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Resource ID#: 55050

Primary Type: Formative Assessment

Long Division - 1

Students are asked to complete three long division problems (no remainders) to check for fluency with the standard division algorithm.

Subject(s): Mathematics
Grade Level(s): 6
Intended Audience: Educators

Freely Available: Yes

Keywords: MFAS, long division, no remainder, fluency

Instructional Component Type(s): Formative Assessment

Resource Collection: MFAS Formative Assessments

ATTACHMENTS

MFAS_LongDivision1_Worksheet.docx

FORMATIVE ASSESSMENT TASK

Instructions for Implementing the Task
This task can be implemented individually, with small groups, or with the whole class.

1. The teacher asks the student to complete the problems on the *Long Division - 1* worksheet.
2. The teacher asks follow-up questions, as needed.

Note: The student should not be allowed to use a calculator for this task.

TASK RUBRIC

Getting Started

Misconception/Error

The student is unable to consistently use the standard algorithm for division.

Examples of Student Work at this Level

The student:

- Attempts to find the quotient by repeatedly multiplying the divisor until a number close to the dividend is found.
- Attempts to use a partial quotients strategy without success.

- Is unable to begin two or three of the problems.

Questions Eliciting Thinking

Do you think trial and error is an efficient strategy? Do you know any other method you could use to find the quotient?

What does each of these products mean? How are you keeping track of how many multiples of the divisor you are pulling out?

Can you tell me what you know about solving a long division problem?

Instructional Implications

Have the student write familiar quotients such as 54 ÷ 9 and divisions involving a remainder such as 65 ÷ 4 using a long division format. It is also helpful to provide contexts for division problems that involve a given number of objects that must be divided into a given number of groups.

Given a division problem, ask the student to first estimate a quotient and use multiplication to check the estimate. Emphasize the relationship between division and multiplication. Have the student write the results of divisions in terms of multiplication (and addition, if there is a remainder). For example, after dividing 175 by 12, ask the student to summarize the result as 175 = (12 x 14) + 7. Model interpreting the result by saying, "The number 175 can be divided into 14 groups of 12 with seven leftover."

Provide the student with direct instruction on the use of the standard algorithm for division. Explain and justify the steps in the process, so the student can develop a useful understanding of the long division. Pay particular attention to the first step in each repeated cycle of steps in which a quotient is estimated. Provide focused practice with this step. Remind the student of the actual meaning of each digit in the quotient throughout the division process. For example, when dividing 9580 by 47, the first digit written above the division box is two, but this digit actually represents 200. Characterize the number 200 as an estimate of the quotient. Then multiplying back and subtracting is just a means of finding what is "left over" or the remainder. If this amount is larger than the divisor, the process should be repeated in order to make the estimate more precise. Describe each cycle of the process as an attempt to find the quotient more precisely.

Show the student a division problem along with an associated visual model. Ask the student questions like:

- What are you dividing into? How many did you start with?
- What are you dividing by? How many in each group?
- What is the difference? How many do you have left over?

Moving Forward

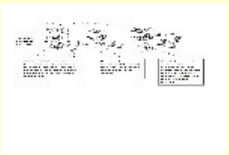
Misconception/Error

The student makes systematic errors in implementing some steps of the standard division algorithm.

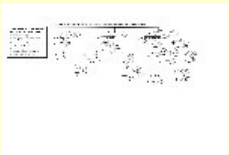
Examples of Student Work at this Level

The student appears to understand the major steps of the standard division algorithm but:

- Brings down digits from the dividend incorrectly. For example, the student:
  - Skips bringing down a digit.
  - Does not bring down the final digit.
  - Brings down the same digit twice.
  - Brings down two digits at once while only putting one digit in the quotient – forgetting to hold one place in the quotient with a zero.
- Does not notice a difference is greater than or equal to the divisor and creates an extra place value in the quotient.



- Adds an extra zero after each number in the quotient ("because the divisor didn't go into the difference") before bringing down the next digit of the dividend.



Questions Eliciting Thinking

What numbers from the dividend have you already used? Are there any numbers in the dividend you have not used?

Should you ever use a digit greater than nine in the quotient? What should you do when the difference is greater than the dividend?

Can you tell me why you put a zero after each number in the quotient? Why is the difference smaller than the divisor? Should it always be smaller?

What is the next step in the division process? What will happen when you bring down the next digit from the dividend?

When should you add a decimal point to the quotient? What does it represent?

Where did you first have trouble with this problem? Can you go back and start the problem again to see if you get the same answer?

Instructional Implications

As with the Getting Started student, provide the student with direct instruction on the use of the standard algorithm for division. Explain and justify the steps in the process, so the student can develop a useful understanding of long division. Pay particular attention to the first step in each repeated cycle of steps in which a quotient is estimated. Provide focused practice with this step. Remind the student of the actual meaning of each digit in the quotient throughout the division process. For example, when dividing 9580 by 47, the first digit written above the division box is two, but this digit actually represents 200. Characterize the number 200 as an estimate of the quotient. Then multiplying back and subtracting is just a means of finding what is "left over" or the remainder. If this leftover amount is larger than the divisor, the process should be repeated in order to make the estimate more precise. Describe each cycle of the process as an attempt to find the quotient more precisely.

Provide the student with error analysis practice. Give the student several division problems with all work shown including some that contain common student errors. Ask the student to decide if each problem is correct and if not, to find the error, describe it, and then correct it.

Ask the student to analyze his or her own work and describe the kinds of errors he or she typically makes.

Almost There

Misconception/Error

The student makes a minor or computational error.

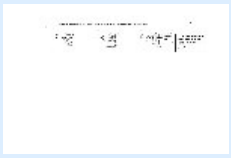
Examples of Student Work at this Level

The student appears to understand the standard division algorithm but:

- Multiplies or subtracts incorrectly.

- Transposes numbers within some step of the problem.

- Neglects to bring down the final digit to finish the long division.



Questions Eliciting Thinking

Can you check your work here? I think you may have made an error.

Do you know how you could check your final answer?

Instructional Implications

Provide the student with error analysis practice. Give the student several division problems with all work shown including some that contain common student errors. Ask the student to decide if each problem is correct and if not, to find the error, describe it, and then correct it.

Ask the student to analyze his or her own work and describe the kinds of errors he or she typically makes.

Consider using MFAS tasks *Long Division - 2* (6.NS.2.2) and *Long Division - 3* (6.NS.2.2).

Got It

Misconception/Error

The student provides complete and correct responses to all components of the task.

Examples of Student Work at this Level

The student uses the standard division algorithm to correctly find each quotient:

1. 48
2. 23
3. 582

A student at this level will show fluency by completing the problems correctly in 5-7 minutes.

Questions Eliciting Thinking

How would you begin a problem that has a three-digit or larger divisor?

How can you check your answer to be sure it is correct?

Will there always be a zero difference in the last step when you work a division problem? If not, what would you do with the remainder? What would the remainder mean?

Have you ever thought about why long division works? How would you explain it to someone else?

Instructional Implications

Have the student begin to address division with multidigit numbers with remainders and multi-digit decimal numbers.

ACCOMMODATIONS & RECOMMENDATIONS

Special Materials Needed:

- *Long Division - 1* worksheet

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Related Standards

Name	Description
MAFS.6.NS.2.2:	Fluently divide multi-digit numbers using the standard algorithm. **Remarks/Examples:** **Fluency Expectations or Examples of Culminating Standards** Students fluently divide multi-digit numbers using the standard algorithm. This is the culminating standard for several years' worth of work with division of whole numbers.