INCLUSION IN TEXAS

Instructional Routines for Mathematics Intervention

The purpose of these mathematics instructional routines is to provide educators with materials to use when providing intervention to students who experience difficulty with mathematics. The routines address content included in the grades 2-8 Texas Essential Knowledge and Skills (TEKS). There are 23 modules that include routines and examples – each focused on different mathematical content. Each of the 23 modules include vocabulary cards and problem sets to use during instruction. These materials are intended to be implemented explicitly with the aim of improving mathematics outcomes for students.

TEA Texas Education Agency

Instructional Routines for Mathematics Intervention

MODULE 14

Division of Whole Numbers

Module 14: Division of Whole Numbers

Mathematics Routines

A. Important Vocabulary with Definitions

Term	Definition
algorithm	A procedure or description of steps that can be used to solve a problem.
computation	The action used to solve a problem.
divide/division	To separate into equal groups.
dividend	The number that is to be divided in a division problem.
division sign	The symbol that tells you to divide.
divisor	The number that the dividend is divided by.
equal groups	Groups with the same number of objects or items in each group.
equal sign	The symbol that tells you that two sides of an equation are the same, balanced, or equal.
hundreds column	The column with digits in the hundreds place.
ones column	The column with digits in the ones place.
quotient	The number that results when one number is divided by another number.
regroup/trade/exchange	The process of exchanging 10 ones for 1 ten, 10 tens for 1 hundred, 10 hundreds for 1 thousand, etc.
remainder	The amount left over in a division problem.
tens column	The column with digits in the tens place.

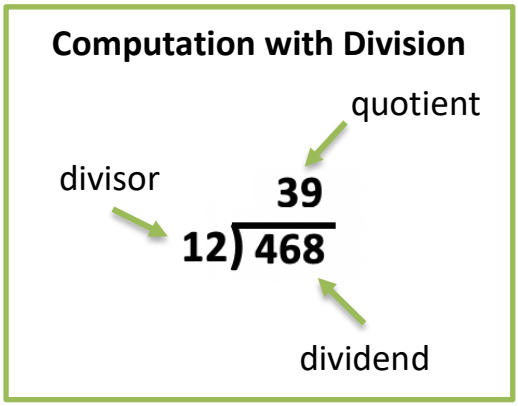
B. Background Information

Background Information:

If your focus is on the conceptual understanding of division, see *Module 13: Concepts of Division.* This module, *Module 14*, focuses on computation with division of whole numbers. As you focus on computation, continue to emphasize division as partitive (i.e., equal shares) and division as quotative (i.e., measurement) because students will see these concepts within word problems.

For learning computation with division, we recommend presenting problems with a division bracket. Some students may require explicit instruction on translating a horizontal problem (e.g., 245 ÷ 15) to the presentation with a division bracket (see below). Depending upon the algorithm, leave enough space above or below the problem for students to complete their written work.

Every student should develop efficiency with a division computation strategy. In the following sections, we provide examples of (1) division with traditional algorithm and (2) division with partial quotients algorithm. Teachers should help students develop competency with at least one algorithm.



C. Routines and Examples

(1) Division with Traditional Algorithm

Routine

Materials:

- Module 14 Problem Sets
- Module 14 Vocabulary Cards
  - If necessary, review Vocabulary Cards before teaching
- A hands-on tool or manipulative like Base-10 blocks or unifix cubes
  - Note that drawings can be used alongside or instead of manipulatives

2-DIGIT ÷ 1-DIGIT: ROUTINE WITH MANIPULATIVES
(Only use manipulatives with simpler problems)

Teacher	**Let's work on division. What does it mean to divide?**
Students	To share equally or measure into groups.
Teacher	**Division means to share equally or to measure into groups. Look at this problem.** (Show problem.)
Teacher	**First, I see a division bracket** (point). **The division bracket tells us to divide. What does the division bracket mean?**
Students	To divide.
Teacher	**Let's do this problem with Base-10 blocks.** (Move Base-10 blocks to workspace.)
Teacher	**With our Base-10 blocks, each cube represents one thousand. What do the cubes represent?**
Students	Thousands.

