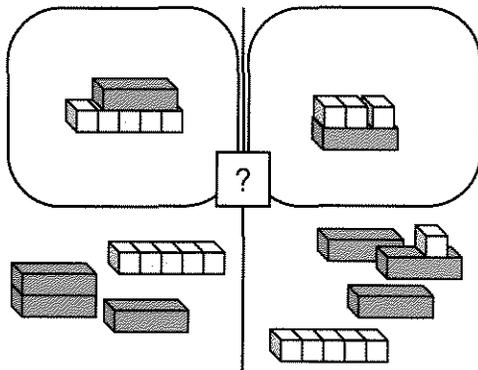


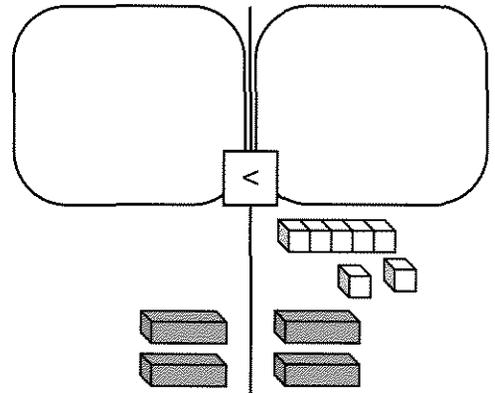
**CAN YOU TELL?**

To compare  $2x - x + 5 - (5 - x)$  with  $5 + 3x - 1 - (x - 3)$ , first show the two expressions with the Lab Gear.



7. Simplify both sides, then arrange the blocks in a logical manner to determine which side is greater.

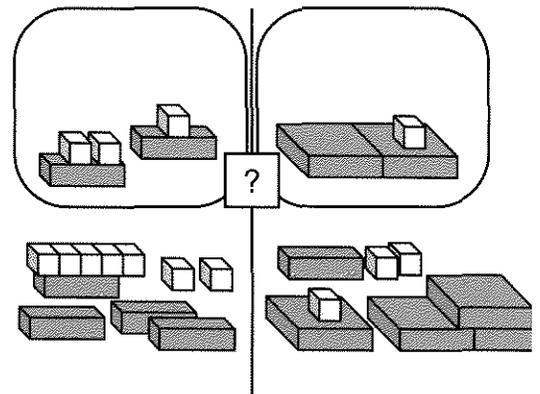
Your workmat should look like this.



Both sides include  $2x$ , but the right side is greater, as it also includes 7 more units. So you can write

$$2x < 2x + 7.$$

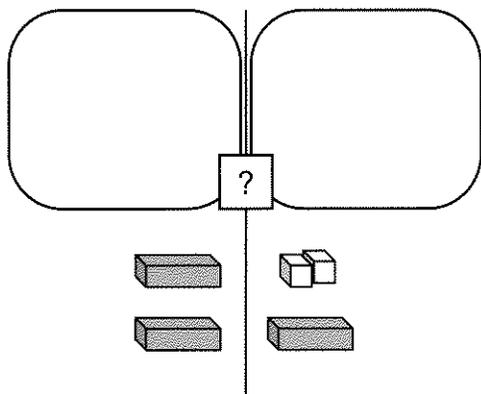
Now compare these expressions.



8. Write both expressions as they are shown in this figure.

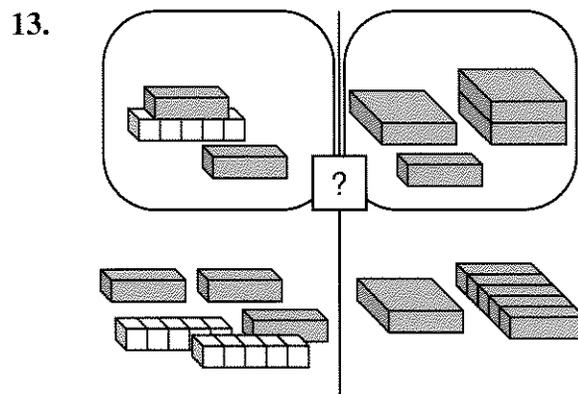
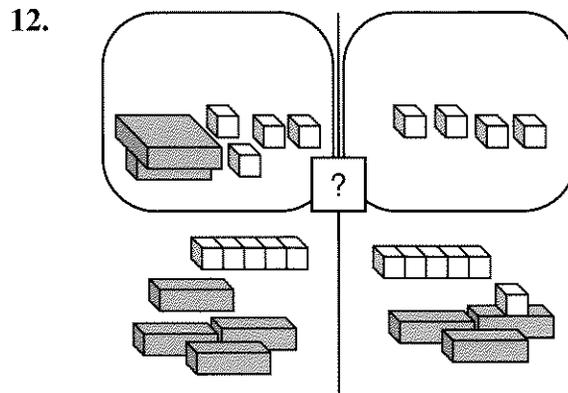
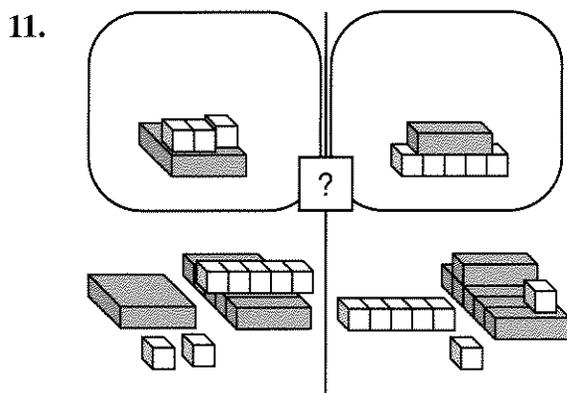
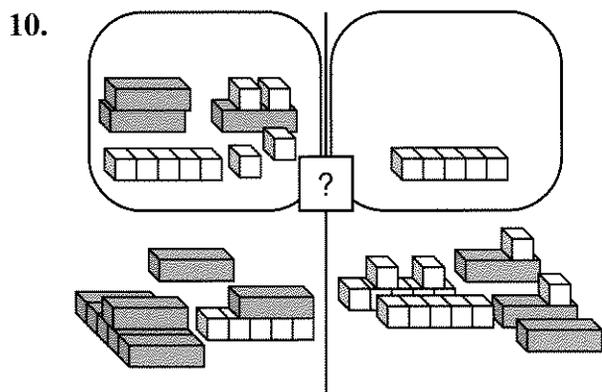
9. Simplify both sides, then arrange the blocks in a logical manner to determine which side is greater.

