MATH GRADE 7 UNIT 1

WORKING WITH RATIONAL NUMBERS

ANSWERS
FOR EXERCISES

ALWAYS LEARNING

PEARSON

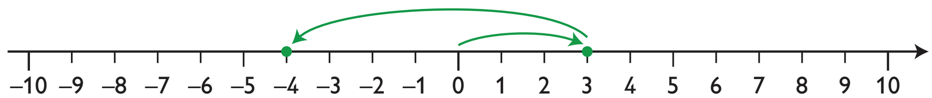
LESSON 2: MODELING INTEGER ADDITION

ANSWERS

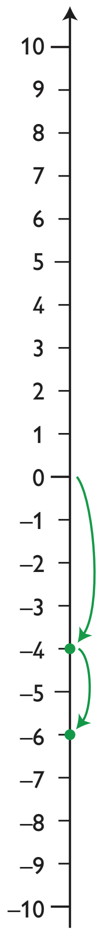
ANSWERS

7.NS.1.b **1.** Ⓒ 0

7.NS.1 **2.** 3 + (–7) = –4



7.NS.1 **3.** –4 + (–2) = –6



7.NS.1.b **4.** –9 + (–16) = –25

7.NS.1.b **5.** –15 + 32 = 17

7.NS.1.b **6.** –38 + (–56) = –94

LESSON 2: MODELING INTEGER ADDITION

ANSWERS

7.NS.1.b **7.** $13 + (-13) = 0$

7.NS.1.c **8.** 407

7.NS.1.c **9.** –81

7.NS.1.b **10.** At noon, the temperature was 3°F.

$-7 + 10 = 3$

7.NS.1.b **11.** The distance from the ground to the top of the pole is 34 ft.

$40 + (-6) = 34$

7.NS.1.b **12.**

a. An equation that represents his total debt is: $-7 + (-5) = -12$

b. An equation that represents his new debt is: $-12 + 10 = -2$

7.NS.1.a **13.** Ask a classmate to read your situation.

Here is one possible situation.

The temperature was –6°F. Then it rose by 6°. Now the temperature is 0°F.

7.NS.1.b **14.** Ask a classmate to read your situation.

Here is one possible situation.

Tania has a balance of –$10 on her credit card (that is, her debt is $10). Then she charges another item that costs $10. Tania now has a balance of –$20 on her credit card (that is, her debt is now $20).

Challenge Problem

7.NS.1.b **15.** For the equation $|a + b| = |a| + |b|$, the integer values for a and b are both positive or both negative, or at least one of the integers is 0.

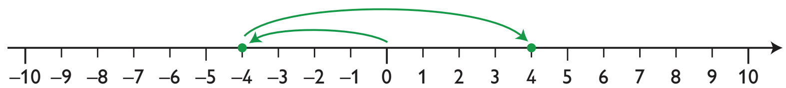
LESSON 3: SUBTRACTION AS "TAKING AWAY"

ANSWERS

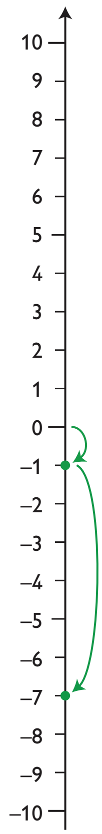
ANSWERS

7.NS.1.c **1.** Ⓑ –1

7.NS.1 **2.** Ⓐ



7.NS.1 **3.** –1 – 6 = –7



7.NS.1.c **4.** 5 – 11 = –6

7.NS.1.c **5.** 9 – (–6) = 15

7.NS.1.c **6.** –7 – 6 = –13

7.NS.1.c **7.** –3 – (–3) = 0

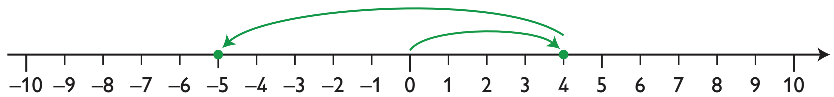
7.NS.1.c **8.** –42 – (–26) = –16

7.NS.1.c **9.** 85 – 93 = –8

LESSON 3: SUBTRACTION AS "TAKING AWAY" ANSWERS

7.NS.1.c **10.** The morning temperature was –5°F.

