Study Guide Review

MODULE 1 Adding and Subtracting Integers

ESSENTIAL QUESTION

How can you use addition and subtraction of integers to solve real-world problems?

EXAMPLE 1

Add.

A. $-8 + (-7)$ The signs of both integers are the same.

$8 + 7 = 15$ Find the sum of the absolute values.

$-8 + (-7) = -15$ Use the sign of integers to write the sum.

B. $-5 + 11$ The signs of the integers are different.

$|11| - |-5| = 6$ Greater absolute value – lesser absolute value.

$-5 + 11 = 6$ 11 has the greater absolute value, so the sum is positive.

EXAMPLE 2

The temperature Tuesday afternoon was 3 °C. Tuesday night, the temperature was −6 °C. Find the change in temperature.

Find the difference $-6 - 3$.

Rewrite as $-6 + (-3)$.   −3 is the opposite of 3.

$-6 + (-3) = -9$

The temperature decreased 9 °C.

EXERCISES

Add. (Lessons 1.1, 1.2)

1. $-10 + (-5)$ _____

2. $9 + (-20)$ _____

3. $-13 + 32$ _____

Subtract. (Lesson 1.3)

4. $-12 - 5$ _____

5. $25 - (-4)$ _____

6. $-3 - (-40)$ _____

7. Antoine has $13 in his checking account. He buys some school supplies and ends up with $5 in his account. What was the overall change in Antoine's account? (Lesson 1.4)

_____

Multiplying and Dividing Integers

ESSENTIAL QUESTION

How can you use multiplication and division of integers to solve real-world problems?

EXAMPLE 1

Multiply.

A. (13)(−3)

Find the sign of the product. The numbers have different signs, so the product will be negative. Multiply the absolute values. Assign the correct sign to the product.

$$13(−3) = −39$$

B. (−5)(−8)

Find the sign of the product. The numbers have the same sign, so the product will be positive. Multiply the absolute values. Assign the correct sign to the product.

$$(−5)(−8) = 40$$

EXAMPLE 2

Christine received −25 points on her exam for 5 wrong answers. How many points did Christine receive for each wrong answer?

Divide −25 by 5.

$$−25 ÷ 5 = −5$$

The signs are different. The quotient is negative.

Christine received −5 points for each wrong answer.

EXAMPLE 3

Simplify: 15 + (−3) × 8

$$15 + (−24)$$ Multiply first.

$$−9$$ Add.

EXERCISES

Multiply or divide. (Lessons 2.1, 2.2)

1. −9 × (−5) _____

2. 0 × (−10) _____

3. 12 × (−4) _____

4. −32 ÷ 8 _____

5. −9 ÷ (−1) _____

6. −56 ÷ 8 _____

Simplify. (Lesson 2.3)

7. −14 ÷ 2 − 3 _____

8. 8 + (−20) × 3 _____

9. 36 ÷ (−6) × − 15 _____

10. Tony bought 3 packs of pencils for $4 each and a pencil box for $7. Mario bought 4 binders for $6 each and used a coupon for $6 off. Write and evaluate expressions to find who spent more money. (Lesson 2.3)

_____

MODULE 3 Rational Numbers

Key Vocabulary
rational number *(número racional)*
repeating decimal *(decimal periódico)*
terminating decimal *(decimal finito)*

ESSENTIAL QUESTION
How can you use rational numbers to solve real-world problems?

EXAMPLE 1
Eddie walked $1\frac{2}{3}$ miles on a hiking trail. Write $1\frac{2}{3}$ as a decimal. Use the decimal to classify $1\frac{2}{3}$ according to the number group(s) to which it belongs.

$1\frac{2}{3} = \frac{5}{3}$ Write $1\frac{2}{3}$ as an improper fraction.

$$
\begin{array}{r}
1.66 \\
3\overline{)5.00} \\
\underline{-3} \\
2\,0 \\
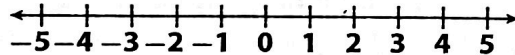\underline{-1\,8} \\
20 \\
\underline{-18} \\
2
\end{array}
$$

Divide the numerator by the denominator.

