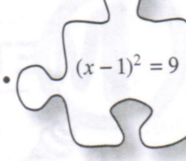
10.2.3 Which method is best?



More Solving and an Application

Recently you investigated three different approaches to solving one-variable equations: rewriting, looking inside, and undoing. Today you will use those approaches to solve new kinds of equations you have not solved before. You will also use your equation-writing skills to write an inequality for an application. As you work today, ask yourself these questions:

How can I represent it?

What is the best approach for this equation?

Have I found all of the solutions?

10-69. Solve these equations. Each time, be sure you have found all possible solutions. Check your work and write down the name of the method(s) you used.

a. $|x+1|=5$

b. $(x-13)^3=8$

c. $2\sqrt{x-4}=14$

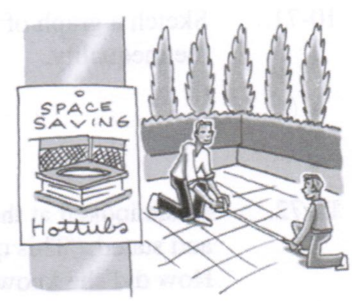
d. $|4x+20|=8$

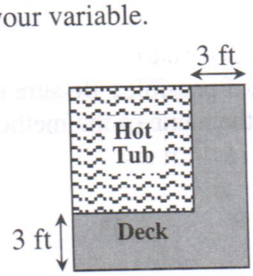
e. $3(x+12)^2=27$

f. $6|x-8|=18$

10-70. RUB A DUB DUB

Ernie is thinking of installing a new hot tub in his backyard. The company he will order it from makes square hot tubs, and the smallest tub he can order is 4 feet by 4 feet. He plans to add a 3-foot-wide deck on two adjacent sides, as shown in the diagram below. If Ernie's backyard (which is also a square) has 169 square feet of space, what are the possible dimensions that his hot tub can be? Write and solve an inequality that represents this situation. Be sure to define your variable.





METHODS AND MEANINGS

MATH NOTES

Solving Absolute-Value Equations

To solve an equation with an absolute value algebraically, first determine the possible values of the quantity inside the absolute value.

For example, if $|2x+3|=7$, then the quantity $(2x+3)$ must equal 7 or –7.

With these two values, set up new equations and solve as shown below.

$$|2x+3|=7$$

$$\begin{array}{ccc} 2x+3=7 & \text{or} & 2x+3=-7 \\ 2x=4 & & 2x=-10 \\ x=2 & & x=-5 \end{array}$$

Always check your solutions by substituting them into the original equation:

Test $x=2$: $|2(2)+3|=7$ ✓ True

Test $x=-5$: $|2(-5)+3|=7$ ✓ True

Review & Preview

10-71. Sketch a graph of the inequality below. Shade the region containing the solutions of the inequality.

$$y>(x-4)(x+3)$$

10-72. Jessie looked at the equation $(x-11)^2=-4$ and stated, "This quadratic has no solutions!" How did she know?

10-73. Solve these equations, if possible. Be sure to find all possible solutions. Check your work and write down the name of the method(s) you used.

a. $9(x-4)^2=81$

b. $|x-6|=2$

c. $5=2+\sqrt{3x}$

d. $2|x+1|=-4$

10-74. Review what you know about solving inequalities by solving the inequalities below. Show your solutions on a number line.

a. $6x-1<11$

b. $\frac{1}{3}x\geq 2$

c. $9(x-2)>18$

d. $5-\frac{x}{4}\leq\frac{1}{2}$

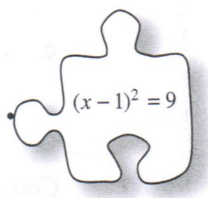
10-75. Multiply or divide the rational expressions below. Leave each answer in simplified form.

a. $\frac{(x-3)^2}{2x-1}\cdot\frac{2x-1}{(3x-14)(x+6)}\cdot\frac{x+6}{x-3}$

b. $\frac{4x^2+5x-6}{3x^2+5x-2}\div\frac{4x^2+x-3}{6x^2-5x+1}$

10-76. Use the meaning of an exponent to rewrite the expression $5x^3y^2$. Review the meaning of an exponent in problem 10-66 if necessary.

10.2.4 How can I solve the inequality?



Solving Inequalities with Absolute Value

The three approaches you have for solving equations can also be used to solve inequalities. While the one-variable inequalities you solve today look different than the ones in Chapter 9, the basic process for solving them is similar. As you solve equations and inequalities in today's lesson, ask yourself these questions:

How can I represent it?

What **connection** can I make?

10-77. Solve the inequality $2x+7<12$. Represent the solution on a number line.

a. What is the boundary point? Is it part of the solution? Why or why not?

b. In general, how do you find a boundary point? How do you find the solutions of an inequality after you have found the boundary point? Briefly review the process with your team.