$4 - 9 = 4 + (-9) = -5$



7.NS.1.c **11.** a. A subtraction expression that represents this situation is $-75 - (-15)$.

b. Sophie's mom now owes \$60.

$-75 - (-15) = -75 + 15 = -60$

7.NS.1.c **12.** Her elevation is now –51 ft, or 51 ft below sea level.

$-14 - 37 = -14 + (-37) = -51$

7.NS.1.c **13.** Ask a classmate to read your situation.

Here is one possible situation.
The temperature at midnight was –6°F. By 2 a.m., the temperature had dropped another 6° to –12°F.

7.NS.1.c **14.** Ask a classmate to read your situation.

Here is one possible situation.
Maya had \$10 in her checking account. Then she wrote a check for \$15.
Now her balance is –\$5.

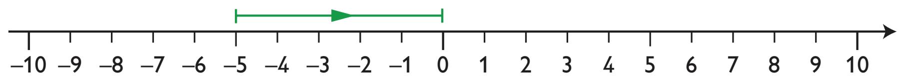
Challenge Problem

7.NS.1.c **15.** $|a - b| = a - b$ when $a \geq b$.

LESSON 4: SUBTRACTION AS DISTANCE — ANSWERS

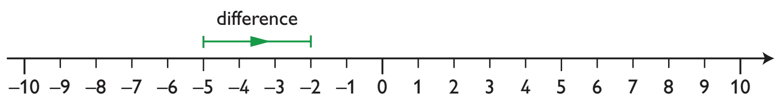
ANSWERS

7.NS.1.b **1.** a.

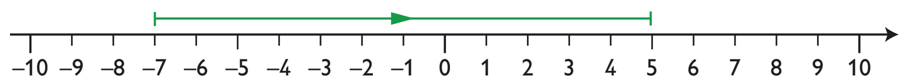


b. The distance is 5 units.

7.NS.1.b **2.** (A)



7.NS.1.b **3.** a.



b. The distance is 12 units.

7.NS.1.b **4.** The distance is 5 units.

7.NS.1.c **5.** To find the distance between *A* and *B*, find the absolute value of the difference of 6 and –4.

$|6 - (-4)| = |6 + 4| = |10| = 10$

7.NS.1.c **6.** To find the distance between –8 and –1, find the absolute value of the difference.

$|-8 - (-1)| = |-8 + 1| = |-7| = 7$

7.NS.1.b
7.NS.1.c **7.** (D) $|-43 - (72)|$

7.NS.1.b **8.** The distance is 256 units.

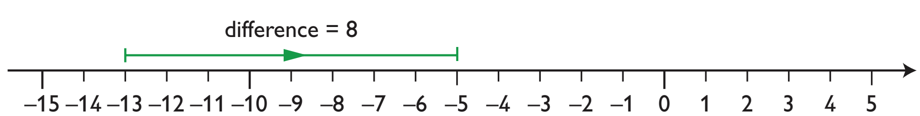
$|-561 - (-305)| = |-561 + 305| = |-256| = 256$

7.NS.1.c **9.** The difference is 14,776 ft.

$|14{,}494 - (-282)| = |14{,}494 + 282| = |14{,}776| = 14{,}776$ ft

7.NS.1.c **10.** The distance is 8 blocks. The school, library, and park are located at –13, –5, and 0, respectively. The distance from the school to the library in blocks is shown with this equation and on the number line.

$|-13 - (-5)| = |-13 + 5| = |-8| = 8$



LESSON 4: SUBTRACTION AS DISTANCE

ANSWERS

7.NS.1.b
7.NS.1.c

11. The difference is 165°.

Challenge Problem

7.NS.1.b
7.NS.1.c

12. The equation $|a - b| = -(a - b)$ is true when $a \le b$.

Here is one possible explanation.
I made a table to try out different values for a and b. I put the values in both sides of the equation, evaluated it, and then looked to see if the equation was true.

