

warm up: page 34

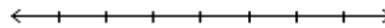
Fill in the blanks below on your notebook and try to answer letters a-f

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) $\frac{x}{4} = \frac{x+2}{8}$
 $8x = 4(x+2)$
 $8x = 4x + 8$
 $-4x \quad \leftarrow$
 $\frac{4x = 8}{4} \quad \frac{4}{4}$
 $x = 2$

12) $\frac{9}{5} = \frac{6}{x+1}$
 $9(x+1) = 30$
 $9x + 9 = 30$
 $\quad \quad \quad \leftarrow -9$
 $\frac{9x = 21}{9} \quad \frac{9}{9}$
 $x = 2\frac{1}{3}$

15) $\frac{5}{x-2} = \frac{3}{x+2}$
 $5(x+2) = 3(x-2)$
 $5x + 10 = 3x - 6$
 $-3x \quad \quad \quad \leftarrow -10$
 $\frac{2x = -16}{2} \quad \frac{2}{2}$
 $x = -8$

10) $\frac{7}{10} = \frac{x+3}{5}$
 $10(x+3) = 35$
 $10x + 30 = 35$
 $\quad \quad \quad \leftarrow -30$
 $\frac{10x = 5}{10} \quad \frac{10}{10}$
 $x = \frac{1}{2}$

13) $\frac{x+4}{2} = \frac{x+3}{3}$
 $3(x+4) = 2(x+3)$
 $3x + 12 = 2x + 6$
 $-2x \quad \quad \quad \leftarrow -12$
 $\frac{x = -6}{1} \quad \frac{1}{1}$

16) $\frac{4}{2x-5} = \frac{3}{x+5}$
 $3(2x-5) = 4(x+5)$
 $6x - 15 = 4x + 20$
 $-4x \quad \quad \quad \leftarrow +15$
 $\frac{2x = 35}{2} \quad \frac{2}{2}$
 $x = 17\frac{1}{2}$

11) $\frac{4}{x} = \frac{6}{x-2}$
 $6x = 4(x+2)$
 $6x = 4x + 8$
 $-4x \quad \quad \quad \leftarrow$
 $\frac{2x = 8}{2} \quad \frac{2}{2}$
 $x = 4$

14) $\frac{2x-1}{5} = \frac{4x+2}{9}$
 $5(4x+2) = 9(2x-1)$
 $20x + 10 = 18x - 9$
 $-18x \quad \quad \quad \leftarrow -10$
 $\frac{2x = -19}{2} \quad \frac{2}{2}$
 $x = -9\frac{1}{2}$

17) $\frac{x+6}{3} = \frac{5}{1}$
 $x + 6 = 15$
 $\quad \quad \quad \leftarrow -6$
 $\frac{x = 9}{1} \quad \frac{1}{1}$

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.

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

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

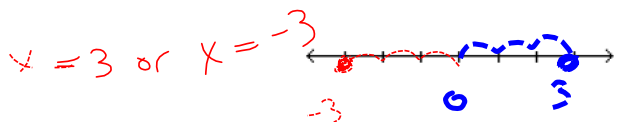
$$x = 24$$

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.

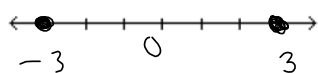
a. $|x| = 3$



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

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

$2|x| = 6$
 $|x| = 3$



$x = 3$ or $x = -3$

Step 1 Isolate the absolute value
 Step 2 SOLVE
 Step 3

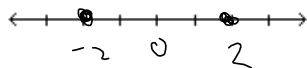
✓ Understanding Check

Solve and graph each equation and give a final answer:

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

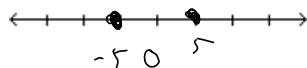
$9|x| = 18$
 $|x| = 2$

$x = 2$ or $x = -2$



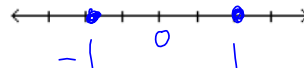
b. $-3|x| + 2 = -13$

$-3|x| = -15$
 $|x| = 5$



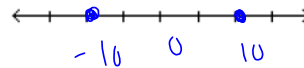
c. $8|x| - 6 = 2$

$8|x| = 8$
 $|x| = 1$
 $x = 1$ or $x = -1$



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

$-|x| = -10$
 $|x| = 10$
 $x = 10$ or $x = -10$



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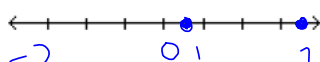
Example 2:

Solve each equation.

a. $|x - 4| = 3$

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

$$x = 7 \text{ or } x = 1$$



Step 1 Think "3 away from 0"

Step 2 set up both equations and solve

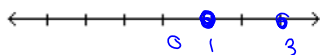
Step 3 Give both answers

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

$$3x - 6 = 3 \text{ or } 3x - 6 = -3$$

$$3x = 9 \qquad 3x = 3$$

$$x = 3 \qquad x = 1$$



Step 1 Same

Step 2

Step 3

✓ Understanding Check

Solve each equation:

a. $|x + 6| = 8$

$$x + 6 = 8 \text{ or } x + 6 = -8$$

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

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

$$2x + 10 = 14 \text{ or } 2x + 10 = -14$$

$$2x = 4$$

$$2x = -24$$

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

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

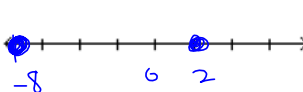
$$4x - 12 = 20$$

Example 3:*** DO NOT DISTRIBUTE!!!!**

Solve each equation.

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

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

$$|x + 3| = 5$$


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

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

Step 1

Isolate the Abs. Val.

Step 2

SOLVE

Step 3

✓ Understanding Check

Solve each equation:

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

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

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

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

$$2x = 8 \quad \text{or} \quad 2x = -6$$

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

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

Homework:

HW page 26 ALL