Your workmat should look like this.



In this case, it is impossible to tell which side is greater, because we do not know whether  $x$  is greater or less than 2.

For problems 10-13, write both expressions as they are given. Then simplify, using your blocks, and write the expressions in simplified form. Decide which side is greater, whether they are equal, or whether it is impossible to tell. Write the correct symbol or ?.



#### TESTING VALUES OF $x$

Look at these two expressions.

$$2x - 5 \qquad -3x + 6$$

Which is greater? The answer depends on the value of  $x$ .

14. a. Substitute  $-1$  for  $x$  in both expressions and tell which is greater.  
 b. Substitute  $3$  for  $x$  in both expressions and tell which is greater.  
 c. Find another value for  $x$  which makes  $2x - 5$  greater.  
 d. Find another value for  $x$  which makes  $-3x + 6$  greater.
15. For each of the following pairs of expressions, find two values of  $x$ , one that makes the first expression greater and one that makes the second expression greater. Show all your calculations.
- a.  $7x - 4$                        $3x - 2$   
 b.  $-2x + 6$                        $8x - 4$   
 c.  $x$                                        $-x$

▼ 3.5

For each pair of expressions, write

- A if the expression in column A is greater;
- B if the expression in column B is greater;
- ? if you would have to know the value of  $x$  in order to know which is greater.

Remember that  $x$  can have negative and fractional values. It may help to think about the Lab Gear. In each case *explain your answer*, giving test values of  $x$  if it helps your explanation.

A	B
16. $7x$	$7x - 1$
17. $7x + 1$	$-7x + 1$
18. $7x + 1$	$7x - 1$

19.  $7x - 1$        $-7x - 1$

20.  $7x + 1$        $-7x - 1$

21.  $7x^2 - 1$        $7x - 1$

22. Compare your answers to problems 16-21 with other students' answers. Discuss your disagreements. If you disagree with another student, try to find an example to show which answer is not correct.
23. Write an expression containing  $x$ , that is less than 4 when  $x$  is less than 9.
24. Write an expression containing  $x$ , that is less than 4 when  $x$  is more than 9.
25. 💡 Write an expression containing  $x$ , that is less than 4 for all values of  $x$ .



**DISCOVERY** MORE CODES

If the coding function is of the form  $y = mx$ , it is more difficult to encode and decode. (For the letter values, see **Thinking/Writing 3.A.**)

26. a. Encode the word **extra** using  $y = 3x$ .  
 b. What did you do when  $3x$  was larger than 26?
27. Decode the following sentence which was encoded with  $y = 3x$ . It may help to make a table showing the matching of the plaintext and coded alphabet.

APIBOCEO HXO VOCIO.

28. Encode the word **multiplication** with:
- a.  $y = x$ ;                      b.  $y = 2x$ ;
  - c.  $y = 13x$ ;                    d.  $y = 26x$ .

29. 💡
- a. Decode the following message, which was encoded with  $y = 2x$ . It may help to make a table showing the matching

of the plaintext and coded alphabet.  
 HD NPJ JRNPJ NPRBN. DPN PD  
 FBB XDP NJXX TPBN'L JRNPJ?

- b. What makes  $y = 2x$  a difficult code to crack?

**DISCOVERY** SUMMING UP

Say that the sum of a word is the sum of the numbers corresponding to its letters. (For the letter values, see **Thinking/Writing 3.A.**) For example, the word **topic** has value

$$20 + 15 + 16 + 9 + 3 = 63.$$

30. What is the sum of the word **algebra**?
31. Find as many words as possible having sum 100.