

6.1 An Integer Experiment

GOAL

Add positive and negative integers.

- Nestor and his friends are playing a basketball game. Players have 2 min to shoot baskets. They score +1 each time they get the ball in the net, and -1 each time they miss. The player with the highest score wins.
 - Nestor got the ball in the net five times during his turn. What is his score? _____
 - Nayana missed twice during her turn. What is her score? _____
 - Fiona got the ball in the net three times during her turn. What is her score? _____
 - Jacob got the ball in the net once, and missed twice. What is his total score? _____

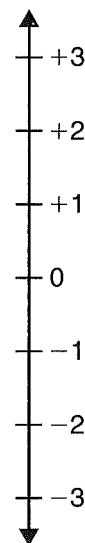
At-Home Help

Integers are the counting numbers (+1, +2, +3, ...), zero (0), and the opposites of the counting numbers (-1, -2, -3, ...).

- The chart shows Nick's score for each of his six turns. Complete the chart to calculate his total score. Use the number line to help you. Move 1 up for each +1, and move 1 down for each -1.

Turn	Shots	Score	Total Score So Far
1st	1 miss	-1	-1
2nd	2 baskets	+2	+1
3rd	1 miss		
4th	3 baskets		
5th	2 misses		
6th	1 basket		

What is Nick's score at the end of the game? _____

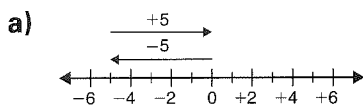


6.2 Adding Integers Using the Zero Principle

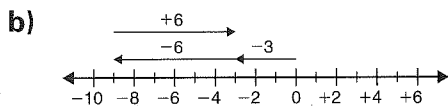
GOAL

Use the zero principle to add integers.

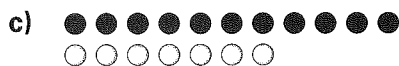
1. Write the addition sentence that is represented by each picture. Black counters represent negative numbers and white counters represent positive numbers. Solve each addition sentence.



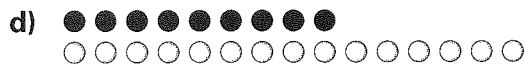
_____ + _____ = _____



_____ + _____ = _____



_____ + _____ = _____



_____ + _____ = _____

2. Use the zero principle to add.

a) $(-1) + (+1) + (-1) + (+1) + (+1) =$ _____

b) $(+1) + (+1) + (-1) + (+1) =$ _____

3. Calculate.

a) $(+3) + (+4) =$ _____

c) $(-5) + (+3) =$ _____

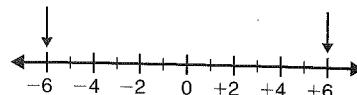
b) $(-4) + (-2) =$ _____

d) $(-6) + (-5) =$ _____

At-Home Help

Opposite integers are two integers the same distance from 0 on a number line.

For example, -6 and $+6$.




The **zero principle** states that the sum of two opposite integers is 0.


For example, $(-6) + (+6) = 0$.

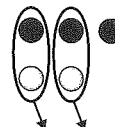
You can use the zero principle to add integers.

For example, calculate

$(-3) + (+2)$.

 I used 3 black counters to represent -3 .

 I used 2 white counters to represent $+2$.

 By the zero principle, the sum of $+1$ and -1 is 0. I paired black and white counters and took them away.

Only 1 black counter is left, so the answer is -1 .

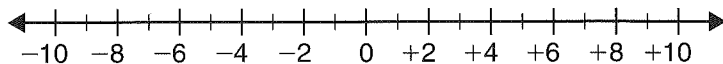
$(-3) + (+2) = (-1)$

6.3 Adding Integers that Are Far from Zero

GOAL

Add integers using number lines.

