AchieveMath

Student Book

Volume 1

Name:

Catapult Learning™

Unit 1:

Addition and Subtraction with Integers

Catapult Learning™

Catapult Learning™

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Hometown Helpers

Model the addends with **counters**. Then add and answer the questions.

Shane and Eliana have also signed on to be Hometown Helpers. Shane offers lawn services, and Eliana offers pet care.

1. This week Shane earned $20 raking a neighbor's leaves. Unfortunately, he broke his rake and had to buy a new one. Shane spent $15 on his new rake. What is Shane's overall profit?

a. Has Shane made money or lost money overall? How do you know?

_____

_____

b. What addition equation models the problem?_____

2. Eliana starts her week by spending $12 on two new leashes. On Tuesday, she spends $7 on dog treats. What is Eliana's overall profit?

a. Has Eliana made money or lost money overall? How do you know?

_____

_____

b. What addition equation models the problem?_____

3. The following week, Eliana spends $5 on cat toys. Then, she earns $19 for pet-sitting a neighbor's cat. What is Eliana's overall profit that week?

a. Has Eliana made money or lost money overall? How do you know?

_____

_____

b. What addition equation models the problem?_____

Deep Freeze

Part 1: Use **counters** to model each problem. Then write an addition equation to solve.

To reward themselves for all the hard work they've been doing on the Hometown Helpers app, Shane and Eliana are going to reward themselves by going to a football game! But Shane doesn't want to go if it's too cold, so Eliana is keeping track of the temperature.

1. On Thursday it is 0 degrees at dawn. Throughout the day the temperature rises 8 degrees. Overnight the temperature drops 3 degrees. What is the temperature Friday morning?

Equation: _____

The temperature is _____ degrees Friday morning.

2. Saturday it is 0 degrees at dawn. Throughout the day the temperature rises 2 degrees. Overnight the temperature drops 8 degrees. What is the temperature Sunday morning?

Equation: _____

The temperature is _____ degrees Sunday morning.

3. Monday it is 0 degrees at dawn. Throughout the day the temperature drops 4 degrees. Overnight the temperature rises 3 degrees. What is the temperature Tuesday morning?

Equation: _____

The temperature is _____ degrees on Sunday morning.

Part 2: Use **counters** to find each sum.

4. $-7 + 15 =$ _____

5. $3 + (-8) =$ _____

6. $10 + (-4) =$ _____

7. $-13 + 4 =$ _____

8. $-11 + 20 =$ _____

9. $8 + (-16) =$ _____

10. $-10 + (-15) =$ _____

11. $-5 + (-16) =$ _____

12. $-1 + 20 =$ _____

13. $-3 + (-14) =$ _____

14. $8 + (-9) =$ _____

15. $-2 + 3 =$ _____

Lesson 1 Exit Ticket

Part 1: Model the addends with **counters**. Then add and answer the questions.

1. Shane earns $15 for trimming a neighbor's bushes. Then, he spends $9 on flyers for his business. What is Shane's overall profit?

a. Has Shane made money or lost money overall? How do you know?

_____

_____

b. What addition equation models the problem? _____

2. Eliana spends $4 on a bottle of fish food. Later in the week, she earns $11 for feeding a neighbor's fish for a few days. What is Eliana's overall profit?

a. Has Eliana made money or lost money overall? How do you know?

_____

_____

b. What addition equation models the problem? _____

Part 2: Use **counters** to model each problem. Then write an addition equation to solve.

3. The temperature in the morning is 0 degrees. By noon, the temperature warms up 13 degrees. By midnight, the temperature drops 15 degrees. What is the temperature at midnight?

Equation: _____

The temperature is _____ at midnight.

4. The next day, the temperature in the morning is 0 degrees. By noon, the temperature drops 6 degrees. By midnight, the temperature warms up 12 degrees. What is the temperature at midnight?

Equation: _____

The temperature is _____ at midnight.

Extra Practice: Fore!

The table shows the scores of each golfer on two holes of golf. Use **counters** to model each player's score after Hole 2. Then write an equation to show the addition.

Golf Scores			
Player	**Hole 1**	**Hole 2**	**Equation**
Binh	2 under par	3 under par	
Jill	1 over par	2 over par	
Antonio	3 over par	3 under par	
Alex	par	2 under par	
Sam	1 under par	2 over par	
Christopher	2 under par	2 under par	
Jennifer	1 over par	3 over par	
Amy	3 under par	1 over par	
Jeff	3 under par	1 under par	
Claire	2 over par	par	

River Records

As a river researcher, Bram needs to keep track of the water level over the course of the summer season. The table shows the water level for the rivers in May and how the water level has changed by September.

River	Water Level in May Relative to Normal (feet)	Water Level Drop by September
Shady Oak	–7	2 feet
Big Lizard	–5	–5 feet
Blue	4	8 feet
Lazy S	–6	7 feet
Rio Verde	10	–3 feet

Write the subtraction and addition expressions to model each river's water level change. Then, use **counters** to model the integers and find the water level in September.

Team Member	Subtraction Expression	Addition Expression	Water Level in September Relative to Normal (feet)
Shady Oak			
Big Lizard			
Blue			
Lazy S			
Rio Verde			

How can you use addition to find the difference between two integers? Give an example.

Research Funds

Model the problems with **counters**. Then answer the questions.

Bram is sometimes gone for days doing his research, so he has to shop for food and other materials. He must keep close track of the money he spends and receives because his research is funded by a university.

1. For one trip the university grants him a $10 budget for food. Bram ends up spending $16 on food.

a. What subtraction expression models the problem? _____

b. Rewrite the subtraction expression as an addition expression. _____

c. What integer represents Bram's money after buying food for the trip? _____

d. How much money does Bram have, compared to 0? _____

2. After another trip, Bram goes over budget and must put $12 on a credit card. After looking at his receipts, the university agrees to take away $8 of the debt.

a. What subtraction expression models the problem? _____

b. Rewrite the subtraction expression as an addition expression. _____

c. What integer represents Bram's money after the university takes away some of his debt? _____

d. How much money does Bram have, compared to 0? _____

3. Before his last trip of the year, Bram is $4 in debt. During the trip, he spends another $10.

a. What subtraction expression models the problem? _____

b. Rewrite the subtraction expression as an addition expression. _____

c. What integer represents how much money Bram has after the trip? _____

d. How much money does Bram have, compared to 0? _____

Lesson 2 Exit Ticket

Part 1: Bram and the members of his research team need to buy equipment to test the quality of the water they research. The table shows how much money each team member had to start with and how much money they spent on equipment.

Team Member	Available Money (dollars)	Money Spent (dollars)
Bram	3	7
Leah	–9	–2
Alan	4	10

1. Write the subtraction and addition expressions to model each person's change in available money. Then, use **counters** to model the integers and find the amount of money after buying equipment.

Team Member	Subtraction Expression	Addition Expression	Available Money after Buying Equipment (dollars)
Bram			
Leah			
Alan			

Part 2: Model the problem with **counters**. Then answer the questions.

2. A new river, the Silver Snake, has been added to Bram's list, and he needs to calculate its water level. In May the water level was 3 feet below normal, and in September, the water level had dropped an additional 6 feet.

a. What subtraction expression models the problem? _____

b. Rewrite the subtraction expression as an addition expression. _____

c. What integer represents the river's water level in September relative to the normal level?

_____

d. What is the river's water level in September, compared to its usual water level?

_____

Extra Practice: Basket Battle

Part 1: Carly and Jayden play a game shooting baskets. Every time a player makes a basket, they earn 5 points. Every time a player misses a basket, they lose 3 points. The tables show each player's score at the beginning of a round, and how many points they lose in the round. Model the problem with **counters** and complete the tables to show each player's score at the end of the round.

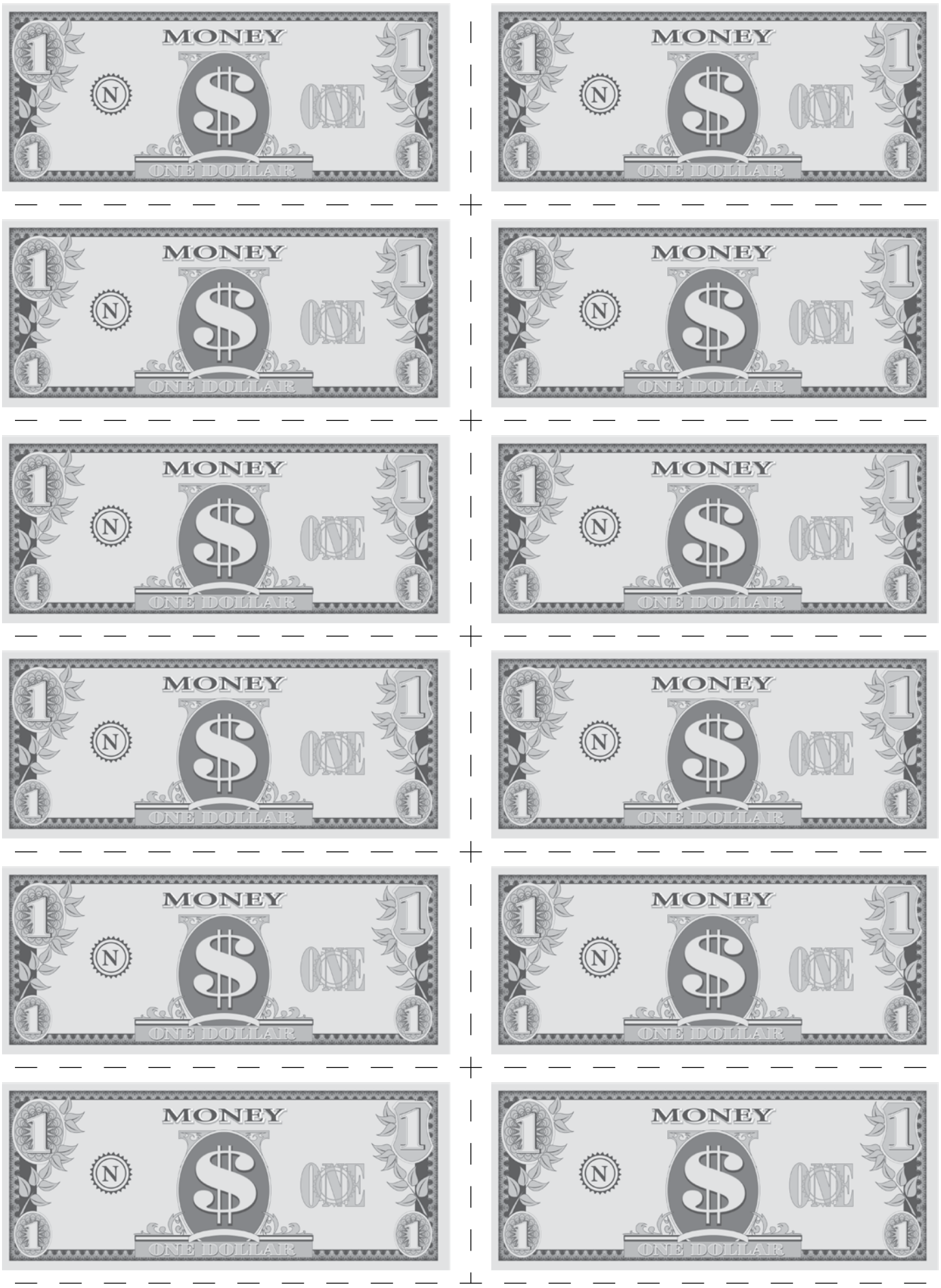
	Beginning of Round 2	Points Lost in Round 2	Score at the End of Round 2
Carly	–10	1	
Jayden	7	10	

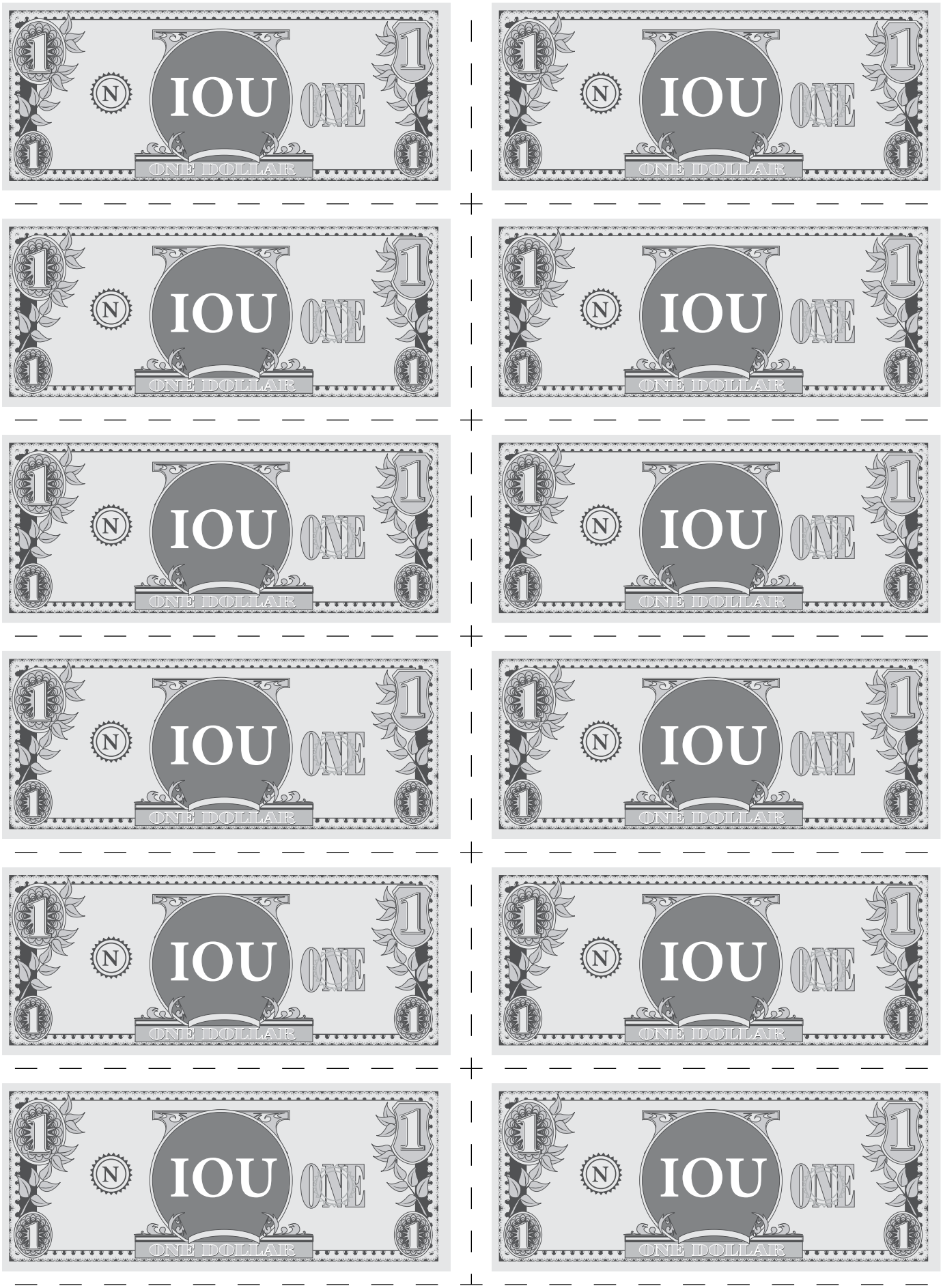
	Beginning of Round 4	Points Lost in Round 4	Score at the End of Round 4
Carly	–3	–9	
Jayden	–10	–4	

	Beginning of Round 6	Points Lost in Round 6	Score at the End of Round 6
Carly	–2	3	
Jayden	4	7	

Part 2: Jaxon and Isla are playing the same game. Isla writes subtraction expressions to keep track of her score. Turn each subtraction expression into an addition equation and use **counters** to find the sum.

Round	Subtraction Expression	Addition Equation
2	1 – (–6)	
4	9 – 10	
6	–3 – 2	
8	–10 – (–7)	


MONEY
ONE
ONE DOLLAR


IOU
ONE
ONE DOLLAR

Early or Late?

Model the addition on **integer number lines**. Then answer the questions.

1. This morning, Stephen is 7 minutes ahead of his usual schedule for going to school. Then, he decides to check his email and loses 12 minutes.

a. Write an addition and subtraction equation to model the problem.

Addition: _____ Subtraction: _____

b. Which way did you move to add on the number line? Why?

_____

_____

2. Keiko woke up for school 10 minutes late. By skipping her regular sit-down breakfast and grabbing a protein bar to eat on her way, Keiko gained back 14 minutes to her schedule.

a. Write an addition and subtraction equation to model the problem.

