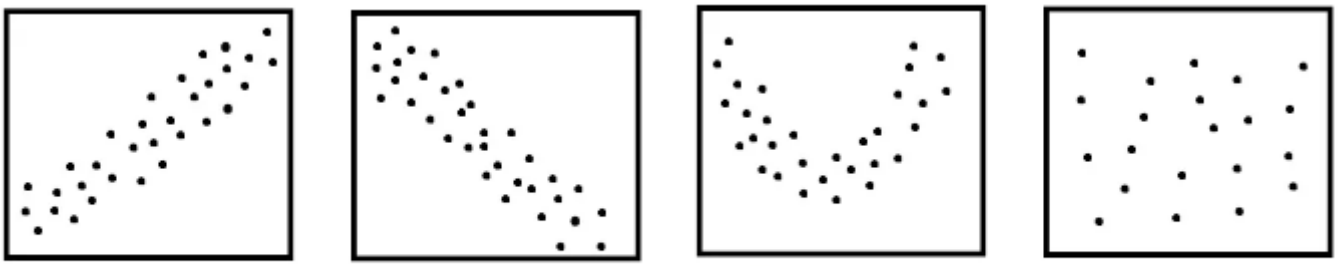
_____ wands

= 1 wand



Constructing Scatter Plots

A scatter plot shows the association between two varaibles



positive linear association | negative linear association | nonlinear association | no association

Ex: Sean measured the height and petal length (in centimeters) of all the flowers in his garden.

Plot the data in a scatter plot.

Height (cm)	32.5	20	15	35	10	37.5
Petal length (cm)	5	4	2	8	1.5	8.5

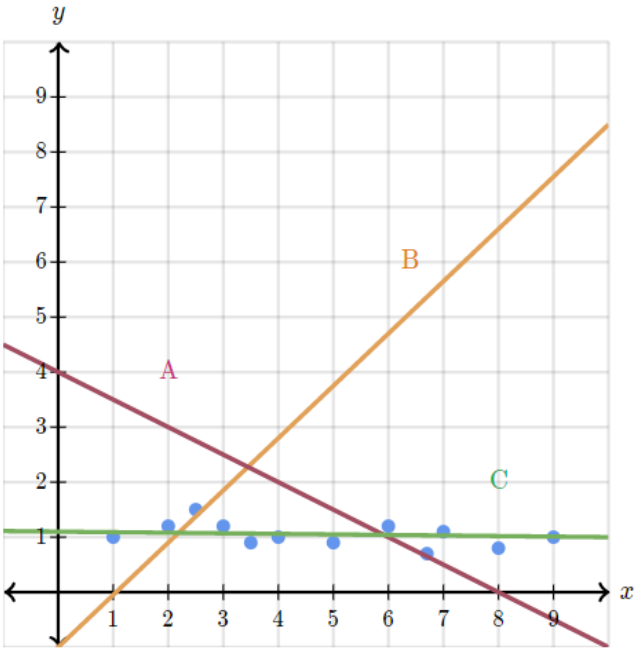
Ex. A doctor collected data on how many hours children of different ages slept in a day. Data for 5 participants are shown below.

Plot the data in a scatter plot.

Age (years)	1	2	3	5	8
Sleep (hours)	13	11	10	9	8

Eyeballing the line of best fit

ex:



Which line fits the data graphed below?

Choose 1 answer:

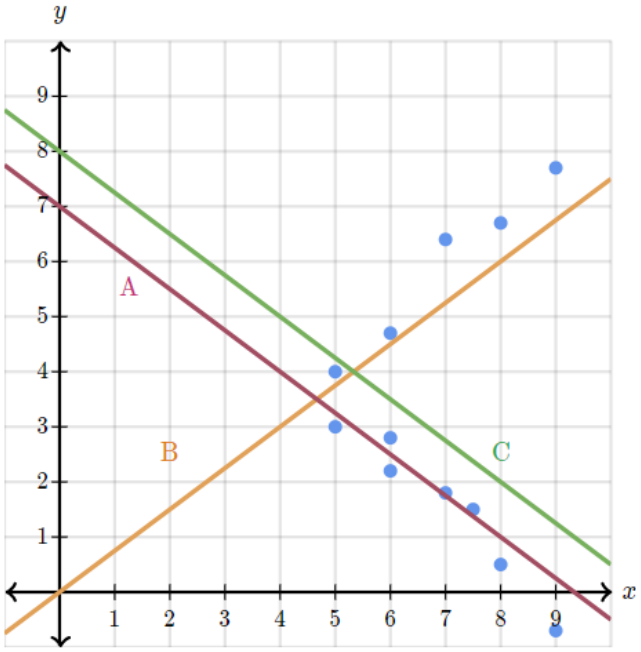
(A) A

(B) B

(C) C — all the points are gathered around this one line

(D) None of the lines fit the data.

02.



Which line fits the data graphed below?

