

warm up: page 34

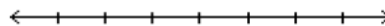
Fill in the blanks below on your notebook and try to answer letters a-f

### 2-7 Solving Absolute Value Equations

#### Vocabulary

**Absolute Value** – Every number has an absolute value which describes the number's distance from zero on a number line. We ask for and describe a number's absolute value with bars which look like this:  $||$

**Example:**



What is the absolute value of each of the following?

a.  $|4| = 4$    b.  $|-6| = 6$    c.  $|203| = 203$    d.  $|-56| = 56$    e.  $|7.2| = 7.2$    f.  $|-9.1| = 9.1$

## answers: HW page 24

1)  $\frac{10}{k} = \frac{8}{4}$   
 $\frac{8k}{8} = \frac{40}{8}$   
 $k = 5$

2)  $\frac{m}{12} = \frac{7}{3}$   
 $\frac{3m}{3} = \frac{84}{3}$   
 $m = 28$

3)  $\frac{2}{x} = \frac{7}{9}$   
 $\frac{7x}{7} = \frac{18}{7}$   
 $x = 2\frac{4}{7}$

4)  $\frac{x}{12} = \frac{10}{2}$   
 $\frac{2x}{2} = \frac{120}{2}$   
 $x = 60$

5)  $\frac{4}{9} = \frac{2}{x}$   
 $\frac{4x}{4} = \frac{18}{4}$   
 $x = 4\frac{1}{2}$

6)  $\frac{p}{8} = \frac{13}{2}$   
 $\frac{2p}{2} = \frac{104}{2}$   
 $p = 52$

7)  $\frac{10}{12} = \frac{2}{n}$   
 $\frac{10n}{10} = \frac{24}{10}$   
 $n = 2\frac{2}{5}$