For all of the values I tried, I found if a is less than b or if a equals b, then the equation is true. If a is greater than b, the equation is not true.

a	b	$\|a - b\| = -(a - b)$	True?
0	0	$\|0 - 0\| = -(0 - 0)$ $\|0\| = -(0)$ $0 = 0$	Yes (The opposite of zero is zero)
1	1	$\|1 - 1\| = -(1 - 1)$ $\|0\| = -(0)$ $0 = 0$	Yes (The opposite of zero is zero)
1	0	$\|1 - 0\| = -(1 - 0)$ $\|1\| = -(1)$ $1 = -1$	No
0	1	$\|0 - 1\| = -(0 - 1)$ $\|-1\| = -(-1)$ $1 = 1$	Yes
2	1	$\|2 - 1\| = -(2 - 1)$ $\|1\| = -(1)$ $1 = -1$	No
1	2	$\|1 - 2\| = -(1 - 2)$ $\|-1\| = -(-1)$ $1 = 1$	Yes
–1	1	$\|-1 - 1\| = -(-1 - 1)$ $\|-2\| = -(-2)$ $2 = 2$	Yes
1	–1	$\|1 - (-1)\| = -(1 - [-1])$ $\|1 + 1)\| = -(1 + 1)$ $\|2\| = -(2)$ $2 = -2$	No

LESSON 5: ADDING AND SUBTRACTING — ANSWERS

ANSWERS

7.NS.1.b **1.** $3\frac{1}{2}+\left(-3\frac{1}{2}\right)=0$

7.NS.1.b **2.** $-0.64 + 1.7 = 1.06$

7.NS.1.c **3.** $4\frac{2}{3}-7\frac{3}{5}=-2\frac{14}{15}$

7.NS.1.c **4.** $-5.03 - (-2.92) = -2.11$

7.NS.1.b **5.** $\frac{4}{7}+\left(-\frac{3}{4}\right)=-\frac{5}{28}$

7.NS.1.c **6.** $-0.5 - 0.8 = -1.3$

7.NS.1.b **7.**

A $-\frac{35}{24}$

D $-1\frac{11}{24}$

7.NS.1.b
7.NS.1.c **8.**

a. Maya's total debt is represented by this equation.

$-\$26.75 + (-\$5.50) = -\$32.25$

The equation may be written in other ways. Here are two possible ways. If you are unsure of your work, ask a classmate to check your equation.

$-\$26.75 - \$5.50 = -\$32.25$

$-(\$26.75 + \$5.50) = -\$32.25$

b. Maya's new debt is represented by this equation.

$-\$32.25 + \$12 = -\$20.25$

7.NS.1.b **9.**

a. The total length of the path is 18.31 mi.

$7.55 + 10.76 = 18.31$

b. The distance between the aquarium and the theater is 5.1 mi.

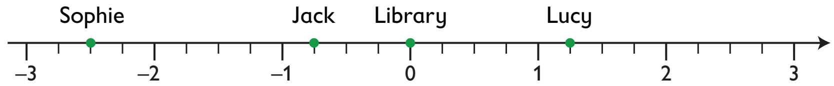
$3.29 + 1.81 = 5.1$

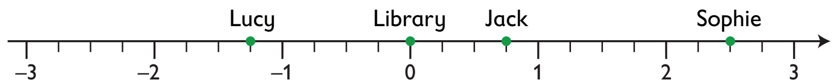
7.NS.1.c **10.** The new altitude is $\frac{81}{8}$ m or the new altitude is $10\frac{1}{8}$ m.

LESSON 5: ADDING AND SUBTRACTING ANSWERS

7.NS.1
7.NS.1.b

11. Either of these two number lines is possible.





7.NS.1.c

12. The difference is 2.8°.

Challenge Problem

7.NS.1.b
7.NS.1.c

13. The value of $b - a$ is 12.

Strategies will vary. Here is one possible method.
I created a table. I entered values for a and b that work in the first equation ($a - b = -12$). Then I entered those same values in the second equation ($b - a = ?$) and evaluated it.

For all of the values, I found that $b - a = 12$.

a	b	$a - b = -12$	$b - a = ?$
0	12	0 – 12 = –12	12 – 0 = 12
1	13	1 – 13 = –12	13 – 1 = 12
2	14	2 – 14 = –12	14 – 2 = 12
10	22	10 – 22 = –12	22 – 10 = 12
–1	11	–1 – 11= –12	11 – (–1) = 12
–13	–1	–13 – (–1) = –12	–1 – (–13) = 12

Here is another possible method.