Choose 1 answer:

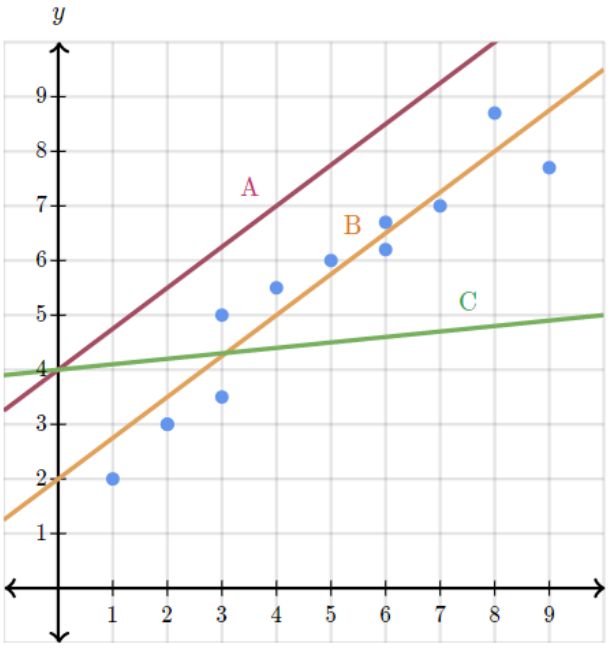
(A) A

(B) B

(C) C

(D) None of the lines fit the data.

03.



Which line fits the data graphed below?

Choose 1 answer:

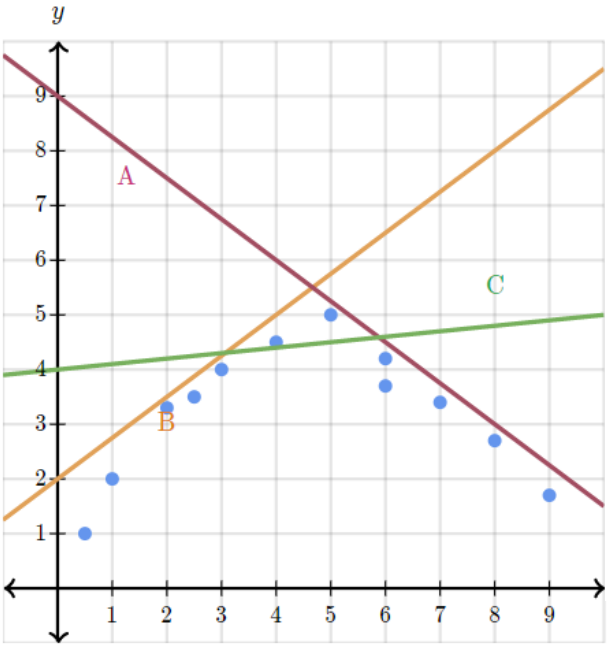
(A) A

(B) B

(C) C

(D) None of the lines fit the data.

04.



Which line fits the data graphed below?

Choose 1 answer:

(A) A

(B) B

(C) C

(D) None of the lines fit the data.

Estimating Slope of Line of Best Fit

ex. The scatter plot below shows the relationship between the percentage of American adults who smoke and years since 1945.

During this time period, the percentage of adults who smoked changed each year by about

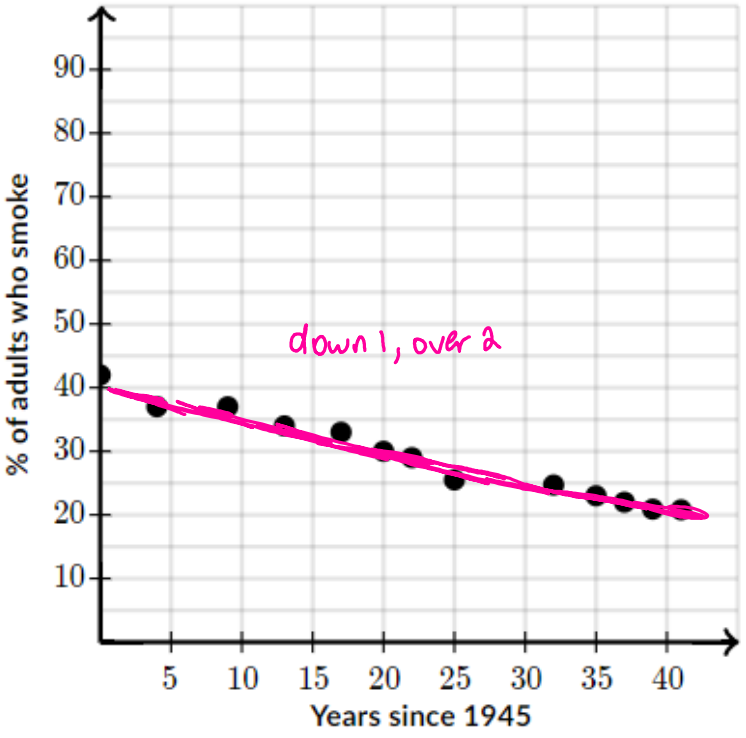
Choose 1 answer:

(A) -2 percentage points

(B) -1 percentage point

(C) $-\frac{1}{2}$ percentage point

(D) $-\frac{1}{4}$ percentage point



65. The scatter plot below shows the average rent (in dollars per month) for a 1-bedroom apartment in New York City each year between 2000 and 2013.

Which of the following is the best estimate of the average change in rent each year?

