

## UNIT 2 • REASONING WITH LINEAR EQUATIONS AND INEQUALITIES

### Lesson 1: Creating Linear Equations and Inequalities in One Variable

#### Instruction

#### Guided Practice 2.1.2

##### Example 1

Juan has no more than \$50 to spend at the mall. He wants to buy a pair of jeans and some juice. If the sales tax on the jeans is 4% and the juice with tax costs \$2, what is the maximum price of jeans Juan can afford?

1. Read the problem statement carefully.

2. Reread the scenario and make a list of the known quantities.

Sales tax is 4%.

Juice costs \$2.

Juan has no more than \$50.

3. Read the statement again, identifying the unknown quantity or variable.

The unknown quantity is the cost of the jeans.

4. Create expressions and inequalities from the known quantities and variable(s).

The price of the jeans + the tax on the jeans + the price of the juice must be less than or equal to \$50.

$$x + 0.04x + 2 \leq 50$$

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#### Instruction

5. Solve the resulting inequality.

$$x + 0.04x + 2 \leq 50 \quad \text{Inequality from the previous step}$$

$$1.04x + 2 \leq 50 \quad \text{Add like terms.}$$

$$1.04x \leq 48 \quad \text{Subtract 2 from both sides.}$$

$$x \leq 46.153846 \quad \text{Divide both sides by 1.04.}$$

Regardless of the digit in the thousandths place, round down to 46.15; rounding up will increase the price to a value that is not in Juan's budget.

$$x \leq 46.15$$

6. Interpret the solution of the inequality in terms of the context of the problem.

Juan should look for jeans that are priced at or below \$46.15. 

#### Example 2

Alexis is saving to buy a laptop that costs \$1,100. So far she has saved \$400. She makes \$12 an hour babysitting. What's the least number of hours she needs to work in order to reach her goal?

1. Read the problem statement carefully.

2. Reread the scenario and make a list of the known quantities.

Alexis has saved \$400.

She makes \$12 an hour.

She needs at least \$1,100.

3. Read the statement again, identifying the unknown quantity or variable.

You need to know the least number of hours Alexis must work to make enough money. Solve for hours.

## UNIT 2 • REASONING WITH LINEAR EQUATIONS AND INEQUALITIES

### Lesson 1: Creating Linear Equations and Inequalities in One Variable

#### Instruction

4. Create expressions and inequalities from the known quantities and variable(s).

The sum of Alexis's saved money and her earned money must be greater than or equal to the cost of the laptop.

$$400 + 12h \geq 1100$$

5. Solve the resulting inequality.

$$400 + 12h \geq 1100 \quad \text{Inequality from the previous step}$$

$$12h \geq 700 \quad \text{Subtract 400 from both sides.}$$

$$h \geq 58.\bar{3} \quad \text{Divide both sides by 12.}$$

6. Interpret the solution of the inequality in terms of the context of the problem.

In this situation, it makes sense to round up to the nearest half hour since babysitters usually get paid by the hour or half hour. Therefore, Alexis needs to work at least 58.5 hours to make enough money to save for her laptop.



#### Example 3

A radio station is giving away 40 concert tickets. The station gives away 2 tickets every hour on the hour for a number of hours until there are at most 4 tickets left for a grand prize. If the contest runs from 11:00 A.M. to 1:00 P.M. each day, for how many days will the contest last?

1. Read the problem statement carefully.

2. Reread the scenario and make a list of the known quantities.

The contest starts with 40 tickets.

The station gives away 2 tickets every hour.

The contest ends with at most 4 tickets left.

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### Lesson 1: Creating Linear Equations and Inequalities in One Variable

#### Instruction

3. Read the statement again, identifying the unknown quantity or variable(s).  
For how many days will the contest last?  
This is tricky because the tickets are given away in terms of hours.  
First, solve for hours.



4. Create expressions and inequalities from the known quantities and variable(s).  
The difference of the initial 40 tickets and the “2 tickets given away every hour” must be less than or equal to 4 tickets.  
$$40 - 2h \leq 4$$



5. Solve the resulting inequality.
- |                  |   |
|------------------|---|
| $40 - 2h \leq 4$ | Inequality from the previous step                           |
| $-2h \leq -36$   | Subtract 40 from both sides.                                |
| $h \geq 18$      | Divide both sides by $-2$ and switch the inequality symbol. |



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6. Interpret the solution of the inequality in terms of the context of the problem.

The inequality is solved for the number of hours the contest will last. The contest will last at least 18 hours; that is, for 18 hours or more.

The problem asks for the number of days the contest will last. If the contest lasts from 11:00 A.M. to 1:00 P.M. each day, and tickets are given out on the hour, that is 3 hours per day. Convert the units.

$$18 \text{ hours} \cdot \frac{1 \text{ day}}{3 \text{ hours}}$$
$$18 \cancel{\text{ hours}} \cdot \frac{1 \text{ day}}{3 \cancel{\text{ hours}}} = 6 \text{ days}$$

The contest will run for at least 6 days. Note that there are a total of 40 tickets to give away, so if the station gives away 6 tickets per day until there are at most 4 tickets left for a grand prize, then the longest the contest can last is 7 days. Thus, the contest will last for 6 or 7 days.

