Warm-Up

CST: Grade 4 AF 2.1

The letters S and T stand for numbers.
If $S - 100 = T - 100$, which statement is true?

A $S = T$

B $S > T$

C $S = T + 100$

D $S > T + 100$

*If $S - 100 = T$, which statement would be true? Justify your answer.

Review: Grade 3 AF 1.2

What is the smallest whole number that will make this number sentence true?

$6 \times 9 < 3 \times \square$

Find a value that would make $6 \times 9 > 3 \times \square$

Find a value that would make $6 \times 9 = 3 \times \square$

Current: Grade 5 NS 1.3

Given

$j = (3 \times 10^3) + (7 \times 10^2) + (6 \times 10^1)$

$k = (7 \times 10^2) + (5 \times 10^1) + (2 \times 10^0)$

Which statement is true?

A $j = k$

B $j < k$

C $j > k$

* What else do you know about j and k?

Other: Grade 4 NS 1.2

Choose the best symbol for each comparison.

a. 103.25 ◯ 130.25 < = >

b. 78.5 ◯ 78.500 < = >

c. 12.37 ◯ 1.237 < = >

d. 49.09 ◯ 48.99 < = >

Comparing Expressions: Grades 3, 4, and 5

3AF1.2, 4AF1.3
5.OA.1

Introduction:

Today you will be learning a way to compare two expressions. We want to know if they are equal or if they form an inequality.

$38+14+25 \quad \bigcirc \quad 50+12+5$

What do you know about these expressions? [addition, 3 terms each, answer isn't obvious]
Use models to compare and understand the expressions.

$38+14+25 \quad \bigcirc \quad 50+12+5$

38	14	25
30+8	10+4	20+5
30+20	10	8+4+5
60		17
77		

50	12	5
50	10+2	5
50	10	2+5
60		7
67		

- Build a bar model for each expression.
- Place each term in a separate part of the bar.
- Decompose to make adding easier.
- Note that both sides have sixty and some more. The comparison can be made based on the 17 and the 7.
- Complete the comparison.

By decomposing and recomposing, we can see that the expressions form an inequality.

$\therefore 38+14+25 > 50+12+5$

You Try:

$24+47+19 \quad \bigcirc \quad 41+36+24$

$24+47+19$ ◯ $41+36+24$

24	47	19	41	36	24
20+4	40+7	10+9	40+1	30+6	20+4
20+40+10	4+7+9		40+30+20	1+6+4	
70	20		90	11	
90			101		

$\therefore 24+47+19 < 41+36+24$

Students will most likely evaluate both sides to compare 90 and 101, but decomposing allows them to find equal values on both sides and compare what is left.

$24+47+19$ ◯ $41+36+24$

24	47	19	41	36	24
24	41+6	19	41	36	24
24	41	19+6	41	36	24
24	41	25	41	36	24

$\therefore 24+47+19 < 41+36+24$

Notice 24 equals 24 and 41 equals 41. That leaves 25 on the left and 36 on the right to be compared.

Order of Operations:

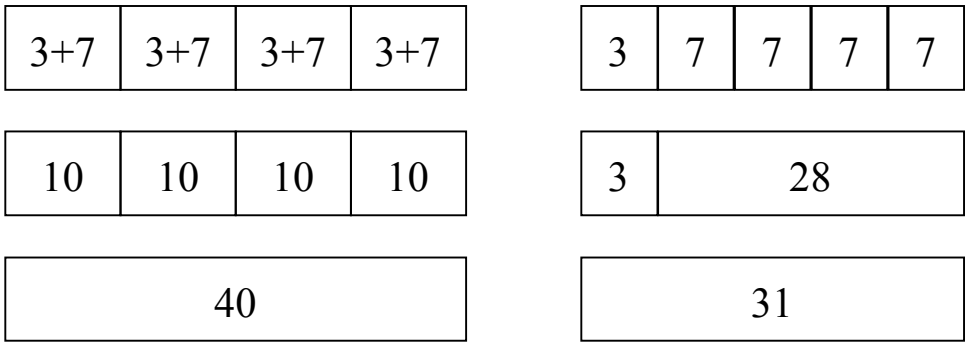
When we have expressions with more than one operation, we need to follow the order of operations while we evaluate them.

