

Grade 8 Mathematics

Number and Number Relations: Lesson 9

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol (\downarrow) by them.

Purpose of Lesson 9:

- In this lesson, the tutor and the students will
 - ✓ add and subtract integers, and
 - ✓ solve real-life problems involving integers.

Equipment/Materials Needed:

- Copies of Student Sheets 68 – 70
- Paper and pencils
- Chalkboard

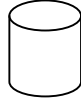
Preparations before beginning Lesson 9:

- Run one copy of Student Sheets 68 – 70 for each student.
- Have paper and pencils available.

Say:

What amount does this picture represent? (-1.) Why? (There are 2 sets of zero pairs. They can be removed to leave -1.) The idea of zero pairs becomes important when representing operations on integers.

] Draw a cup on the board.



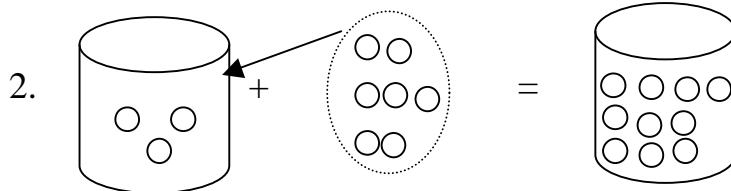
Say:

Let's think of addition as putting counters in a cup. We are going to add $2 + 3$. Draw 2 white circles in the cup and then draw 3 more white circles. We start with 2 positive counters in the cup and then add 3 more positive counters. The sum is 5 positive counters, or 5.
Let's add $-2 + (-3)$. Draw 2 black circles in the cup and then draw 3 more black circles. We start with 2 negative counters in the cup and add 3 more negative counters. The sum is 5 negative counters or -5.

] Give students Student Sheet 68, Problems 1 – 8.

Answers:

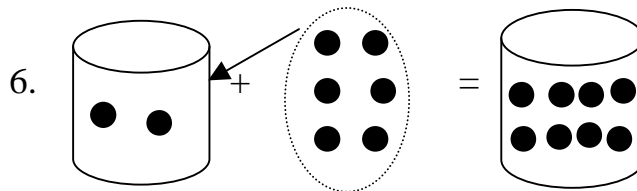
1. $4 + 5 = 9$



3. 5026

4. Positive

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



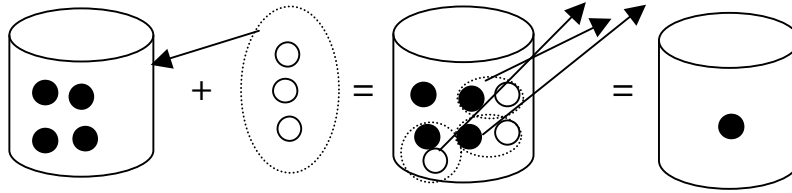
7. -7005

8. Negative

Say:

So far, the problems that we have done have had both addends with the same sign. Let's see what happens when the two numbers have different signs. Remember to think about removing the zero pairs.

Let's add $-4 + 3$. Draw the problems on the board as you talk about them.

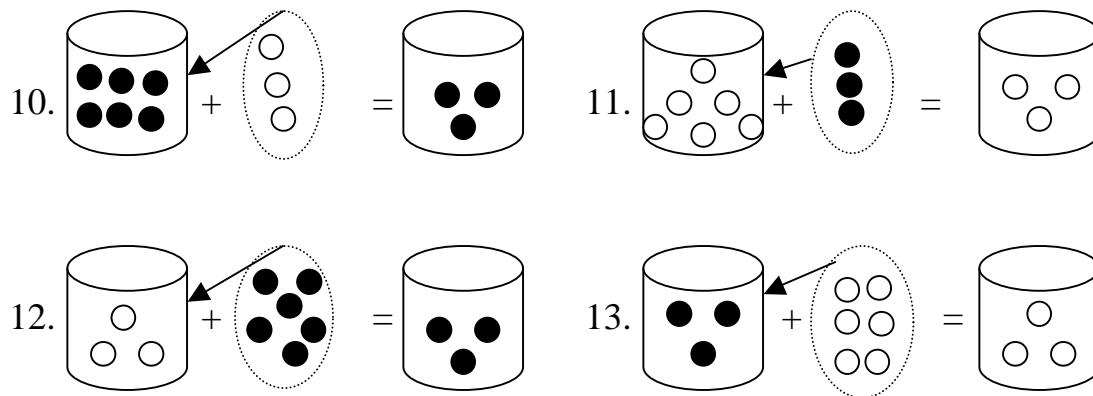


Add the 3 positive counters to the cup. Find zero pairs. Remove them. The sum is the amount left, or -1 . Continue demonstrating with the following problems: $3 + (-4)$, $4 + (-3)$, $-3 + 4$.

Give students the rest of Student Sheet 68, Problems 9 – 16.

Answers:

9. $-5 + 3 = -2$; I put the 3 positive counters in the cups. I removed 3 zero pairs. I was left with -2 .