Addition: _____ Subtraction: _____

b. Which way did you move to add on the number line? Why?

_____

_____

3. Miles was running 5 minutes late for school because he had to help his little brother finish his homework. Then the bus got stuck behind a train and was 4 minutes behind schedule.

a. Write an addition equation and a subtraction equation to model the problem.

Addition: _____ Subtraction: _____

b. Which way did you move to add on the number line? Why?

_____

_____

Temperature Changes

Review the example problem. Then use **integer number lines** to add and subtract.

Example

When Stephen leaves for school this morning the temperature is **8**° above zero. During the day, a storm comes in, and by the time Stephen leaves school the temperature has dropped **11**°. What is the temperature at the end of the school day?

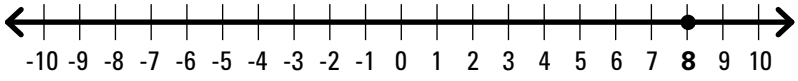
Step 1

Write an addition expression and a subtraction expression to model the problem.

8 + (–**11**)
8 – **11**

Step 2

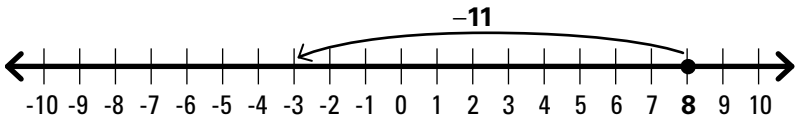
Use the addition expression to find the answer. Plot a point on the number line to show the first addend.



Step 3

Determine whether you will add a positive or negative integer. Move to the right to add a positive integer. Move to the left to add a negative integer.

The temperature dropped **11**°, so you need to add –**11**.



Step 4

The number you land on is the sum and difference.

8 + (–**11**) = –3
8 – **11** = –3

The temperature at the end of the school day is –3, or 3° below 0.

1. A few days later the temperature before school is 5° below 0. During the day the temperature rises 14°. What is the temperature at the end of the day? Write the addition and subtraction equations that model the problem.

Addition: _____ Subtraction: _____

2. When Stephen goes to bed the temperature is 1° below 0. The temperature decreases by 12° overnight. What is the temperature when Stephen wakes up?

Addition: _____ Subtraction: _____

Lesson 3 Exit Ticket

Use **integer number lines** to add and subtract.

Ellie wakes up for school 12 minutes late. She loses another 6 minutes looking for her library book.

1. Write an addition equation and a subtraction equation to model the problem.

Addition: _____ Subtraction: _____

2. Which way did you move to add on the number line? Why?

_____

_____

When Malik leaves for school the temperature is 10° below zero. By the end of the school day, the temperature has risen by 7°.

3. Write an addition equation and a subtraction equation to model the problem.

Addition: _____ Subtraction: _____

4. Which way did you move to add on the number line? Why?

_____

_____

Abigail loses $1 at school. Then she takes a $5 raffle ticket from Grayson and says she'll pay him for it later. How much money does Abigail have now?

5. Write an addition equation and a subtraction equation to model the problem.

Addition: _____ Subtraction: _____

6. Which way did you move to add on the number line? Why?

_____

_____

Extra Practice: Game Play

Part 1: Use the game board at right to answer the questions.

Gabe and Melanie play a game. In the game each player starts in the middle of the board. There are 10 numbered spaces above the starting space and 10 numbered spaces below the starting space. On Gabe's first turn, he moves up from start to space 8. On his second turn, he moves down 12 spaces.

10
9
8
7
6
5
4
3
2
1
start
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10

1. Explain how to use the game board to find which space Gabe is on at the end of his second turn. _____

_____

_____

2. What space is Gabe on at the end of his second turn? _____

3. Write an addition equation and a subtraction equation to model the problem.

Addition: _____ Subtraction: _____

Part 2: Match the pairs of expresssions.

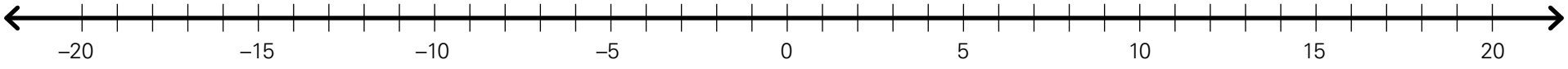
4.

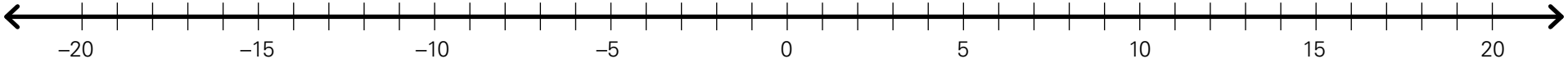
–8 + 6	8 + 6
8 – 6	8 + (–6)
8 – (–6)	–8 – 6
–8 + (–6)	–8 – (–6)

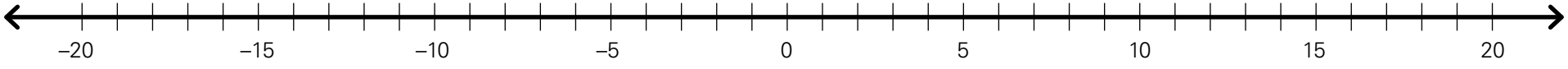
5.

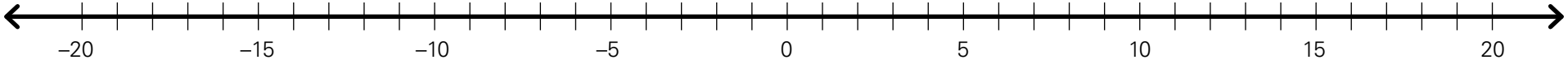
13 + (–4)	–13 + (–4)
13 + 4	13 – 4
–13 – 4	–13 + 4
–13 – (–4)	13 – (–4)

Integer Number Lines

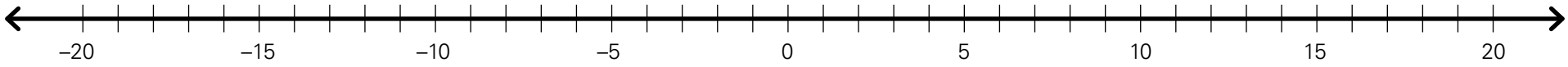


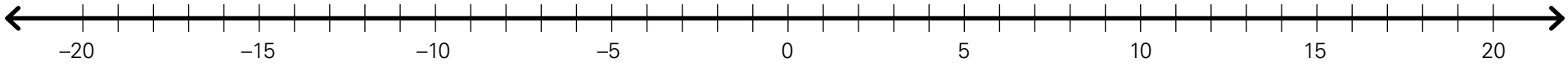


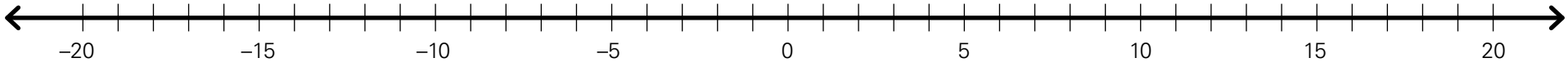


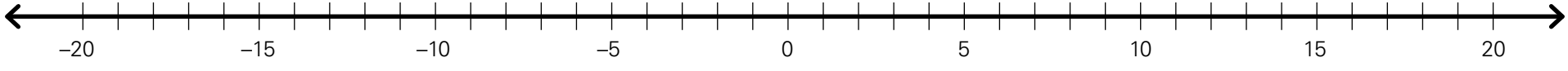


Integer Number Lines

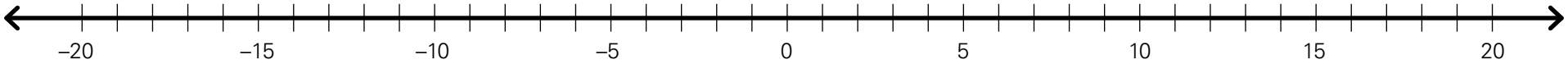


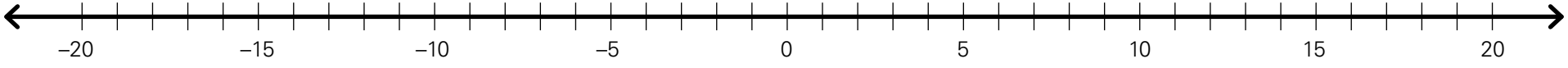


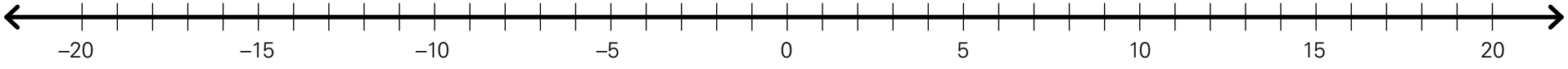


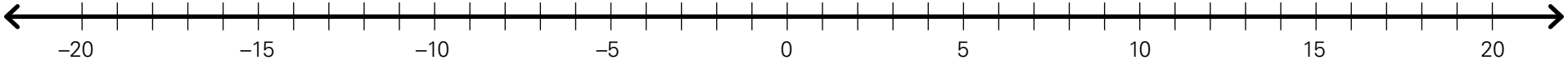


Integer Number Lines

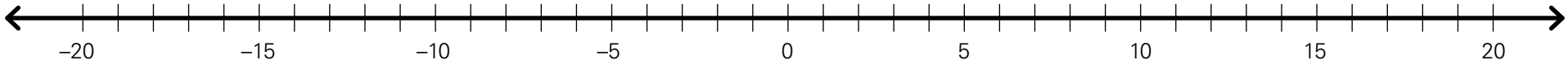


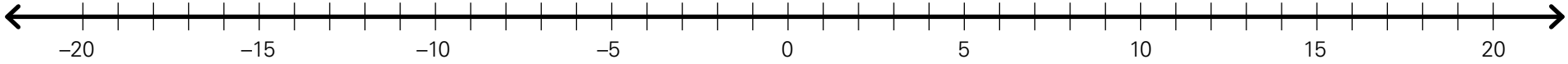


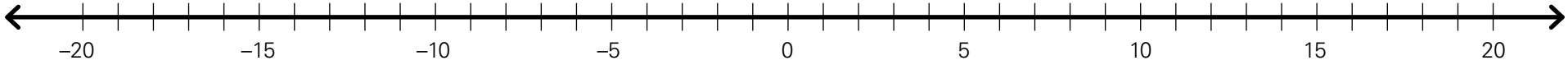


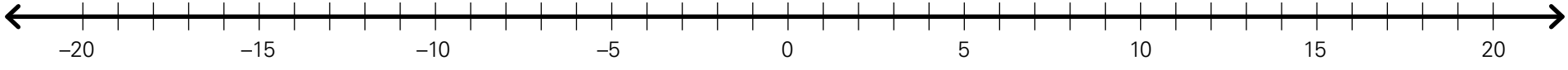


Integer Number Lines

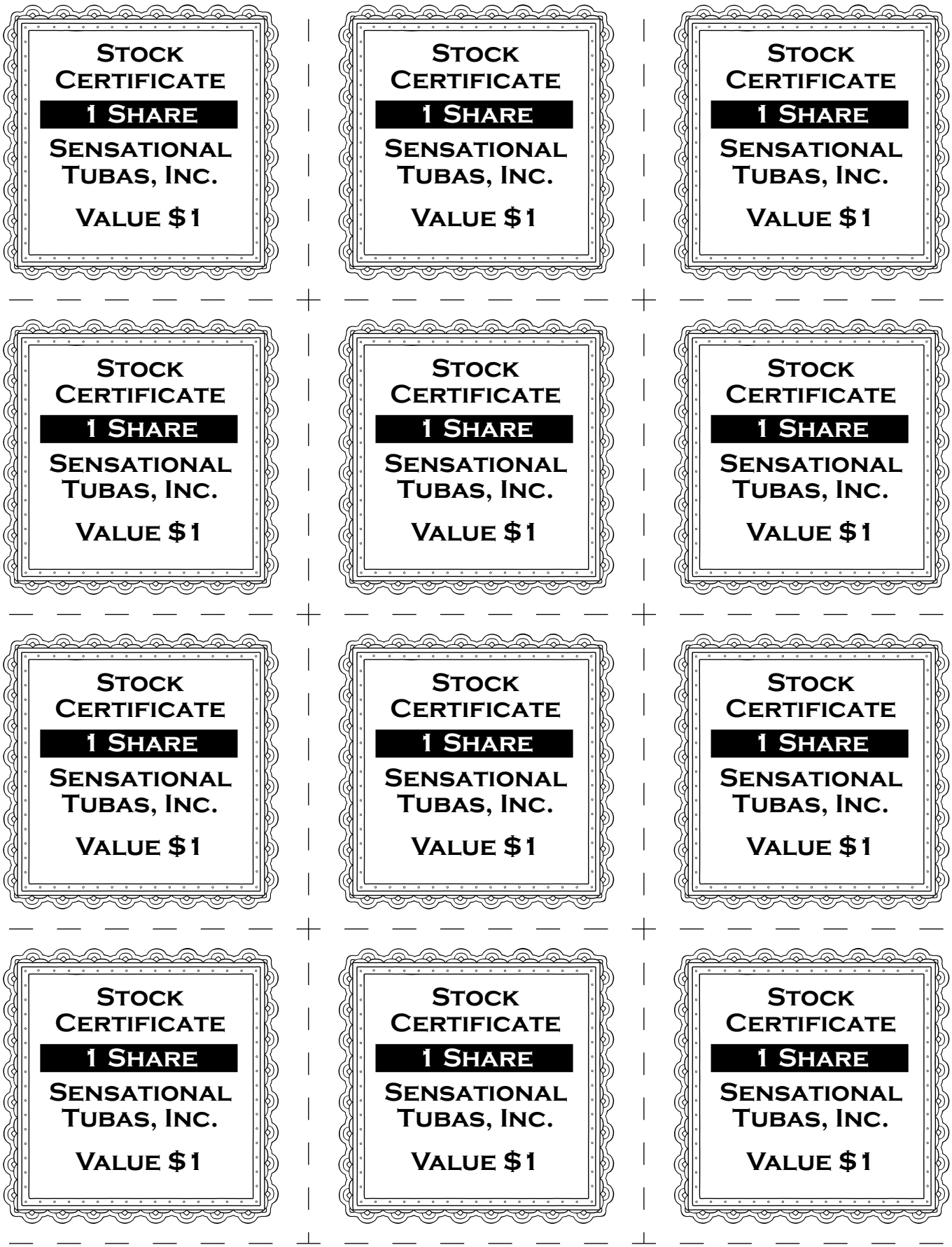








Stock Certificates



Jessie's Job

Use integer addition rules to find the sums and answer the questions.

1. On Tuesday Jessie stayed late at work and earned an extra $15. Before she left work, she bought several watermelons for $18.

a. How do you know whether the integers in the problem are positive or negative?

_____

_____

_____

b. Which integer in the problem has a greater absolute value? _____

c. Will you add or subtract the absolute values? Why? _____

_____

d. Write an addition equation to model the problem. _____

e. What does the sum tell you about how much money Jessie has on Tuesday?

_____

_____

2. Doug works at Ronnie's as well. He usually works the same number of hours each week, but last week he left early on Wednesday, so he was missing $12 from his paycheck. Plus, Thursday was a holiday, so he didn't earn the $48 he usually earns for his Thursday shift.

a. How do you know whether the integers in the problem are positive or negative?

_____

_____

_____

b. Which integer in the problem has a greater absolute value? _____

c. Will you add or subtract the absolute values? Why? _____

_____

d. Write an addition equation to model the problem. _____

e. What does the sum tell you about how much money Doug earned this paycheck?

_____

New Shoes

Part 1: Review the example problem. Then use integer addition rules to answer the questions and find the sums.

Example

Jessie needs to buy a new pair of sneakers for work. Looking online, she finds a pair that she wants to buy. Jessie has a **$15** coupon, but she pays **$6** for fast shipping. After combining the coupon and the shipping fee, how much will the coupon save Jessie?

Step 1	Step 2	Step 3	Step 4
Model each amount with an integer and write the addition expression. Coupon: **15** Shipping: **–6** **15** + (**–6**)	Identify which integer addition rule to use to add. Since the integers have different signs, subtract the absolute values. Then take the sign of the integer with the greater absolute value.	Write an absolute value equation to help find the sum. |**15**| – |**–6**| = **15** – **6** = 9	Determine the sign of the sum. |**15**| > |**–6**|, so the sum will be positive. **15** + (**–6**) = 9 Jessie's coupon will save her $9 when combined with the shipping fee.

1. On a different website, Jessie finds the same sneakers. The shipping fee is only $4 and she has a $10 coupon. How much will Jessie's coupon save her on this website? Show your work.