$(3+7)\times 4$ ◯ $3+(7\times 4)$

These two expressions have the same numbers and operations. They look very similar. How are they different? (parentheses around different quantities)

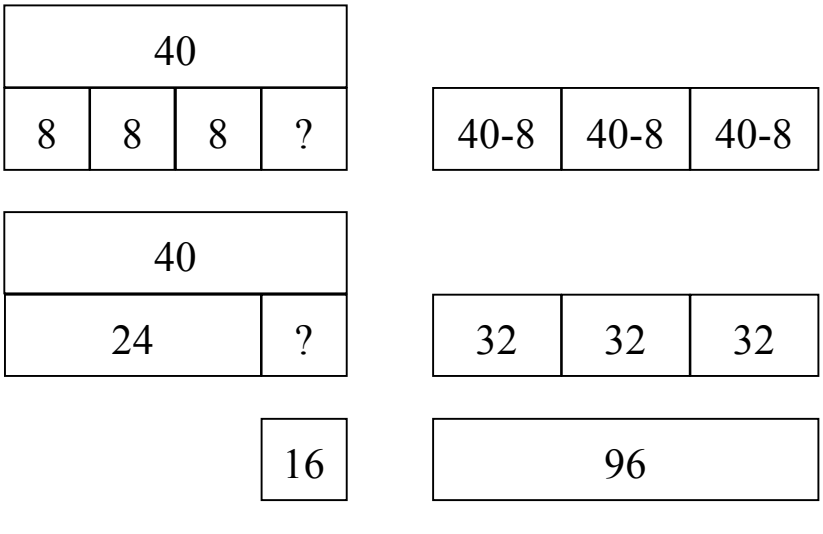
The grouping symbols help us know what to do first. Make bar models for each expression.

$(3+7)\times 4$ ◯ $3+(7\times 4)$



$\therefore (3+7)\times 4 > 3+(7\times 4)$

$40-(8\times 3)$ ◯ $(40-8)\times 3$



$\therefore 40-(8\times 3) < (40-8)\times 3$

- On the left, we are comparing the two terms, 40 and (8x3), so we need a double bar.
- On the right, we are multiplying two factors, so a single bar shows the repeated addition of (40-8).

You Try:

$(5\times20)-9$ ◯ $5\times(20-9)$

20	20	20	20	20
9	?			

20-9	20-9	20-9	20-9	20-9

100				
9	?			

11	11	11	11	11

91

55

$\therefore (5\times20)-9 > 5\times(20-9)$

Sometimes the proportions of the bar and the value inside the bar won't match. That's ok. They are tools for understanding the expressions rather than exact representations.

$9+(15\div3)$ ◯ $(9+15)\div3$

9	15	

9	9 + 15

9	5	5	5

	24	

9	5

8	8	8

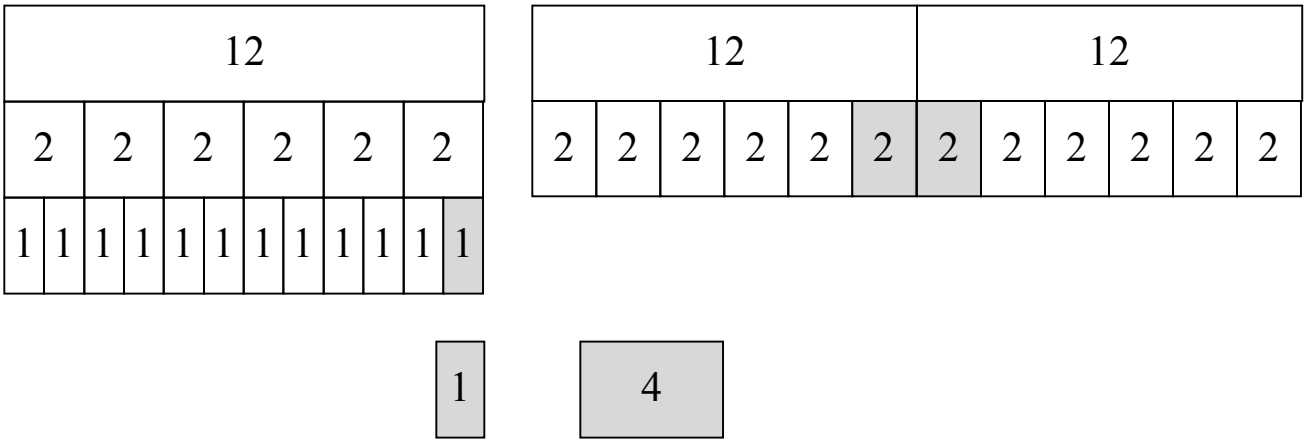
14

8

$\therefore 9+(15\div3) > (9+15)\div3$

You Try:

$12 \div (6 \times 2)$ ◯ $(12 \div 6) \times 2$



$\therefore 12 \div (6 \times 2) < (12 \div 6) \times 2$

Extension: Have students play a game of "Greater Than/Less Than" using expressions. Make cards with expressions appropriate to your students' level.

Each player draws a card and then creates bar models to show the value of the expression. Players compare their work and explain how they evaluated their expression. Players should record the inequality with their own expression first. The player whose expression is greater scores a point. If the expressions are equal, both players score a point. Earn five points to win.

examples

Multiple Addends	23+36+112	45+17+98
Two Operations with Parentheses	6×(36−16)	(8×12)−20
Order of Operations without Parentheses	18−4×3	48÷6×2