Teacher	**The flats represent hundreds. What do the flats represent?**
Students	Hundreds.
Teacher	**The rods represent tens. What do the rods represent?**
Students	Tens.
Teacher	**With our Base-10 blocks, the units represent ones. What do the units represent?**
Students	Ones.
Teacher	**Our dividend is __. What's our dividend?**
Students	__.
Teacher	**Let's show this dividend by showing __ with the Base-10 blocks.** (Use Base-10 blocks to show dividend.)
Teacher	**How many blocks?**
Students	__.
Teacher	**Our divisor is __. What's our divisor?**
Students	__.
Teacher	**Let's solve this problem using division as partitive or equal shares. What does equal shares mean?**
Students	We divide the blocks equally among groups.
Teacher	**If we want to equally share the blocks, our divisor tells us the number of groups. What's the divisor tell us?**
Students	The number of groups.
Teacher	**Let's show the groups by showing __ plates.** (Show plates.)
Teacher	**Now, let's use the Base-10 blocks and divide the blocks equally among the __ groups. Let's start dividing with the greatest place value. In this example, that means I'll divide the tens then I'll divide the ones. How will we divide?**
Students	Tens then ones.
Teacher	**So, let's equally share the tens among the groups. I place 1 ten on each plate until I either have no remaining tens or I don't have enough tens to share equally.** (Equally share the tens blocks on each plate.)
Teacher	**Do we have any remaining tens?**
Students	*OPTION 1:* No. *OPTION 2:* Yes.
Teacher	***OPTION 2:*** **We have tens remaining that cannot be equally shared unless we regroup the tens into ones. Let's regroup the tens into ones.** (Regroup remaining tens into ones.)
Teacher	**So, how many ones do we have to equally share?**
Students	__.
Teacher	**Let's equally share the ones among the groups. I place 1 one on each plate until I have no remaining ones.** (Equally share the ones blocks on each plate.)
Teacher	**Now, to learn the quotient, let's count the number of blocks in one group. We have __, __, __, …**

(Count blocks on 1 plate.)

Teacher **How many blocks in one group?**

Students __.

Teacher **Yes! There are __ blocks. So, __ divided by __ equals __. Let's say that together.**

Students __ divided by __ equals __.

Teacher **Let's say it together again.**

Students __ divided by __ equals __.

Teacher **So, if you have __ blocks and share the blocks equally among __ groups, the quotient is __. __ divided by __ equals __. Let's review. What's a dividend?**

Students The total number that will be divided.

Teacher **What's a divisor?**

Students The number of groups we will make to then equally share objects.

Teacher **What's a quotient?**

Students The result in each group after you equally share.

Teacher **What does it mean to partition?**

Students To equally share objects among groups.

Teacher **How could you explain dividing to a friend?**

Students We started with a total number of blocks. We equally shared the blocks among groups. The quotient was the number of blocks in each group.

3-DIGIT ÷ 2-DIGIT: ROUTINE WITHOUT MANIPULATIVES

Teacher **Let's work on division. What does it mean to divide?**

Students To share equally or measure into groups.

Teacher **Division means to share equally or to measure into groups. Look at this problem.**

(Show problem.)

Teacher **First, I see a division bracket** (point). **The division bracket tells us to divide. What does the division bracket mean?**

Students To divide.

Teacher **Let's do this problem with our pencil. First, when I see a problem like this that requires computation, I like to draw vertical lines to separate the hundreds from the tens and the tens from the ones. Let's draw a vertical line between each of the columns in the dividend.**

(Draw vertical lines to separate place value columns.)

Teacher **When we divide using this method, for each place value in the dividend, the first thing we do is divide. If we can divide, then we multiply, subtract, and then bring in the next place value. So, the pattern is: divide, multiply, subtract, bring in. Say that with me.**

Students Divide, multiply, subtract, bring in.

Teacher **And we keep repeating that pattern until we have solved the problem. Let's see how it works. Are you ready?**

Students	Yes!	
Teacher	**Now, we start by dividing the dividend by the divisor. What's our dividend?**	
Students	__.	
Teacher	**And we'll divide the dividend by the divisor. What's the divisor?**	
Students	__.	
Teacher	**Okay, how many groups of __** (divisor) **can we make if we have _** (digit in hundreds column of dividend)**?**	
Students	We can't make any groups of __.	
Teacher	**We can't make a group of __. So, now I think how many groups of __** (divisor) **can we make if we have __** (digits in the hundreds and tens columns of dividend)**?**	
Students	*OPTION 1:*	__ groups.
	OPTION 2:	We can't make any groups of __.
Teacher	***OPTION 1:***	**We can make __ groups. So, let's write __ above the division bracket in the tens column.** (Write.)
Teacher		**So, __** (divisor) **times __** (digit above tens column) **equals __. What's __** (divisor) **times __** (digit above tens column)**?**
Students		__.
Teacher		**Let's write that product below the __** (digits in the hundreds and tens columns of dividend). (Write.)
Teacher		**Now, let's write a minus sign and an equal line. What sign?**
Students		Minus sign.
Teacher		**And let's subtract __** (digits in the hundreds and tens column of dividend) **minus __** (product). **What do we subtract?**
Students		__ minus __.
Teacher		**What's __ minus __?**
Students		__.
Teacher		**Let's write the difference here under the equal line.** (Write.)
Teacher		**Now, we bring in the one to our difference. __** (difference) **becomes __. This is our new dividend. What's our new dividend?**
Students		__. (Draw arrow and write.)
Teacher	***OPTION 2:***	**We can't make any groups of __. So, now I think about how many groups of __** (divisor) **can we make if we have __** (digits in the hundreds, tens, and ones columns of dividend)**?**
Teacher	**How many groups of __** (divisor) **can we make with our new dividend?**	
Students	__ groups.	
Teacher	**We can make __ groups. So, let's write __ above the division bracket in the ones column.** (Write.)	

