

## Looking Ahead

In the following statistics example, you must translate the stated problem into symbolic notation. Here, the key word “underfilled” signals the correct symbol to use for  $H_0$ .

### Example Preview

A manufacturer of potato chips would like to know whether its bag filling machine works correctly at the 417 gram setting. Is there sufficient evidence at the 0.02 level that the bags are underfilled? Assume the population is normally distributed.

State the null and alternative hypotheses for the above scenario.

### Solution

The issue in this problem is whether or not the bags are underfilled. Since  $\mu$  is the true mean filling capacity of the bags and the potato chips manufacturer wants to test if  $\mu$  is less than 417, this information is placed in the alternative hypothesis. The null hypothesis states that  $\mu$  is equal to the standard setting of 417 grams.

Specifically, for the null hypothesis, the true mean filling capacity is equal to 417 and for the alternative hypothesis, the true mean filling capacity is less than 417. Given this information, the null and alternative hypotheses are stated below.

$$H_0: \mu = 417$$

$$H_a: \mu < 417$$

## 10.R.1 Exercises

### Concept Check

**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. The order in which the values are given is particularly important when working with subtraction and division problems.
2. “More than” and “increased by” are key phrases specifying the operation of subtraction.
3. Division is indicated by the phrase “five less than a number.”
4. Key phrases for parentheses can be used to limit ambiguity in English phrases.

**Practice**

Write the algebraic expressions described by the English phrases. Choose your own variable.

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5. six added to a number
  
6. twenty decreased by the product of four and a number
  
7. eighteen less than the quotient of a number and two

Translate each pair of English phrases into algebraic expressions. Notice the differences between the algebraic expressions and the corresponding English phrases.

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8. a. six less than a number  
  
b. six less a number
  
9. a. six less than four times a number  
  
b. six less four times a number

Write the algebraic expression described by the English phrase using the given variables.

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10. The cost of purchasing a fishing rod and reel if the rod costs  $x$  dollars and the reel costs \$8 more than twice the cost of the rod

Translate each algebraic expression into an equivalent English phrase. (There may be more than one correct translation.)

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11.  $-9x$
  
12.  $\frac{9}{x+3}$

