

CCSS Math Samples — Statistics and Probability



The distance required to stop an Ice Road Trucker and his big rig on a sheet of ice was measured to compare the stopping ability of 3 different tread designs. The results are in the figure below. Which tread design should be chosen if you owned the trucking company?

- A. tread design A
- B. tread design B
- C. tread design C
- D. tread design B or C

2. The following table shows a student's test scores for 5 subjects, the mean score for that test, and the standard deviation for that test.

Subject	Test Score	Mean Score	Standard Deviation
Math	84	80	10
Chemistry	82	80	6
Physics	85	83	8
Biology	78	75	4
History	90	81	13

In which course is the student's relative standing the highest?

- A. Math
- B. Chemistry
- C. Biology
- D. History

3. In Australia, a study of farms with 30 or fewer sheep produced the following data.

Number of Sheep per Farm (x_i)	Number of Farms (f_i)
15	6
20	3
22	5
25	4
30	2

- a) What is the mean for the number of sheep per farm?
 - b) Find the standard deviation to the nearest tenth.
 - c) What is the total number of farms that lie within one standard deviation of the mean?
4. The weights of a bags of pretzels are distributed normally with a mean of 385 grams and a variance of 361. What percent of pretzel bags will likely weigh less than 423 grams?
- A. 65.54 B. 97.72 C. 17.11 D. 47.72
5. The correlation between anxiety and performance on complex tasks is -0.73 . Which of the following may be concluded?
- A. As anxiety increases, performance on complex tasks improves.
 - B. As performance on complex tasks improves, anxiety tends to decrease.
 - C. As anxiety decreases, so does performance.
 - D. High performance is because of low anxiety.

6. A teacher wants to know if the number of absences a student has affects the test score. In the data, the independent variable is Number of Absences.

Use your calculator to determine the equation of the linear regression line for the data.

Number of Absences	Test Score
7	55
8	68
9	70
12	78
14	84

- A. $y = 3.56x + 35.41$ B. $y = 2.78x + 79.06$
 C. $y = 0.25x - 7.75$ D. $y = 8.34x + 80.17$

7. The chart below shows the number of people who viewed a particular YouTube video during the first few days after its posting. Use an equation that best models this data to predict the day when the video will be viewed by 12,000 people.

Day	Viewings
1	54
2	260
3	560
4	850
5	1250
6	1500

- A. day 40 B. day 42
 C. day 44 D. day 46

8. The Gross National Income (GNI) in billions of dollars of a small European country between 1997 and 2008 is shown in the table below.

Year	1997	1998	1999	2000	2001	2002
GNI	9.01	9.54	9.94	10.22	10.66	11.34
Year	2003	2004	2005	2006	2007	2008
GNI	12.84	14.14	15.90	18.13	20.55	21.16

- a) Find the exponential function that best fits the data. Code the years so that 1997 = 0, 1998 = 1, etc.
- b) What do the coefficients represent in the function you created in the previous part?
- c) Does the function reasonably describe the GNI growth for this country?
- d) Use the best fit function to estimate what this country's GNI will be in 2020. What does this estimate presume about the country?
9. The student council at a local high school is collecting data to determine the top ten favorite songs of the students in the school. Which of the following methods represents stratified sampling?
- A. interview every second student who arrives at school Monday morning
- B. randomly interview 10% of students from each grade
- C. survey all the students in grade 9
- D. interview students who download music on the web.
10. To collect data about the kinds of pets people own, Rebecca interviews everyone who brings their pet to a local Animal Hospital. What type of sample does this represent?
- A. a random sample
- B. a stratified sample
- C. a self-selective sample
- D. a convenience sample

11. Which of the following are advantages of using a cluster sample?

- I. It enables the person doing the study to get more detailed information about a particular subject.
- II. A numbered list may already exist.
- III. It can simplify fieldwork.
- IV. It is convenient.
- V. Ease of selecting the sample.