8)  $\frac{10}{m} = \frac{4}{6}$   
 $\frac{4m}{4} = \frac{60}{4}$   
 $m = 15$

1.	5
2.	28
3.	$2\frac{4}{7}$
4.	60
5.	$4\frac{1}{2}$
6.	52
7.	$2\frac{2}{5}$

9)  $\frac{x}{4} = \frac{x+2}{8}$  **P24**

$$8x = 4(x+2)$$

$$8x = 4x + 8$$

$$-4x \leftarrow$$

$$\frac{4x}{4} = \frac{8}{4}$$

$$x = 2$$

12)  $\frac{9}{5} = \frac{6}{x+1}$

$$9(x+1) = 30$$

$$9x + 9 = 30$$

$$\rightarrow -9$$

$$9x = 21$$

$$\frac{9x}{9} = \frac{21}{9}$$

$$x = 2\frac{1}{3}$$

15)  $\frac{5}{x-2} = \frac{3}{x+2}$

$$5(x+2) = 3(x-2)$$

$$5x + 10 = 3x - 6$$

$$-3x \leftarrow -10$$

$$\frac{2x}{2} = \frac{-16}{2}$$

$$x = -8$$

10)  $\frac{7}{10} = \frac{x+3}{5}$

$$10(x+3) = 35$$

$$10x + 30 = 35$$

$$\rightarrow -30$$

$$\frac{10x}{10} = \frac{5}{10}$$

$$x = \frac{1}{2}$$

13)  $\frac{x+4}{2} = \frac{x+3}{3}$

$$3(x+4) = 2(x+3)$$

$$3x + 12 = 2x + 6$$

$$-2x \leftarrow -12$$

$$x = -6$$

16)  $\frac{4}{2x-5} = \frac{3}{x+5}$

$$3(2x-5) = 4(x+5)$$

$$6x - 15 = 4x + 20$$

$$-4x \leftarrow +15$$

$$\frac{2x}{2} = \frac{35}{2}$$

$$x = 17\frac{1}{2}$$

11)  $\frac{4}{x} = \frac{6}{x-2}$

$$6x = 4(x+2)$$

$$6x = 4x + 8$$

$$-4x \leftarrow$$

$$\frac{2x}{2} = \frac{8}{2}$$

$$x = 4$$

14)  $\frac{2x-1}{5} = \frac{4x+2}{9}$

$$5(4x+2) = 9(2x-1)$$

$$20x + 10 = 18x - 9$$

$$-18x \leftarrow -10$$

$$\frac{2x}{2} = \frac{-19}{2}$$

$$x = -9\frac{1}{2}$$

17)  $\frac{x+6}{3} = \frac{5}{x}$

$$x+6 = 15$$

$$\rightarrow -6$$

$$x = 9$$

8.	15
9.	2
10.	$\frac{1}{2}$
11.	4
12.	$2\frac{1}{3}$
13.	-6
14.	$-9\frac{1}{2}$
15.	-8
16.	$17\frac{1}{2}$
17.	9

**answers: HW page 25**

1. An object that weighs 12 pounds on Earth, would weigh only 2 pounds on the moon. How much would a kid who weighs 84 pounds on Earth, weigh on the moon?

$$\frac{12}{2} = \frac{84}{x} \quad \frac{12x}{12} = \frac{168}{12}$$

$$x = 14 \quad \boxed{14 \text{ pounds}}$$

2. A speedboat factory can produce 12 boats in 8 days. How many days will it take the factory to produce 30 speedboats?

$$\frac{12}{8} = \frac{30}{x} \quad \frac{12x}{12} = \frac{240}{12}$$

$$x = 20 \quad \boxed{20 \text{ days}}$$

3. A biscuit recipe for 60 biscuits calls for 4 cups of flour. How much flour is needed to make 90 biscuits?

$$\frac{60}{4} = \frac{90}{x} \quad \frac{60x}{60} = \frac{360}{60}$$

$$x = 6 \quad \boxed{6 \text{ cups}}$$

4. Darwin can read 7 pages of his book in 5 minutes. At this rate, how long will it take him to read the entire 175 page book.

$$\frac{7 \text{ pgs}}{5 \text{ min}} = \frac{175}{x}$$

$$\frac{7x}{7} = \frac{875}{7}$$

$$x = 125 \quad \boxed{125 \text{ min.}}$$

5. While exercising, Julie found that her heart was beating 12 times every 5 seconds. How many times was it beating per 60 seconds?

$$\frac{12}{5} = \frac{x}{60} \quad \frac{5x}{5} = \frac{720}{5}$$

$$x = 144 \quad \boxed{144 \text{ beats}}$$

6. There are 1,200 calories in 8 ounces of frosting, how many calories are in 5 ounces of frosting?

$$\frac{1,200}{8} = \frac{x}{5} \quad \frac{8x}{8} = \frac{6000}{8}$$

$$x = 750 \quad \boxed{750 \text{ cal.}}$$

7. If a bunny can hop 12 feet in 8 seconds, how many seconds will it take the bunny to hop 180 feet.

$$\frac{12 \text{ ft}}{8 \text{ sec}} = \frac{180 \text{ ft}}{x \text{ sec}}$$

$$\frac{12x}{12} = \frac{1440}{12}$$

$$x = 120$$

120 sec.

9. Party Fizz Punch is made by mixing 4 parts fruit juice to 3 parts Sprite. Bill has 44 ounces of fruit juice. How much Sprite should he mix with it?

$$\frac{4 \text{ juice}}{3 \text{ sprite}} = \frac{44 \text{ juice}}{x \text{ sprite}}$$

$$\frac{4x}{4} = \frac{132}{4}$$

$$x = 33$$

33 oz.  
Sprite

8. At a rock concert, the ratio of men to women is 6 to 2. If there are 1,500 men, how many women are there?

$$\frac{6 \text{ men}}{2 \text{ women}} = \frac{1500}{x}$$

$$\frac{6x}{6} = \frac{3000}{6}$$

$$x = 500$$

500 women

10. The money used in Jordan is called the Dinar. The exchange rate is \$3 to 2 Dinars. Find how many Dinar you would receive if you exchanged 36 dollars.

$$\frac{\$3}{2 \text{ Dinar}} = \frac{\$36}{x \text{ Dinar}}$$

$$\frac{3x}{2} = \frac{72}{2}$$

$$x = 24$$

24 Dinar

**back to page 34****Example 1: Solving an Absolute Value Equation**

Sometimes, we need to think **backwards**, and say what numbers are possible for  $x$ , when **given** the distance from zero.