$a - b = -12$

$a - b + b = -12 + b$

$a + 12 = -12 + 12 + b$

$a - a + 12 = b - a$

$12 = b - a$

LESSON 6: PROPERTIES OF OPERATIONS

ANSWERS

ANSWERS

7.NS.1.d **1.** Ⓐ Additive identity property of 0

7.NS.1.d 7.NS.1.a **2.** $-\frac{7}{9}$

7.NS.1.d 7.NS.1.a **3.** 0.053

7.NS.1.d **4.** Ⓐ $4\frac{5}{8}+\left(3\frac{2}{3}+6\frac{1}{3}\right)$

7.NS.1.d **5.**

$(3.8 - 4.5) - 3.8 = (3.8 + [-4.5]) + (-3.8)$	Subtracting is the same as adding the opposite
$= (-4.5 + 3.8) + (-3.8)$	Commutative Property of Addition
$= -4.5 + (3.8 + [-3.8])$	Associative Property of Addition
$= -4.5 + 0$	Additive Inverses
$= -4.5$	Additive Identity Property of 0

7.NS.1.d **6.**

a. Marcus switched the order of the 4 and –5 in 4 – (–5), and he switched the order of the 4 and 0 in 0 – 4. Switching the order is incorrect because subtraction is not commutative.

b. Here is a correct calculation.

$$\begin{aligned}5 + 4 - (-5) &= 5 + 4 + 5\\ &= 14\end{aligned}$$

7.NS.1.d **7.**

a. Lucy tried to apply the associative property in order to group 12 – 12 together. However, the associative property works only with addition.

b. Here is a correct calculation.

$$\begin{aligned}12 - (12 + 17) &= 12 - 29\\ &= 12 + (-29)\\ &= -17\end{aligned}$$

7.NS.1.d **8.**

a. Jack tried to apply the associative property in order to group 12.5 + 7.5 together. However, the associative property works only with addition.

b. Here is a correct calculation.

$$\begin{aligned}20 - 12.5 + 7.5 &= 20 + (-12.5) + 7.5\\ &= 7.5 + 7.5\\ &= 15\end{aligned}$$

LESSON 6: PROPERTIES OF OPERATIONS

ANSWERS

7.NS.1.d **9.** $\left(3\frac{2}{5}+1\frac{4}{9}\right)+\left(2\frac{3}{5}-\frac{4}{9}\right)=7$

Here is one possible method.

$$\begin{aligned}\left(3\tfrac{2}{5}+1\tfrac{4}{9}\right)+\left(2\tfrac{3}{5}-\tfrac{4}{9}\right)&=\left(3\tfrac{2}{5}+1\tfrac{4}{9}\right)+\left(2\tfrac{3}{5}+\left[-\tfrac{4}{9}\right]\right)\\&=\left(3\tfrac{2}{5}+2\tfrac{3}{5}\right)+\left(1\tfrac{4}{9}+\left[-\tfrac{4}{9}\right]\right)\\&=\left(\left[3+\tfrac{2}{5}\right]+\left[2+\tfrac{3}{5}\right]\right)+\left(\left[1+\tfrac{4}{9}\right]+\left[-\tfrac{4}{9}\right]\right)\\&=(3+2)+\left(\tfrac{2}{5}+\tfrac{3}{5}\right)+1+\left(\tfrac{4}{9}+\left[-\tfrac{4}{9}\right]\right)\\&=5+\tfrac{5}{5}+1+0\\&=5+1+1\\&=7\end{aligned}$$

7.NS.1.d **10.** 11

7.NS.1.d **11.** –0.09

7.NS.1.d **12.** 5 – 12 + 8 – 3

8 – 12 + 5 – 3

Challenge Problem

7.NS.1.d **13.** Here is one possible answer.

$a-b+c-d=a+(-b)+c-d$	Subtracting is the same as adding the opposite.
$=a+c+(-b)-d$	Commutative property of addition
$=a+(c+[-b])-d$	Associative property of addition
$=(c+[-b])+a-d$	Commutative property of addition
$=c-b+a-d$	Adding the opposite is the same as subtracting.