Jessie's coupon will save her $ _____.

Part 2: Complete each equation.

2. 14 + (–19) = _____

3. –56 + 66 = _____

4. –2 + 23 = _____

5. 8 + (–9) = _____

6. –7 + (–1) = _____

7. –6 + 46 = _____

8. –5 + 3 = _____

9. –9 + (–15) = _____

10. –38 + 38 = _____

11. 2 + (–10) = _____

Lesson 4 Exit Ticket

Part 1: Use integer addition rules to find the sums.

1. Doug cashes his paycheck on Friday. He spends most of his paycheck on food that night. He wants to save the rest for a new computer. On Saturday he spends $18 on toys for his little sister. Then he loans his friend $24.

a. How do you know whether the integers in the problem are positive or negative?

_____

_____

_____

b. Does Doug save money on Saturday? Show your work and circle your answer.

Doug does / does not save money on Saturday.

Part 2: Complete each equation.

2. −7 + (−13) = _____

3. 92 + (−91) = _____

4. −8 + (−5) = _____

5. −16 + 1 = _____

6. −70 + (−12) = _____

7. 13 + (−13) = _____

8. 12 + (−6) = _____

9. −45 + (−40) = _____

10. 11 + (−9) = _____

11. 4 + (−5) = _____

Extra Practice: Bank Account Balance

Part 1: Represent each situation with an integer.

Situation	Integer
Evan gives $7 to a friend.	
Chelsea earns a $15 bonus at work.	
Nico has $18 taken out of his paycheck for income tax.	
Leo spends $12 on comics.	
Shane deposits $21 into his bank account.	
Emily finds $5.	

Part 2: Write and solve an addition equation to find how much money each pair has in all.

1. Evan and Chelsea _____

2. Nico and Leo _____

3. Shane and Emily _____

4. Evan and Nico _____

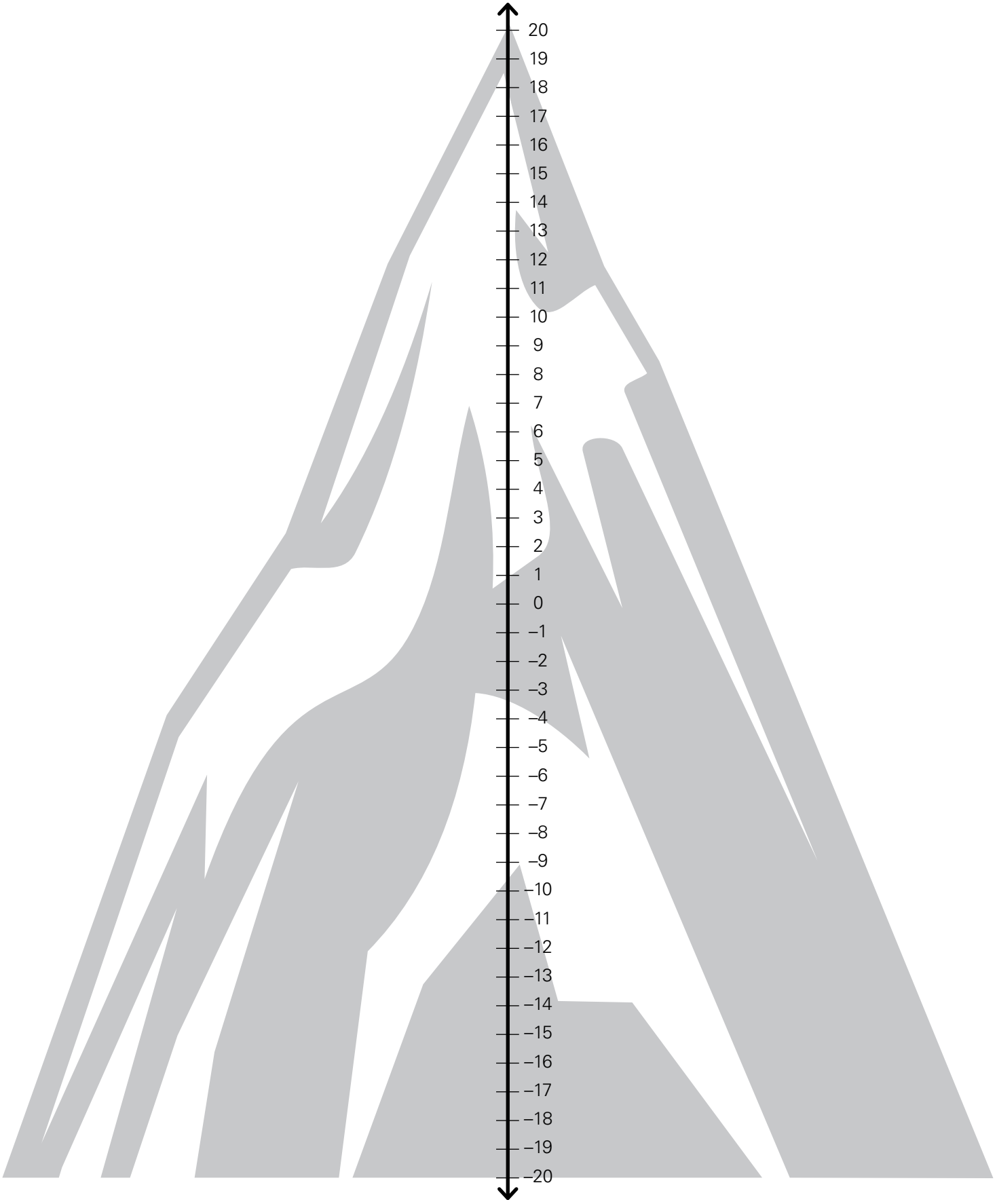
5. Chelsea and Emily _____

6. Leo and Shane _____

7. Evan and Shane _____

8. Nico and Chelsea _____

Mountain Climbers



Icy Blast!

Use integer subtraction and addition rules to solve. Then answer the questions.

1. The perceived air temperature at Dr. Foster's research station at noon is −16°F. The wind chill lowers the perceived temperature 11°. What is the wind chill?

a. Explain how you know whether to add or subtract. _____

_____

_____

b. Complete the keep-change-change chart.

keep	change	change

= _____

c. The wind chill is _____ °F.

2. The high temperature at Dr. Foster's research station was −8°F, and the low temperature was −23°F. What was yesterday's temperature range?

a. Explain how you know whether to add or subtract. _____

_____

_____

b. Complete the keep-change-change chart.

keep	change	change

= _____

c. The temperature range was _____ °F.

3. The next day at the research station the temperature reaches 4°F, but the temperature drops 22 degrees by midnight. What is the temperature at midnight?

a. Explain how you know whether to add or subtract._____

_____

_____

b. Complete the keep-change-change chart.

keep	change	change

= _____

c. The temperature was _____ °F at midnight.

Ancient Finds

Part 1: Review the example problem. Then use the keep-change-change rule and integer addition rules to subtract.

Example

Dr. Chavez is working at an archeological site in the desert. The ground at the site is located at **13** feet below sea level. Dr. Chavez digs down **4** feet and finds a pottery bowl. At what elevation is the pottery bowl?

Step 1

Identify the integers and write an expression to model the problem.

Ground: **13** feet below sea level

Bowl: **4** feet lower

Expression: **−13** − **4**

Step 2

Use the keep-change-change rule to convert the subtraction expression into an addition expression.

−13	−	**4**
keep	change	change
−13	+	**−4**

The addition expression is **−13** + (**−4**).

Step 3

Follow the rules for integer addition.

−13 + (**−4**) = −17

The pottery bowl was found 17 feet below sea level.

1. Dr. Chavez starts at the ground, which is 13 feet below sea level. He digs down 6 feet and finds a woven basket. At what elevation is the basket?

keep	change	change

= _____

The basket was found _____ sea level.

Part 2: Use integer subtraction and addition rules to complete each equation.

2. −17 − (−19) = _____

3. −12 − (−11) = _____

4. −18 − (−5) = _____

5. −20 − 17 = _____

6. −6 − (−3) = _____

7. 18 − (−14) = _____

8. 11 − (−2) = _____

9. −1 − 17 = _____

10. 8 − (−6) = _____

11. 14 − 17 = _____

Lesson 5 Exit Ticket

Part 1: Use the keep-change-change and integer addition rules to subtract. Then answer the questions.

1. Three days ago, the temperature at Dr. Foster's research station at 8 a.m. was –6°F. The temperature dropped 19° by noon.

a. Explain how you know whether to add or subtract. _____

_____

_____

b. Complete the keep-change-change chart.

keep	change	change

= _____

c. The temperature was _____ °F by noon.

Part 2: Use integer subtraction and addition rules to complete each equation.

2. 13 – (–18) = _____

3. 4 – (–15) = _____

4. 20 – (–1) = _____

5. –16 – (–13) = _____

6. 1 – 4 = = _____

7. 19 – (–20) = _____

8. –1 – (–18) = _____

9. –9 – (–17) = _____

10. 5 – 11 = _____

11. –6 – 17 = _____

Extra Practice: River Sampling

Part 1: Complete each statement with *always*, *sometimes*, or *never*.

1. The difference of a positive integer and a negative integer is _____ positive.

2. A positive integer subtracted from a negative integer is _____ negative.

3. The difference of two positive integers is _____ positive.

4. In the keep-change-change rule, you _____ change the first number in the subtraction equation.

Part 2: Use the keep-change-change rule and integer addition rules to complete the table and answer the questions.

5. The table shows the depth of Rashida's first water sample and how much farther Rashida lowers the sampling container for the second water sample.

Day	**First Water Sample Depth** (inches)	**Distance Container Lowered** (inches)	**Subtraction Expression**	**Second Water Sample Depth** (inches)
Monday	–7	8		
Tuesday	–12	6		
Wednesday	–4	19		
Thursday	–9	12		
Friday	–4	16		

Part 3: Use the keep-change-change rule and integer addition rules to complete the equations.

6. 18 – 33 = _____

7. 54 – (–69) = _____

8. –11 – (–16) = _____

9. 30 – 93 = _____

10. 77 – (–80) _____

11. 87 – (–22) = _____

12. –8 – 26 = _____

13. –60 – 36 = _____

14. 63 – (–55) = _____

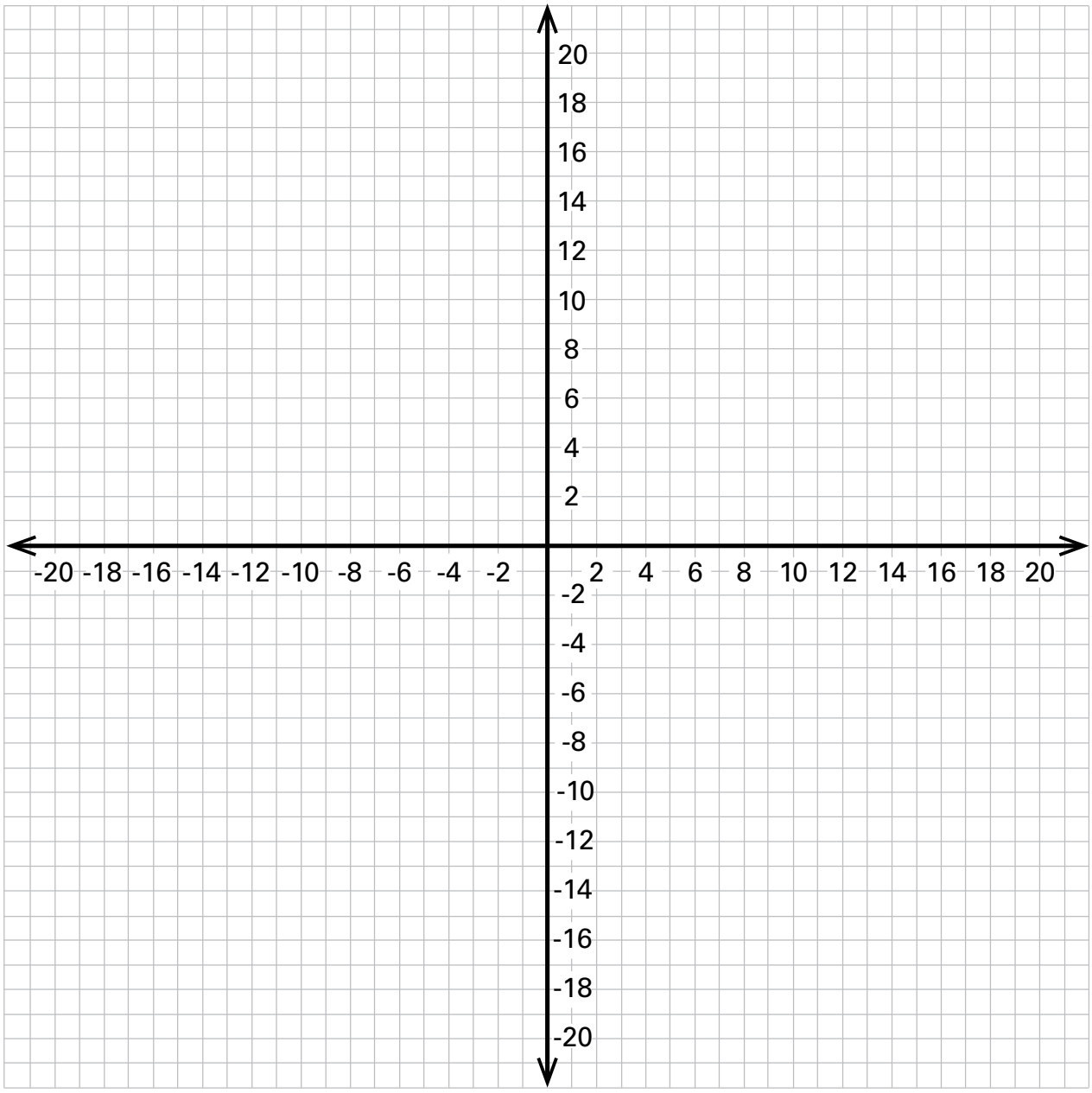
15. 45 – (–95) = _____

16. –73 – 39 = _____

17. 2 – 33 = _____

Graph Now

x	*y*
11	20
13	18
15	16
17	14
19	12



Equation Match Expressions

$4 - 12$	$-6 - 9$
$-7 - (-8)$	$-4 - 10$
$15 - (-3)$	$-11 - (-16)$
$20 - 12$	$-14 - (-3)$
$-8 - 9$	$12 - 18$

Equation Match Differences

-8	-15
1	-14
18	5
8	-11
-17	-6

Captain Noodles

Plot the integers on an **integer number line** to find the distance between them. Then write related subtraction and addition equations to find the difference.

1. On Wednesday Kai and Phoebe also help look for Captain Noodles. Kai walks 12 blocks north from my house, and Phoebe walks 5 blocks in the opposite direction.

a. What subtraction equation can you use to find the distance between the two points?

_____

b. What addition equation can you use to find the distance between the two points?

_____

c. What distance do Kai and Phoebe cover in their search on Wednesday? _____

2. On Thursday Kai and Phoebe search again. Kai walks 8 blocks south from my house, and Phoebe walks 7 blocks in the opposite direction.

a. What subtraction equation can you use to find the distance between the two points?

_____

b. What addition equation can you use to find the distance between the two points?

_____

c. What distance do Kai and Phoebe cover in their search on Thursday? _____

3. On Friday Vashti and DeSean help me search for Captain Noodles again. They really miss him! Vashti walks 4 blocks south from my house, and DeSean walks 14 blocks in the opposite direction.

a. What subtraction equation can you use to find the distance between the two points?

_____

b. What addition equation can you use to find the distance between the two points?

_____

c. What distance do Vashti and DeSean cover in their search on Friday? _____

Spotted!

Review the example problem. Then write and solve subtraction and addition equations to find the distance between integers.

Example

On Saturday I look for Captain Noodles. When I am **6** blocks south of my house, Phoebe texts that she spotted Captain Noodles! Captain Noodles is **3** blocks from my house in the opposite direction. How far away am I from Captain Noodles?

Step 1	Step 2	Step 3	Step 4
Use the house as the starting point, 0. Determine the integers represented in the problem. My location: **–6** Captain Noodles's location: **3**	Write a subtraction equation to show that the distance is the absolute value of the difference between integers. $\lvert -\mathbf{6} - \mathbf{3} \rvert = d$	Rewrite the subtraction equation as addition of the inverse. $\lvert -\mathbf{6} + (-\mathbf{3}) \rvert = d$	Use integer addition rules to add. Then find the absolute value of the sum. $\lvert -\mathbf{9} \rvert = d$ $\mathbf{9} = d$ Captain Noodles is **9** blocks away.

