

Looking Ahead

In the following example, we will be looking at a statistical measure known as the standard score or z -score. The standard score of a value tells you how that value relates to the mean of the data, specifically how many standard deviations it is away from the mean.

Example Preview

A sample of 113 hotels is selected from a large urban area and the price for a night of lodging for a single room was determined for each. The mean rate is computed to be \$93 and the standard deviation is \$13.

What is the standard score for a hotel charging \$105 per night? Round your answer to two decimal places.

Solution

The standard score is calculated using the formula $z = \frac{x - \bar{x}}{s}$.

where x is the price of a single room at the hotel, \bar{x} is the mean, and s is the standard deviation.

We know that $x = 105$, $\bar{x} = 93$, and $s = 13$.

Substitute these values into the formula and compute z .

Therefore,

$$z = \frac{105 - 93}{13} = 0.92$$

Thus, the standard score for a hotel charging \$105 per night is 0.92.

3.R.5 Exercises

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

1. A variable that does not appear to have an exponent has an exponent of 1.
2. In the term $-9x$, nine is being subtracted from x .
3. In the term “ $12a$,” 12 is the constant.
4. Like terms have the same coefficients.

Practice

Identify the like terms in each list of terms.

5. $-5, 3, 7x, 8, 9x, 3y$

Simplify each expression by combining like terms.

6. $8x + 7x$

7. $3x - 5x + 12x$

8. $13x + 12x^2 + 15x - 35 - 41 - 2x^2$

Simplify each expression and then evaluate the expression for $y = 3$ and $a = -2$.

9. $5y + 4 - 2y$

10. $\frac{3a + 5a}{-2} + 12a$

Applications

Solve.

11. **Profit:** An apartment management company owns a property with 100 units. The company has determined that the profit made per month from the property can be calculated using the equation $P = -10x^2 + 1500x - 6000$, where x is the number of units rented per month. How much profit does the company make when 80 units are rented?

12. **Physics:** A ball is thrown upward from an initial height of 96 feet with an initial velocity of 16 feet per second. After t seconds, the height of the ball can be described by the expression $-16t^2 + 16t + 96$. What is the height of the ball after 3 seconds?
13. **Applying a Standard Score:** Carlita scored 32 on the ACT Mathematics Test and 730 on the mathematics section of the SAT. If the ACT Mathematics Test had a mean score of 21.0 with a standard deviation of 5.3, and the mathematics section of the SAT had a mean score of 516 with a standard deviation of 116, on which exam did Carlita earn a better math score with respect to her peers? (Calculate the z -score for each test to make a decision.) Round to two decimal places.

Writing & Thinking

14. Discuss like and unlike terms and give an example of each.

15. Explain the difference between -13^2 and $(-13)^2$.