- A. I only
- B. II only
- C. I, III and IV only
- D. I, III, IV and V only

12. To determine the preferred van driven by families with children, a car company located in Oshawa surveyed 10% of the families living there.

- a) What type of sampling method was used?
- b) What were the advantages of this method?
- c) What were the disadvantages of this method?
- d) Suggest an improvement that could be made to collect the data.

13. For extra credit in his Statistics class, Josh needs to collect data and analyze it. He asks a random sampling of classmates in his 3rd and 4th periods how many consecutive jumps they can make while jump-roping. The data is in the table below.

3rd Period	4th Period
36	54
23	67
15	54
72	36
14	19
10	67
42	99
54	31
43	56
20	70
19	13
59	44
95	59
65	22
73	40
	59
	11

What is the mean and standard deviation for each period? Round to two decimal places.

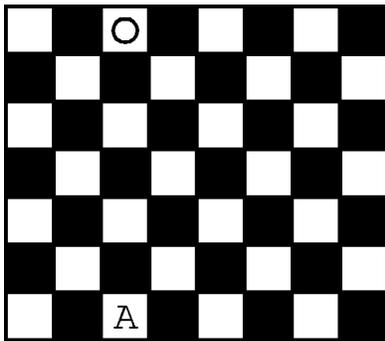
- A. 3rd Period: mean = 45.00, σ = 23.54. 4th Period: mean = 49.38, σ = 24.67.
- B. 3rd Period: mean = 38.93, σ = 21.19. 4th Period: mean = 43.89, σ = 26.51.
- C. 3rd Period: mean = 41.98, σ = 24.37. 4th Period: mean = 42.76, σ = 23.84.
- D. 3rd Period: mean = 42.67, σ = 26.15. 4th Period: mean = 47.12, σ = 23.45.

14. Miriam has seven toy animals in a box. She pulls out a toy, records the animal, and returns it to the box. She repeats this process 40 times. Her results are shown in the table below.

Animal	Panda	Giraffe	Lion	Elephant
Frequency	12	6	5	17

Based on these results, how many of each animal are in the box? Explain your reasoning.

- 15.

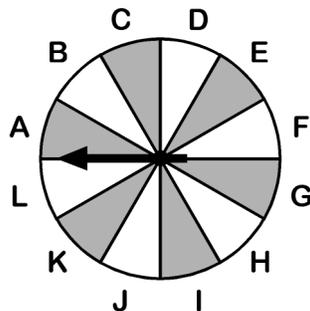


The disk on the board at 'o' is permitted to move diagonally forward on the white squares. How many paths are there for the disk to reach the square labeled 'A'?

- A. 7 B. 12 C. 19 D. 25
16. A spinner is divided into twelve lettered sections, as shown. (Assume the arrow never lands on a dividing line.)

With just one spin, what is the probability of landing on a vowel or an unshaded region?

- A. $\frac{1}{3}$ B. $\frac{1}{2}$
 C. $\frac{5}{8}$ D. $\frac{3}{4}$



17. For two people, actuarial tables say the probability that person A will die before age 86 is 0.7, and that the probability that person B will die before age 86 is 0.6. What is the probability that at least one of A and B dies before the age of 86?

- A. 0.88 B. 0.60 C. 0.92 D. 0.84

18. Two packets each contain 8 seeds. Of the seeds from the first package, three will produce red flowers and five will produce white flowers. Of the seeds from the second package, four will produce red flowers and four will produce white flowers. A seed is chosen that produces a red flower. What is the probability of the seed coming from the first package? (The probability of choosing each packet is $\frac{1}{2}$.)

- A. $\frac{7}{16}$ B. $\frac{3}{16}$ C. $\frac{3}{7}$ D. $\frac{5}{9}$

19. A test for a certain disease is found to be 95% accurate when testing people who have the disease. However, the same test gives a false-positive result for 3% of the healthy patients tested. For a certain segment of the population the incidence of the disease is 8%. If a person tests negative for the disease, find the probability that the person actually has the disease.