1. I found Captain Noodles! He was 4 blocks north of my house. I need to go to the veterinarian to make sure he isn't hurt. The veterinarian is 8 blocks from my house in the opposite direction. How far away is the veterinarian?

_____ blocks

2. Captain Noodles is fine, but very grumpy. From the veterinarian's clinic, I take him to the pet shop to get him a toy. The clinic is 8 blocks south of my house. The shop is 6 blocks from my house in the opposite direction. How far is it to the shop?

_____ blocks

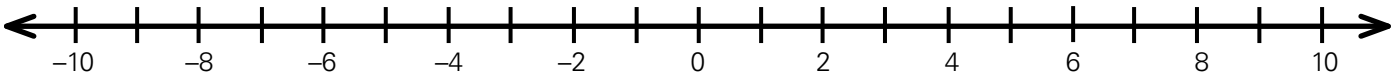
3. I drop off Captain Noodles at home so he can take a nap. Then I ride my bike 12 blocks south from my house to where Vashti lives so I can tell her the good news. Phoebe lives 7 blocks south of my house, so I go there next to thank her for spotting Captain Noodles. How far do I ride my bike between Vashti's and Phoebe's houses?

_____ blocks

Lesson 6 Exit Ticket

Part 1: Plot the integers on the number line to find the distance between them. Then write related subtraction and addition equations to find the difference.

1. I have a party to celebrate Captain Noodles's return. We play a cat trivia game outside. Everyone starts at the center line in the yard. They take a step forward when they get a question right, and they take a step back when they get a question wrong. Vashti takes 5 steps forward and DeSean takes 5 steps back. How far apart are Vashti and DeSean?



a. What subtraction equation can you use to find the distance between the two points?

_____

b. What addition equation can you use to find the distance between the two points?

_____

c. How far apart are Vashti and DeSean? _____steps

Part 2: Write and solve subtraction and addition equations to find the distance between integers.

2. Kai and Phoebe play the game, too. Kai takes 9 steps back, but Phoebe takes 8 steps forward. How far apart are Kai and Phoebe?

_____ steps

3. 3. DeSean and Kai play in the championship cat trivia game. The winner gets a framed photo of Captain Noodles. DeSean is very nervous, and in the first round he takes 15 steps back. Kai takes 2 steps back. How far apart are DeSean and Kai?

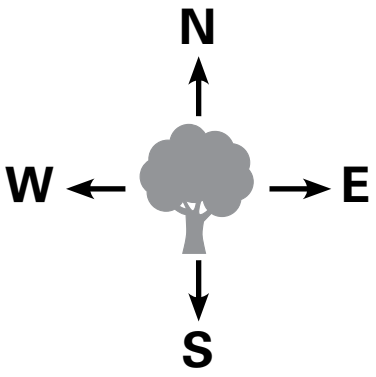
_____ steps

Extra Practice: Snakes

Part 1: Find the distance between each pair of snakes. Use a **number line** to check your work.

Meredith and her mom find many snakes in the forest. The table shows where they find each snake in relation to the oak tree.

water snake	400 feet west of the oak tree
queen snake	200 feet north of the oak tree
brown snake	500 feet east of the oak tree
red-bellied snake	800 feet north of the oak tree
green snake	100 feet south of the oak tree
fox snake	700 feet east of the oak tree



1. How far apart are the water snake and the brown snake? _____

2. How far apart are the queen snake and the red-bellied snake? _____

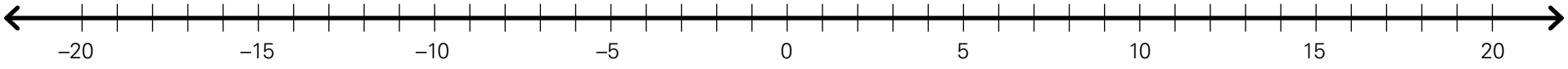
3. How far apart are the red-bellied snake and the green snake? _____

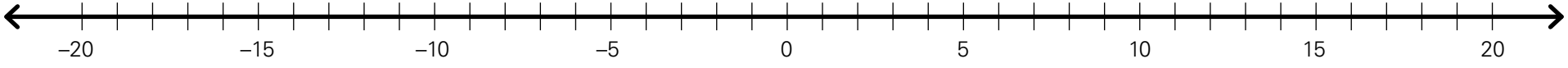
4. How far apart are the fox snake and the brown snake? _____

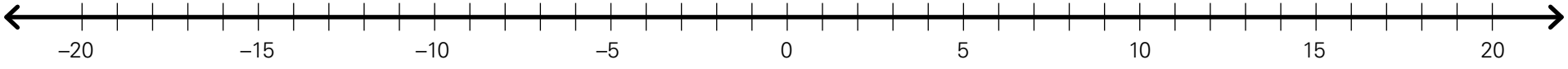
Part 2: Match each equation with the correct answer.

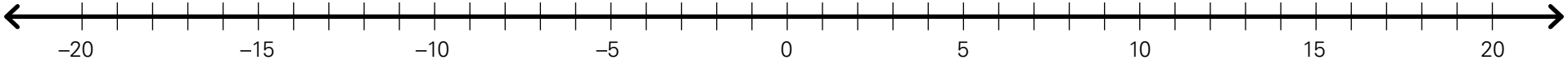
$\|12 - (-9)\| =$	4
$\|-12 - (-9)\| =$	16
$\|10 - 6\| =$	3
$\|10 - (-6)\| =$	21

Integer Number Lines

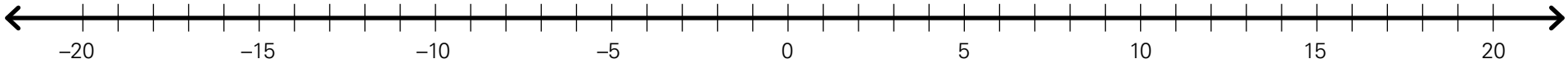


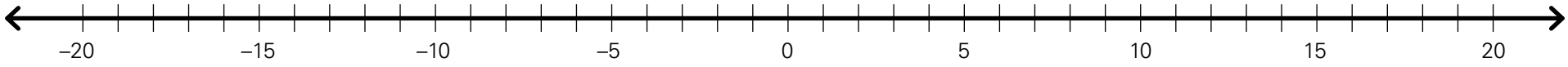


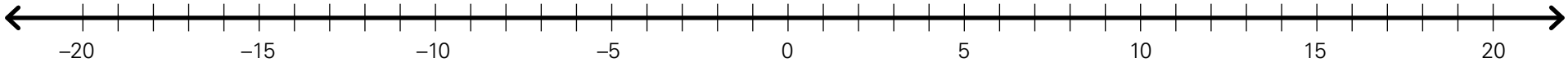


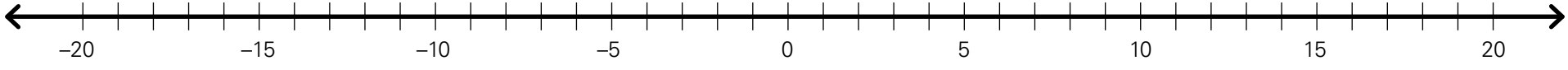


Integer Number Lines



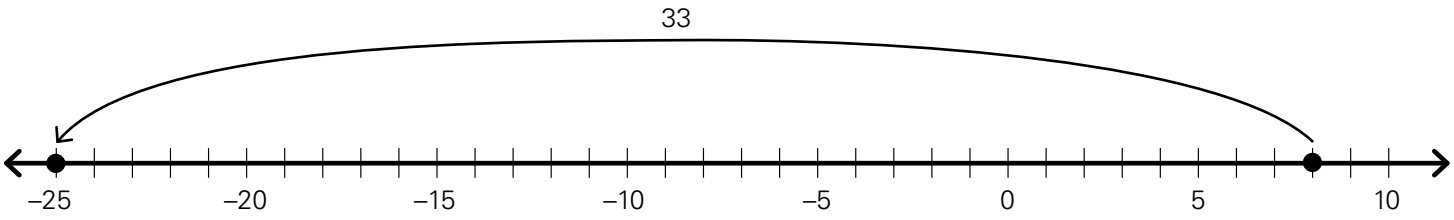






Under the Sea

Part 1: Explain the parts of the number line by answering the questions.



1. Which integer represents the starting point? _____

2. Which integer represents the ending point? _____

3. Which integer represents the distance or change? _____

4. Explain why the equation 8 + 25 = 33 represents the number line: _____

_____

_____

_____

_____

Part 2: Model and solve each situation with a **vertical number line**. Then write an addition or subtraction equation and solve.

5. On Tuesday, Carter dives to 53 feet below the surface of the ocean to watch a shark. Then he swims up and takes photographs of a school of fish at 36 feet below the surface. How far is the shark from the school of fish?

Equation: _____

The shark is _____ feet from the school of fish.

6. On Thursday, Carter takes a small boat out to a new area of the reef. He jumps in the water from the boat deck 2 feet above the surface of the water. He dives to 45 feet below the surface to observe sea urchins. How far does Carter dive?

Equation: _____

Carter dives _____ feet down from the boat deck.

Carter's Expenses

Review the example problem. Then model the situations with an **open number line** and an equation and choose a tool or strategy to help you solve.

Example

Carter needs to make repairs to his underwater camera. He has a $**3** credit on his credit card. He spends $**154** on the repairs. How much money is on Carter's credit card now?

Step 1

Identify the parts of the problem.

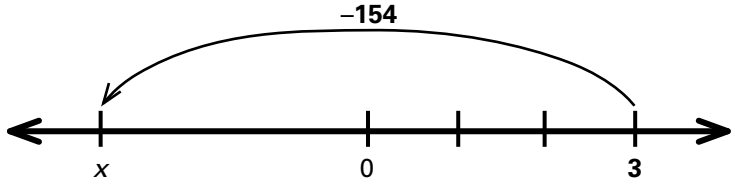
Starting point: $**3**

Ending point: x

Change: –$**154**

Step 2

Model the problem with a number line.



Step 3

Write an addition or subtraction equation that represents the problem.

3 – **154** = x

Step 4

Choose an appropriate strategy to solve.

It would take too long to count out 154 yellow counters, so using the integer subtraction rules is more appropriate.

$$3 - 154 = 3 + (-154) = -151$$

Carter has –$151 on his card after paying for repairs.

Carter owes his team member Sasha $58. He pays her back some of what he owes by buying her a cooler that costs $23. How much does Carter still owe Sasha?

1. Circle the information that is missing from the problem.

starting point ending point change

2. Write an addition or subtraction equation that represents the problem. _____

3. Which strategy or tool will you use to solve? Explain why you chose this strategy.

_____

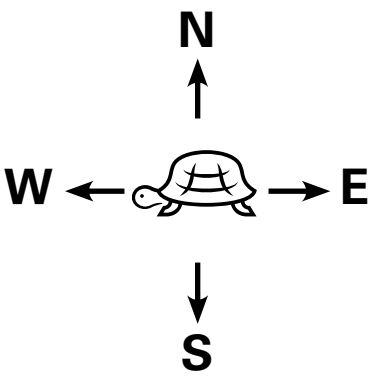
_____

4. What integer represents Carter's money? _____

5. How much does Carter still owe Sasha? _____

Lesson 7 Exit Ticket

Part 1: Model each situation with an **open number line**. Then write an addition or subtraction equation and solve.



Carter puts a satellite tag on a turtle so he can track her movements. The turtle swims east of the boat, and then hides on a rock to rest. From the rock, the turtle swims 199 meters west in a straight line before diving down at a point 164 meters west of the boat. How far is the boat from the rock where the turtle rested?

1. Draw a number line to model the problem.

2. Equation: _____

3. The boat is _____ meters from the rock.

Part 2: Model the situation with an **open number line** and an equation and choose a tool or strategy to help you solve.

Carter owes his team member Ricardo $5. Then Ricardo buys Carter notebooks to record information about the turtles they are tagging. Now Carter owes Ricardo $13. How much did the notebooks cost?

4. Circle the information that is missing from the problem.

starting point ending point change

5. Use a number line to draw a model of the problem.

6. Write an addition or subtraction equation that represents the problem. _____

7. Which strategy or tool will you use to solve? Explain why you chose this strategy.

_____

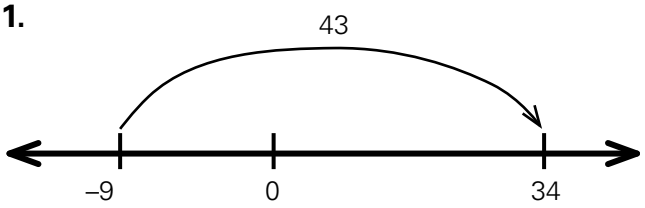
_____

8. How much did the notebooks cost? _____

Extra Practice: Stories

Write a real-world problem that can be solved using the number line.

1.



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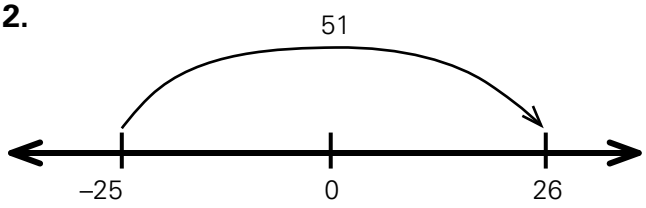

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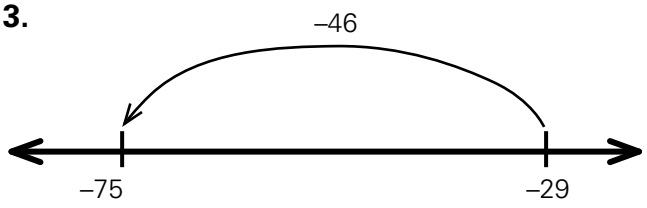