LESSON 7: PUTTING IT TOGETHER 1

ANSWERS

ANSWERS

7.NS.1.a
7.NS.1.b
7.NS.1.c
7.NS.1.d

4. Definitions and examples will vary. Here are some examples.

Word or Phrase	Definition	Examples
integer	A whole number	Can be positive, negative, or zero 1 –5,411 0 256 –8
additive inverse	Opposite is another word for additive inverse. A number plus its additive inverse equals 0.	Number: Additive Inverse: 3 –3 –55 55 $12 + (-12) = 0$ $-5 + 5 = 0$ $a + (-a) = 0$
additive identity property of 0	When you add 0 to a number, the value doesn't change.	$0 + 9 = 9 + 0 = 9$ $0 + a = a + 0 = a$
associative property of addition	In addition, changing how the numbers are grouped doesn't change the value. Does **not** work with subtraction	$(1 + 2) + 3 = 1 + (2 + 3)$ $3 + 3 = 1 + 5$ $6 = 6$ $(a + b) + c = a + (b + c)$ **not** with subtraction: $(1 - 2) - 3 = 1 - (2 - 3)$ $-1 - 3 = 1 - (-1)$ $-4 \neq 2$
commutative property of addition	In addition, changing the order of the numbers added doesn't change the value. Does **not** work with subtraction	$4 + 5 = 5 + 4$ $(-4) + (-5) = (-5) + (-4)$ $a + b = b + a$ **not** with subtraction: $4 - 5 \neq 5 - 4$ $-1 \neq 1$

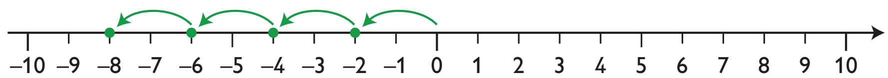
LESSON 11: MULTIPLYING INTEGERS

ANSWERS

ANSWERS

7.NS.2 **1.** Ⓐ –14

7.NS.2 **2.** 4(–2) = –8



7.NS.2 **3.** a.

4 • –9 =	–36
3 • –9 =	–27
2 • –9 =	–18
1 • –9 =	–9
0 • –9 =	0

b. Each time the first factor (the number that –9 is multiplied by) decreases by 1, the product increases by 9.

7.NS.2 **4.**

0 • –9 =	0
–1 • –9 =	9
–2 • –9 =	18
–3 • –9 =	27

7.NS.2 **5.** Here are two possible methods.

Method 1

4(–4) = –16
3(–4) = –12
2(–4) = –8
1(–4) = –4
0(–4) = 0
–1(–4) = 4
–2(–4) = 8
–3(–4) = 12
–4(–4) = 16

Method 2

0 • –4 =	0
–1 • –4 =	4
–2 • –4 =	8
–3 • –4 =	12
–4 • –4 =	16

7.NS.2 **6.** –44

PEARSON

LESSON 11: MULTIPLYING INTEGERS — ANSWERS

7.NS.2 **7.** 72

7.NS.2 **8.** –24

7.NS.2 **9.** 300

7.NS.2 **10.** –8

7.NS.2 **11.** 27

7.NS.2 **12.**
3 • (–3) • 33 • (–3) = ___ Positive product
(–10) • (–26) • 5 • (–6) = Negative product
(–17) • (–42) • (–19) • 38 = ___ Negative product
21 • 7 • 4 • (–600) = ___ Negative product
(–8) • (–1) • (–9) • (–2) = ___ Positive product

7.NS.2 **13.** 7(–2) = –14
The temperature will be –14°F at 7 a.m.

7.NS.2 **14.** B The number of points Lucy loses if she makes 20 mistakes

7.NS.2 **15.**
a. The expression 6(–9) represents the total amount her savings changes in 6 weeks.
b. Representations will vary. Here are two possible representations.

Example 1
The expression represents the total amount she saves by not going to the movies for 2 weeks.

Example 2
The expression represents the amount that Karen keeps in her savings account if her aunt pays for her ticket one week and her friend pays for her ticket one week.

Challenge Problem

7.NS.2 **16.**
a. The expression $a(b + 5)$ will be positive when a is negative and b is less than –5 or when a is positive and b is greater than –5.
b. The expression $a(b + 5)$ will be negative when a is negative and b is greater than –5, or when a is positive and b is less than –5.

