# Just In Time Quick Check
## Standard of Learning (SOL) 6.6c

| **Strand:** Computation and Estimation |
|---|

## Standard of Learning (SOL) 6.6c
*The student will simplify numerical expressions involving integers.*

## Grade Level Skills:
- Use the order of operations and apply the properties of real numbers to simplify numerical expressions involving more than two integers. Expressions should not include braces { } or brackets [ ], but may contain absolute value bars |   |. Simplification will be limited to three operations, which may include simplifying a whole number raised to an exponent of 1, 2 or 3.

## Just in Time Quick Check

## Just in Time Quick Check Teacher Notes

## Supporting Resources:
- VDOE Mathematics Instructional Plans (MIPS)
  - Order Up (Word) / PDF
- VDOE Algebra Readiness Formative Assessments
  - 6.6c (Word) / PDF
- VDOE Algebra Readiness Remediation Plans
  - Simplify Numerical Expressions – Order of Operations (Word) / PDF
- VDOE Word Wall Cards: Grade 6
  - Order of Operations
- Desmos Activity
  - Twin Puzzles

## Supporting and Prerequisite SOL:  6.3c, 6.4, 6.6a, 5.7, 4.4b, 4.4c

# SOL 6.6c - Just in Time Quick Check

1. Choose all the following that are true.

| a. $3^4$ = 12 | b. 5 + 3 x 4 = 17 | c. $|-6 + 4| = -2$ |
|---|---|---|
| d. 3(2 + -1) = 3•2 + 3•-1 = 3 | e. 32 = $2^5$ | f. 12 ÷ 4 x 3 = 9 |

2. Simplify. $\dfrac{-2(4)}{2}$ + 4

3. Find the solution.

$$6 ÷ \text{-}2 \bullet |-4 + 0|$$

4. Three students completed their homework and their work is shown in the table. Two students competed the questions correctly and one did not. Find the student who did not complete the work correctly and describe what is not correct.

| Audrey | Bo | Conner |
|---|---|---|
| $5^3 - 3 \text{ x } 6$ | $3^2 + |-4 + 3|$ | -6 + 3(4 - 2) |
| 125 – 3 x 6 | $3^2$ + 7 | -6 + 3 x 2 |
| 125 – 18 | 9 + 7 | -6 + 6 |
| 107 | 16 | 0 |

# SOL 6.6c - Just in Time Quick Check Teacher Notes
## Common Errors/Misconceptions and their Possible Indications

1. Choose all the following that are true.

| a. $3^4$ = 12 | b. 5 + 3 x 4 = 17 | c. $\lvert -6 + 4 \rvert = -2$ |
|---|---|---|
| d. 3(2 + -1) = 3•2 + 3•-1 = 3 | e. 32 = $2^5$ | f. 12 ÷ 4 x 3 = 9 |

*This table is made up of examples of some of the most common errors students make while completing order of operations. This box isolates some common misconceptions so that teachers can see where students may make errors. Encourage students to show work so you can see their misconceptions.*

a. *Students often do not realize the exponent has a specific meaning. They commonly multiply the base with the exponent and get the incorrect product. If students choose (a) as correct, they may need additional instruction in exponents.*

b. *The common error in b occurs if students just move left to right to find the answer. If students do not mark b as correct, they most likely think that the answer should be 32, which means that they added before multiplying.*

c. *Absolute value is something new to students this year, so they often do not recognize that the symbols mean distance from zero (always positive) and they consider the symbols to be like parentheses. If students see the absolute value as parentheses, they will say that c is true because instead of 2, they think it should be -2.*

d. *Students often are confused to see a number outside of a parenthesis. They often solve what is inside parentheses and then just put the number beside it (if the expression inside parentheses equals 3, with a 2 outside, they make it 23).*

e. *Students who chose (a) as being correct are likely to choose (e) as being incorrect because they multiplied the base times the exponent. When the exponent is a little higher (>3), sometimes students have a hard time completing the repeated multiplication and revert to addition (2+2+2+2+2). This equation ensures that students can remember to complete the number of times multiplying for larger exponents.*

f. *If students have used a mnemonic to remember the order of operations, they sometimes think that multiplication must be completed before division and addition must be completed before subtraction. For this example, division is presented before multiplication, so division is the first operation needing to be completed. If students feel that the answer is incorrect and should be 1, they completed multiplication before division, not realizing they are the same step and need to be considered from left to right.*

2. Simplify. $\dfrac{-2(4)}{2} + 4$

*Students may not be sure when to add four. Sometimes, they add four to the numerator of the fraction, other times, the denominator, and other times, both. Another error may occur if they try to divide both numbers in the numerator by the divisor, rather than solving the expression in the numerator first and then dividing. When students see the "divided by two", they need to understand that it is a "grouping" with the expression on top. This needs to be completed before adding four. Asking them to re-write it like: (-2 x 4) ÷2 + 4 may be helpful.*

3. Find the solution.

$$6 \div \text{-}2 \bullet |-4 + 0|$$

*This question has multiple steps for students to complete, and some are new in 6th grade (integer operations and absolute value). Looking at the work from prior questions can reveal where a breakdown in student understanding may occur. Requiring students to show their work will reveal their misconceptions.*

*The identity property of addition is modeled in the absolute value bars, and many students may not remember to find the distance from zero, so they may bring out a -4 instead of 4. They may also confuse multiplication and addition and give the answer of zero inside the absolute value bars.*

*Additionally, students may try to complete -2 x 4 instead of 6÷-2 first. Students often have a hard time when the "answer" to a part of the question is used in another step, for example the quotient of 6 and -2 will be used in the next step of multiplied by 4. Encouraging students to show each step may help. Often students try to do work in their heads, which gets much more complicated as problems have additional steps.*

4. Three students completed their homework and their work is shown in the table. Two students competed the questions correctly and one did not. Find the student who did not complete the work correctly and describe what is not correct.

| Audrey | Bo | Conner |
|---|---|---|
| $5^3 - 3 \times 6$ | $3^2 + |-4 + 3|$ | -6 + 3(4 - 2) |
| $125 - 3 \times 6$ | $3^2 + 7$ | -6 + 3 x 2 |
| $125 - 18$ | $9 + 7$ | -6 + 6 |
| 107 | 16 | 0 |

*Audrey found the correct answer. Sometimes students have trouble with $5^3$ because of not properly handling the exponent. Other students may subtract three before multiplying by six. These are common mistakes that can be worked on with practice with similar types of operations.*

*Bo did not correctly answer the question. The error is in the first step when he finds the absolute value of the expression inside. What Bo did is a common mistake for students. They know that what comes out of absolute value bars needs to be positive, so they change the numbers inside to positives and then add them. A review of simplifying expressions inside absolute value bars will help students understand application of this skill.*

*Conner correctly completed the question. One issue that students may have is not being sure about what the three outside of parentheses means. They complete the operations inside the parentheses but then add the factor outside the parentheses.*

*Many times, this type of question has students going through the steps in the example, and sometimes it is not easy to see the error. If a student is having trouble following along, have him/her write the original problem and complete it without looking at the work shown. Students can then compare their answers to the ones done by the three students.*