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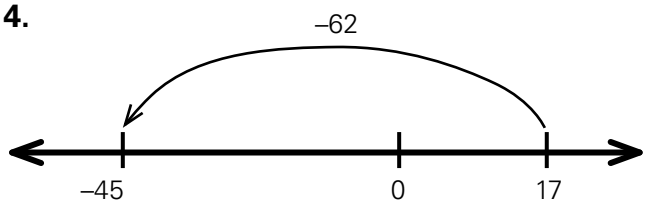
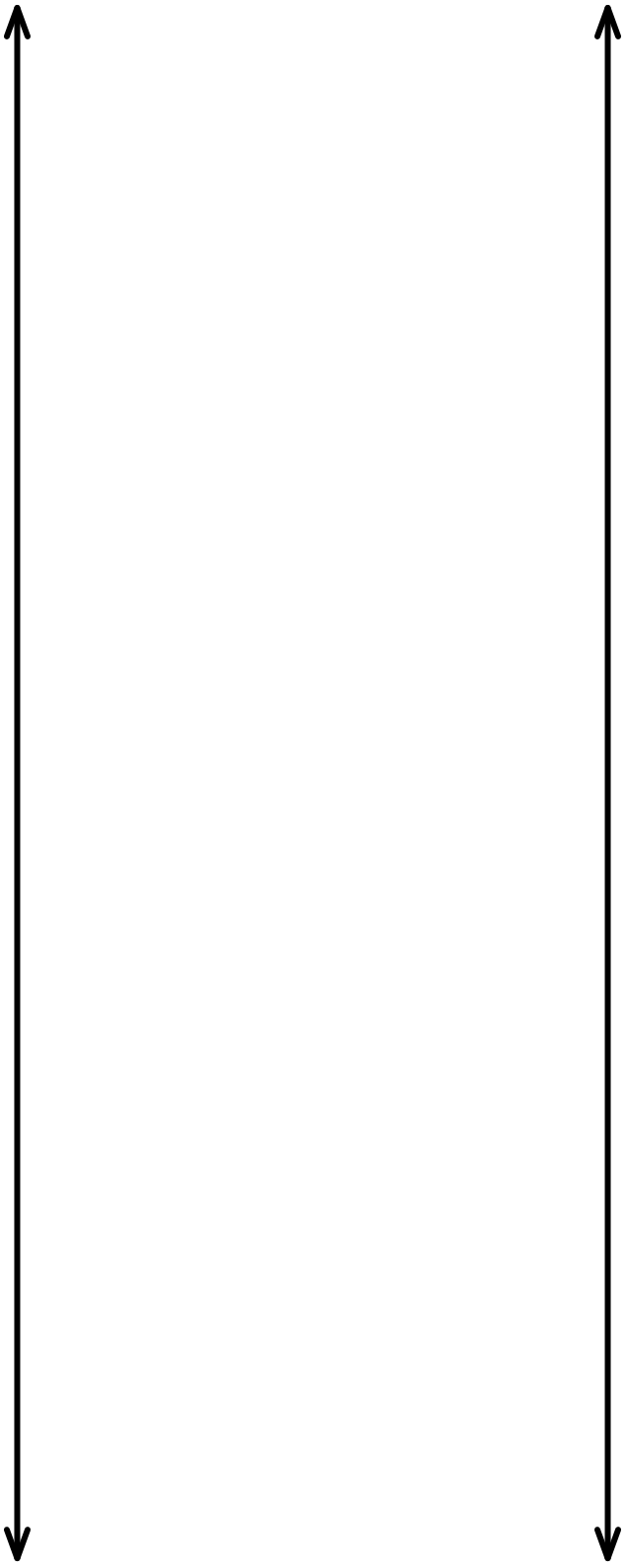
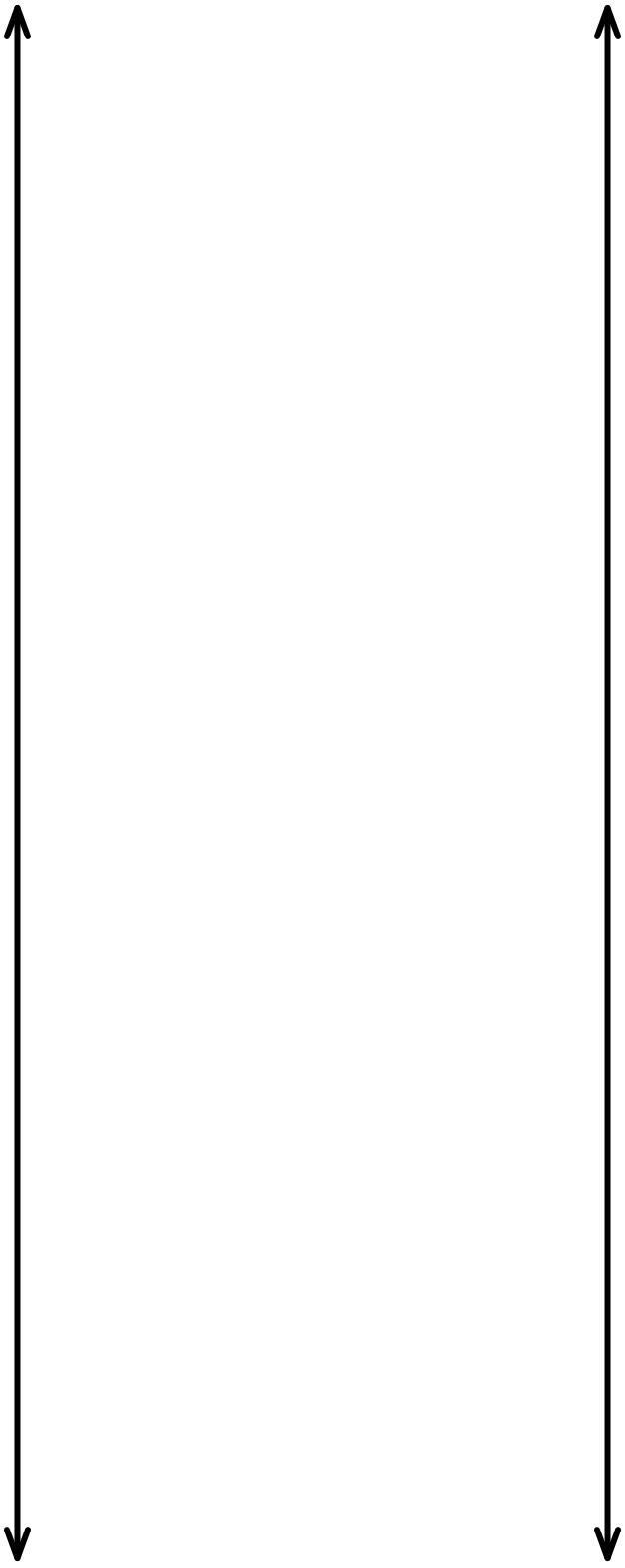


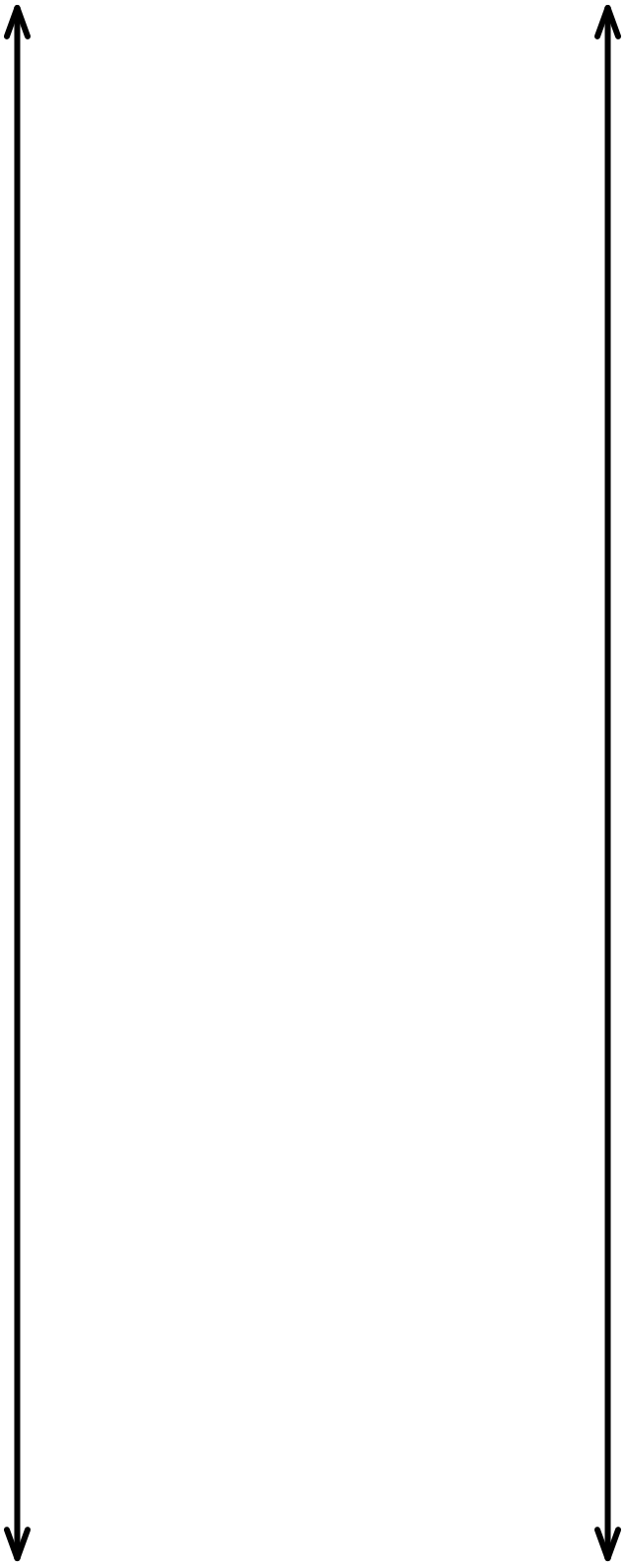
Vertical Open Number Lines



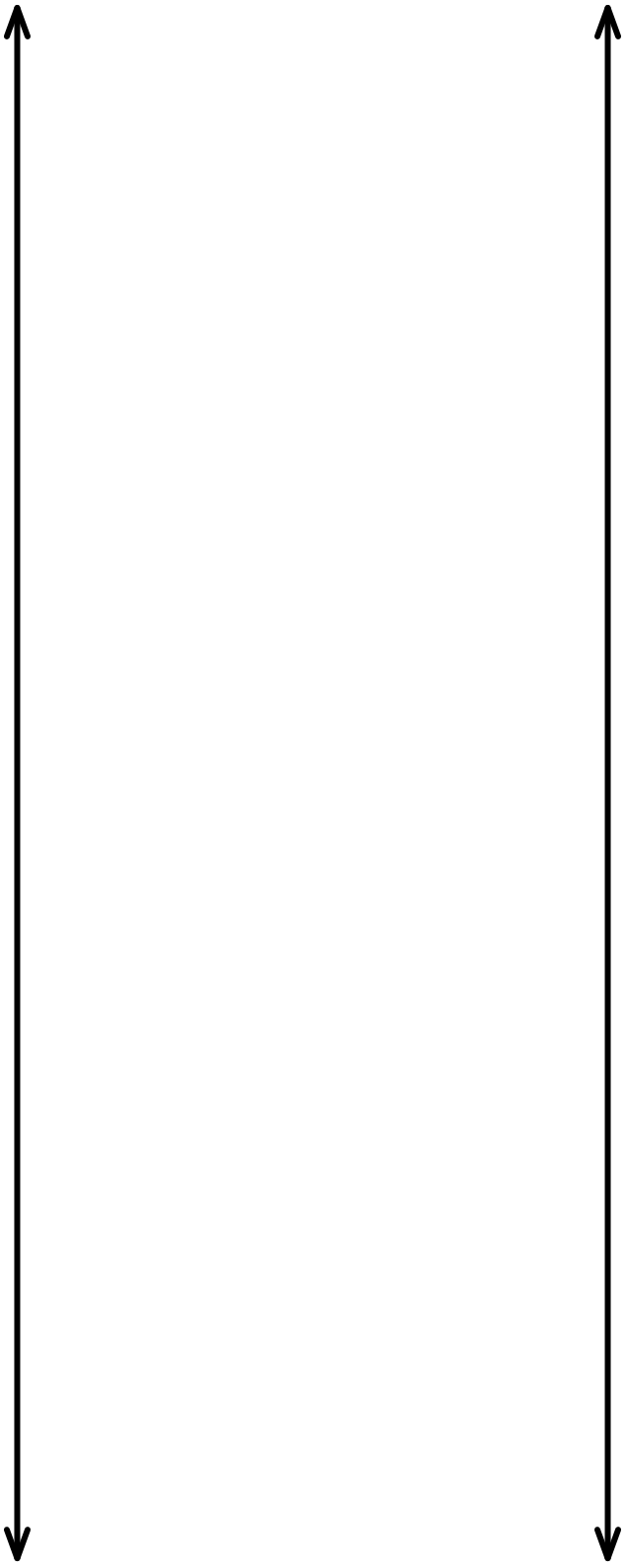
Vertical Open Number Lines



Vertical Open Number Lines



Vertical Open Number Lines



Open Number Lines

Open Number Lines

Open Number Lines

Open Number Lines


MONEY
ONE
ONE DOLLAR


MONEY
5
FIVE
FIVE DOLLARS


MONEY
5
FIVE
FIVE DOLLARS


MONEY
5
FIVE
FIVE DOLLARS


MONEY
5
FIVE
FIVE DOLLARS


MONEY
10
TEN
TEN DOLLARS


MONEY
10
TEN
TEN DOLLARS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10
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TWENTY DOLLARS


MONEY
20
TWENTY
TWENTY DOLLARS


MONEY
20
TWENTY
TWENTY DOLLARS

Integer Cards

–20	–19	–18	–17
–16	–15	–14	–13
–12	–11	–10	–9
–8	–7	–6	–5

Integer Cards

–4	–3	–2	–1
0	1	2	3
4	5	6	7
8	9	10	11

Integer Cards

12	13	14	15
16	17	18	19
20			

Earn Cards

Earn $8 mowing the lawn	Earn $30 raking leaves
Earn $25 babysitting	Earn $25 selling clothes
Earn $15 tutoring	Earn $12 delivering flowers
Earn $10 doing chores	Earn $5 for returning a lost wallet

Spend Cards

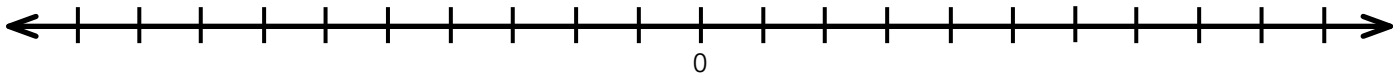
Spend $6 at the store	Spend $20 at the store
Spend $5 at the arcade	Spend $9 for an app
Spend $18 for lunch	Spend $11 for breakfast
Spend $13 on a movie	Spend $22 for dinner

Assessment

Unit 1 Assessment

1. Use the number line to find the sum.

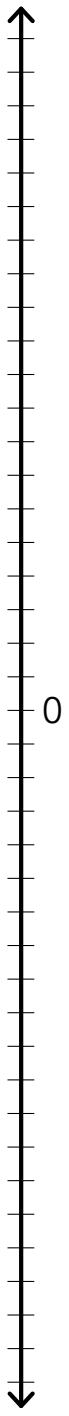
$-8 + 3 =$ _____



2. Keke throws a diving ring into the pool from 3 feet above the surface of the water. From where she throws it, the ring falls 11 feet to land at the bottom of the pool. Write an addition equation to model the problem, and then use the number line to solve.

_____ + _____ = _____

What integer represents where the ring landed, relative to the surface of the pool? _____



3. Joelle is playing a game. In her first turn, she loses 5 points. In her second turn, she earns 7 points. What is the sum of Joelle's points? Use integer addition rules to find the sum and write an equation. Then explain how you used the rules to find the sum.

_____

4. Find the sum using integer addition rules. Then explain how you found it.

$-10 + (-26) =$ _____

5. Last week, the water level in Omar's swimming pool was 4 inches below the top edge of the pool. This week, the water level went down another 5 inches. How far below the top edge of the pool is the water level now? Write a subtraction equation, and then use the keep-change-change rule to solve.

_____

= _____

6. Use integer subtraction rules to solve. Then explain how you used the rules to find the difference.

$-15 - (-9) =$ _____

_____

_____

_____

_____

_____

7. Use absolute value to find the distance between 16 and –9. Show your work.

The distance between 16 and –9 is _____ .

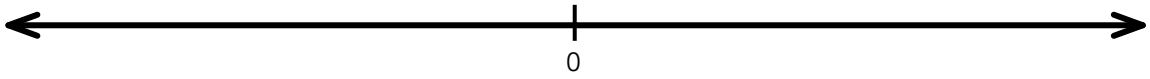
8. Breonna is 18 feet to the left of the lemonade stand. Ariel is 20 feet to the right of the lemonade stand. How far apart are the two friends? Write an equation using absolute value to solve.

_____

The friends are _____ feet apart.

9. Use a number line to model the problem. Then write an addition or subtraction equation and solve.

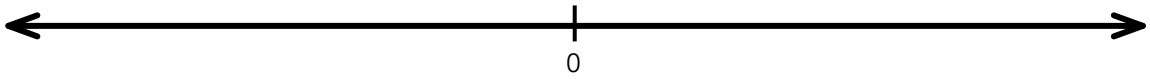
Mei has a coupon that will save her $12 on a new rug if she orders online. For her online order, there is a shipping fee of $7. After shipping, how much will Mei's coupon save her?



Equation: _____ Mei's coupon will save her $ _____.

10. Use a number line to model the problem. Then write an addition or subtraction equation and solve.

A diving bird catches a fish 2 meters below the water. Then it flies up to a branch that is 20 meters above the water. How far does the bird travel vertically to reach the branch?



Equation: _____ The bird travels _____ meters.

Unit 1 Cumulative Review

1. Divide using the standard algorithm.

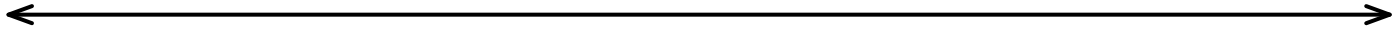
$6\overline{)479.34}$

2. Thea is buying bottles of apple juice. The table shows the costs for different numbers of bottles. Complete the table. Use the double number line to show your work.

Number of Bottles	Cost
1	
2	$8
5	
	$36

Number of Bottles

Cost



3. Keir buys a bag of gumballs. The label says there are more than 35 gumballs in the bag. Circle each possible number of gumballs that could be in Keir's bag. Then write an inequality that describes the quantity of gumballs in a bag.

35	28
42	36
147	33

_____

4. Group like terms to write an equivalent expression.

$3x + 6 + 1 + 2x =$ _____

5. The opposite of −12 is _____.

6. Sixth graders make up 16% of the basketball team. There are 25 students on the basketball team. How many sixth graders are on the basketball team?

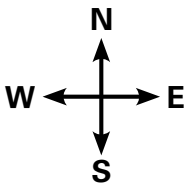
There are _____ sixth graders on the basketball team.

7. Monique buys 5 books. Each book costs *b* dollars. She spends a total of $32.50 on the books. How much does Monique spend on each book? Write an equation using the variable *b* to represent the situation. Then solve for the variable.

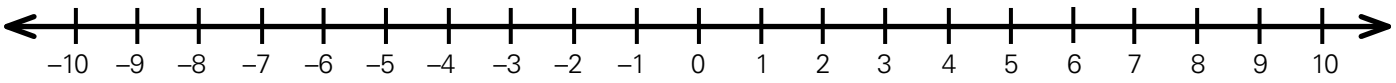
Equation: _____

Monique spends _____ on each book.