14. Negative

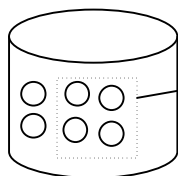
15. Positive

16. The answer will have the sign of the addend that has more counters.

Say:

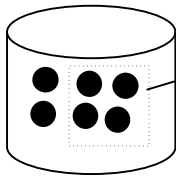
When we subtract integers, let's think of removing counters from a cup.

Model $6 - 4$ on the board. Draw 6 circles in the cup. Erase or remove 4 counters.



Remove 4 positive counters. The answer is two positive counters, or 2.

Model $-6 - (-4)$ on the board. Draw 6 black circles in the cup. Erase or remove 4 black circles.



Remove 4 negative counters. The answer is two negative counters, or -2 .

Give students Student Sheet 69, Problems 1 – 5.

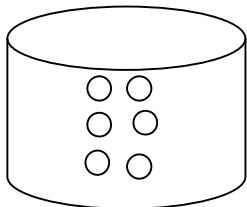
Answers:

1. $-5 - (-3) = -2$
2. $4 - 1 = 3$
3. $-5 + 3 = -2$
4. $4 + (-1) = 3$
5. You want the students to see that subtracting a number is the same as adding the opposite of the number.

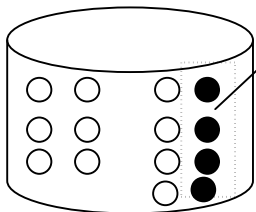
Say:

Zero pairs can help us when subtracting numbers with opposite signs.

Model $6 - (-4)$ on the board. Draw 6 circles in the cup. The try to remove 4 negative circles.



We have 6 positive counters, but we need to subtract 4 negative counters. We could add in 4 zero pairs.



Now we can subtract out 4 negative counters. The answer is 10 positive counters or 10.

How could we look at this problem another way? Remember that subtraction is the same as adding the opposite. So, $6 - (-4) = 6 + 4$. Both $6 - (-4)$ and $6 + 4 = 10$.

Give students the rest of Student Sheet 69, Problems 6 – 23.

Answers:

6. $-5 - 2 = -7$ 7. $-2 - 2 = -4$
8. $-5 + (-2) = -7$ 9. $-2 + (-2) = -4$
10. Subtraction is the same as adding the opposite.
11. $3 - (-2) = 5$ 12. $1 - (-3) = 4$
13. $3 + 2 = 5$ 14. $1 + 3 = 4$
15. Subtraction is the same as adding the opposite.
16. -1 17. 1 18. -3 19. 3
20. -1 21. -178 22. -612 23. 431

] Give students Student Sheet 70. This sheet will apply adding and subtracting integers to real-life situations.

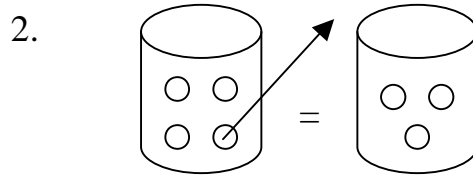
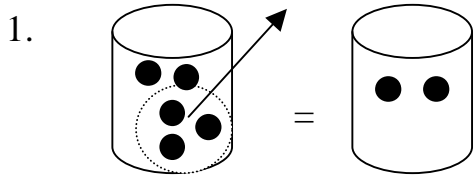
Answers: The equations may vary.

- -7 yards; $8 - 15$
- 180°F ; $100 - (-80)$
- $\$91$; $118 - 87 + 62 - 2$
- $-\$36.04$; $-5.81 - (-10.23) - (-20)$
- -600 feet or 600 feet below sea level; $-200 - 400$
- $\$93$; $100 - 4.75 - 2.25$
- $-\$178$ or he lost $\$178$ the first week; $150 - 328$
- -15°C ; $-5 - 10$
- -60 feet; $-40 + x = -100$
- -10 or 10 under par; $-8 - 2$

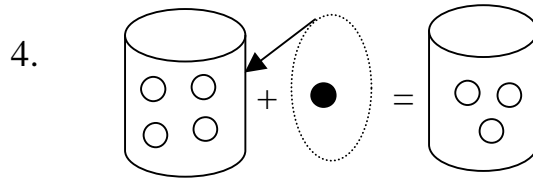
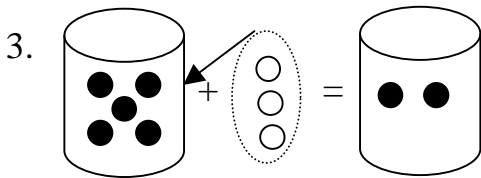
] Have one student summarize today's lesson. Understanding how to add and subtract integers is very important in solving algebraic problems.

Student Sheet 69 (Number: Lesson 9)

What subtraction problems are modeled here?