The decimal equivalent of $1\frac{2}{3}$ is 1.66..., or $1.\overline{6}$. It is a repeating decimal, and therefore can be classified as a rational number.
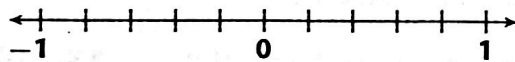
EXAMPLE 2
Find each sum or difference.

A. $-2 + 4.5$

Start at -2 and move 4.5 units to the right: $-2 + 4.5 = 2.5$.

B. $-\frac{2}{5} - \left(-\frac{4}{5}\right)$

Start at $-\frac{2}{5}$. Move $\left|-\frac{4}{5}\right| = \frac{4}{5}$ unit to the right because you are subtracting a negative number: $-\frac{2}{5} - \left(-\frac{4}{5}\right) = \frac{2}{5}$.

EXAMPLE 3
Find the product: $3\left(-\frac{1}{6}\right)\left(-\frac{2}{5}\right)$.

$3\left(-\frac{1}{6}\right) = -\frac{1}{2}$ Find the product of the first two factors. One is positive and one is negative, so the product is negative.

$-\frac{1}{2}\left(-\frac{2}{5}\right) = \frac{1}{5}$ Multiply the result by the third factor. Both are negative, so the product is positive.

$3\left(-\frac{1}{6}\right)\left(-\frac{2}{5}\right) = \frac{1}{5}$

EXAMPLE 4

Find the quotient: $\frac{15.2}{-2}$.

$\frac{15.2}{-2} = -7.6$ The quotient is negative because the signs are different.

EXAMPLE 5

A lake's level dropped an average of $3\frac{4}{5}$ inches per day for 21 days. A heavy rain then raised the level 8.25 feet, after which it dropped $9\frac{1}{2}$ inches per day for 4 days. Jayden says that overall, the lake level changed about $-1\frac{1}{2}$ feet. Is this answer reasonable?

Yes; the lake drops about 4 inches, or $\frac{1}{3}$ foot, per day for 21 days, rises about 8 feet, then falls about $\frac{3}{4}$ foot for 4 days:
$-\frac{1}{3}(21) + 8 - \frac{3}{4}(4) = -7 + 8 - 3 = -2$ feet.

EXERCISES

Write each mixed number as a whole number or decimal. Classify each number according to the group(s) to which it belongs: rational numbers, integers, or whole numbers. (Lesson 3.1)

1. $\frac{3}{4}$ _____

2. $\frac{8}{2}$ _____

3. $\frac{11}{3}$ _____

4. $\frac{5}{2}$ _____

Find each sum or difference. (Lessons 3.2, 3.3)

5. $-5 + 9.5$ _____

6. $\frac{1}{6} + \left(-\frac{5}{6}\right)$ _____

7. $-0.5 + (-8.5)$ _____

8. $-3 - (-8)$ _____

9. $5.6 - (-3.1)$ _____

10. $3\frac{1}{2} - 2\frac{1}{4}$ _____

Find each product or quotient. (Lessons 3.4, 3.5)

11. $-9 \times (-5)$ _____

12. $0 \times (-7)$ _____

13. -8×8 _____

14. $\frac{-56}{8}$ _____

15. $\frac{-130}{-5}$ _____

16. $\frac{34.5}{1.5}$ _____

17. $-\frac{2}{5}\left(-\frac{1}{2}\right)\left(-\frac{5}{6}\right)$ _____

18. $\left(\frac{1}{5}\right)\left(-\frac{5}{7}\right)\left(\frac{3}{4}\right)$ _____

19. Lei withdrew $50 from her bank account every day for a week. What was the change in her account in that week?

_____

20. Dan is cutting 4.75 foot lengths of twine from a 240 foot spool of twine. He needs to cut 42 lengths, and says that 40.5 feet of twine will remain. Show that this is reasonable.

_____

MODULE 6 Expressions and Equations

ESSENTIAL QUESTION
How can you use equations to solve real-world problems?

EXAMPLE 1

Huang and Belita both repair computers. Huang makes $50 a day plus $25 per repair. Belita makes $20 a day plus $35 per repair. Write an expression for Huang and Belita's total daily earnings if they make the same number of repairs r.

Huang: $50 + $25r

Belita: $20 + $35r

Together: $(50 + 25r) + (20 + 35r) = 50 + 20 + 25r + 35r$

$$= 70 + 60r$$

Huang and Belita earn $70 + $60r together.