LESSON 12: PROVING RULES FOR MULTIPLYING

ANSWERS

ANSWERS

7.NS.2.a 7.NS.2.c **1.** (B) $-\frac{1}{2}$

7.NS.2.a 7.NS.2.c **2.** –4.09

7.NS.2.a 7.NS.2.c **3.**

$-\frac{1}{9} \cdot -3 = \left(-1 \cdot \frac{1}{9}\right) \cdot (-1 \cdot 3)$	Multiplicative identity property of 1
$= -1 \cdot \left(\frac{1}{9} \cdot -1\right) \cdot 3$	Associative property of multiplication
$= -1 \cdot \left(-1 \cdot \frac{1}{9}\right) \cdot 3$	Commutative property of multiplication
$= (-1 \cdot -1) \cdot \left(\frac{1}{9} \cdot 3\right)$	Associative property of multiplication
$= 1 \cdot \left(\frac{1}{9} \cdot 3\right)$	Multiplicative identity property of 1
$= \frac{1}{9} \cdot 3$	Multiplicative identity property of 1

7.NS.2.a **4.** (C) Distributive property

7.NS.2.a **5.** –1.8

7.NS.2.a **6.** $\frac{1}{2}$

7.NS.2.a **7.** –0.108

7.NS.2.a **8.** –321.86

7.NS.2.a **9.** $\frac{1}{120}$

7.NS.2.a **10.** Her elevation is –52 ft.

Challenge Problem

7.NS.2.a **11.** Here is one possible explanation.

The negative number can be written as –1 times a positive number, so the product is the same as the product of –1 and two positive numbers, which is negative.

LESSON 13: DIVIDING

ANSWERS

ANSWERS

7.NS.2.b **1.** –1

7.NS.2.b **2.** 72 ÷ 12.

The division expression 72 ÷ 12 represents 72¢ ÷ 12¢ per day.

7.NS.2.b **3.** –2

7.NS.2.b **4.** 7

7.NS.2.b **5.**

a. $-9 \bullet \left(\frac{1}{18}\right) = ?$

b. $-9 \div 18 = -\frac{1}{2}$ or $-9 \div 18 = -0.5$

7.NS.2b
7.NS.2c **6.** You can write the quotient as a product of the dividend and the reciprocal of the divisor (that is, you can write a ÷ b as $a \bullet \frac{1}{b}$). A reciprocal has the same sign as the original number. So, the sign of the quotient will be the same as the sign of the product.

7.NS.2.b **7.** $-\frac{5}{12} \div \frac{5}{6} = -\frac{1}{2}$ or $-\frac{5}{12} \div \frac{5}{6} = -0.5$

$$\begin{aligned} -\frac{5}{12} \div \frac{5}{6} &= -\frac{5}{12} \bullet \frac{6}{5} \\ &= -\frac{\cancel{5}^{1}}{{}_{2}\cancel{12}} \bullet \frac{\cancel{6}^{1}}{\cancel{5}_{1}} \\ &= -\frac{1}{2} \end{aligned}$$

7.NS.2.b **8.** D 20

7.NS.2.b **9.** –110

7.NS.2.a
7.NS.2.b **10.** No. If two numbers have the same sign, their product and their quotient will both be positive. If the numbers have different signs, their product and their quotient will both be negative.

LESSON 13: DIVIDING

ANSWERS

7.NS.2
7.NS.2.b

11. Her elevation changed at a rate of –4 ft per minute.

Elevation change = –72 ft – (–8 ft) = –64 ft
Change per minute = –64 ft ÷ 16 min = –4 ft per minute

Challenge Problem

7.NS.2

12.
a. Possible answer: $a = 1$ and $b = 2$
b. Possible answer: $a = 1$ and $b = 0.5$
c. Possible answer: $a = -1$ and $b = -2$
d. Possible answer: $a = -1$ and $b = -0.5$
e. Possible answer: $a = -1$ and $b = 0.5$
f. Possible answer: $a = -1$ and $b = 2$

LESSON 14: THE DISTRIBUTIVE PROPERTY

ANSWERS

ANSWERS

7.NS.2.c **1.** (D) 3(5.7 + 4.3)

7.NS.2.c **2.** (D) Distributive property

7.NS.2.c **3.** Jack can think of \$0.88 as \$1 minus \$0.12. So, using the distributive property, the total cost can be represented by this equation:

$$\begin{aligned} 5(\$1-\$0.12) &= 5\cdot\$1-5\cdot\$0.12 \\ &= \$5-\$0.60 \\ &= \$4.40 \end{aligned}$$

The total cost of the frozen fruit bars is \$4.40.