1. Calculate. Use the number line.



- a) $(-3) + (-5) = \underline{\hspace{2cm}}$ d) $(+7) + (-8) = \underline{\hspace{2cm}}$
 b) $(+4) + (+3) = \underline{\hspace{2cm}}$ e) $(-2) + (+9) = \underline{\hspace{2cm}}$
 c) $(-3) + (+4) = \underline{\hspace{2cm}}$ f) $(-3) + (-2) + (-2) = \underline{\hspace{2cm}}$

2. Calculate.

- a) $(-12) + (+7) = \underline{\hspace{3cm}}$
 b) $(+30) + (+20) = \underline{\hspace{3cm}}$
 c) $(-60) + (+30) = \underline{\hspace{3cm}}$
 d) $(+100) + (-25) = \underline{\hspace{3cm}}$
 e) $(-80) + (+50) = \underline{\hspace{3cm}}$
 f) $(-20) + (-40) + (+10) = \underline{\hspace{3cm}}$

3. Megan and her friends are playing a board game. Complete the table to calculate their final scores.

Name	Starting Point	Points Gained/Lost	Final Score
Megan	0	+12	
Fiona	+15	-11	
Matthew	-3	+20	
Pavlo	+40	-16	
Nayana	-23	-35	

At-Home Help

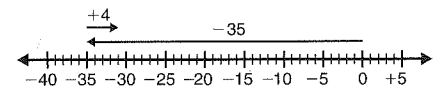
When adding integers that are not close to zero, use a number line to help you. Follow these three steps:

Step 1: Draw an arrow from zero to the first integer.

Step 2: Starting at the tip of the first arrow, draw a second arrow to represent the second integer. The arrow points right if the integer is positive. It points left if the integer is negative.

Step 3: The tip of the second arrow represents the answer.

For example, calculate $(-35) + (+4)$.



$(-35) + (+4) = (-31)$

6.4 Integer Addition Strategies

GOAL

Develop personal addition strategies for integers.

1. Circle pairs of opposite integers in each sum.

a) $(-45) + (+48) + (+45) + (+6)$

b) $(+23) + (+87) + (-23) + (+5)$

c) $(+76) + (-69) + (-8) + (-76)$

2. Calculate.

a) $(-8) + (+8) + (-6) = \underline{\hspace{2cm}}$

b) $(+7) + (-5) + (-7) = \underline{\hspace{2cm}}$

c) $(-40) + (+40) + (-25) = \underline{\hspace{2cm}}$

3. Calculate.

a) $(-450) + (+380) = \underline{\hspace{2cm}}$

b) $(-170) + (+100) = \underline{\hspace{2cm}}$

c) $(+24) + (-122) = \underline{\hspace{2cm}}$

4. Calculate. Use the strategy of your choice.

a) $(-58) + (+40) + (+8) = \underline{\hspace{2cm}}$

b) $(+100) + (-57) + (+57) = \underline{\hspace{2cm}}$

c) $(+46) + (+34) + (-20) + (-26) = \underline{\hspace{2cm}}$

d) $(-125) + (-34) + (+125) + (-16) = \underline{\hspace{2cm}}$

5. Jacob built a model submarine and tested it in a swimming pool.

At 4:00 p.m., the submarine was at -100 cm. Jacob recorded the changes in depth. How deep was the submarine at 5:00 p.m.?

Time	4:00 p.m.	4:15 p.m.	4:30 p.m.	4:45 p.m.	5:00 p.m.
Change in Depth (cm)		+25	-32	+63	-55
Depth (cm)	-100				

At-Home Help

Here are some strategies to use when adding integers:

- Find zero pairs of opposite integers.

For example,

$$(-5) + (\cancel{+16}) + (+8) + (\cancel{-16}) = (-5) + (+8)$$

- Rearrange the question so that the positive and negative integers are grouped together. Add the positive integers and the negative integers separately, and then add the results together.

For example,

$$\begin{aligned} (-4) + (+2) + (+5) + (-3) \\ = (-4) + (-3) + (+2) + (+5) \\ = (-7) + (+7) \\ = 0 \end{aligned}$$

6.5

Subtracting Integers Using Counters

GOAL

Develop a counter model for subtracting integers.

1. Calculate by drawing counters.

a) $(-11) - (-7) = \underline{\hspace{2cm}}$

b) $(-13) - (-5) = \underline{\hspace{2cm}}$

c) $(+6) - (+6) = \underline{\hspace{2cm}}$

2. Calculate.

a) $(-5) - (+3) = \underline{\hspace{2cm}}$

b) $(+1) - (-6) = \underline{\hspace{2cm}}$

c) $(-4) - (-5) = \underline{\hspace{2cm}}$

3. Do these subtractions have the same result?

Use counters to help you explain.