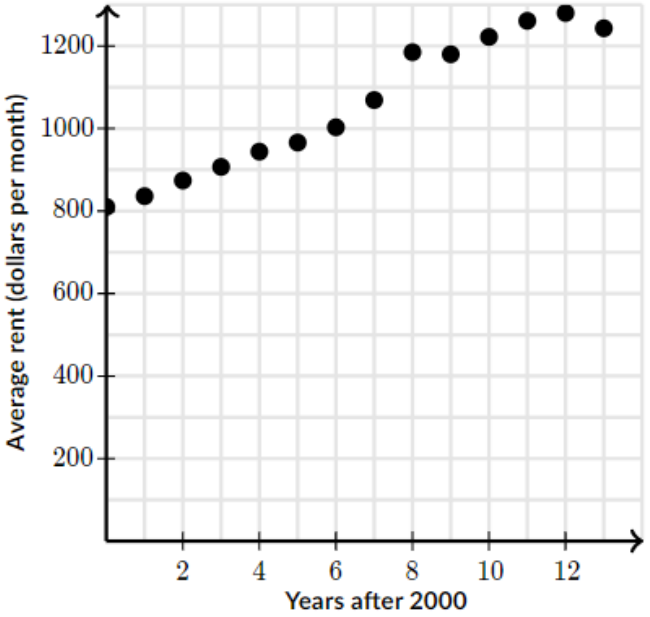
Choose 1 answer:

(A) \$0.5

(B) \$1

(C) \$40

(D) \$400



67. Shira's math test included a survey question asking how many hours students spent studying for the test. The scatter plot below shows the relationship between how many hours students spent studying and their score on the test.

Which of the following is the best estimate of the average score change associated with a 1 hour increase in study time?

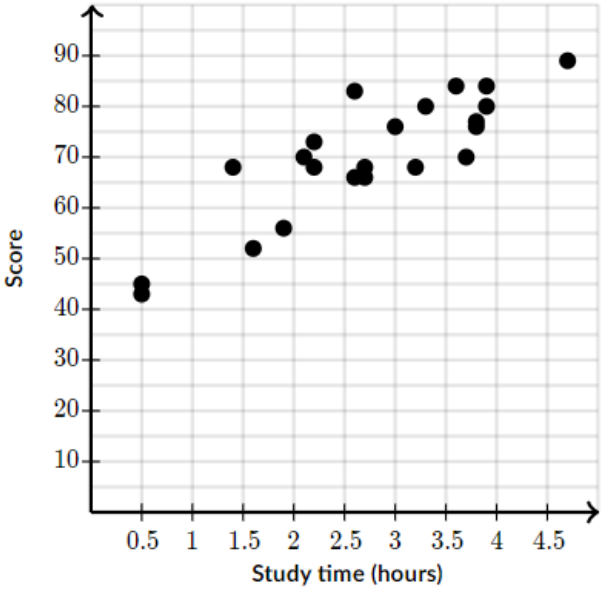
Choose 1 answer:

(A) 20 points

(B) 10 points

(C) 2 points

(D) 1 point



68. Liz's math test included a survey question asking how many hours students spent studying for the test. The scatter plot below shows the relationship between how many hours students spent studying and their score on the test.

Which of the following is the best estimate of the average score change associated with a 1 hour increase in study time?

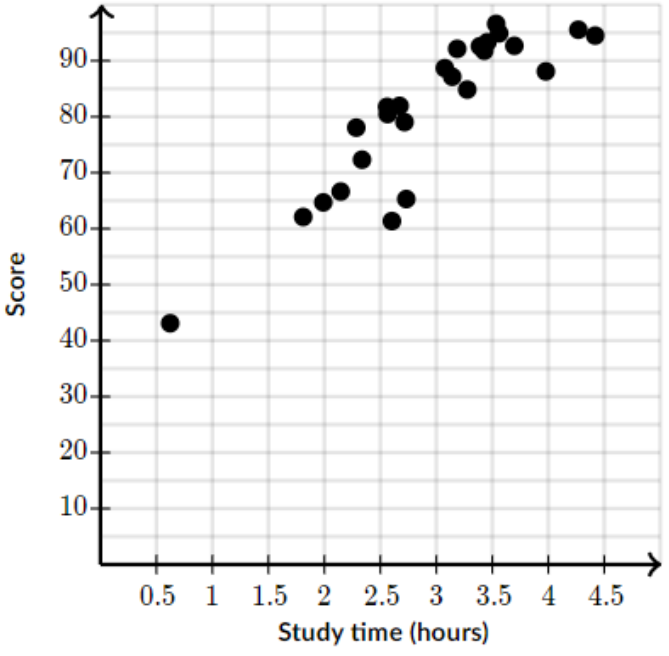
Choose 1 answer:

(A) 20 points

(B) 5 points

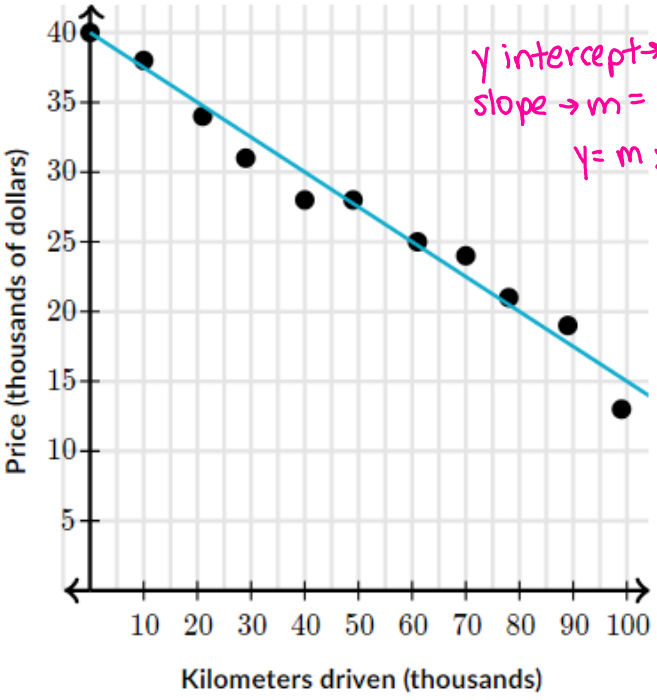
(C) 2 points

(D) 1 point



Estimating equations of line of best fit and using them to make predictions

ex: Cars lose value the farther they are driven. A random sample of 11 cars for sale was taken. All 11 cars were the same make and model. A line was fit to the data to model the relationship between how far each car had been driven and its selling price.



y intercept → b = 40
slope → m = $-1/4$
$y = mx + b \rightarrow y = -\frac{1}{4}x + 40$

Which of these linear equations best describes the given model?

Choose 1 answer:

(A) $\hat{y} = \frac{1}{2}x + 40$

(B) $\hat{y} = -x + 40$

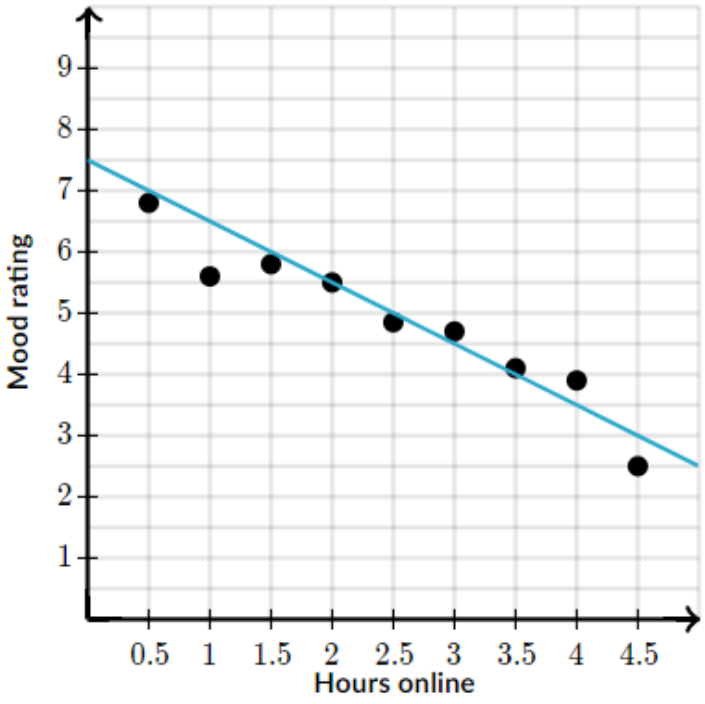
(C) $\hat{y} = -\frac{1}{4}x + 40$

Based on this equation, estimate the price of a car that had been driven 56 thousand kilometers.

$y = -\frac{1}{4}(56) + 40 = -14 + 40 = 26$

$ 26 thousand dollars

69. Jacob distributed a survey to his fellow students asking them how many hours they spent on the Internet in the past day. He also asked them to rate their mood on a scale from 0 to 10, with 10 being the happiest. A line was fit to the data to model the relationship.



Which of these linear equations best describes the given model?

Choose 1 answer:

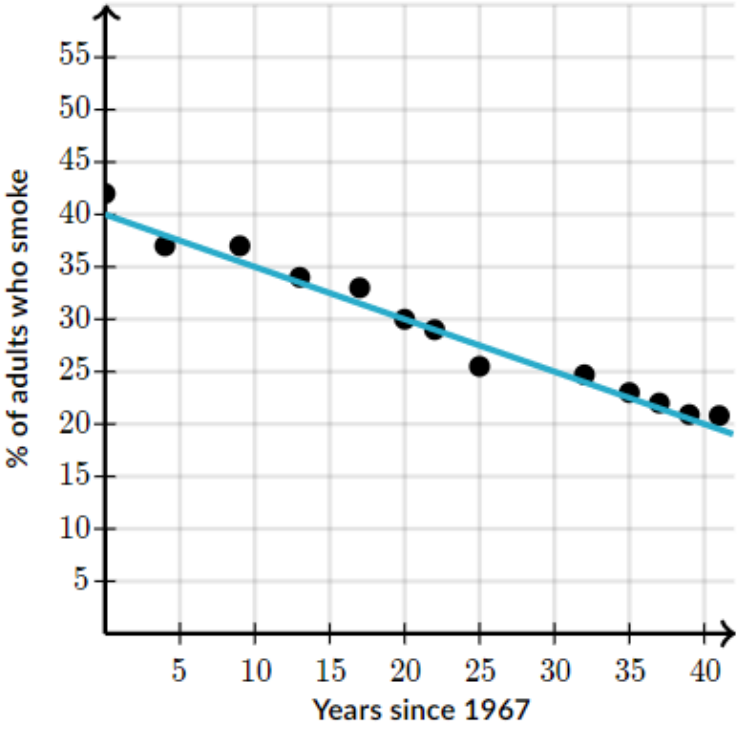
(A) $\hat{y} = x + 7.5$

(B) $\hat{y} = -x + 7.5$

(C) $\hat{y} = -\frac{1}{2}x + 7.5$

Based on this equation, estimate the mood rating for a student that spent 5.5 hours online.

