Math 60, Section 1.1 and 1.3 Activity   Name: _Solutions_

Section 1.1: Review of Arithmetic with Negative Numbers

Adding

1. Using the context of money, find the answer to each problem.

a. $\$6 + \$7$ = **$\$13$**
   earn, earn

b. $-\$2.10 + (-\$7.49)$ = **-9.59**
   spend, spend

c. $\$3 + (-\$9)$ = **-6**
   earn, spend

d. $-\$10 + \$12$ = **2**

2. Using the context of a number line, find the answer to each problem.
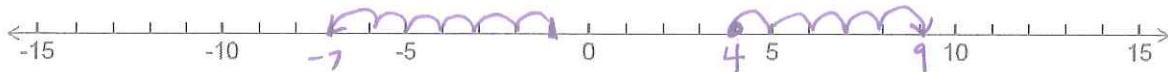
a. $4 + 5$ = **9**
   right, right

b. $-1 + (-6)$ **-7**
   left, left

c. $4.5 + (-6.5)$ = **-2**
   right, left

d. $-7 + 12$ = **5**

3. Write down some notes in your own words for adding signed numbers.

   if the numbers have the same sign, I add them and keep that sign.

   if the numbers have opposite signs, I subtract them and use the sign of the "larger."

4. Practice. Use the method that is most useful for you.

a. $-\$10 + \$10$ = **0**

b. $-\$5 + (-\$10)$ = **-15**

c. $\$12 + (-\$3) + (-\$8)$
   = $9 - 8$
   = 1

d. $-14 + 15$ = **1**

e. $9 + (-1) + 7$
   = $8 + 7$
   = 15

f. $-5.50 + (-5.01)$
   = -10.51

Subtracting

5. Using the Context of a Number Line
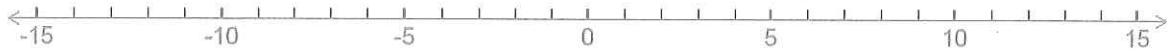
a. $4 - 9 = -5$
   right, left

b. $-3 - 7 = -10$
   left, left

c. $4 - (-6)$
   right, right
   $$4 + 6 = 10$$

d. $-7.3 - (-6.1) = -1.2$

6. Using the Context of Money

a. $\$10 - \$13 = -3$
   earn, spend

b. $-\$7 - \$8 = -15$

c. $\$11.75 - (-\$7.25)$
   earn, get a credit
   $$\$19$$

d. $-\$4 - (-\$9) = 5$

7. Write down some notes in your own words for subtracting signed numbers.

   Change any double negatives to addition $3 - (-2)$

8. Practice. Use the method that is most useful for you.

a. $-\$7 - \$7 = -14$

b. $-\$4 - \$9 = -13$

c. $\$6 - (-\$4) = 10$

d. $-7 - (-7) = 0$

e. $-5 - (-10) = 5$

f. $10 - 24.5 = -14.5$

9. Simplifying Longer Expressions. Show each step.

a. $15+(-7)+5-(-14)$ Left to right

$= 8 + 5 + 14$

$= 13 + 14$

$= 27$

b. $4.5-5-(-11)-(-9)$ add like signs first

$= 4.5 + 11 + 9 - 5$

$= 24.5 - 5$

$= 19.5$

<u>Multiplying and Dividing</u>

10. Sign rules for multiplying and dividing.

positive • positive = positive   negative • negative = positive

positive • negative = negative   negative • positive = negative

a. $-4 \cdot 3 = -12$

b. $-2(-9) = 18$

c. $-12 \div 3 = -4$

d. $-40 \div (-8) = 5$

e. $-2(3)(-4) = 24$

f. $(-1)(-2)(-3)(-4) = 24$
   $+$ $+$

g. $-10(-0.5) = 5$
   $(-10)(-\frac{1}{2})$

h. $100(-0.4) = ^-40$
   100
   $\underline{4}$
   400

i. $-5.2(-6.1)$ if $52 \cdot 61 = 3172$

31.72

j. $-4(0) = 0$

k. $0 \div 4 = 0$

l. $4 \div 0 = $ undefined

<u>Exponents</u>

11. Expand each exponential expression in a-f. The first two are shown for you.