7.NS.2.c **4.**

$$\begin{aligned} 11(\$7.95) &= 11(\$8-\$0.05) \\ &= \$88-\$0.55 \\ &= \$87.45 \end{aligned}$$

7.NS.2.c **5.**

$$\begin{aligned} 4\left(5\tfrac{2}{9}\right) &= 4\left(5+\frac{2}{9}\right) \\ &= 20+\frac{8}{9} \\ &= 20\tfrac{8}{9} \end{aligned}$$

7.NS.2.c **6.**

$$\begin{aligned} 3.09\cdot 12 &= 12(3+0.09) \\ &= 36+1.08 \\ &= 37.08 \end{aligned}$$

7.NS.2.c **7.**

$$\begin{aligned} \frac{3}{4}\cdot\frac{1}{9}\cdot 4+\left(5\cdot -\frac{1}{12}\cdot\frac{4}{5}\right) &= \frac{3}{4}\cdot 4\cdot\frac{1}{9}+\left(5\cdot\frac{4}{5}\cdot -\frac{1}{12}\right) \\ &= 3\cdot\frac{1}{9}+\left(4\cdot -\frac{1}{12}\right) \\ &= \frac{1}{3}+\left(-\frac{1}{3}\right) \\ &= 0 \end{aligned}$$

7.NS.2.c **8.** (A) –48 + 12

LESSON 14: THE DISTRIBUTIVE PROPERTY

ANSWERS

7.NS.2.c **9.**

$$(5.4 - 6.3) \div 9 = (5.4 - 6.3) \bullet \frac{1}{9}$$
$$= \frac{5.4}{9} - \frac{6.3}{9}$$
$$= 0.6 - 0.7$$
$$= -0.1$$

7.NS.2.c **10.**

$$-0.007 \bullet 0.4 \bullet -0.02 \bullet 10 \bullet 1{,}000 \bullet 100 = (-0.007 \bullet 1{,}000) \bullet (0.4 \bullet 10) \bullet (-0.02 \bullet 100)$$
$$= -7 \bullet 4 \bullet (-2)$$
$$= 56$$

7.NS.2.c **11.** B $12 - 6 + 9$

Challenge Problem

7.NS.2.c **12.** Equivalent Expressions

Group one
a. $a(b - c)$
d. $(ab) - (ac)$
f. $ab - ac$
g. $(b - c)a$

Group two
b. $(ab) - c$
c. $ab - c$

Group three
h. $b - (ca)$
i. $b - ca$

LESSON 15: RATIONAL NUMBERS

ANSWERS

ANSWERS

7.NS.2.d **1.** $\frac{2}{1}$

7.NS.2.d **2.** C $\frac{3}{100}$

7.NS.2.d **3.** $-\frac{9}{1}$

7.NS.2.d **4.** $\frac{28}{100}$ or $\frac{7}{25}$

7.NS.2.d **5.** $\frac{47}{10}$

7.NS.2.d **6.** $\frac{4,444}{10,000}$, or $\frac{1,111}{2,500}$

7.NS.2.d **7.** $\frac{1}{3}$

7.NS.2.d **8.** –0.875

7.NS.2.d **9.** $0.\overline{2}$

7.NS.2.d **10.** 1.15

7.NS.2.d **11.** $0.41\overline{6}$

7.NS.2.d **12.**

a. $0.\overline{1}$

$0.\overline{01}$

$0.\overline{001}$

$0.\overline{0001}$

b. Each decimal form is a repeating decimal. The repeating part is a number of zeros followed by 1. The number of zeros is one less than the number of 9s in the denominator.