70. The percent of adults who smoke, recorded every few years since 1967, suggests a negative linear association with no outliers. A line was fit to the data to model the relationship.



Which of these linear equations best describes the given model?

Choose 1 answer:

(A) $\hat{y} = -0.5x + 40$

(B) $\hat{y} = -x + 40$

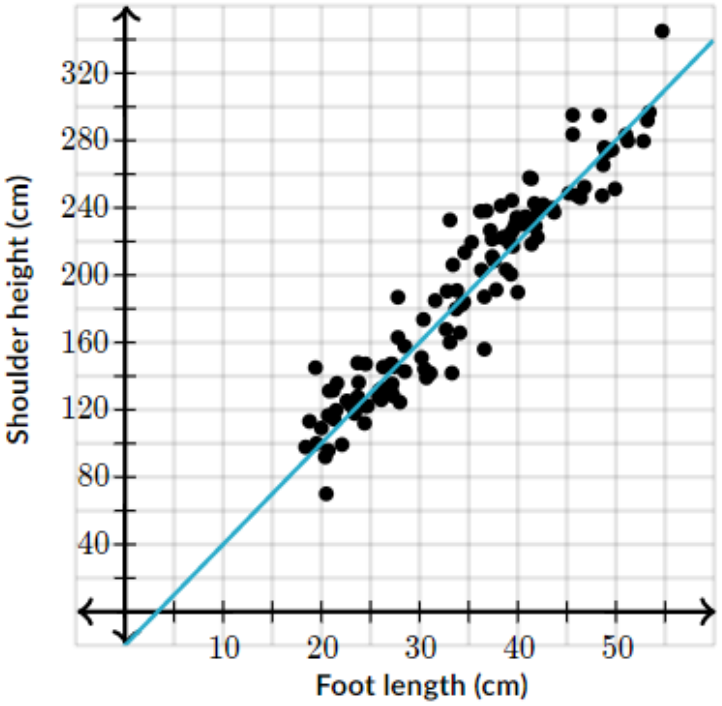
(C) $\hat{y} = -2x + 40$

(D) $\hat{y} = -3x + 40$

Based on this equation, estimate what percent of adults smoked in 1997.
Round your answer to the nearest tenth of a percent.

____ %

71. Baruti, a ranger in Kruger National Park in South Africa, collected data about the elephant population in the park. She compared the foot lengths of the elephants and their shoulder height (both in centimeters) and created the following scatter plot. A line was fit to the data to model the relationship.



Which of these linear equations best describes the given model?

Choose 1 answer:

(A) $\hat{y} = 6x - 20$

(B) $\hat{y} = 6x + 20$

(C) $\hat{y} = \frac{3}{2}x - 20$

(D) $\hat{y} = \frac{3}{2}x + 20$

Based on this equation, estimate the shoulder height for an elephant whose foot length is 45 cm.

____ cm

Evaluate Logarithms

72. $\log_8 1 =$ ____

73. $\log_3 9 =$ ____

74. $\log_4 16 =$ ____

75. $\log_3 1 =$ ____

Simple probability

Ex: You roll a fair 6-sided die.
What is P(roll greater than 4)? (the probability of rolling a number greater than 4).
If necessary, round your answer to two decimal places.

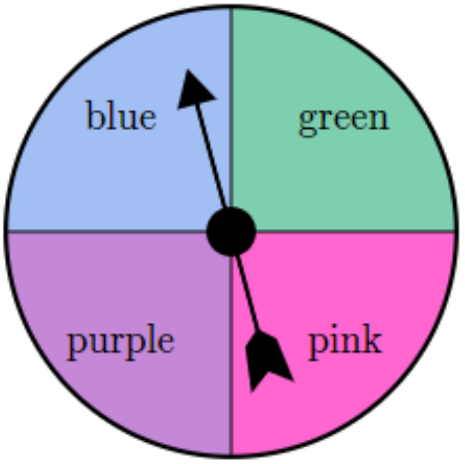
number of possible outcomes: 6
number of outcomes that are greater than 4: 2

P(greater than 4) = $\frac{\text{favorable outcomes}}{\text{total outcomes}} = \frac{2}{6} = 0.33$

76. Bruce is going to call one person from his contacts at random. He has 25 total contacts. 20 of those contacts are from his neighborhood.
What is P(call a person not from his neighborhood)? If necessary, round your answer to 2 decimal places.

77. Dhruv is at a car dealership. He is going to randomly select a vehicle to test drive. There are 13 trucks, 8 vans, and 4 compact cars.
What is P(compact car)? If necessary, round your answer to 2 decimal places.

78. You spin the spinner shown below once. The spinner has 4 equal sectors colored pink, purple, blue, and green.
What is P(blue)? If necessary, round your answer to 2 decimal places.



79. Jake is going to call one person from his contacts at random. He has 30 total contacts. 16 of those contacts are people he met at school.
What is P(call a person from school)? If necessary, round your answer to 2 decimal places.