A. $(-2) - (+3)$

B. $(-3) - (+2)$

4. Calculate.

a) $(-10) - (-2) = \underline{\hspace{2cm}}$

c) $(+2) - (+8) = \underline{\hspace{2cm}}$

e) $(-7) - (-3) = \underline{\hspace{2cm}}$

b) $(-3) - (+3) = \underline{\hspace{2cm}}$

d) $(+4) - (-4) = \underline{\hspace{2cm}}$

f) $(-9) - (-3) = \underline{\hspace{2cm}}$

At-Home Help

Use counters, such as white and black checkers, to help you subtract integers.

For example, calculate $(-4) - (+3)$.



I used 4 black counters to represent -4 .



I have to subtract $+3$, so I need 3 white counters. I used the zero principle to add $+3$ and -3 . Then I subtracted $+3$.



7 black counters are left.

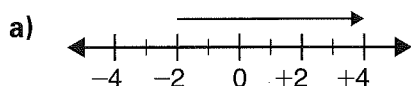
$(-4) - (+3) = (-7)$

6.6 Subtracting Integers Using Number Lines

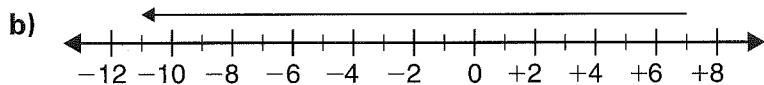
GOAL

Calculate the difference between integers using a number line.

1. Write the subtraction question each arrow represents. Calculate each difference. Part (a) is done for you.



subtraction question $(+4) - (-2) = (+6)$

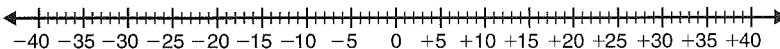


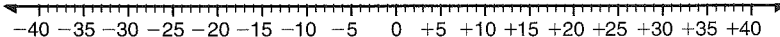
subtraction question _____

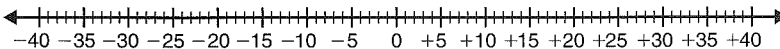


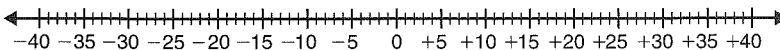
subtraction question _____

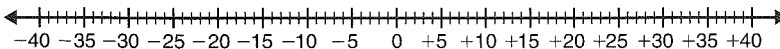
2. Calculate. Use the number lines.

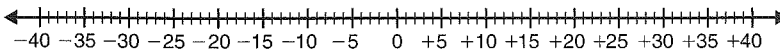
a) $(-32) - (+4) =$ _____ 

b) $(-32) - (-4) =$ _____ 

c) $(+32) - (+4) =$ _____ 

d) $(+32) - (-4) =$ _____ 

e) $(-16) - (-28) =$ _____ 

f) $(+14) - (+21) =$ _____ 

At-Home Help

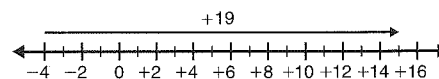
When subtracting integers that are not close to zero, you can use a number line to help you. Follow these three steps:

Step 1: Draw an arrow from the position of the 2nd term to the position of the 1st term.

Step 2: If the arrow points right, the answer is positive. If the arrow points left, the answer is negative.

Step 3: Count the number of units in the arrow and add the appropriate sign.

For example, calculate $(+15) - (-4)$.



$(+15) - (-4) = (+19)$

6.7 Solve Problems by Working Backward

GOAL

Solve problems using the strategy of working backward.

1. Work backward to find the original number.

a)

- Think of a number.
- Subtract +6.
- Add -2.
- Subtract -1.
- The answer is -5.

The original number is _____.

b)

- Think of a number.
- Add +14.
- Add -2.
- Subtract +3.
- Add -4.
- The answer is 0.

The original number is _____.