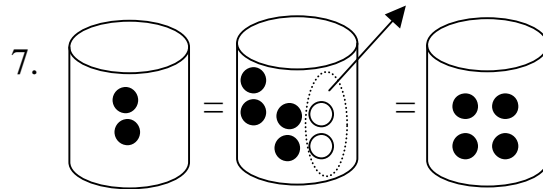
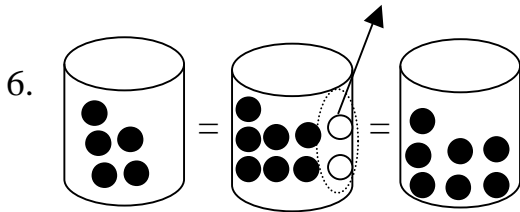


What addition problems are modeled here?

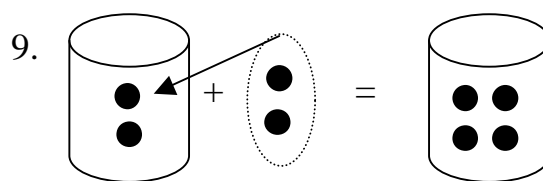
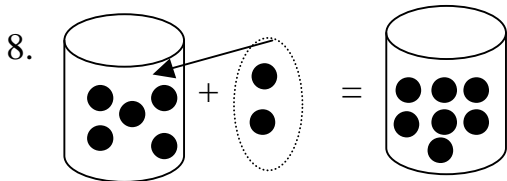


5. What do you notice about problems 1 and 3 and problems 2 and 4?

What subtraction problems are modeled in problems 6 and 7?



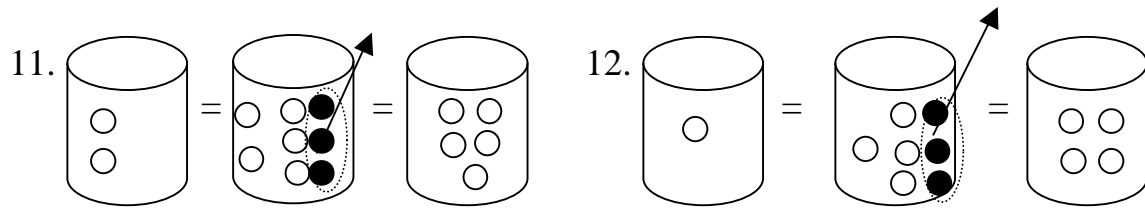
What addition problems are modeled in problems 8 and 9?



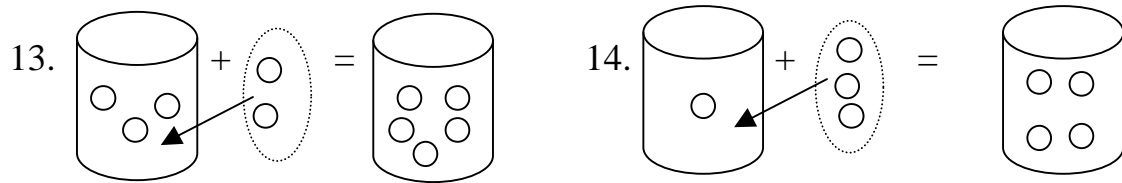
10. What do you notice about problems 6 and 8 and problems 7 and 9?

Student Sheet 69 (Number: Lesson 9) continued

What subtraction problems are modeled in problems 11 and 12?



What addition problems are modeled in problems 13 and 14?



15. What do you notice about problems 11 and 13 and problems 12 and 14?

Subtract the following problems.

16. $1 - 2$

17. $2 - 1$

18. $-1 - 2$

19. $1 - (-2)$

20. $235 - 236$

21. $-89 - 89$

22. $-632 - (-20)$

23. $421 - (-10)$

Student Sheet 70 (Number: Lesson 9)

Write an expression that will help you solve each problem. Then solve the problems.

1. A football team gained 8 yards on one play and lost 15 yards on the next play. What are the team's total yards gained on the two plays?
2. In Alaska, the highest temperature ever recorded was 100°F , and the lowest temperature was -80°F . What is the range of temperatures?
3. Laurie's bank balance in June was \$118. In July, she wrote a check for \$87, deposited \$62, and paid a service charge of \$2. What was her ending balance in July?
4. Terry didn't realize that he was overdrawn at the bank. His balance was $-\$5.81$. He wrote a check for \$10.23. The bank charged him an overdraft charge of \$20. What was his balance then?
5. A submarine is at -200 feet, or 200 feet below sea level. It is ordered to descend 400 feet more. Where is the submarine now?
6. Nancy invested \$100 in the stock market for 2 days. On day 1, she lost \$4.75, and on day 2, she lost \$2.25. How much money did she have invested at the end of two days?
7. Colin is starting a lawn cutting business. He earned \$150 the first week, but had to buy the mower for \$328. Find the amount of money he earned or lost in the first week.
8. The temperature in Fargo was -5°C . It dropped 10° at night. What was the temperature after the drop?
9. A fish finder helps locate fish in deep water. The finder is showing fish at -100 feet, or 100 feet below the surface. Your line is at -40 feet. How much farther should you drop your line?
10. Tiger Woods had a score of -8 , or 8 strokes under par, for the first two rounds of a golf tournament. On the last day, he scored 2 under par. What was his score for the tournament?