c. $0.\overline{00001}$

LESSON 15: RATIONAL NUMBERS ANSWERS

Challenge Problem

7.NS.2.d **13.** a. $\frac{1}{2} = 0.5$

$\frac{1}{3} = 0.\overline{3}$

$\frac{1}{4} = 0.25$

$\frac{1}{5} = 0.2$

$\frac{1}{6} = 0.1\overline{6}$

$\frac{1}{7} = 0.\overline{142857}$

$\frac{1}{8} = 0.125$

$\frac{1}{9} = 0.\overline{1}$

$\frac{1}{10} = 0.1$

$\frac{1}{11} = 0.\overline{09}$

$\frac{1}{12} = 0.08\overline{3}$

b. Unit fractions that have denominators of 2 and/or 5 as the only prime factors have decimal forms that terminate. All other unit fractions have decimal forms that repeat.

LESSON 16: PUTTING IT TOGETHER 2

ANSWERS

ANSWERS

7.NS.2.a
7.NS.2.b
7.NS.2.c
7.NS.2.d

3. Definitions and examples will vary. Here are some examples.

Word or Phrase	Definition	Examples
associative property of multiplication	In multiplication, changing how the numbers are grouped Doesn't change the value. Does **not** work with division	$(2 \cdot 3) \cdot 4 = 2 \cdot (3 \cdot 4)$ $6 \cdot 4 = 2 \cdot 12$ $24 = 24$ $(a \cdot b) \cdot c = a \cdot (b \cdot c)$ **not** with division: $(12 \div 6) \div 3 = 12 \div (6 \div 3)$ $2 \div 3 = 12 \div 2$ $\frac{2}{3} \neq 6$
commutative property of multiplication	In multiplication, changing the order of the numbers multiplied doesn't change the value. Does **not** work with division	$3 \cdot 4 = 4 \cdot 3$ $12 = 12$ $a \cdot b = b \cdot a$ **not** with division: $12 \div 6 = 6 \div 12$ $2 \neq 0.5$
distributive property	Multiplying a number by the sum of two numbers surrounded by parentheses is equal to the sum of the number times the first and the number times the second. Does **not** work with division	$2 \cdot (3 + 4) = (2 \cdot 3) + (2 \cdot 4)$ $2 \cdot (7) = (6) + (8)$ $14 = 14$ $a \cdot (b + c) = (a \cdot b) + (a \cdot c)$ **not** with division: $12 \div (6 + 2) = (12 \div 6) + (12 \div 2)$ $12 \div 8 = 2 + 6$ $1.5 \neq 8$

(continues)

LESSON 16: PUTTING IT TOGETHER 2

ANSWERS

7.NS.2.a
7.NS.2.b
7.NS.2.c
7.NS.2.d

3. *(continued)*

Word or Phrase	Definition	Examples
multiplicative identity property of 1	1 times any number equals the number; any number times 1 equals the number. –1 times any number equals the opposite of the number; any number times –1 equals the opposite of the number. Does **not** work with division	$1 \cdot (-5) = (-5) \cdot 1 = (-5)$ $-1 \cdot (-5) = (-5) \cdot (-1) = 5$ $1 \cdot a = a \cdot 1 = a$ $-1 \cdot a = a \cdot -1 = -a$ **not** with division: $1 \div 2 = (12 \div 6) + (12 \div 2)$ $12 \div 8 = 2 + 6$ $1.5 \neq 8$
multiplicative inverses	Any number times its multiplicative inverse is 1. Any number divided by itself is 1.	$2 \cdot \frac{1}{2} = 1$ $2 \div 2 = 1$ $a \cdot \frac{1}{a} = 1$ $a \div a = 1$
multiplicative property of zero	In multiplication, 0 times any number equals 0.	$0 \cdot 9 = 9 \cdot 0 = 0$ $0 \cdot a = a \cdot 0 = 0$

(continues)

LESSON 16: PUTTING IT TOGETHER 2

ANSWERS

7.NS.2.a
7.NS.2.b
7.NS.2.c
7.NS.2.d

3. *(continued)*

Word or Phrase	Definition	Examples
rational number	a number that can be written as a fraction where both the numerator and denominator are whole numbers	$-2 = -\frac{2}{1}$ $0.125 = \frac{1}{8}$ $-0.3\overline{3} = -\frac{1}{3}$