a. $(-4)^2 = (-4)(-4) = 16$

b. $-4^2 = -4 \cdot 4 = -16$

c. $(-2)^3 = (-2)(-2)(-2) = -8$

d. $-2^3 = -2 \cdot 2 \cdot 2 = -8$

e. $(-5)^4 = (-5)(-5)(-5)(-5)$
   $= 625$

f. $-5^4 = -5 \cdot 5 \cdot 5 \cdot 5 = -625$

g. $(-1)^{804} = 1$
   (even exponent)

h. $(-1)^{805} = -1$
   (odd exponent)

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12. Write what you know or have learned about even and odd exponents.

a negative base raised to an even power is positive
a negative base raised to an odd power is negative

Section 1.3: Absolute Value and Square Roots

The <u>absolute value</u> of a number is its distance from 0 on the number line. Distance is always <u>*positive*</u>

$$|-10| = 10 \qquad |10| = 10$$

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  -15      -10       -5        0        5       10       15
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13. a. $|-6|$

$= 6$
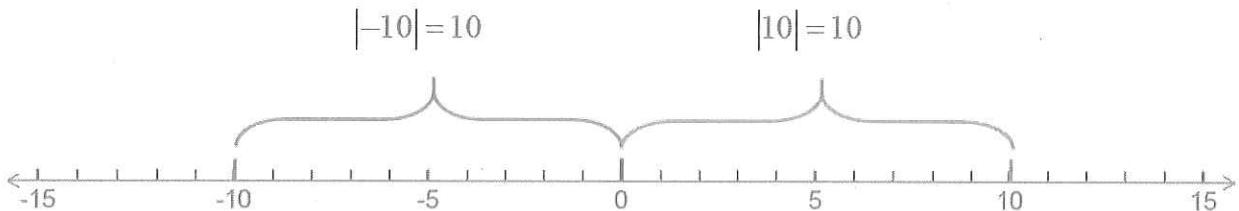
b. $-|-16|$

↓ ~
−16

c. $|-11-6|$

$|-17|$
17

d. $-2|11-20|$

$= -2|-9|$
$= -2 \cdot 9$
$= -18$

Square Root Facts

14. a. $\sqrt{81} = 9$

b. $-\sqrt{100} = -10$

Square Roots of Fractions

15. a. $-\sqrt{\dfrac{144}{49}}$

$= \dfrac{12}{7}$

b. $\sqrt{\dfrac{1}{36}}$

$= \dfrac{1}{6}$

Square Roots of Negative Numbers

16. a. $\sqrt{-36}$

not a real number

b. $-\sqrt{-\dfrac{81}{100}}$

not a real number

Finding Square Roots on the Calculator

17. Use a calculator to approximate the following. Write your answer with four significant digits.

a. $\sqrt{10}$

≈ 3.162

b. $-\sqrt{80}$

≈ -8.944

c. $\sqrt{-72}$

not a real number

18. Personal Reflection. Do you feel that you are placed in the correct math class? If this material seems too easy or too hard, please talk with me and I will help you.

This is a personal reflection. Please talk with me if you want help with this or if you think you might not be in the right class.

More Practice.

19. Write an expression with all the operations on a single line and simplify it. Write your answer in a complete sentence.

a. At the end of last month your checking account balance was $432. So far this month, you got paid $878, spent $204 on groceries, spent $32 on coffee at PCC, and returned an item to the store for a credit of $25. What is your new balance?

$$\$432 + 878 - 204 - 32 + 25$$
$$= 1310 - 204 - 32 + 25$$
$$= 1335 - 204 - 32$$
$$= 1335 - 236$$
$$= \$1099$$

My new balance is $1,099.

$$\begin{array}{r} 4\overset{1}{3}\overset{1}{2} \\ 878 \\ \hline 1310 \\ +25 \\ \hline 1335 \end{array}$$

$$\begin{array}{r} \overset{2}{1}\overset{12}{3}\overset{}{3}\overset{}{5} \\ -236 \\ \hline 1099 \end{array}$$

b. In problem a above, where did you or where could you have subtracted a negative?