8. Lin walks from his house 6 blocks east to mail a letter at the post office. Then, Lin walks 9 blocks west to the mall. How far is the mall from Lin's house? Write an equation and solve.



Equation: _____



The mall is _____ of Lin's house.

9. Divide. Show your work.

$6\frac{1}{2} \div 1\frac{3}{4} =$

_____

10. Nina has a dog walking business. The table shows how much Nina makes based on the number of dogs she walks each day. How much does Nina earn for each dog she walks?

Number of Dogs Walked (x)	Dollars Earned (y)
3	$15
6	$30
9	$45

Nina earns $_____ for each dog she walks.

What equation models the amount Nina earns for any number of dogs?

y = _____

11. Kamal and Diego both rode their bikes at the park on Monday. Kamal rides his bike at the park every 3 days. Diego rides his bike at the park every 4 days. How many days will it be before Kamal and Diego are riding their bikes at the park together again? Show your work.

It will be _____ days until Kamal and Diego ride their bikes at the park together again.

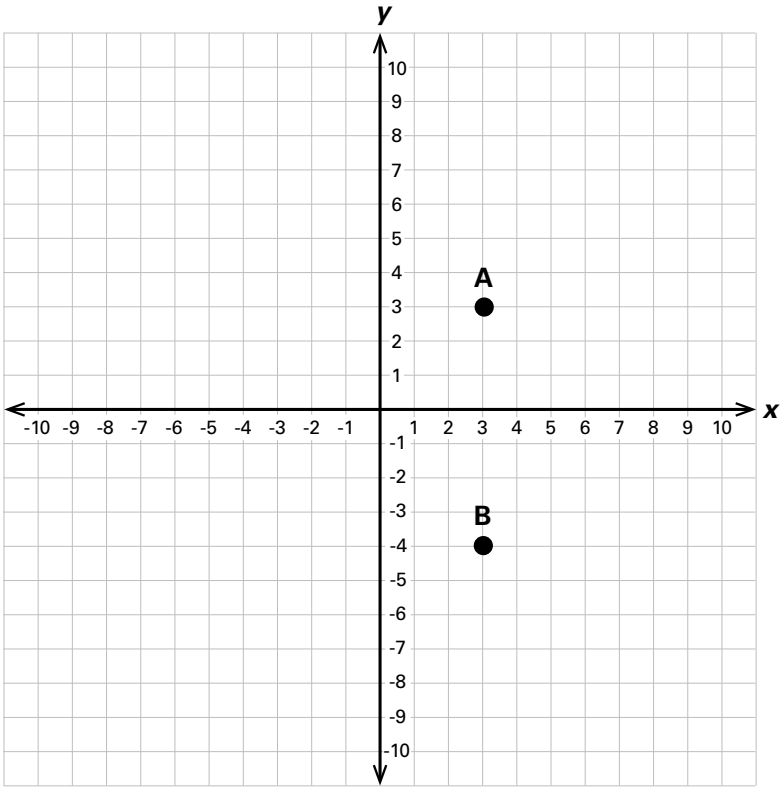
12. Mr. Sanderson can drive his car 240 miles in 4 hours. How many miles can Mr. Sanderson drive in 7 hours?

Mr. Sanderson can drive _____ miles in 7 hours.

13. Write the expression in standard form.

6^3 = _____

14. What is the distance between Point A and Point B?



The distance between Point A and Point B is _____ units.

15. Angelo went hiking last weekend. From the trailhead he hiked down 75 feet to a waterfall. Then, he hiked down another 28 feet to explore a cave. How far down did Angelo hike? Write an equation and solve.

_____

Angelo hiked _____ feet down.

Unit 2:

Multiplication and Division with Integers and Rational Numbers

Catapult Learning™

Best Buds Forever

Use **counters** to model the problems. Then, answer the questions.

1. Jolene and Sun from the garden club go on a backpacking trip. They hike down into a steep canyon. They descend 2 miles every hour. What is their change in altitude from the present to the time when they started their hike 6 hours ago?

a. What integer represents the number of groups? _____

b. What integer represents the number of items in each group? _____

c. What color will the counters be after multiplying? Explain.

_____

_____

_____

_____

d. Write an equation to represent your model. _____

e. What was Jolene and Sun's altitude at the beginning compared to now? _____

2. The next day, Jolene and Sun go looking for fossils in the canyon, digging very carefully so as not to miss any small ones. In one spot, Jolene removes 5 cups of sand each hour for 3 hours and finds several snail fossils. What is the change in the amount of sand where she is digging?

a. What integer represents the number of groups? _____

b. What integer represents the number of items in each group? _____

c. What color will the counters be after multiplying? Explain.

_____

_____

_____

_____

d. Write an equation to represent your model. _____

e. What is the change in the amount of sand? _____

Garden Temps

Review the example problem. Then, write an equation and use integer multiplication rules to multiply and answer the questions.

Example

The temperature drops **4** degrees every hour for **12** hours. How does the temperature change?

Step 1

Identify the integer representing the groups and whether it is positive or negative.

Each hour is a group. There are **12** hours. The hours move forward, so the integer is **12**.

Step 2

Identify the integer representing the number of items in each group and whether it is positive or negative.

Each hour, the temperature changes **4** degrees, so **4** is the number of items in each group. The temperature is dropping, so the integer is **–4**.

Step 3

Write an equation to show how many degrees the temperature changes in 12 hours.

12 × **–4** = t

Step 4

Use integer multiplication rules to solve. Then interpret the product.

positive × negative = negative

12 × **–4** = –48

–48 is the temperature changes in 12 hours. Since it is negative, it shows that the temperature was 48 degrees lower after 12 hours.

1. The temperature warms 3 degrees per hour.
What was the temperature 6 hours ago compared to now? Equation: _____

Since the product is _____, that means that the temperature _____

_____

2. The temperature drops 5 degrees per hour.
What was the temperature 7 hours ago compared to now? Equation: _____

Since the product is _____, that means that the temperature _____

_____

3. Solve:

4 × –9 = _____ 9 × –6 = _____ –3 × –7 = _____

–2 × –11 = _____ 9 × –1 = _____ –2 × 6 = _____

Lesson 9 Exit Ticket

Part 1: Use **counters** to model the problems. Then, answer the questions.

1. Steve goes scuba diving. From the surface, he swims down to a coral reef at a rate of 8 feet per minute for 6 minutes. What is his depth now compared to 6 minutes ago?

a. What integer represents the number of groups? _____

b. What integer represents the number of items in each group? _____

c. What color will the counters be after multiplying? Explain.

_____

_____

_____

_____

d. Write an equation to represent your model. _____

e. Is the product positive or negative? _____

What does that mean in terms of the real-world context? _____

_____

_____

Part 2: Use the rules for integer multiplication to find the products.

2. $-9 \times 3 =$ _____

3. $10 \times -12 =$ _____

4. $-6 \times -12 =$ _____

5. $8 \times -8 =$ _____

6. $-5 \times -7 =$ _____

Extra Practice: Color By Product

Find the product using integer multiplication and division rules. Color the boxes for all positive integers one color, and the boxes for negative integers another color.

$-3 \times -24 =$ _____	$4 \times -15 =$ _____	$-8 \times -2 =$ _____	$-2 \times 10 =$ _____	$7 \times -10 =$ _____
$6 \times -8 =$ _____	$-7 \times -2 =$ _____	$-12 \times 6 =$ _____	$11 \times 6 =$ _____	$6 \times -3 =$ _____
$-9 \times -9 =$ _____	$-12 \times 9 =$ _____	$-5 \times -4 =$ _____	$-10 \times -6 =$ _____	$4 \times -6 =$ _____
$-1 \times 1 =$ _____	$-6 \times -4 =$ _____	$-3 \times -12 =$ _____	$-8 \times 7 =$ _____	$-8 \times 12 =$ _____
$7 \times -10 =$ _____	$5 \times -4 =$ _____	$5 \times 2 =$ _____	$6 \times -1 =$ _____	$11 \times 10 =$ _____

Bingo

Prove It

Read the problem and answer the questions.

1. Brynn went golfing last weekend. On the last 5 holes of her round, she scored 2 shots under par each hole (–2). Brynn wants to figure out how much her score changed over the last 5 holes and prove whether her score is positive or negative.

a. What multiplication expression models the problem? _____

b. Write an equation by setting your expression to equal 0. _____

c. How can you make the equation true? _____

d. Use the distributive property to simplify the equation. Show your work.

e. What does your proof show? _____

2. Dipesh predicted the product of -8×-7 would be positive. Tamika predicted it would be negative.

a. Using opposites, the zero product property, and the distributive property, prove which student is correct.

b. Which student is correct? _____

Prove the Product

Review the example problem. Then use the zero product property, the distributive property, and opposite pairs to prove each statement.

Example

Prove that **6** × **–5** has a negative product.

Step 1

Set the equation equal to 0.

6 × **–5** = 0

Step 2

Use the zero product property and opposite integers to make the equation true.

6 × 0 = 0 and **–5** + 5 = 0

So, **6** × (**–5** + 5) = 0.

Step 3

Apply the distributive property and simplify the positive factors.

6 × (**–5** + 5) = 0

(**6** × **–5**) + (**6** × 5) = 0

(**6** × **–5**) + 30 = 0

Step 4

Use opposites to explain why a positive and negative factor have a negative product.

The sum of an opposite pair is 0, so (6 × –5) must equal the opposite of 30, which is –30.

(**6** × **–5**) + 30 = 0

(–30) + 30 = 0

So, **6** × **–5** = –30.

1. Prove that 8 × –3 has a negative product.

2. Prove that –12 × –1 has a positive product.

3. Prove that –11 × –6 has a positive product.

4. Prove that –4 × 8 has a negative product.

Lesson 10 Exit Ticket

Part 1: Read the problem and answer the questions.

1. Charmaine bought 12 shares of Global Widgets stock. A month later, the price of each share of stock dropped $5.

a. What multiplication expression models the problem? _____

b. Write an equation by setting your expression to equal 0. _____

c. How can you make the equation true? _____

d. Write the true equation you describe. Then use the distributive property to solve. Show your work.

Part 2: Use the zero product property, the distributive property, and opposite pairs to prove each statement.

2. Prove that -5×-9 has a positive product.

3. Prove that -4×6 has a negative product.

4. $4 \times -6 =$_____

Extra Practice: I'm Positive It's Negative!

Part 1: Determine whether the following statements are *true* or *false*.

1. A negative product must have a negative factor. _____

2. A positive times a negative will always give a positive product. _____

3. The zero product property is the only multiplication property you can use to prove the integer multiplication rules. _____

4. Opposite pairs equal zero when multiplied together. _____

5. If you know that two expressions are equal, you can substitute one for another in an expression. _____

Part 2: Match the factors with the correct product.

9×9	12
-2×-6	–81
-36×-3	–12
9×-9	81
3×-4	108
18×-6	–108

Part 3: Circle the equations that have a positive product and draw a rectangle around the equations that have a negative product.

25×-6

-17×-8 $\quad$ -9×6

-5×-18

-14×3 $\quad$ 11×-10

-32×-2

Joke Code

What do you call a crate of ducks?

CODE KEY

A	**–24**	**N**	**–14**
B	**12**	**O**	**100**
C	**–30**	**P**	**30**
D	**4**	**Q**	**–20**
E	**–48**	**R**	**45**
F	**16**	**S**	**–9**
G	**26**	**T**	**36**
H	**18**	**U**	**21**
I	**9**	**V**	**24**
J	**–15**	**W**	**58**
K	**70**	**X**	**–42**
L	**–100**	**Y**	**55**
M	**–84**	**Z**	**–12**

_____		_____	_____	_____		_____	_____
–8 × 3		–2 × –6	–10 × –10	–6 × 7		–20 × –5	–4 × –4

_____	_____	_____	_____	_____	_____	_____	_____
4 × –5	–3 × –7	–12 × 2	–5 × 6	–7 × –10	–12 × 4	–9 × –5	3 × –3

Bake Sale

Part 1: Read the problem and complete the equation. Show your work

1. I need 3 ⅓ dozen cookies for the bake sale. I haven't made ⅛ of the cookies I need. What number represents the amount of cookies I have now?

$-3\frac{1}{3} \times \frac{1}{8} =$ _____

2. I made 3 ⅘ trays of cupcakes for the bake sale. By noon I've sold 1/10 of each tray. What number represents the chanage in the amount of cupcakes I have

$3\frac{4}{5} \times -\frac{1}{10} =$ _____

3. I borrowed 5 pounds of powdered sugar from a friend. I used ⅚ of the powdered sugar and gave the rest back. What number represents the pounds of powdered sugar I have now?

$-5 \times \frac{5}{6} =$ _____

4. I brought 1 ½ cakes for the bake sale to sell by the slice. At the end of the bake sale, I have sold ⅔ of the cake that I brought. What number represents the change in the amount of cake I have?

$1\frac{1}{2} \times -\frac{2}{3} =$ _____

Part 2: Complete each equation.

5. $\frac{5}{7} \times -\frac{1}{7} =$ _____

6. $-8 \times -\frac{3}{10} =$ _____

7. $-\frac{1}{4} \times -\frac{2}{5} =$ _____

8. $-4 \times -\frac{2}{3} =$ _____

9. $\frac{9}{13} \times -2 =$ _____

10. $-\frac{3}{11} \times -\frac{5}{8} =$ _____

11. $\frac{3}{8} \times -\frac{7}{10} =$ _____

12. $-\frac{1}{11} \times \frac{1}{3} =$ _____

13. $-\frac{2}{3} \times -\frac{4}{11} =$ _____

14. $-\frac{2}{3} \times -\frac{1}{2} =$ _____

Rational Products

Review the example problem. Then use rational and integer multiplication rules to multiply positive and negative rational numbers and answer questions.

Example

What is the product of $-\frac{13}{4} \times -\frac{2}{5}$?

Step 1

Multiply the rational numbers disregarding the signs of the factors.

$$\frac{13}{4} \times \frac{2}{5} = \frac{(13 \times 2)}{(4 \times 5)} = \frac{26}{20}$$

Simplify the product if possible.

$$\frac{26}{20} \div \frac{2}{2} = \frac{13}{10}$$

Step 2

Look at the signs of the original factors and apply the correct integer multiplication rule.

$-\frac{13}{4} \times -\frac{2}{5}$ is a negative times a negative.

The product will be positive.

$$-\frac{13}{4} \times -\frac{2}{5} = \frac{13}{10}$$

1. $\frac{1}{6} \times -2\frac{1}{3} =$ _____

2. $-\frac{1}{3} \times -\frac{9}{20} =$ _____

3. $-7 \times -1\frac{2}{4} =$ _____

4. $1\frac{7}{8} \times -\frac{7}{6} =$ _____

5. $-14\frac{1}{2} \times \frac{2}{3} =$ _____

6. $-\frac{2}{3} \times 1\frac{5}{6} =$ _____

7. $-\frac{7}{8} \times -\frac{4}{5} =$ _____

8. $\frac{9}{10} \times -3 =$ _____

9. $4\frac{2}{5} \times -3 =$ _____

10. $4\frac{2}{5} \times -\frac{3}{4} =$ _____

11. $-1\frac{3}{4} \times 5\frac{1}{2} =$ _____

12. $-\frac{1}{6} \times -2\frac{5}{6} =$ _____

13. $6\frac{3}{8} \times -2 =$ _____

14. $-3\frac{2}{3} \times 2 =$ _____

Lesson 11 Exit Ticket

Find the product. Simplify if possible.

1. $-\frac{1}{4} \times -\frac{11}{2} =$ _____

2. $1\frac{2}{3} \times -\frac{5}{7} =$ _____

3. $\frac{7}{12} \times -\frac{1}{2} =$ _____

4. $-\frac{2}{9} \times -\frac{5}{8} =$ _____

5. $-\frac{1}{5} \times \frac{1}{5} =$ _____

6. $-\frac{7}{11} \times -1\frac{3}{5} =$ _____

Extra Practice: Be Rational

Part 1: Complete the following statements with *sometimes, always,* or *never.*

1. The product of two rational factors is _____ greater than 1.

2. Two negative factors _____ have a positive product.

3. When multiplying an integer by a fraction, the product will _____ be positive.

4. A positive factor and a negative factor can _____ have a product greater than 0.

5. _____ add the numerators and denominators to find the product of fractions.

Part 2: Match the factors with the correct product.

6.