80. You randomly draw a marble from a bag of marbles that contains 8 blue marbles, 5 green marbles, and 8 red marbles.
What is P(draw a blue or red marble)? If necessary, round your answer to 2 decimals places.

81. You roll a fair 6-sided die.
What is P(not 5)? If necessary, round your answer to 2 decimal places.

Comparing Probabilities

82. Juanita and Nina are bowling together. The probability of Juanita getting a strike next game is 24%. The probability of Nina getting a strike next game is 0.17.
Which of these events is more likely?
A. Juanita gets a strike next game
B. Nina gets a strike next game
C. Neither. Both events are equally likely

83. Erin, Elizabeth and Anna are playing a game. Their probabilities of winning the game are as follows:
P(Erin wins) = 0.3
P((Anna wins) = 1/2
P(Elizabeth wins) = 20%
Put the following events in order from least to most likely: Elizabeth wins, Anna wins, Erin wins.

84. Paulina plays both volleyball and soccer. The probability of her getting injured playing volleyball is 0.1. The probability of her getting injured playing soccer is 1/10. Which of these events is more likely?
A. Paulina gets injured playing volleyball
B. Paulina gets injured playing soccer.
Neither. Both events are equally likely

85. Vera ordered a soup, salad, and sandwich to share with her friends. The probabilities of each item being ready first are as follows:
P(soup ready first) = 1/5
P(salad ready first) = 0.45
P(sandwich ready first) = 35%
Put the following events in order from least to most likely: Salad ready first, soup ready first, sandwich ready first.

86. Simone is stranded on an island. The probability of her finding safety by waiting for help is 1/4. The probability of her finding safety by leaving in her raft is 0.32. Which of these events is more likely:
A. Simone finds safety by waiting for help
B. Simone finds safety by leaving in her raft
C. Neither. Both events are equally likely

87. Ella, Daniela, and Sophia are competing in an eating contest. Their probabilities of winning the contest are as follows:
P(Ella wins) = 0.75
P(Daniela wins) = 5%
P(Sophia wins) = 1/5
Put the following events in order from least to most likely: Sophia wins, Ella wins, Daniela wins.

88. The probability of Jamie making money investing in bonds is 1/20. The probability of Jamie making money investing in stocks is 82%.
Which of these events is more likely?
A. Jamie makes money investing in bonds
B. Jamie makes money investing in stocks
C. Neither. Both events are equally likely

Experimental Probability

Experimental probability is the probability that is determined on the basis of experiments.

ex: The following frequency table summarizes last week's bed sales at Cloud Nine Furniture.

$P(\text{twin}) = \frac{\text{twin}}{\text{total}} = \frac{3}{3+6+4+2} = 0.2$

Size of bed	Number of beds
Twin	3
Double	6
Queen	4
King	2

Based on this data, what is a reasonable estimate of the probability that the next bed sold is a twin bed?
Choose the best answer.
Choose 1 answer:

- 0.20
- B 0.25
- C 0.27
- D 0.40

89. The table shows the number of feathers Patsy the Peacock sold at each of the 8 festivals this year.

3	6	1	4
2	3	7	2

Based on this data, what is a reasonable estimate of the probability that Patsy sells fewer than 5 feathers next festival?

Choose the best answer.

Choose 1 answer:

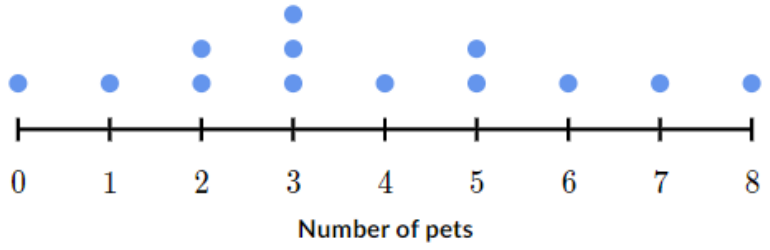
(A) 25%

(B) 46%

(C) 54%

(D) 75%

90. The following dot plot shows how many pets each customer owned before entering Jeremy's Pet Store today. Each dot represents one customer.



Based on this data, what is a reasonable estimate of the probability that the next customer to enter Jeremy's Pet Store has exactly 3 pets?

Choose the best answer.

Choose 1 answer:

(A) 0.06

(B) 0.10

(C) 0.23

(D) 0.30

91. Pat's Pizza made 21 cheese pizzas, 14 veggie pizzas, 23 pepperoni pizzas, and 14 sausage pizzas yesterday.

Based on this data, what is a reasonable estimate of the probability that the next pizza made is *not* a cheese pizza?
Choose the best answer.
Choose 1 answer:

(A) 51%

(B) 66%

(C) 71%

(D) 81%

92. The following frequency table summarizes this year's injuries on the Canadian Rounders cricket team.

Number of injured players	Number of matches
0	4
1	5
2	2
3	3
4	2

Based on this data, what is a reasonable estimate of the probability that the Canadian Rounders have 0 players injured for their next match?
Choose the best answer.
Choose 1 answer:

(A) 20%

(B) 25%

(C) 33%

(D) 40%

93. The following table shows the number of goals that the Texas Sharpshooters scored in each of their 8 hockey games this season.

