Looking Ahead

The following example incorporates some of the skills you learned in this section, including order of operations, evaluating exponents, and finding a least common multiple in order to find a common denominator.

Example Preview

Evaluate the following expression, using the correct order of operations.

$$4+1\cdot 5\div 8+\left(-1\right)^3$$

Solution

Because there are no grouping symbols in this expression, the first step is to calculate exponents and roots.

$$4+1\cdot 5\div 8+\left(-1\right)^3 = 4+1\cdot 5\div 8-1$$ Simplify the term with an exponent.

$$= 4+\frac{5}{8}-1$$ Perform multiplications and divisions from left to right.

$$= \frac{32}{8}+\frac{5}{8}-\frac{8}{8}$$ Find a common denominator.

$$= \frac{29}{8}$$ Add.

1.R.1 Exercises

Concept Check

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

1. Nine squared is equal to eighteen.

2. $2^7 = 128$

3. 7^0 is undefined.

4. According to the order of operations, multiplication is always performed before division.

5. A number that is divisible by 10 is also divisible by 2 and 5.

6. 6801 is divisible by 9.

7. 7605 is divisible by 10.

8. 5,187,042 is divisible by 3.

9. A prime number has exactly 1 factor.

10. A composite number has 2 or more factors.

11. 231 is a prime number.

12. All the factors of 30 are 1, 2, 3, 5, 6, 10, 15 and 30.

13. The LCM of 15 and 25 is 50.

14. The first five multiples of 9 are 9, 18, 27, 36, and 45.

15. When given larger numbers, the most efficient way to find the LCM is to use the prime factorization method.

Practice

For each exponential expression **a.** identify the base, **b.** identify the exponent, and **c.** evaluate the exponential expression.

16. 2^3

17. 4^0

Simplify.

18. $30 \div 2 - 11 + 2(5-1)^3$

Using the tests for divisibility, determine which of 2, 3, 4, 5, 6, 9, and 10 (if any) will divide exactly into each given number.

19. 105

20. 150

21. 331

22. 1234

Determine whether each number is prime or composite. If the number is composite, find at least three factors of the number.

23. 47

24. 63

Find the prime factorization of each number. Use the tests for divisibility for 2, 3, 4, 5, 6, 9, and 10 whenever they help to find beginning factors.

25. 125

26. 150

27. Find the LCM of 3, 4, and 8.

28. **For** 14, 35, and 49, **a.** find the LCM and **b.** state how many times each number divides into the LCM.

For each equation, find the missing numerator that will make the fractions equivalent.

29. $\frac{5}{8} = \frac{?}{24}$

30. $\frac{5}{12} = \frac{?}{108}$

Applications

Solve.

31. ***Purchases:*** Robert is purchasing shirts for his weekend soccer team. The shirts he wants to buy are normally \$25 each but are on sale for \$10 off. His team has a total of 11 players. How much will he spend to buy the shirts?

a. If you simplify the expression $\$25 - \$10 \cdot 11$ using the order of operations, will you get the correct answer? If not, explain what is wrong with the expression.

b. What is the answer? If necessary, write the corrected expression to get the correct results when following the order of operations.

32. ***Fundraising:*** You are on a team that is participating in a charity walk with a goal to raise \$12,400. Each team member agrees to raise the same amount of money. If the possible team sizes are 5, 6, 9, or 10 members, which team sizes allow the goal amount to be evenly split between the team members? How much money would each team member raise for each team size that can evenly split the goal amount?

33. ***Time:*** A company is working on a project that will take 440 hours of work to complete. The manager in charge of the project has the option to have 4, 6, or 8 people work on the project. If the manager wants to evenly divide the work between the team members, which team size will evenly split the work hours? How many hours would each team member spend on the project for each team size that evenly splits the work hours?

34. ***Inventory:*** Twenty-four pencils are to be distributed evenly between the members of a group. What are the possible group sizes if each person in the group is to receive the same number of pencils?

35. ***Baking:*** A chocolatier makes 72 specialty truffles. She wants to sell packages that each have the same number of truffles. What are her options for the number of truffles that can be in a package?

36. ***Security:*** Three security guards meet at the front gate for coffee before they walk around inspecting buildings at a manufacturing plant. The guards take 15, 20, and 30 minutes, respectively, for the inspection trip.

a. If they start at the same time, in how many minutes will they meet again at the front gate for coffee?

b. How many trips will each guard have made?

Writing & Thinking

37. Give one example where addition should be completed before multiplication.

38. a. If a number is divisible by both 3 and 5, then it will be divisible by 15. Give two examples.

b. However, a number might be divisible by 3 and not by 5. Give two examples.

c. Also, a number might be divisible by 5 and not 3. Give two examples.

39. Are all odd numbers also prime numbers? Explain your answer.

40. Explain the difference between factors of a number and multiples of that number.

41. Explain, in your own words, why each number in a set divides evenly into the LCM of that set of numbers.

42. Explain why simply multiplying two numbers together will not necessarily find the LCM of those numbers. Give an example of when it would find the LCM and an example when it would not.