$-\frac{1}{12} \times -\frac{4}{5}$	$5\frac{2}{3}$
$1\frac{3}{5} \times -2\frac{5}{6}$	$-4\frac{8}{15}$
$\frac{7}{8} \times -\frac{5}{9}$	$\frac{1}{15}$
$\frac{2}{10} \times -3\frac{1}{4}$	$-\frac{35}{72}$
$-3\frac{2}{5} \times -1\frac{2}{3}$	$-\frac{13}{20}$

Part 3: State whether the product will be positive or negative.

7. $-\frac{1}{2} \times -4\frac{2}{5}$ _____

8. $-\frac{4}{15} \times \frac{3}{10}$ _____

9. $\frac{20}{6} \times -\frac{1}{12}$ _____

10. $-5\frac{2}{3} \times -\frac{5}{24}$ _____

11. $-\frac{36}{8} \times -\frac{4}{9}$ _____

12. $-\frac{8}{13} \times \frac{12}{7}$ _____

Memory

$\frac{1}{4} \times -\frac{4}{4}$	$-\frac{1}{4}$	$-\frac{11}{12} \times -\frac{1}{3}$
$-\frac{2}{3} \times -\frac{3}{10}$	$\frac{1}{5}$	$\frac{11}{36}$
$\frac{6}{7} \times -\frac{2}{3}$	$-\frac{4}{7}$	$-\frac{3}{4} \times -\frac{5}{6}$
$-\frac{9}{11} \times -\frac{1}{9}$	$\frac{1}{11}$	$\frac{5}{8}$

Memory

$-\frac{1}{2} \times \frac{3}{4}$	$-\frac{3}{8}$	$-\frac{4}{5} \times \frac{1}{2}$
$\frac{7}{9} \times -\frac{7}{8}$	$-\frac{49}{72}$	$\frac{2}{5}$
$-\frac{1}{3} \times -\frac{3}{4}$	$\frac{1}{4}$	$-\frac{2}{3} \times -\frac{1}{2}$
$-\frac{1}{2} \times -\frac{9}{10}$	$\frac{9}{20}$	$\frac{1}{3}$

Multiplication Madness

$\frac{1}{4}$ Start	$\frac{2}{3}$	$-3\frac{2}{5}$	$-\frac{7}{8}$	$\frac{3}{4}$	$\frac{1}{2}$
FINISH LINE					$-2\frac{7}{9}$
		$-\frac{8}{2}$			$1\frac{1}{6}$
$\frac{6}{3}$	$-\frac{2}{9}$	$\frac{6}{7}$			$-\frac{9}{10}$
$-\frac{7}{3}$					$1\frac{4}{5}$
$6\frac{1}{2}$	$-\frac{2}{7}$	$\frac{3}{8}$	$2\frac{5}{6}$	$-1\frac{3}{4}$	$4\frac{1}{7}$

Good Neighbors

Use **counters** to model the problems and answer the questions.

1. Anya and her two sisters found a lost dog at the park. Anya called the phone number on the dog's tag and the owner came right over. The owner offered a reward of $15 for the 3 sisters to share equally, but the girls refused it. How much does each girl have after refusing the reward?

a. Is the dividend positive or negative? How do you know? _____

_____

b. Is the divisor positive or negative? How do you know? _____

_____

c. What color will the counters be after dividing? Explain. _____

_____

d. Write an equation to represent your model. _____

e. What does the quotient represent in the problem? _____

_____

2. When they found the dog, the sisters bought food and treats. The bill was $24. They planned to split it equally 3 ways. But the store owner refused their money, because they were doing a good deed for a stray dog. How much money does each girl have after visiting the pet store?

a. Is the dividend positive or negative? How do you know? _____

_____

b. Is the divisor positive or negative? How do you know? _____

_____

c. What color will the counters be after dividing? Explain. _____

_____

d. Write an equation to represent your model. _____

e. What does the quotient represent in the problem? _____

_____

Blanket Cost

Part 1: Use **counters** to model the problems and answer the questions.

1. Marisol helps her friend's mom make blankets for a local children's hospital. The total they spend on yarn for the blankets is $32. They make a total of 8 blankets. How much does each blanket cost them?

a. Is the dividend positive or negative? How do you know? _____

_____

_____

b. Is the divisor positive or negative? How do you know? _____

_____

c. What color will the counters be after dividing? Explain. _____

_____

_____

d. Write an equation to represent your model. _____

e. What does the quotient represent in the problem? _____

_____

Part 2: Use **counters** to model the problems and complete the equations.

2. $-20 \div -5 =$ _____

3. $-33 \div -11 =$ _____

4. $27 \div -9 =$ _____

5. $16 \div -4 =$ _____

6. $-18 \div 6 =$ _____

7. $-88 \div -11 =$ _____

8. $-20 \div 5 =$ _____

9. $-28 \div -4 =$ _____

Lesson 12 Exit Ticket

Part 1: Use **counters** to model the problems and answer the questions.

1. Charlotte wins the Cheat Lake Elementary School's baking contest and earns the $18 prize. The 3 contest sponsors contributed equally to the prize money. However, Charlotte doesn't feel right about keeping the money because the point of the baking contest was to raise money for the school. How much money from each sponsor will Charlotte lose if she refuses the money?

a. Is the dividend positive or negative? How do you know? _____

_____

_____

b. Is the divisor positive or negative? How do you know? _____

_____

c. What color will the counters be after dividing? Explain. _____

_____

_____

_____

d. Write an equation to represent your model. _____

e. What does the quotient represent in the problem? _____

_____

Part 2: Use **counters** to model the problems and complete the equations.

2. $-20 \div 5 =$ _____

3. $-12 \div -6 =$ _____

4. $-27 \div -3 =$ _____

Extra Practice: Loan Payment

Use **counters** to model the division problems represented in the following scenarios. Then, answer the questions.

1. Quinn set up an automatic withdrawal from his checking account of $12 per month to pay back a loan of $60.

a. Use two-color counters to model how many months it takes for Quinn to pay off his loan.

b. Write an integer division equation for this situation. _____

c. It will take Quinn _____ months to pay back his loan.

2. Use the chart to answer the questions. For each problem, write an equation using positive and negative integers.

Lender	Borrower	Loan Amount	Length of Loan	Monthly Payment
Benjamin	Chloe	$42		$6
Hayden	Eli	$36	9 months	$4
Genesis	Abby	$27	9 months	

a. How long is Benjamin without the money he lent to Chloe?

Equation: _____ Benjamin is without the money for _____ months.

b. Sebastian and Charlotte decide to help Eli pay off his loan. If they split the loan between them, how much does each pay?

Equation: _____ Sebastian and Charlotte each pay _____ dollars.

c. Each month, Abby refuses to pay back her loan to Genesis. How much money does she keep each month?

Equation: _____ Abby keeps _____ dollars each month.

Model Muddle Match

Set 1

$-12 \div 6 = -2$	$-12 \div -2 = 6$
$-12 \div -6 = 2$	$-12 \div 2 = -6$

Set 2

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

Set 3

$-10 \div 5 = -2$	$-10 \div -2 = 5$
$-10 \div -5 = 2$	$-10 \div 2 = -5$

Set 4

$-24 \div 6 = -4$	$-24 \div -4 = 6$
$-24 \div -6 = 4$	$-24 \div 4 = -6$

Tuskegee Airmen

Rewrite each division equation as a multiplication equation with a variable for the missing factor. Then use integer multiplication rules to find the quotient.

1. $-100 \div 20 =$ _____

_____ × _____ = _____

2. $54 \div -9 =$ _____

_____ × _____ = _____

3. $-75 \div -25 =$ _____

_____ × _____ = _____

4. $-6 \div 3 =$ _____

_____ × _____ = _____

5. $36 \div -4 =$ _____

_____ × _____ = _____

6. $12 \div 3 =$ _____

_____ × _____ = _____

7. $-24 \div -6 =$ _____

_____ × _____ = _____

8. $55 \div -11 =$ _____

_____ × _____ = _____

9. $-81 \div 9 =$ _____

_____ × _____ = _____

10. $-36 \div -6 =$ _____

_____ × _____ = _____

11. $44 \div -11 =$ _____

_____ × _____ = _____

12. $-20 \div 10 =$ _____

_____ × _____ = _____

13. $66 \div 11 =$ _____

_____ × _____ = _____

14. $-10 \div -1 =$ _____

_____ × _____ = _____

15. $-121 \div 11 =$ _____

_____ × _____ = _____

16. $-6 \div -1 =$ _____

_____ × _____ = _____

Hike to the Lake

Review the example problem. Then write a related multiplication equation for each problem and use integer multiplication rules to find the quotient.

Example

A film crew is hiking to a lake to find a plane wreck. They have arrived at the lake, but **12** minutes ago, they were **600** feet from the lake. How many feet did they walk each minute on average?

Step 1

Write a related multiplication equation.

–600 ÷ **–12** = *m*

–12 × *m* = **–600**

Step 2

Find the missing factor without looking at the signs.

12 × 50 = **600**

Step 3

Use integer multiplication rules to identify the sign of the missing factor.

A negative times a positive equals a negative, so the missing factor is positive.

–12 × 50 = **–600**

Step 4

Substitute the missing factor for the quotient in the original equation.

–600 ÷ **–12** = 50

They walked 50 feet per minute.

1. –1,050 ÷ –70 = _____

_____ × _____ = _____

2. –10 ÷ 10 = _____

_____ × _____ = _____

3. 540 ÷ –20 = _____

_____ × _____ = _____

4. –84 ÷ –14 = _____

_____ × _____ = _____

5. –125 ÷ 25 = _____

_____ × _____ = _____

6. –42 ÷ –14 = _____

_____ × _____ = _____

7. –480 ÷ –40 = _____

_____ × _____ = _____

8. 165 ÷ –15 = _____

_____ × _____ = _____

9. 99 ÷ 9 = _____

_____ × _____ = _____

10. 72 ÷ –8 = _____

_____ × _____ = _____

11. –96 ÷ –8 = _____

_____ × _____ = _____

12. –32 ÷ –8 = _____

_____ × _____ = _____

Lesson 13 Exit Ticket

Part 1: Use integer multiplication rules to find the quotients and answer the questions.

1. $-56 \div 7 = m$

Related multiplication equation: _____

Is the missing factor positive or negative? How do you know?

_____

_____

$-56 \div 7 =$ _____

2. $-88 \div -11 =$ _____

3. $125 \div -5 =$ _____

Part 2: Complete the sentences to list the rules for dividing integers.

4. A positive divided by a positive equals a _____ quotient.

5. A positive divided by a negative equals a _____ quotient.

6. A negative divided by a positive equals a _____ quotient.

7. A negative divided by a negative equals a _____ quotient.

Extra Practice: Sweet Stocks

Part 1: Use integer multiplication rules to divide positive and negative integers and answer questions based upon the following chart.

Stocks	Number of Shares Bought (Start of Week)	Total Value Loss/Gain (End of Week)	Loss/Gain per share (End of Week)
Gummy Worm Stock	7	–49	
Candy Heart Stock		–25	–5

1. How did the value of each Gummy Worm stock change by the end of the week?

a. Division equation: _____ Multiplication equation: _____

b. Solve the equation to find the quotient. Show your work.

Each stock's value changed by _____ dollars.

2. How many shares of Candy Heart stocks were bought at the start of the week?

a. Division equation: _____ Multiplication equation: _____

b. Solve the equation to find the quotient. Show your work.

_____ shares were bought at the start of the week.

Part 2: Rewrite each division equation as the related multiplication equation.

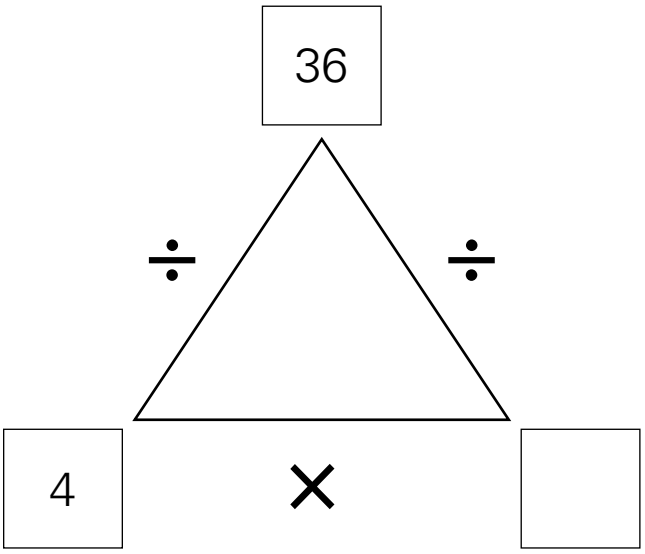
3. $100 \div -4 = v$ _____

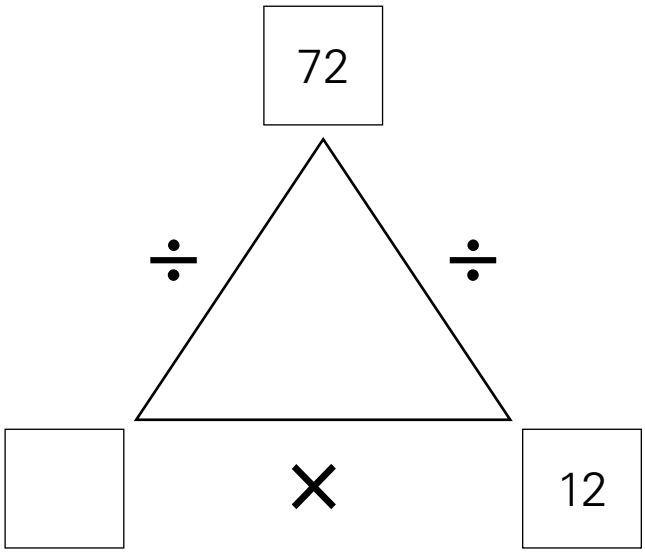
4. $-255 \div -17 = w$ _____

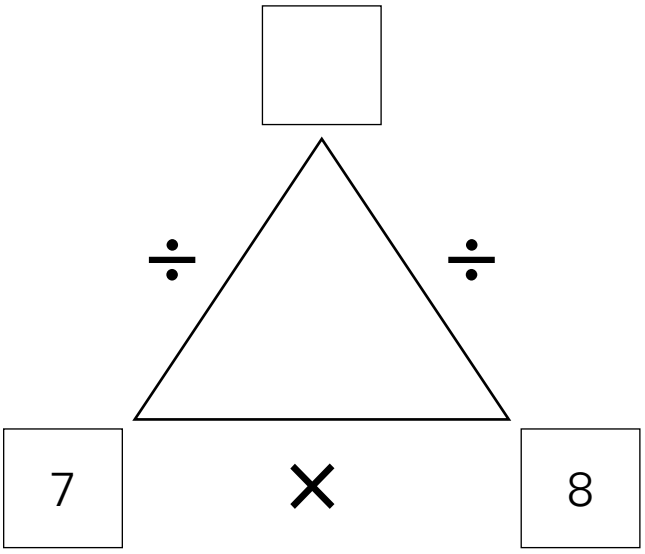
5. $-54 \div 9 = y$ _____

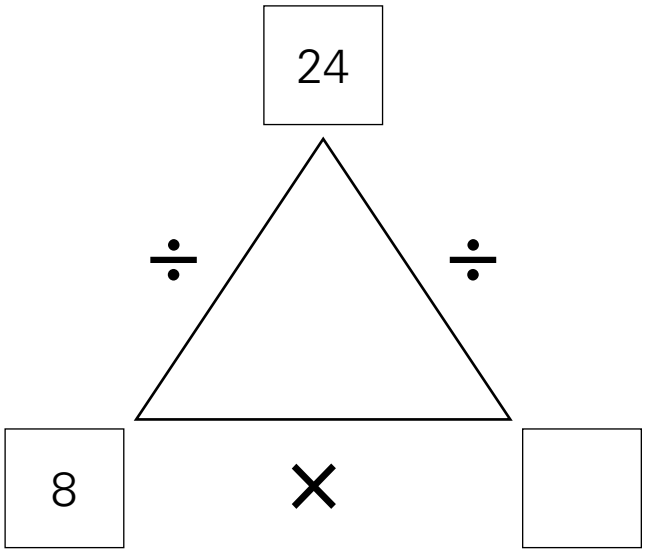
6. $-60 \div -3 = z$ _____

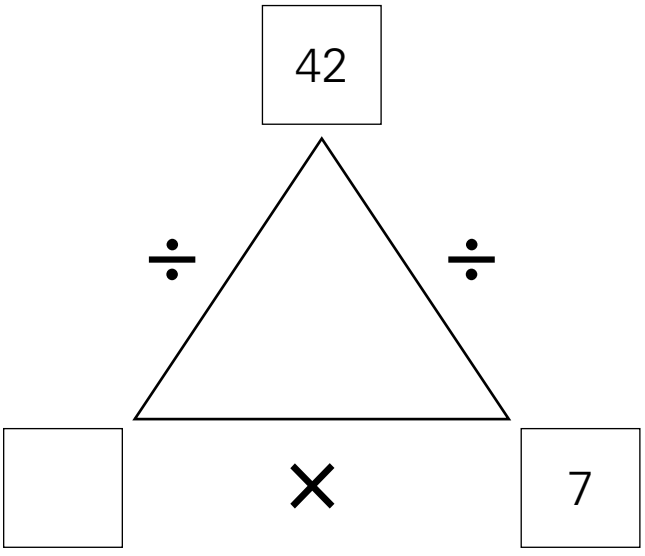
Number Triangles

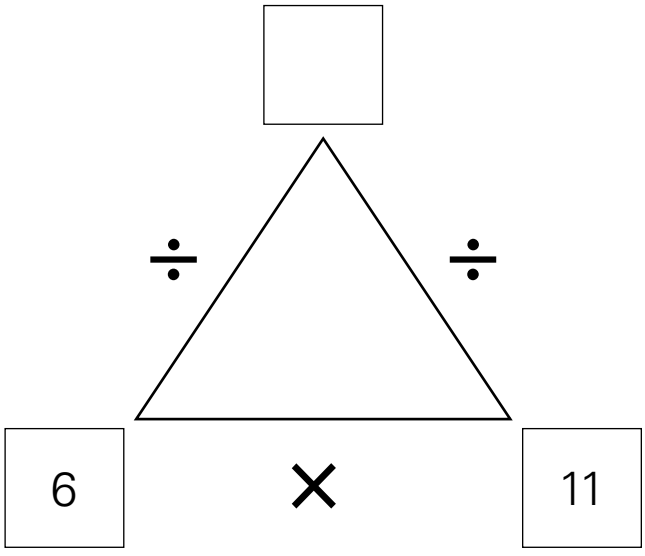












Desert Drive

Use a tape diagram to model the problem. Then answer the questions.

