MA.5.AR.1.1

Overarching Standard: ***MA.5.AR.1*** *Solve problems involving the four operations with whole numbers and fractions.*

Benchmark of Focus

MA.5.AR.1.1: Solve multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context.

Benchmark Clarifications

Clarification 1: Depending on the context, the solution of a division problem with a remainder may be the whole number part of the quotient, the whole number part of the quotient with the remainder, the whole number part of the quotient plus 1, or the remainder.

Related Benchmark/Horizontal Alignment

- MA.5.NSO.2.1
- MA.5.NSO.2.2
- MA.5.FR.1.1
- MA5.GR.3.3
- MA.5.GR.4.2
- MA.5.DP.1.2

Vertical Alignment

Previous Benchmarks	Next Benchmarks
MA.3.AR.1.2	MA.6.NSO.2.3
MA.4.AR.1.1	

Terms from the K-12 Glossary

- Dividend
- Divisor
- Equation

Purpose and Instructional Strategies

The purpose of this benchmark is for students to solve multistep word problems with whole numbers and whole-number answers involving any combination of the four operations. Work in this benchmark continues instruction from Grade 4 where students interpreted remainders in division situations (MA.4.AR.1.1) (MTR.7.1) and prepares for solving multi-step word problems involving fractions and decimals in Grade 6 (MA.6.NSO.2.3).

- To allow for an effective transition into algebraic concepts in Grade 6 (MA.6.AR.1.1), it is important for students to have opportunities to connect mathematical statements and number sentences or equations.
- During instruction, teachers should allow students an opportunity to practice with word problems that require multiplication or division which can be solved by using drawings and equations, especially as the students are making sense of the context within the problem (MTR.5.1).

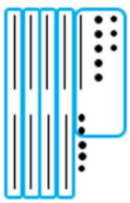
- Teachers should have students practice with representing an unknown number in a word problem with a variable by scaffolding from the use of only an unknown box.
- Offer word problems to students with the numbers covered up or replaced with symbols or icons and ensure to ask students to write the equation or the number sentence to show the problem type situation (MTR.6.1).
- Interpreting number pairs on a coordinate graph can provide students opportunities to solve multi-step real-world problems with the four operations (MA.5.GR.4.2).

Common Misconceptions or Errors

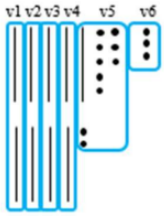
- Students may apply a procedure that results in remainders that are expressed as r for ALL situations, even for those in which the result does not make sense. For example, when a student is asked to solve the following problem: "There are 34 students in a class bowling tournament. They plan to have 3 students in each bowling lane. How many bowling laneswill they need so that everyone can participate?" the student response is "11 $r1$ bowling lanes," without any further understanding of how many bowling lanes are needed and how the students may be divided among the last 1 or 2 lanes. To assist students with this misconception, pose the question…"What does the quotient mean?"

Strategies to Support Tiered Instruction

- Instruction includes opportunities to engage in guided practice completing multi-step word problems with any combination of the four operations, including problems with remainders. Students use drawings and models to understand how to interpret the remainder in situations in which they will need to drop the remainder as their solution.
    - For example, the teacher displays and reads the following problem aloud: "There are 58 fourth grade students and 45 fifth grade students going on a class field trip. They plan to have 20 students in each van. How many vans will they need so that everyone can participate?" Students use models or drawings to represent the problem and write an equation to represent the problem. The teacher uses guided questioning to encourage students to identify that they will need to add one to the quotient as their solution. If students state that they will need 5r3 vans, the teacher refers to the models to prompt students that a sixth van is needed for the remaining three students. If students state that they will need 3 more vans since the remainder is 3, the teacher reminds students through guided questioning that the remainder of 3 represents 3 remaining students and only 1 more van is needed (i.e., "add 1 to the quotient"). This is repeated with similar multistep real-world problems, asking students to explain what the quotient means in problems involving remainders.

