Quiz 9 Review

Name: Key

Z-Scores, Percentiles, Normal Distributions, Empirical Rule Date:_____ Period:_____

Vocabulary—*Use your notes to find the exact answer that fits each blank.*

1. A percentile is the data point with a percent of the values less than or equal to it.
2. The central tendency that z-scores are based on is the mean.
3. About 99.8% of values are within ±3 standard deviation of the mean.
4. Data values that are LARGER than the mean have positive z-scores.
5. A z-score tells how many standard deviations from the mean the observation falls, and in what direction.
6. The 68-95-99.8 Rule is also known as the Empirical Rule.
7. Percentiles are percentages written as ranks.
8. The type of curve that is symmetric, single-peaked, and bell-shaped is a Normal curve.
9. About 68% of values are within ±1 standard deviation of the mean.
10. The equation used to find a z-score is $z = \frac{(x-\bar{x})}{s}$.
11. Data values that are SMALLER than the mean have negative z-scores.
12. The central tendency that percentiles are based on is the median.
13. The Empirical Rule applies only to Normal distributions.
14. About 95% of values are within ±2 standard deviation of the mean.

Work Problems—*answer each question fully.*

PERCENTILES

Below is a list of test grades for a class of 20 GMC students.

~~99~~ ~~81~~ ~~80~~ ~~77~~ ~~73~~ ~~83~~ ~~78~~ ~~80~~ ~~73~~ ~~77~~
~~83~~ ~~86~~ ~~90~~ ~~79~~ ~~85~~ ~~83~~ ~~89~~ ~~84~~ ~~82~~ ~~74~~
73 73 74 77 77 78 79 80 80 81 82 83 83 83 84 85 86 89 90 99

Determine the percentile of the following students.

15. If Jenny scored an 86 on the test. $\frac{17}{20} = 85^{th}$

16. Greg scored a 77 on the test $\frac{5}{20} = 25^{th}$

17. If Bobby scored a 90 on the test. $\frac{19}{20} = 95^{th}$

18. Tabi scored an 83 on the test. $\frac{14}{20} = 70^{th}$

Z-SCORES

The weight of the wrestlers on the wrestling team is normally distributed with a mean of 154 and a standard deviation of 3. Find the z-scores for each of the following.

19. 160 lbs. $Z = \frac{(160-154)}{3} = 2$

20. 132 lbs. $Z = \frac{(132-154)}{3} = -7.33$

The following set of data represents the shoe size of randomly selected male students. {13, 11.5, 9, 10.5, 13, 11, 10.5, 12.5, 13, 9, 9, 8, 10}. Find the z-scores for the following. $\bar{x} = 10.8 \quad s = 1.74$

21. Size 14 $Z = \frac{(14-10.8)}{1.74} = 1.84$

22. Size 10 $Z = \frac{(10-10.8)}{1.74} = -.46$

The z-scores of four students on an algebra test are given. If the mean of the test was 89 and the standard deviation was 5.5, find each students test grade.

23. Samantha's z-score is −.25 $-.25 = \frac{(x-89)}{5.5}$ $X = 87.6$ $-1.375 = x - 89$

24. Kendall's z-score is 1.5 $1.5 = \frac{(x-89)}{5.5}$ $X = 97.3$ $8.25 = x - 89$

The distribution of ACT scores in recent years has been roughly normal with mean of 19 and standard deviation of 4. SAT scores have been roughly normal with mean of 1035 and standard deviation of 200.

25. Jordyn gets a 20 on the ACT and 1050 on the SAT. On which ~~test did Jordyn do better?~~

ACT: $Z = .25$ SAT: $Z = .075$ Jordyn did better on ACT

26. Tanner got a 1011 on the SAT. What score on the ACT is ~~equivalent to Tanner's 1011?~~

SAT: $Z = -.12 \rightarrow -.12 = \frac{(x-19)}{4} =$ 18.52 is equivalent

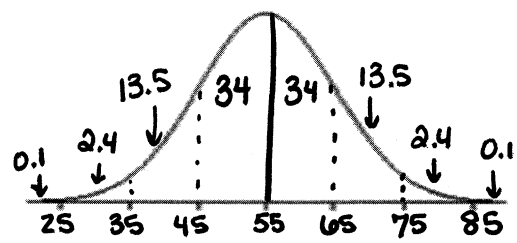
27. Georgia got a 28 on the ACT. What score on the SAT is equivalent to Georgia's 28?

ACT: $\frac{28-19}{4} = Z$ $Z = 2.25 \rightarrow 2.25 = \frac{(x-1035)}{200}$ $450 = x - 1035$ $X = 1485$ is equivalent

NORMAL DISTRIBUTION & EMPIRICAL RULE

The playing time of a professional soccer player has the normal distribution with mean 55 minutes and standard deviation 10 minutes.

Using the information given above, label the normal curve with the numerical values for the mean and all of the standard deviations. Label the percentages of the Empirical Rule as well.



28. The middle 68% of the data fall between what two times? 45 and 65

29. What percentage of on-field time is between 35 and 55 minutes?

$13.5 + 34 =$ 47.5%

30. What is the percentage of on-field time greater than 65 minutes?

$13.5 + 2.4 + 0.1 =$ 16%

31. How many standard deviations away from the mean is an on-field time of 85? And in which direction? positive 3

32. What is the percentage of on-field time less than 75 minutes?

$13.5 + 34 + 34 + 13.5 + 2.4 + 0.1 =$ 97.5%

33. The middle 95% of the data fall between what two times? 35 and 75

34. What percentage of on-field time is between 25 and 65 minutes?

$2.4 + 13.5 + 34 + 34 =$ 83.9%

35. What percentage of on-field time is less than 55 minutes?

$34 + 13.5 + 2.4 + 0.1 =$ 50%