EXAMPLE 2

A skydiver's parachute opens at a height of 2,790 feet. He then falls at a rate of $-15\frac{1}{2}$ feet per second. How long will it take the skydiver to reach the ground?

Let x represent the number of seconds it takes to reach the ground.

$$-15\frac{1}{2}x = -2,790$$

$$-\frac{31}{2}x = -2,790 \qquad \text{Write as a fraction.}$$

$$\left(-\frac{2}{31}\right)\left(-\frac{31}{2}x\right) = \left(-\frac{2}{31}\right)(-2,790) \qquad \text{Multiply both sides by the reciprocal.}$$

$$x = 180$$

It takes 180 seconds for the skydiver to reach the ground.

EXAMPLE 3

A clothing store sells clothing for 2 times the wholesale cost plus $10. The store sells a pair of pants for $48. How much did the store pay for the pants? Represent the solution on a number line.

Let w represent the wholesale cost of the pants, or the price paid by the store.

$2w + 10 = 48$

10 11 12 13 14 15 16 17 18 19 20

$\quad 2w = 38 \quad$ Subtract 10 from both sides.

$\quad w = 19 \quad$ Divide both sides by 2.
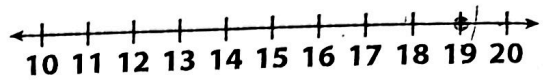
The store paid $19 for the pants.

EXERCISES

Simplify each expression. (Lesson 6.1)

1. $(2x + 3\frac{2}{5}) + (5x - \frac{4}{5})$ _____

2. $(-0.5x - 4) - (1.5x + 2.3)$ _____

3. $9(3t + 4b)$ _____

4. $0.7(5a - 13p)$ _____

Factor each expression. (Lesson 6.1)

5. $8x + 56$ _____

6. $3x + 57$ _____

**Use inverse operations to solve each equation.** (Lesson 6.2)

**7.** $1.6 + y = -7.3$ _____

8. $-\frac{2}{3}n = 12$ _____

9. The cost of a ticket to an amusement park is $42 per person. For groups of up to 8 people, the cost per ticket decreases by $3 for each person in the group. Marcos's ticket cost $30. Write and solve an equation to find the number of people in Marcos's group. (Lesson 6.3, 6.4)

_____

Solve each equation. Graph the solution on a number line. (Lesson 6.4)

10. $8x - 28 = 44$

−12   −8   −4   0   4   8   12

_____

11. $-5z + 4 = 34$

−12   −8   −4   0   4   8   12

_____
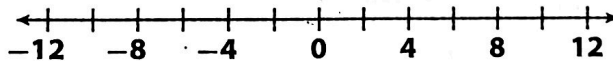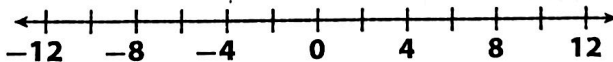
ESSENTIAL QUESTION

How can you use inequalities to solve real-world problems?

EXAMPLE 1

Amy is having her birthday party at a roller skating rink. The rink charges a fee of $50 plus $8 per person. If Amy wants to spend at most $170 for the party at the rink, how many people can she invite to her party?

Let p represent the number of people skating at the party.

$50 + 8p \leq 170$

$8p \leq 120$ Subtract 50 from both sides.

$\dfrac{8p}{8} \leq \dfrac{120}{8}$ Divide both sides by 8.

$p \leq 15$

Up to 15 people can skate, so Amy can invite up to 14 people to her party.

EXAMPLE 2

Determine which, if any, of these values makes the inequality $-7x + 42 \leq 28$ true: $x = -1, x = 2, x = 5$.

Substitute each value for x in the inequality and evaluate the expression to see if a true inequality results.

$-7(-1) + 42 \leq 28$ $-7(2) + 42 \leq 28$ $-7(5) + 42 \leq 28$

$x = 2$ and $x = 5$

EXERCISES

1. Prudie needs $90 or more to be able to take her family out to dinner. She has already saved $30 and wants to take her family out to eat in 4 days. (Lesson 7.2)
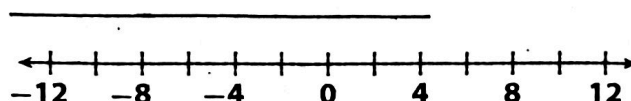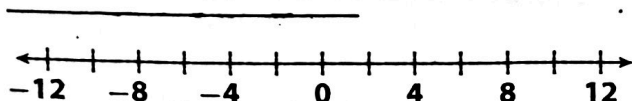
   a. Suppose that Prudie earns the same each day. Write an inequality to find how much she needs to earn each day.