1. Charlotte also played the *Desert Drive* video game. From cactus bumps, she lost 35 points on each level. She wants to figure out how many total points she lost on 4 levels.

a. Write and solve an equation to represent the situation. _____

b. What does the solution represent? _____

2. On Charlotte's second attempt at playing the game, she did better and ended with −75 points. She played a total of 15 levels and lost the same number of points on each level. How many points did Charlotte lose per level?

a. Write and solve an equation to represent the situation. _____

b. What does the solution represent? _____

_____

Temperature Drop

Review the example problem. Use **tape diagrams** to model the problems and answer the questions.

Example

The temperature dropped **28**°F over **4** days. How much did the temperature change each day?

Step 1

Decide whether the situation is multiplication or division.

The total is known: **28** degrees.
The number of groups is known: **4** days.
The number of items in each group is unknown:
How many degrees did the temperature change each day?

Because the total and the number of groups is known, this is a division problem.

Step 2

Write a multiplication or division equation.

The temperature dropped, so the dividend is negative.

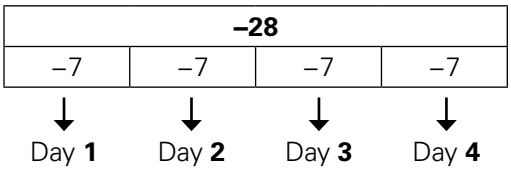
The number of days moved forward in time, so the divisor is positive.

$-28 \div 4 = d$

Step 3

Draw a tape diagram to model the equation. The dividend is the total. The number of groups is the number of parts.

–28 ÷ **4** = –7



Step 4

Interpret the quotient or product.

Since the quotient is negative, the temperature dropped 7 degrees each day.

1. Mei is performing a chemistry experiment with a beaker of water. During the experiment, the water temperature drops 6°C per minute. How many minutes will it take for the temperature to drop 18°C?

a. Write and answer an equation to represent the situation. _____

b. What does the solution represent? _____

_____

2. In order to have school canceled for frigid temperatures tomorrow, the temperature needs to drop 4 degrees per hour over the next 7 hours. How many total degrees does the temperature need to drop?

a. Write and answer an equation to represent the situation. _____

b. What does the solution represent? _____

_____

Lesson 14 Exit Ticket

Use a tape diagram to model each problem. Then answer the questions.

1. A business lost $750 at a rate of $150 per month. How long did the business take to lose all $750?

a. Write an equation to represent the situation. _____

b. What does the solution represent? _____

_____

2. Jin's grade goes down 4 points per week over 7 weeks. How many points did her grade change after 7 weeks?

a. Write an equation to represent the situation. _____

b. What does the solution represent? _____

_____

3. The temperature dropped 24 degrees over 6 hours. How many degrees did it drop per hour?

a. Write an equation to represent the situation. _____

b. What does the solution represent? _____

_____

Extra Practice: Go Doggies, Go!

Write a short story about a dog for each tape diagram. Make sure your story includes a whole, a number of groups, and the number of items in each group. Write an equation to represent your story.

−36			
−9	−9	−9	−9

Write an equation to represent the situation. _____

60											
5	5	5	5	5	5	5	5	5	5	5	5

Write an equation to represent the situation. _____

Floor Model

1. Greg lost a total of $96 over 12 weeks. How did the money he had change each week?

Equation: _____

What does the solution represent? _____

_____

2. The temperature dropped 6 degrees per hour over 8 hours. How did the temperature change after 8 hours?

Equation: _____

What does the solution represent? _____

_____

3. Brennan played 7 rounds of the Fly Splatter game. He lost 10 points per game. How did his score change after 7 rounds?

Equation: _____

What does the solution represent? _____

_____

4. Kianna walked for 3 miles. At the end, she realized that she had a hole in her pocket and lost 45 pennies throughout her walk. Assuming she lost them at an equal rate, how did the number of pennies she have change per mile?

Equation: _____

What does the solution represent? _____

_____

Tape Diagrams

Tape Diagrams

Batting Averages

Complete the table and convert fractions to decimals (to the nearest thousandths).

Player	Hits	At Bats	Batting average as a fraction	Batting average as a decimal (thousandths)
Nina	4	5		
Ayisha	10	12		
Sophie	3	12		
Kimberly	3	9		

1. Can any of the batting averages be converted to a decimal using equivalent fractions? Explain.

_____

_____

2. Convert Nina's batting average to a decimal.	**3.** Convert Ayisha's batting average to a decimal.
4. Convert Sophie's batting average to a decimal.	**5.** Convert Kimberly's batting average to a decimal.

Softball Game Attendance

Review the example problem. Convert fractions to decimals.

Example

At the last three softball games, **$\frac{3}{5}$**, **$\frac{7}{8}$**, and **$\frac{8}{9}$** of the seats in the stands were filled. Javier, the school reporter, wants to report the attendance as a decimal. How can he do that?

Step 1

If the denominator can be changed to a power of 10, use equivalent fractions to convert.

$\frac{\mathbf{3}}{\mathbf{5}} \times \frac{2}{2} = \frac{6}{10}$

$\frac{6}{10}$ as a decimal is 0.6.

$\frac{\mathbf{3}}{\mathbf{5}} = 0.6$

Step 2

If the denominator cannot be changed to a power of 10, use division to convert. For repeating decimals, draw a bar over the digits that repeat.

$\frac{\mathbf{7}}{\mathbf{8}} = 0.875$

$$
\begin{array}{r}
0.875 \\
8\overline{)7.000} \\
\underline{-0000} \\
7000 \\
\underline{-6400} \\
600 \\
\underline{-560} \\
40 \\
\underline{-40} \\
0
\end{array}
$$

$\frac{\mathbf{8}}{\mathbf{9}} = 0.\overline{8}$

$$
\begin{array}{r}
0.888 \\
9\overline{)8.000} \\
\underline{-0\,000} \\
8\,000 \\
\underline{-7\,200} \\
800 \\
\underline{-720} \\
80 \\
\underline{-72} \\
8
\end{array}
$$

The softball team made it to the playoffs. So far, ticket sales for each game are as shown in the table below. Help Javier convert each fraction of sales to a decimal.

	Game 1	Game 2	Game 3
Ticket Sales as a Fraction	$\frac{18}{20}$	$\frac{4}{6}$	$\frac{5}{8}$
Ticket Sales as a Decimal			

Convert $\frac{18}{20}$ to a decimal.	Convert $\frac{4}{6}$ to a decimal.	Convert $\frac{5}{8}$ to a decimal.

Lesson 15 Exit Ticket

Part 1: Use long division to convert the fractions to decimals. Show your work. Use a repeating bar to show repeating decimals.

1. $\frac{2}{3}$ = _____

2. $\frac{3}{8}$ = _____

3. $\frac{5}{6}$ = _____

Part 2: Use equivalent fractions to convert the fractions to decimals. Show your work.

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

5. $\frac{6}{8}$ = _____

6. $\frac{2}{20}$ = _____

Extra Practice: Pocket Change

Part 1: Use equivalent fractions or long division to convert the fractions to decimals and answer questions.

Dana found $\frac{6}{8}$ of a dollar in her brother's pocket while doing laundry.

a. Which process would you use to convert $\frac{6}{8}$ to a decimal to determine how much money Dana found? Explain. _____

_____

b. Convert $\frac{6}{8}$ to a decimal. Show your work.

$\frac{6}{8}$ = _____

Part 2: Match the fractions with the equivalent decimal.

$\frac{28}{50}$	$0.\overline{6}$
$\frac{6}{11}$	0.56
$\frac{8}{12}$	0.125
$\frac{36}{100}$	0.36
$\frac{1}{8}$	$0.\overline{54}$

Part 3: Circle the fractions you could convert to decimals using equivalent fractions. Draw a line through the fractions you must use long division to convert.

$\frac{4}{5}$ $\frac{7}{20}$ $\frac{10}{35}$ $\frac{6}{7}$ $\frac{1}{3}$ $\frac{35}{50}$ $\frac{2}{10}$ $\frac{5}{36}$ $\frac{6}{8}$

Joke Code

Convert the fractions to decimals to solve the riddle. Show your work.

What do you call a skeleton who sits around doing nothing?

CODE KEY

A	**$0.\overline{1}$**	**N**	**$0.\overline{714285}$**
B	**$0.\overline{6}$**	**O**	**0.47**
C	**0.952**	**P**	**0.925**
D	**0.318**	**Q**	**0.125**
E	**$0.\overline{18}$**	**R**	**0.48**
F	**0.25**	**S**	**0.2**
G	**0.105**	**T**	**0.691**
H	**$0.\overline{3}$**	**U**	**$0.\overline{8}$**
I	**0.749**	**V**	**0.3**
J	**0.5**	**W**	**0.672**
K	**$0.\overline{45}$**	**X**	**0.284**
L	**0.75**	**Y**	**0.85**
M	**$0.\overline{2}$**	**Z**	**0.8**

_____	_____	_____	_____
$\frac{3}{4}$	$\frac{1}{9}$	$\frac{8}{10}$	$\frac{17}{20}$

_____	_____	_____	_____	_____
$\frac{12}{18}$	$\frac{47}{100}$	$\frac{5}{7}$	$\frac{2}{11}$	$\frac{10}{50}$

Assessment

Unit 2 Assessment

1. Multiply.

$15 \times -3 =$ _____ $-4 \times -4 =$ _____

2. Using opposites, the zero product property, and the distributive property, prove that the product of any two negative numbers is positive, using −12 and −4 as an example. Show your work. Then complete the equation.

$-12 \times -4 =$ _____

3. Multiply. Show your work. $-\frac{2}{3} \times -\frac{1}{2} =$ _____

4. Multiply. Show your work. $4\frac{2}{3} \times -\frac{1}{5} =$ _____

5. Rewrite the equation as a multiplication equation and find the value of g.

$-150 \div -5 = g$

_____ × _____ = _____

$g =$ _____

6. Divide.

$-32 \div 4 =$ _____ $-49 \div -7 =$ _____

7. Mackenzie was riding her bike yesterday when a storm front came through. The temperature dropped 2 degrees a minute for 7 minutes. What was the total change in temperature?

a. Write an equation that models the problem. _____

b. The temperature dropped _____ degrees.

8. DeSean skateboarded 27 feet down a hill, decreasing 3 feet of elevation per second. How long did it take him to reach the bottom of the hill? Draw a tape diagram and solve.

It took DeSean _____ seconds to reach the bottom of the hill.

9. Convert the fraction to a decimal. Round to the nearest hundredths place or use a repeating bar.

$\frac{7}{9} =$ _____

10. Convert the fraction to a decimal. Use equivalent fractions and show your work.

$\frac{63}{75} =$ _____

Unit 2 Cumulative Review

1. Lenore bought a new pair of shoes. She saved $9 by using a coupon for 20% off the total. What was the original price of the shoes?

The original price of the shoes was $_____.

2. What is the greatest common factor of the three numbers? 36, 52, 108

The greatest common factor is _____.

3. Asher's bill for a video streaming service is $42 total for the remaining 7 months of the year. If he pays an equal amount each month, how should he record this expense in his budget?

Each month Asher will pay $_____.

4. Add. $-5 + 16 =$ _____

5. Divide. $742 \div 0.4 =$ _____

6. Raven bought a bag of blue and green marbles. According to the package, for every 2 blue marbles, there are 5 green marbles. Complete the ratio table to find out how many green marbles there are if the bag has 24 blue marbles.

Blue	Green
2	5
6	
	25
24	

If Raven's bag has 24 blue marbles,

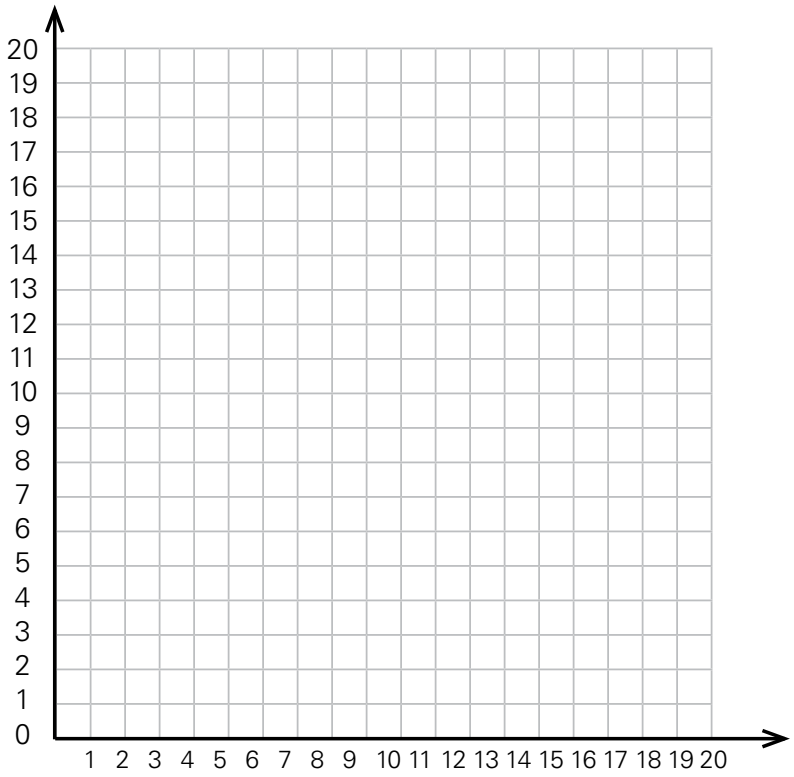
there will be _____ green marbles.

7. Subtract. 44 – (–12) = _____

8. Substitute the values of *x* below into the equation. Find the value of *y*, and plot the coordinate pairs on the graph.

$y = 4x - 3$

x	*y*
2	
3	
5	



9. Tal works at a pet store. One of his jobs is to fill the small bowls for the betta fish with water from special bottles. A bottle has $\frac{9}{12}$ liters of water and each betta fish bowl holds $\frac{1}{4}$ liter. How many betta fish bowls can Tal fill from a single bottle of water?

Tal can fill _____ betta fish bowls.

10. Simplify the expression $(10 - 7) + 3^2 \times 4$. Show your work.

$(10 - 7) + 3^2 \times 4 =$ _____

11. Multiply. $\frac{-2}{3} \times \frac{3}{5} =$ _____

12. Solve for x. $3x + 4 < 10$

13. Ahmed has 80 ounces of butter. If there are 16 ounces in a pound, how many pounds of butter does Ahmed have? Show your work.

Ahmed has _____ pounds of butter.

14. Match the equivalent expressions.

$5(2x + 4)$	$5(4x + 2)$
$20x + 10$	$20x + 8$
$4(2x) + 4(5)$	$5(2x) + 5(4)$
$4(5x + 2)$	$4(2x + 5)$

15. Graph $f < 8$ on the number line.