- A. 0.004 B. 0.266 C. 0.734 D. 0.996

20. Mr. Garcia put 4 half-dollars, 5 quarters and 3 dimes on the shelf. If two coins are taken at random, what is the probability of selecting a half-dollar and then a dime? (Answers are approximate.)

- A. 0.09 B. 0.15 C. 0.33 D. 0.67

21. Two cards are drawn at random from a standard deck of cards without replacement.

- a) How many ways can 2 cards be drawn?
- b) What is the probability of selecting 2 aces?
- c) What is the probability of selecting 2 red cards?

22. A box contains 6 red, 2 white, and 4 blue marbles. You will draw one marble, then put it back in the box. Then you will draw a second marble.

- a) What is the probability that you will draw a red marble and then a white marble?
- b) This time you will *not* replace the marble drawn first. What is the probability that you will draw a blue marble and then another blue marble?

23. Based on past experience, a building contractor sets the probability of winning a contract at 0.30. The contract is worth \$25,000 and the cost to prepare the contract proposal is \$2400. What is the expected value of the contract proposal?

- A. \$5100
- B. -\$22600
- C. \$22600
- D. -\$5100

24. You have 8 white balls and 8 black balls and two empty boxes. How should the balls be arranged in the two boxes in order to maximize the probability of drawing a white ball and what is this probability?

25. There are 208 students enrolled in the local high school. The foreign language department offers French, German, and Spanish.

- 4 students take all three languages.
- 48 students study French.
- There are twice as many students who study both French and Spanish (but not German) as who study both French and German (but not Spanish), and 4 times as many as who study all 3.
- 124 students study Spanish.
- 27 students do not study any foreign language.
- The group of students who study both French and Spanish (but not German) is exactly the same size as the group made up of students who study both German and Spanish.

What is the probability that a student studies German or French but not Spanish?

- A. $\frac{57}{208}$
- B. $\frac{3}{52}$
- C. $\frac{1}{26}$
- D. $\frac{1}{13}$

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Statistics and Probability

Num	Scoring	Standard	Answer
1	A	S.ID.02	tread design A
2	C	S.ID.04	Biology
3		S.ID.04	21; 4.7; 12
4	B	S.ID.04	97.72
5	B	S.ID.08	As performance on complex tasks improves, anxiety tends to decrease.
6	A	S.ID.06A	$y = 3.56x + 35.41$
7	B	S.ID.06A	day 42
8		S.ID.06A	$f(x) = 8.1316(1.0899)^x$; 8.1316 = GNI in 1997, 1.0899 = rate of increase of the GNI; Answers vary; 58.89 billion, presume the GNI increases along the same pattern
9	B	S.IC.03	randomly interview 10% of students from each grade
10	D	S.IC.03	a convenience sample
11	D	S.IC.03	I, III, IV and V only
12		S.IC.03	Cluster sampling. It was a quick and easy way to collect information. It chose families in one city only and these could be employees of the car company. Interview about 5% of families with children of other cities in each province.
13	D	S.IC.05	3rd Period: mean = 42.67, $\sigma = 26.15$. 4th Period: mean = 47.12, $\sigma = 23.45$.
14		S.IC.04	2 Pandas, 1 Giraffe, 1 Lion, 3 Elephants
15	D	S.CP.09	25
16	D	S.CP.07	$\frac{3}{4}$
17	A	S.CP.07	0.88
18	C	S.CP.08	$\frac{3}{7}$
19	A	S.CP.08	0.004
20	A	S.CP.09	0.09
21		S.CP.09	1,326; $\frac{6}{1,326}$; $\frac{325}{1,326}$
22		S.MD.03	$\frac{1}{12}$; $\frac{1}{12}$
23	A	S.MD.04	\$5100
24		S.MD.05B	7 white and 8 black in one box and the last white in the other box, $\frac{11}{15}$
25	A	S.MD.03	$\frac{57}{208}$