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$$z = \frac{x - \mu}{\sigma}$$

Date _____
Algebra II

Z Scores

For a standardized test with a mean of 78 and a standard deviation of 4, find the z score of the following test scores:

1. 78

$$z = \frac{78 - 78}{4}$$

$$z = \frac{0}{4}$$

$$z = 0$$

2. 82

$$z = \frac{82 - 78}{4}$$

$$z = \frac{4}{4}$$

$$z = 1$$

3. 73

$$z = \frac{73 - 78}{4}$$

$$z = \frac{-5}{4}$$

$$z = -1.25$$

4. 87

$$z = \frac{87 - 78}{4}$$

$$z = \frac{9}{4}$$

$$z = 2.25$$

For a standardized test with a mean of 75 and a standard deviation of 8, find the z score of the following test scores:

5. $x = 71$

$$z = \frac{71 - 75}{8}$$

$$z = \frac{-4}{8}$$

$$z = -.5$$

6. $x = 89$

$$z = \frac{89 - 75}{8}$$

$$z = \frac{14}{8}$$

$$z = 1.75$$

7. $x = 76$

$$z = \frac{76 - 75}{8}$$

$$z = \frac{1}{8}$$

$$z = .125$$

8. $x = 100$

$$z = \frac{100 - 75}{8}$$

$$z = \frac{25}{8}$$

$$z = 3.125$$

The score on a standardized test is an 80 and that has a z score of 2. Find the standard deviation if the data has the following means:

9. $\mu = 78$

$$2 = \frac{80 - 78}{\sigma}$$

$$\frac{2\sigma}{2} = \frac{2}{2}$$

$$\sigma = 1$$

10. $\mu = 84$

$$2 = \frac{80 - 84}{\sigma}$$

$$\frac{2\sigma}{2} = \frac{-4}{2}$$

$$\sigma = -2$$

11. $\mu = 70$

$$2 = \frac{80 - 70}{\sigma}$$

$$\frac{2\sigma}{2} = \frac{10}{2}$$

$$\sigma = 5$$

12. $\mu = 92$

$$2 = \frac{80 - 92}{\sigma}$$

$$\frac{2\sigma}{2} = \frac{-12}{2}$$

$$\sigma = -6$$

The score on a standardized test is an 72 and that has a z score of 1.5. Find the mean if the data has the following standard deviations:

13. $\sigma = 4$

$$1.5 = \frac{72 - \mu}{4}$$

$$\mu = +66$$

$$6 = 72 - \mu$$

$$72 = 72 - \mu$$

14. $\sigma = 3$

$$1.5 = \frac{72 - \mu}{3}$$

$$4.5 = 72 - \mu$$

$$-72 = -72 - \mu$$

$$-67.5 = \mu$$

15. $\sigma = 2.5$

$$1.5 = \frac{72 - \mu}{2.5}$$

$$3.75 = 72 - \mu$$

$$-72 = -72 - \mu$$

$$-68.25 = \mu$$

16. $\sigma = 1$

$$1.5 = \frac{72 - \mu}{1}$$

$$1.5 = 72 - \mu$$

$$-72 = -72 - \mu$$

$$70.5 = \mu$$

The mean on a standardized test is 85 and the standard deviation is 6. Find the test score if the z score is:

17. $z = 2$

$$2 = \frac{x - 85}{6}$$

$$12 = x - 85$$

$$+85 \quad +85$$

$$97 = x$$

18. $z = -3$

$$-3 = \frac{x - 85}{6}$$

$$-18 = x - 85$$

$$+85 \quad +85$$

$$67 = x$$

19. $z = 1.5$

$$1.5 = \frac{x - 85}{6}$$

$$9 = x - 85$$

$$+85 \quad +85$$

$$94 = x$$

20. $z = -1$

$$-1 = \frac{x - 85}{6}$$

$$-6 = x - 85$$

$$+85 \quad +85$$

$$79 = x$$

21. In most colleges, course grades are assigned by how students perform in comparison to the rest of their classmates, not their actual grades. The first test had a mean of 70 and a standard deviation of 5. The second test had a mean of 62 and a standard deviation of 4. Jen scored a 60 on the first test and a 57 on her second test. On which test did she do better?

<p><u>1st Test</u></p> $\mu = 70$ $\sigma = 5$ $x = 60$ $z = \frac{60 - 70}{5} = -2$	<p><u>2nd Test</u></p> $\mu = 62$ $\sigma = 4$ $x = 57$ $z = \frac{57 - 62}{4} = -1.25$	<p><u>2nd Test</u></p>
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22. Ricky and Marissa are very competitive with each other. Ricky took a physics test where the mean was 82, the standard deviation was 4, and he scored an 85. Marissa took a chemistry test where the mean was 78, the standard deviation was 6, and she scored an 83. Who scored better on their exam? Explain your answer.

<p><u>Ricky</u></p> $\mu = 82$ $\sigma = 4$ $x = 85$ $z = \frac{85 - 82}{4} = 0.75$	<p><u>Marissa</u></p> $\mu = 78$ $\sigma = 6$ $x = 83$ $z = \frac{83 - 78}{6} = 0.8\bar{3}$	<p>Marissa because she has a higher z score</p>
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23. Ricky and Marissa have their next exam coming up. Ricky scored a 92 on his exam where his classmates grades had a mean of 84 and a standard deviation of 8. In Marissa's class, the mean was 80 and the standard deviation was 4. What score would Marissa have to get to say she did better than Ricky? Explain your answer.

<p><u>Ricky</u></p> $\mu = 84$ $\sigma = 8$ $x = 92$ $z = \frac{92 - 84}{8} = 1$	<p><u>Marissa</u></p> $\mu = 80$ $\sigma = 4$	<p>She would need an 85 to score a higher z score.</p> $4 = \frac{x - 80}{4}$ $4 + 80 = x - 80 + 80$ $84 = x$
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24. On Katie's first college history exam, she scored a 74 while her class had a mean of 78 with a standard deviation of 5. She scored a 70 on her second test where her class had a mean of 75. What must the standard deviation for the second test be in order for her to have scored better on the second exam? Explain your answer.

<p><u>Test 1</u></p> $\mu = 78$ $\sigma = 5$ $x = 74$ $z = \frac{74 - 78}{5} = -0.8$	<p><u>Test 2</u></p> $\mu = 75$ $x = 70$ $z = -0.8 = \frac{70 - 75}{\sigma}$ $-0.8\sigma = -5$ $\sigma = 6.25$	<p>It must be larger than 6.25.</p>
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