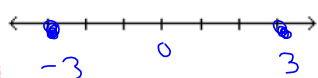
a.  $|x| = 3$



Step 1 Think "3 away from 0"  
 Step 2 Write both possible answers

b.  $2|x| + 5 = 11$

$$\begin{array}{r} -5 \quad -5 \\ 2|x| + 5 = 11 \\ 2|x| = 6 \\ |x| = 3 \end{array}$$



Step 1 Isolate the abs. value.  
 Step 2 Think "3 away from 0"  
 Step 3 Write both possible answers.

$$\boxed{x = 3 \text{ or } x = -3}$$

**Understanding Check**

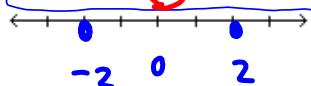
Solve and graph each equation and give a final answer:

a.  $9|x| + 8 = 26$

$$9|x| = 18$$

$$|x| = 2$$

$$\boxed{x = 2 \text{ or } x = -2}$$

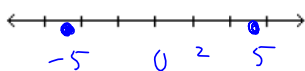


b.  $-3|x| + 2 = -13$

$$-3|x| = -15$$

$$|x| = 5$$

$$\boxed{x = 5 \text{ or } x = -5}$$

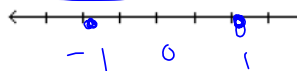


c.  $8|x| - 6 = 2$

$$8|x| = 8$$

$$|x| = 1$$

$$\boxed{x = 1 \text{ or } x = -1}$$

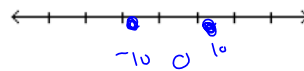


d.  $-|x| + 4 = -6$

$$-|x| = -10$$

$$|x| = 10$$

$$\boxed{x = 10 \text{ or } x = -10}$$



## page 35

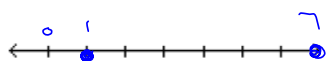
**Example 2:**

Solve each equation.

a.  $|x - 4| = 3$

$$x - 4 = 3 \quad \vee \quad x - 4 = -3$$

$$\boxed{x = 7 \quad \vee \quad x = 1}$$



Step 1 Think "3 away from 0"

Step 2 Set up both equations

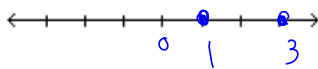
Step 3 Solve

b.  $|3x - 6| = 3$

$$3x - 6 = 3 \quad \vee \quad 3x - 6 = -3$$

$$3x = 9 \quad \quad 3x = 3$$

$$\boxed{x = 3 \quad \vee \quad x = 1}$$



Step 1 SAME

Step 2

Step 3

✓ Understanding Check

Solve each equation:

a.  $|x + 6| = 8$

$$x = -14 \text{ or } x = 2$$

b.  $|2x + 10| = 14$

$$x = -12 \text{ or } x = 2$$

c.  $|4x - 12| = 20$

$$x = -2 \text{ or } x = 8$$



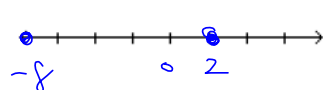
**Example 3:**

Solve each equation.

**\* DO NOT DISTRIBUTE!!!!**

a.  $2|x + 3| - 7 = 3$

$$2|x + 3| = 10$$

$$|x + 3| = 5$$


Step 1

Isolate the Abs. Val.

Step 2

SOLVE

Step 3

$$x + 3 = 5 \quad \text{or} \quad x + 3 = -5$$

$$x = 2 \quad \text{or} \quad x = -8$$

**Understanding Check**

Solve each equation:

a.  $3|2x - 1| + 5 = 26$

$$3|2x - 1| = 21$$

$$|2x - 1| = 7$$

$$2x - 1 = 7 \quad \text{or} \quad 2x - 1 = -7$$

$$2x = 8$$

$$2x = -6$$

$$x = 4 \quad \text{or} \quad x = -3$$

b.  $-5|3x + 9| - 2 = -17$

$$x = -4 \quad \text{or} \quad x = -2$$

**Homework:**

**HW page 26 ALL**