Returning an item for a credit is subtracting a negative   -(-25) or +25

c. The highest point in California is the top of Mt. Whitney, which has an elevation of 14,505 feet above sea level. The lowest point in California is in Death Valley, with an elevation of 282 feet below sea level. Draw a diagram and write an expression that involve subtraction to find the (difference) between the two elevations.
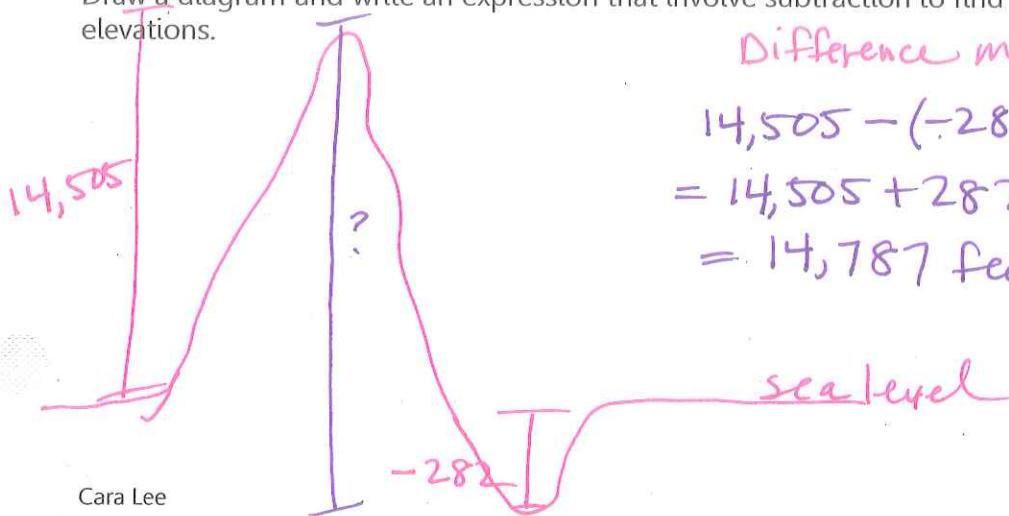
Difference means subtract

$$14,505 - (-282)$$
$$= 14,505 + 282$$
$$= 14,787 \text{ feet}$$

The difference in the elevations is 14,787 feet.

14,505
?
sea level
-282

20. Complete each operation.

   a. $3+(-8)$ $=-5$ b. $3-8$ $=-5$ c. $3-(-8)$ $=11$

   d. $-5-15$ $=-20$ e. $-9-(-11)$ $=2$ f. $18+(-6)$ $=12$

   g. $-4(-9)$ $=36$ h. $-72\div9$ $=-8$ i. $4(-10)$ $=-40$

21. Simplify each exponential expression.

   a. 5^2 $=25$ b. -5^2 $=-25$ c. $(-5)^2$ $=\overset{(-5)(-5)}{25}$

   d. -1^{304} $=-1$ e. $(-1)^{92}$ $=1$ f. -2^6 $=-64$

   $(-1)^{304}=1$

22. Simplify the expressions with absolute value and square roots.

   a. $|10|$ $=10$ b. $|-25|$ $=25$ c. $-|-16|$ $=-16$

   d. $|-6-8|$ e. $-|8-10|$ f. $4|1-12|$

   $=|-14|$ $=-|-2|$ $4|-11|$

   $=14$ $=-2$ $4\cdot11=44$

   g. $\sqrt{0}$ h. $\sqrt{1}$ i. $\sqrt{-1}$

   $=0$ $=1$ not a real number

   j. $\sqrt{100}-\sqrt{64}$ k. $-\sqrt{\dfrac{144}{25}}$ l. $\sqrt{-\dfrac{4}{9}}$

   $10-8$ $-\dfrac{12}{5}$ not a real number

   $=2$