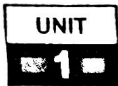   _____

   b. Suppose that Prudie earns $18 each day. Will she have enough money to take her family to dinner in 4 days? Explain.

   _____

Solve each inequality. Graph and check the solution. (Lesson 7.3)

2. $11 + 5y < -19$

3. $7x - 2 \leq 61$

UNIT 1

The Number System
Unit Test: A

1. The temperature at noon was –3°C. By 10 P.M. on the same day the temperature decreased by 5.4°. What was the temperature at 10 P.M.?

    A –8.4°C   C –2.4°C

    B –5.4°C   D 1.6°C

2. Derek spends $3 on breakfast and $5.50 on lunch every school day. How much does he spend on breakfast and lunch in a school week?

    A $38.50   C $49.90

    B $42.50   D $59.50

3. What is the value of (–4.5)(–8.25)?

    A –37.125   C 3.75

    B –12.75   D 37.125

4. An artist is cutting pieces of ribbon to use in a project. Each piece he cuts measures $\frac{7}{8}$ inch. The artist cuts off 5 pieces. How many total inches of ribbon has he cut off?

    A $4\frac{1}{8}$ C $5\frac{5}{7}$

    B $4\frac{3}{8}$ D $5\frac{7}{8}$

5. An airplane took off and reached an altitude of 10,000 feet in 25 minutes. How many feet per minute, on average, did the airplane climb?

    A 400

    B 500

    C 600

    D 2,500

6. The number of students enrolled at Hill School decreased by 120 students over an 8-year period. What was the average decrease in student enrollment per year?

    A 8   C 15

    B 12   D 20

7. Alexis sold boxes of homemade granola bars for $8.50 each. It costs her $2.25 to bake and package each box of granola bars. What was her profit from selling each box of granola bars?

    A –$6.25

    B $5.38

    C $6.25

    D $10.75

8. Alexandra's backpack weighs $7\frac{5}{8}$ pounds. What is the weight of her backpack expressed as a decimal?

    A 7.13   C 7.625

    B 7.58   D 7.85

9. A sandwich costs $4.25 and a fruit drink costs $1.85. How much change will you get from a $10 bill?

    A $2.90   C $3.90

    B $3.70   D $6.10

10. Which of the following fractions is equivalent to a repeating decimal?

    A $\frac{1}{5}$ C $\frac{2}{3}$

    B $\frac{5}{8}$ D $\frac{3}{4}$

UNIT 1 — The Number System

11. The elevation of New Orleans, Louisiana is on average 8 feet below sea level. The elevation of El Centro, California is 39 feet below sea level. What is the difference in elevation between the two cities?

_____

12. Jalil mixed $\frac{3}{8}$ cup of sugar with $1\frac{5}{6}$ cups of water. How many more cups of water than sugar did he use in his mixture?

_____

13. What is the product of –3.4 and 2.5?

_____

14. Fatima wants to purchase a scarf for $45.00 and a sweater for $77.50. If she currently has $100, how much more money does she need to purchase the two items?

_____

15. Arnaud paid $350 for a rug. The price of the rug that Bill purchased was $\frac{2}{5}$ the price that Arnaud paid. How much did Bill pay for his rug?

_____

16. The Martin family spent $518 on groceries in one week. What is the average amount the family spent on groceries per day?

_____

17. What is the average of –2.5, 5.2, 1.7, and –0.8?

_____

18. What is the quotient of –5.2 ÷ 3.9?

_____

19. Gail read $\frac{2}{15}$ of a book on Monday and $\frac{3}{5}$ of the book on Tuesday. What fraction of the book did she read on Monday and Tuesday?

_____

20. At Benito's school, $\frac{5}{8}$ of the students like math class. If there are 208 students, how many of them like math?

