

NAME: _____

A2.S.5: Know and apply the characteristics of the normal distribution

1. 080129b, P.I. A2.S.5
Twenty high school students took an examination and received the following scores: 70, 60, 75, 68, 85, 86, 78, 72, 82, 88, 88, 73, 74, 79, 86, 82, 90, 92, 93, 73.
Determine what percent of the students scored within one standard deviation of the mean.
Do the results of the examination approximate a normal distribution? Justify your answer.
2. 010308b, P.I. A2.S.5
The national mean for verbal scores on an exam was 428 and the standard deviation was 113. Approximately what percent of those taking this test had verbal scores between 315 and 541?
[A] 38.2% [B] 26.4%
[C] 68.2% [D] 52.8%
3. 010809b, P.I. A2.S.5
On a standardized test with a normal distribution, the mean was 64.3 and the standard deviation was 5.4. What is the best approximation of the percent of scores that fell between 61.6 and 75.1?
[A] 38.2% [B] 95%
[C] 68.2% [D] 66.8%
4. 010411b, P.I. A2.S.5
Battery lifetime is normally distributed for large samples. The mean lifetime is 500 days and the standard deviation is 61 days.
Approximately what percent of batteries have lifetimes *longer than* 561 days?
[A] 34% [B] 84% [C] 16% [D] 68%
5. 080202b, P.I. A2.S.5
In a New York City high school, a survey revealed the mean amount of cola consumed each week was 12 bottles and the standard deviation was 2.8 bottles. Assuming the survey represents a normal distribution, how many bottles of cola per week will approximately 68.2% of the students drink?
[A] 12 to 20.4 [B] 6.4 to 12
[C] 6.4 to 17.6 [D] 9.2 to 14.8
6. 080317b, P.I. A2.S.5
The amount of ketchup dispensed from a machine at Hamburger Palace is normally distributed with a mean of 0.9 ounce and a standard deviation of 0.1 ounce. If the machine is used 500 times, approximately how many times will it be expected to dispense 1 or more ounces of ketchup?
[A] 100 [B] 5 [C] 80 [D] 16

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7. 060826b, P.I. A2.S.5

The weights of the boxes of animal crackers coming off an assembly line differ slightly and form a normal distribution whose mean is 9.8 ounces and whose standard deviation is 0.6 ounce. Determine the number of boxes of animal crackers in a shipment of 5,000 boxes that are expected to weigh *more than* 11 ounces.

8. 060126b, P.I. A2.S.5

Professor Bartrich has 184 students in her mathematics class. The scores on the final examination are normally distributed and have a mean of 72.3 and a standard deviation of 8.9. How many students in the class can be expected to receive a score between 82 and 90?

9. 060412b, P.I. A2.S.5

The amount of juice dispensed from a machine is normally distributed with a mean of 10.50 ounces and a standard deviation of 0.75 ounce. Which interval represents the amount of juice dispensed about 68.2% of the time?

- [A] 9.00-12.00 [B] 9.75-10.50
[C] 9.75-11.25 [D] 10.50-11.25

10. 080405b, P.I. A2.S.5

The mean of a normally distributed set of data is 56, and the standard deviation is 5. In which interval do approximately 95.4% of all cases lie?

- [A] 46-56 [B] 51-61
[C] 56-71 [D] 46-66

11. fall9924b, P.I. A2.S.5

A survey of the soda drinking habits of the population in a high school revealed the mean number of cans of soda consumed per person per week to be 20 with a standard deviation of 3.5. If a normal distribution is assumed, find an interval that contains the total number of cans per week approximately 95% of the population of this school will drink. Explain why you selected that interval.

12. 060432b, P.I. A2.S.5

Mrs. Ramírez is a real estate broker. Last month, the sale prices of homes in her area approximated a normal distribution with a mean of \$150,000 and a standard deviation of \$25,000. A house had a sale price of \$175,000. What is the percentile rank of its sale price, to the *nearest whole number*? Explain what that percentile means. Mrs. Ramírez told a customer that most of the houses sold last month had selling prices between \$125,000 and \$175,000. Explain why she is correct.