3	4	1	4
1	1	2	1

Based on this data, what is a reasonable estimate of the probability that the Texas Sharpshooters score exactly 1 goal next hockey game?
Choose the best answer.
Choose 1 answer:

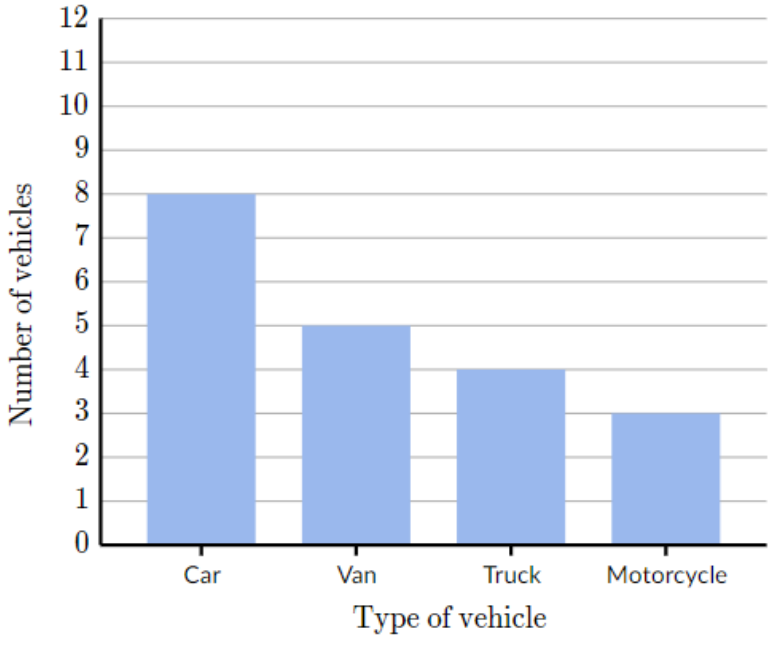
(A) 0.13

(B) 0.24

(C) 0.50

(D) 1.00

94. Shaniya owns a company that rents cars called Car Go. The following bar graph summarizes the type of vehicles rented last week.



Based on this data, what a reasonable estimate of the probability that a van is the next type of vehicle rented? Choose the best answer.

(A) 20%

(B) 25%

(C) 40%

(D) 75%

Making Predictions with Probability

ex: Jeremy is going to roll a fair 6-sided die 180 times.
What is the best prediction for the number of times that Jeremy will roll a number greater than 4?

Best prediction = number of trials × P(favorable outcome)
P(favorable outcome) = P(greater than 4) = $\frac{\text{number of favorable outcomes}}{\text{number of total possible outcomes}}$ = $\frac{\text{outcomes greater than 4}}{\text{total outcomes}} = \frac{2}{6} = \frac{1}{3}$
Best prediction = $180 \times \frac{1}{3} = 60$
This is only a prediction, we cannot say for sure it will be exactly 60

A. Exactly 30 times
B. Close to 30 times but probably not exactly 30 times
C. Exactly 60 times
D. Close to 60 times but probably not exactly 60 times

95. Jose is going to use a random number generator 500 times. Each time he uses it, he will get a 1, 2, 3, or 4.
Complete the following statement with the BEST prediction.
Jose will get something other than a 2....
A. Exactly 250 times.
B. Close to 250 times but probably not exactly 250 times
C. Exactly 375 times
D. Close to 375 times but not exactly 375 times

96. Ellen has a bag with 3 red marbles and 2 blue marbles in it. She is going to randomly draw a marble from the bag 300 times, putting the marble back in the bag after each draw.
What is the best prediction for the number of times that Ellen will draw a blue marble?
A. Exactly 120 times
B. Close to 120 times but probably not exactly 120
C. Exactly 150 times
D. Close to 150 times but probably not exactly 150 times

97. Vitor is going to guess on all 40 questions of his multiple choice test. Each question on the test has 5 answer options.
Complete the following statement with the BEST prediction.
Vitor will correctly answer...
A. Exactly 8 questions
B. Close to 8 questions but probably not exactly 8 questions
C. Exactly 20 questions
D. Close to 20 questions but probably not exactly 20 questions

98. Amit is going to guess on all 20 questions of his multiple choice test. Each question on the test has 4 answer options, and only one is correct.
What is the best prediction for the number of questions that Amit will answer correctly?
A. Exactly 5 questions
B. Close to 5 questions but probably not exactly 5 questions
D. Exactly 80 questions
D. Close to 80 questions but probably not exactly 80 questions

99. Electronics Unlimited sells TVs. There are 110 TVs on display in the showroom, and each TV is turned on to a random channel from a set of 11 channels: 7 sports channels, 3 news channels, and 1 movie channel.
Which statement best predicts how many TVs will not be showing a sports channel?
A. There will be exactly 40 TVs not showing a sports channel
B. There will be close to 40 TVs but probably not exactly 40 TVs not showing a sports channel
C. There will be exactly 70 TVs not showing a sports channel
D. There will be close to 70 TVs but probably not exactly 70 TVs not showing a sports channel

100. Chen has an MP3 player called the Jumble. The Jumble randomly selects a song for the user to listen to. Chen's Jumble has 4 classical songs, 3 rock songs, and 2 rap songs on it. Chen is going to listen to 360 songs.
What is the best prediction for the number of times Chen will listen to a classical song?
A. Exactly 90 times
B. Close to 90 times but probably not exactly 90 times
C. Exactly 160 times
D. Close to 160 times but probably not exactly 160 times