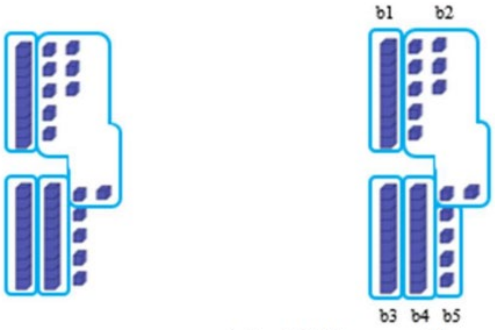


$(58 + 45) \div 20 = v$
$103 \div 20 = 5r3$
They will need 6 vans so everyone can participate on the trip.



They will need 6 vans so everyone can participate on the trip.
$v = van$

- Instruction includes opportunities to engage in practice with explicit instruction completing multi-step word problems with any combination of the four operations, including problems with remainders. Students use manipulatives to understand how to interpret the remainder in situations in which they will need to drop the remainder as their solution.
    - For example, the teacher displays and reads the following problem aloud: "There are 18 red markers and 26 black markers on the art table. Ms. Williams is cleaning up and can put 10 markers in each box. How many boxes will she need so all the markers will be put into box?" The teacher uses manipulatives (e.g., base ten blocks) to represent the problem, having students write an equation to represent the problem. The teacher uses guided questioning to encourage students to identify that they will need to add 1 to the quotient as their solution. If students state that she will need $4r4$ boxes, the teacher refers to the models to prompt students that a fifth box is needed for the remaining four markers. If students state that they will need 4 more boxes since the remainder is 4, the teacher reminds students through guided questioning that the remainder of 4 represents 4 remaining markers and only 1 more box is needed (i.e., "add 1 to the quotient"). This is repeated with similar multistep real-world problems, asking students to explain what the quotient means in problems involving remainders.



$(18 + 26) \div 10 = b$
$44 \div 10 = 4r4$

Ms. Williams will need 5 boxes.
$b = box$

Questions to ask students:

- See if students can correctly identify the operation(s) of a given story problem.
- Sample problem: Lance bought a package of 26 batteries. Each remote-controlled race car takes 4 batteries. How many race cars can Lance fill with batteries?
- Sample answer that indicates understanding: Student uses numbers, pictures, or manipulatives to solve 26 divided by 4 equals 6 with 2 batteries left over.
- Sample answer that indicates an incomplete understanding or a misconception: Student does not recognize there are batteries left over or mistakenly answers 7 because they included the 2 batters to complete a new race car.
- Follow-up question: What does the 2 represent in the problem above?
- Sample answer that indicates understanding: Sample answer that indicates understanding: 2 batteries left over that will not complete a race car, because it needs 4 batteries.

Instructional Tasks

Instructional Task 1

There are 128 girls in the Girl Scouts Troop 1653 and 154 girls in the Girl Scouts Troop 1764. Both Troops are going on a camping trip. Each bus can hold 36 girls. How many busesare needed to get all the girls to the camping site?

Instructional Items
Instructional Item 1

A shoe store orders 17 cases each containing 142 pairs of sneakers and 12 cases eachcontaining 89 pairs of sandals. How many more pairs of sneakers did the store order?

Achievement Level Descriptors

Benchmark	Context	Assessment Limits
MA.5.AR.1.1 Solve multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context. Clarification 1: Depending on the context, the solution of a division problem with a remainder may be the whole number part of the quotient, the whole number part of the quotient with the remainder, the whole number part of the quotient plus 1, or the remainder.	Real-world	Items using multiplication will have a product that does not exceed six digits. Items using division will be up to five digits by up to two digits.

ALD 2	ALD 3	ALD 4	ALD 5
Solves two-step real-world problems involving addition and subtraction and two-step real-world problems involving multiplication and division with whole numbers	Solves two-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context.	Solves multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within terms of the context.	Identifies an error and solves multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within terms of the context

Additional Resources:
CPALMS Resources

Blog Post: Helping students problem solve instead of 'number shop'.

Resources/Tasks to Support Your Child at Home:

Khan Academy: Multi-Step Estimation Word Problems

Khan Academy: Represent Muti-Step Word Problems with an Equation