13. 060206b, P.I. A2.S.5

On a standardized test, the distribution of scores is normal, the mean of the scores is 75, and the standard deviation is 5.8. If a student scored 83, the student's score ranks

- [A] above the 97th percentile
[B] between the 75th percentile and the 84th percentile
[C] between the 84th percentile and the 97th percentile
[D] below the 75th percentile

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14. fall9912b, P.I. A2.S.5
The scores on a 100 point exam are normally distributed with a mean of 80 and a standard deviation of 6. A student's score places him between the 69th and 70th percentile. Which of the following best represents his score?
[A] 81 [B] 86 [C] 84 [D] 66
15. 080515b, P.I. A2.S.5
The mean score on a normally distributed exam is 42 with a standard deviation of 12.1. Which score would be expected to occur less than 5% of the time?
[A] 32 [B] 67 [C] 60 [D] 25
16. 060324b, P.I. A2.S.5
In a certain school district, the ages of all new teachers hired during the last 5 years are normally distributed. Within this curve, 95.4% of the ages, centered about the mean, are between 24.6 and 37.4 years. Find the mean age and the standard deviation of the data.
17. 010226b, P.I. A2.S.5
A set of normally distributed student test scores has a mean of 80 and a standard deviation of 4. Determine the probability that a randomly selected score will be between 74 and 82.
18. 080222b, P.I. A2.S.5
The amount of time that a teenager plays video games in any given week is normally distributed. If a teenager plays video games an average of 15 hours per week, with a standard deviation of 3 hours, what is the probability of a teenager playing video games between 15 and 18 hours a week?
19. 010327b, P.I. A2.S.5
A shoe manufacturer collected data regarding men's shoe sizes and found that the distribution of sizes exactly fits the normal curve. If the mean shoe size is 11 and the standard deviation is 1.5, find:
a the probability that a man's shoe size is greater than or equal to 11
b the probability that a man's shoe size is greater than or equal to 12.5
c $\frac{P(\text{size} \geq 12.5)}{P(\text{size} \geq 8)}$

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[4] 8.7 standard deviation, 70% within one standard deviation, and “Yes,” and appropriate work is shown, and an appropriate justification is given.
or [4] 8.7 standard deviation, 70% within one standard deviation, and “No,” and appropriate work is shown, and an appropriate justification is given.

[3] One error is made in determining the standard deviation or the percent, but all the other work is appropriate.

[2] 8.7 and 70%, and appropriate work is shown, but no justification is given.

or [2] The standard deviation is determined correctly, but more than one error is made when calculating the percent, but the justification is appropriate.

[1] The standard deviation is determined correctly, but no further work is shown.

or [1] The standard deviation is determined incorrectly, but the percent is appropriate, based on the incorrect standard deviation.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[1] incorrect procedure.

[2] C

[3] D

[4] C

[5] D

[6] C

[2] 115, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 115, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[7] incorrect procedure.

[2] 25, and appropriate work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] The solution is incomplete, such as only the correct percent is shown.

or [1] 25, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[8] incorrect procedure.

[9] C

[10] D

[2] Interval from 13 - 27, and correctly drawn and labeled curve with the correct explanation.

or [2] A statement explaining how to interpret the curve and the correct answer, but no curve drawn.

[1] Makes a mathematical error.

or [1] Has the correct answer based on an incorrect curve.

or [1] Just has a correct answer with no curve drawn, and no explanation of the curve.

or [0] Response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously

[11] incorrect procedure.

- [4] 84, and appropriate work is shown, and correct explanations are written.
[3] Appropriate work is shown, but one computational or rounding error is made, but both explanations are correct.
or [3] 84, but only one of the explanations is correct.
[2] 84, but both explanations are only partially correct.
[1] 84, but both explanations are missing or are incorrect.
or [1] One correct explanation is written, but no further correct work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [12] _____
- [13] C
- [14] C
- [15] B
- [2] Mean = 31 and standard deviation = 3.2, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Either the mean or the standard deviation is determined correctly, and appropriate work is shown.
or [1] Mean = 31 and standard deviation = 3.2, but no work is shown.
[0] Mean = 31 or standard deviation = 3.2, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [16] _____

- [2] 0.624 or 62.4%, and appropriate work is shown.
[1] The correct standard deviations of -1.5 and +0.5 are found, but an incorrect probability is calculated.
or [1] Appropriate work is shown, but one computational error is made.
or [1] 0.624 or 62.4%, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [17] _____
- [2] 0.341 or 34.1% or an equivalent answer, and appropriate work is shown.
[1] 0.682 or 0.841 or some other probability related to one standard deviation from the mean is shown.
or [1] 0.341 or 34.1% or an equivalent answer, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [18] _____
- [4] $\frac{1}{2}$ or 50%, $\frac{15.9}{100}$ or 0.159, and $\frac{0.159}{0.977}$ or an equivalent answer, and appropriate work is shown.
[3] Correct answers are found for either part a or part b and for part c.
[2] Correct answers are found for part a and part b, but the answer for part c is missing or is incorrect.
or [2] Only the correct answer for part b is found, and one computational or substitution error is made in determining the answer to part c.
[1] Only the correct answer for either part a or part b is found.
or [1] $\frac{1}{2}$ or 50%, $\frac{15.9}{100}$ or 0.159, and $\frac{0.159}{0.977}$ or an equivalent answer, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [19] _____