2. Fill in the blanks to make up your own number trick. Solve your problem.

- Think of a number.
- Subtract _____.
- Add _____.
- Subtract -2.
- Add _____.
- The answer is _____.

The original number is _____.

3. An elevator goes down seven floors, up three floors, up six floors, down eight floors, up one floor, and down six floors. It is now on Floor 3. Which floor did the elevator start on?

4. Megan bought a book for \$10.00, received an allowance of \$15.00, paid back a loan of \$7.00, bought lunch for \$8.00, earned \$8.00 raking leaves, and found \$2.00. She now has \$22.00. How much did she start with?

At-Home Help

When you are working backward, if the question asks you to add, do the opposite and subtract. If the question asks you to subtract, do the opposite and add.

Chapter 6 Test Yourself

Circle the letter of the correct answer.

1. Calculate $(-4) + (+4)$.

- A. -8 B. -4 C. 0 D. +8

2. Calculate $(+8) + (-17)$.

- A. -25 B. +25 C. -9 D. +9

3. Calculate $(+4) + (-14)$.

- A. +10 B. -10 C. +18 D. -18

4. Calculate $(+15) + (-10) + (+3) + (-5)$.

- A. -3 B. -33 C. +3 D. +33

5. Calculate $(-9) - (+5)$.

- A. +14 B. +4 C. -4 D. -14

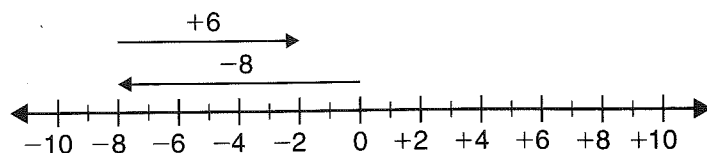
6. Calculate $(+14) - (-12)$.

- A. -26 B. +26 C. -6 D. +6

7. Calculate $(-7) - (-10)$.

- A. +17 B. -17 C. +3 D. -3

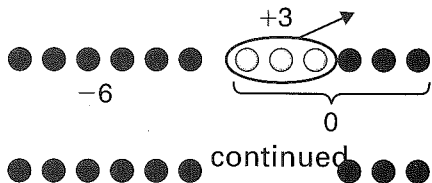
8. Which addition equation is represented by the number line?



- A. $(-8) + (-6) = -14$ C. $(+8) + (-6) = +2$
B. $(-8) + (+6) = -2$ D. $(+8) + (+6) = +14$

Chapter 6 Test Yourself continued

9. Which subtraction equation is represented by the counters?
The black counters are negative and the white counters are positive.



- A. $(-6) - (+3) = -9$ C. $(+6) - (-3) = +9$
 B. $(-6) - (-3) = -3$ D. $(+6) - (+3) = +3$
10. The temperature at 5:00 a.m. was -14°C . By 5:00 p.m., it had risen to $+8^{\circ}\text{C}$.
What is the difference in temperature?
 A. $+6^{\circ}\text{C}$ B. -6°C C. -22°C D. $+22^{\circ}\text{C}$
11. A student received \$45.00 for her birthday. She spent \$35.00 on clothes.
Later, she received \$15.00 for babysitting.
How much money did the student finish with?
 A. \$25.00 B. \$45.00 C. \$40.00 D. \$35.00
12. Julie made cookies on Monday. Her friends ate ten cookies on Tuesday.
On Wednesday, Julie ate three cookies, and on Thursday she took
two cookies to school. By Friday, Julie had seven cookies left. How
many cookies did she bake on Monday?
 A. 22 cookies B. 18 cookies C. 30 cookies D. 16 cookies
13. Nick and Jacob went rock climbing. Nick climbed up 10 m,
slid back 4 m, slid back 6 m, and then climbed up 14 m more.
Jacob climbed 12 m, slid back 4 m, rested, climbed up 33 m,
and then slid back 8 m. They are now together at the 40 m
mark. At what level did each person start climbing?
 A. Nick 6 m and Jacob 9 m C. Nick 12 m and Jacob 14 m
 B. Nick 26 m and Jacob 7 m D. Nick 17 m and Jacob 3 m