The counting principle

The fundamental counting principle is a rule used to count the total number of possible outcomes in a situation. It states that is there are n ways of doing something, and m ways of doing another thing, then there are n*m ways to perform both of these actions.

ex: John always wears a shirt, pants, socks, and shoes. He owns 12 pairs of socks, 3 pairs of shoes, 5 pairs of pants, and 5 shirts.
How many different outfits can John make?
different outfits = 12 sock options × 3 shoe options × 5 pant options × 5 shirt options
= 12 × 3 × 5 × 5 = 900

101. Bruce and Krista are going to buy a new furniture set for their living room. They want to buy a couch, a coffee table, and a recliner. They have narrowed it down so that they are choosing between 4 couches, 5 coffee tables, and 9 recliners.
How many different furniture combinations are possible?

102. Oula is going on an outdoor expedition with his family. The expedition will include a hunting event, a hiking event, and a camping event. There are 4 hunting, 7 fishing, 6 hiking, and 3 camping events for Oula's family to choose from.
How many different outdoor expeditions are possible?

Develop Probability Distributions: Empirical Probabilities

An empirical probability, also called an experimental probability is closely related to the relative frequency of an event. Empirical probability uses the number of occurrences of a given outcome with a sample set as a basis for determining the probability of that outcome occurring again.

ex: In an experiment about the behavior of adults, each of the 50 subjects involved was told to sit in a waiting room until the researcher called for them. There were 5 different types of snacks in the waiting room.

The researchers recorded how many snacks each of the 50 subjects tried. Here are the results:

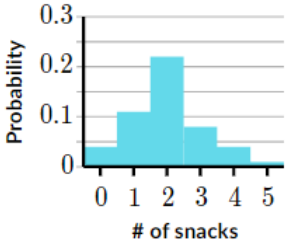
# of snacks	0	1	2	3	4	5
Frequency	4	11	22	8	4	1

total:

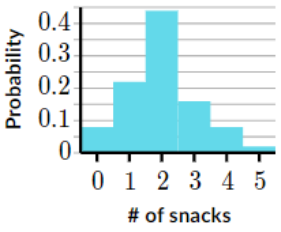
$P(0) = \frac{4}{50} = 0.08$ $P(1) = \frac{11}{50} = 0.22$ $P(2) = \frac{22}{50} = 0.44$ $P(3) = \frac{8}{50} = 0.16$ $P(4) = \frac{4}{50} = 0.08$ $P(5) = \frac{1}{50} = 0.02$

Based on these results, which graph represents an approximate probability distribution of the number of snacks a random adult would try?

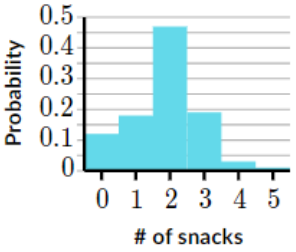
(A) *A*



B



(C) *C*



103. Kelsey plays a video game where enemies sometimes drop objects when they are defeated.

Kelsey defeated a certain enemy 80 times and recorded how many objects the enemy dropped each time:

Fill in the blanks to complete the probability distribution.
Do not round your answers.

Objects dropped	0	1	2	3
Frequency		18	6	2
Probability	0.675		0.075	0.025

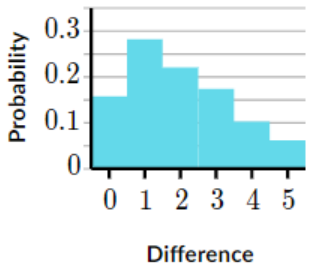
104. Rosie is designing a board game where players roll two six-sided dice and subtract the numbers showing on the faces. The game only looks at nonnegative differences. For example, if a player rolls a 4 and a 6, the difference is 2.

Rosie simulated the differences of $1{,}000$ rolls. Here are the results:

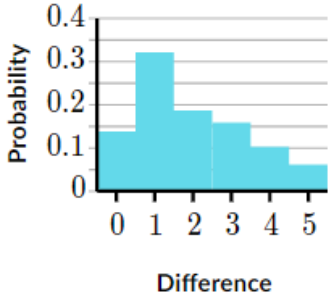
Difference	0	1	2	3	4	5
Frequency	158	282	221	174	103	62

Based on these results, which graph represents an approximate probability distribution of the difference on a random roll?

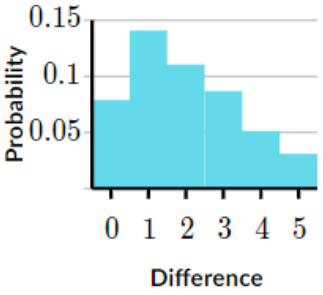
(A) *A*



(B) *B*



(C) *C*



105. A pet toy company performed an experiment to see how many toys dogs might play with. Each of the 60 dogs involved was put in a room with its owner and 4 different toys.

The researchers recorded how many toys each of the 60 dogs used.

Fill in the blanks to complete the probability distribution.
Do not round your answers.

Toys used	0	1	2	3	4
Frequency	3		21	12	9
Probability		0.25	0.35	0.2	0.15