

UNIT 1 • RELATIONSHIPS BETWEEN QUANTITIES

Lesson 2: Creating Equations and Inequalities in One Variable

Instruction

Guided Practice 1.2.2

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 first.



2. Reread the scenario and make a list or a table 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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5. Solve the problem.

$$\begin{array}{ll} x + 0.04x + 2 \leq 50 & \text{Add like terms.} \\ 1.04x + 2 \leq 50 & \text{Subtract 2 from both sides.} \\ 1.04x \leq 48 & \text{Divide both sides by 1.04.} \\ x \leq 46.153846 & \end{array}$$

Normally, the answer would be rounded down to 46.15. However, when dealing with money, round up to the nearest whole cent as a retailer would.

$$x \leq 46.16$$

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 \$46.16.



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 first.

2. Reread the scenario and make a list or a table 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.

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

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

$$400 + 12h \geq 1100$$



5. Solve the problem.

$$400 + 12h \geq 1100$$

Subtract 400 from both sides.

$$12h \geq 700$$

Divide both sides by 12.

$$h \geq 58.\overline{33}$$



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 concert tickets. There are 40 tickets to start. They give away 1 pair of tickets every hour for a number of hours until they have 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 first.



2. Reread the scenario and make a list or a table 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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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).

40 tickets – 2 tickets given away each hour must be less than or equal to 4 tickets.

$$40 - 2h \leq 4$$



5. Solve the problem.

$$40 - 2h \leq 4$$

Subtract 40 from both sides.

$$-2h \leq -36$$

Divide both sides by -2 and switch the inequality symbol.

$$h \geq 18$$



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, or 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, that is 3 hours per day. Convert the units.

$$1 \text{ day} = 3 \text{ hours}$$

$$18 \text{ hours} \cdot \frac{1 \text{ day}}{3 \text{ hours}}$$

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

The contest will run for 6 days or more.