_____

21. Kevin is $5\frac{1}{2}$ feet tall. Jane is $5\frac{3}{8}$ feet tall. Who is taller? Justify your answer.

_____

22. Beatrice built about $\frac{1}{3}$ of a sandcastle. Linda built $\frac{4}{7}$ of the same castle. What fraction of the sandcastle did they build together?

_____

23. In Priya's math class there are 10 boys and 15 girls. What is the ratio of boys to girls in Priya's math class? Express your answer as a decimal.

_____

UNIT
3

Expressions, Equations, and Inequalities
Unit Test: A

1. Which equation below matches the relationship shown in the table?

x	0	1	2
y	0.5	3.5	6.5

  A $y = 2x + 0.5$ C $y = 3x$

  B $y = 2x + 2$ D $y = 3x + 0.5$

2. Which value of x satisfies the equation below?

$$4x - 7 = 25$$

  A $x = -8$ C $x = 8$

  B $x = 4.5$ D $x = 32$

3. The equation $y = 15x + 500$ represents the amount y that Lin earns by working for x hours, plus a performance bonus. What is Lin's hourly rate?

  A $10   C $50

  B $15   D $500

4. What is the solution to the inequality below?

$$2x + 10 \le 40$$

  A $x \le 10$ C $x \ge 10$

  B $x \le 15$ D $x \ge 15$

5. What is the solution to the equation below?

$$\frac{x}{-3} = 4$$

  A $x = -7$ C $x = -1$

  B $x = -12$ D $x = -\frac{4}{3}$

6. Which table represents the same linear relationship as $y = 2x - 5$?
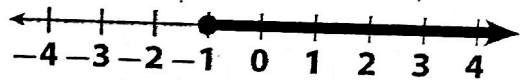
A
x	0	2	4
y	-5	-1	3

B
x	0	2	4
y	-5	1	3

C
x	0	2	4
y	2	-1	3

D
x	0	2	4
y	2	2	3

7. Which of the following inequalities has the graphed solution below?

  A $x + 1 \ge 0$ C $x + 1 \le 0$

  B $x - 1 \ge 0$ D $x - 1 \le 0$

8. Which equation has $x = -2$ as the solution?

  A $2x + 10 = 14$ C $3x + 10 = 1$

  B $2x + 8 = 4$ D $3x - 8 = 7$

9. Boris currently has $1,200 in his savings account. He saves $25 per month. He saves the same amount each month and does not take any money out of the account. In how many months will Boris have $1,450?

  A 10   C 15

  B 12   D 25

10. Kayla tutors a student for $18.50 per hour. She spends $50 on transportation. How much does she earn if she tutors for x hours?

  A $18.50x - 50$ C $50x - 18.50$

  B $18.50x + 50$ D $50x + 18.50$

Expressions, Equations, and Inequalities

11. A technician charges an initial fee of $300 plus an hourly fee of $60. Mr. Jenks paid the technician $480. How many hours did the technician work?

_____

12. What value of x satisfies $3x + 2 = 14$?

_____

13. Draw a number line to represent the inequality $x \leq -4$.

_____

14. Complete the inequality to represent the situation on the number line.

-10 -5   0   5   10

$$\frac{x}{-4} \geq \underline{\hspace{3cm}}$$
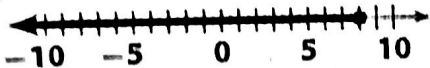
15. Jana paid a $75 initial fee to join a sports club and a monthly fee of $15 per month. Write an expression that shows how much Jana spends after x months of membership at the sports club.

_____

Use the table for 16–18.

Cost of Purchasing Calculators

Number of Calculators	1	2	3	4
Price ($)	20	25	30	35

An electronics store charges a shipping fee plus a price per calculator. The cost of purchasing calculators is shown in the table.

16. What is the price per calculator?

_____

17. What is the shipping cost on each order?

_____

18. Write a linear relationship that shows the relationship between the cost and the number of calculators purchased.

_____

19. Jasmine paid $25 for two binders and one pack of pens. The pack of pens costs $5. What is an equation you can use to find the price of each binder?

_____

20. Kenny wrote the equation for a linear relationship shown below.

$$y = -3x + 4$$

If x equals 7, what is the value of y?

_____

21. Joey earns $16 per hour as a telemarketer. He also earns a monthly bonus of $400. Joey earned $2,000 last month. How many hours did he work?

_____