Teacher	**So, __** (divisor) **times __** (digit above ones column) **equals __. What's __** (divisor) **times __** (digit above ones column)**?**
Students	__.
Teacher	**Let's write that product below the __** (digits in the new dividend). (Write.)
Teacher	**Now, let's write a minus sign and an equal line. What sign?**
Students	Minus sign.
Teacher	**And let's subtract __** (digits in the new dividend) **minus __** (product). **What do we subtract?**
Students	__ minus __.
Teacher	**What's __ minus __?**
Students	__.
Teacher	**Let's write the difference here under the equal line.** (Write.)
Teacher	**Now, do we have any remaining?**
Students	*OPTION 1:* No.
	OPTION 2: Yes.
Teacher	***OPTION 1:*** **We have nothing remaining in our difference. It's time to determine the quotient.**
Teacher	***OPTION 2:*** **We have some remaining in our difference. This will be our remainder. Say that with me.**
Students	Remainder.
Teacher	**I'll show the remainder like this. First, up by the quotient, I'll write a letter R for remainder.** (Write R.)
Teacher	**What does the R stand for?**
Students	Remainder.
Teacher	**Then, I write the remainder amount next to the R. What's the remainder amount?**
Students	__.
Teacher	**Let's write __ next to R.** (Write.)
Teacher	**It's time to determine the quotient.**
Teacher	**Our quotient is the number above the division bracket. Where can you find the quotient?**
Students	Above the division bracket.
Teacher	**What's the quotient?**
Students	__.
Teacher	**So, __ divided by __ equals __. Let's say that together.**
Students	__ divided by __ equals __.
Teacher	**Let's say it together again.**
Students	__ divided by __ equals __.
Teacher	**So, if you have __** (dividend) **and divide by __** (divisor), **the quotient is __. Let's review. What's a dividend?**

Students	The total number that will be divided.
Teacher	**What's a divisor?**
Students	The number of groups we will make.
Teacher	**What's a quotient?**
Students	The result in each group after you equally share or measure groups.
Teacher	**How could you explain dividing to a friend?**
Students	We asked ourselves about how many groups we can make with the divisor from the dividend. The number of groups is the quotient.

Example

$$12\overline{)468}\quad 39$$

3-DIGIT ÷ 2-DIGIT: EXAMPLE WITHOUT MANIPULATIVES

Teacher	**Let's work on division. What does it mean to divide?**
Students	To share equally or measure into groups.
Teacher	**Division means to share equally or to measure into groups. Look at this problem.** (Show problem.)
Teacher	**First, I see a division bracket** (point). **The division bracket tells us to divide. What does the division bracket mean?**
Students	To divide.
Teacher	**Let's do this problem with our pencil. First, when I see a problem like this that requires computation, I like to draw vertical lines to separate the hundreds from the tens and the tens from the ones. Let's draw a vertical line between each of the columns in the dividend.** (Draw vertical lines to separate place value columns.)
Teacher	**Now, we start by dividing the dividend by the divisor. What's our dividend?**
Students	468.
Teacher	**And we'll divide the dividend by the divisor. What's the divisor?**
Students	12.
Teacher	**When we divide using this method, for each place value in the dividend, the first thing we do is divide. If we can divide, then we multiply, subtract, and then bring in the next place value. So, the pattern is: divide, multiply, subtract, bring in. Say that with me.**
Students	Divide, multiply, subtract, bring in.
Teacher	**And we keep repeating that pattern until we have solved the problem. Let's see how it works. Are you ready?**
Students	Yes!
Teacher	**Okay, so we start with the greatest place value of the dividend. Where do we start?**
Students	Greatest place value of the dividend.
Teacher	**In this problem, the greatest place value of the dividend is 4. What number?**

Students	4.
Teacher	**How many groups of 12 can we make with 4?**
Students	We can't make any groups of 4 if we have 12.
Teacher	**We can't make a group of 12. So, now we bring in the 6 to make 46. I think how many groups of 46 can we make if we have 12?**
Students	We can make 3 groups of 12.
	We can make 3 groups. So, let's write 3 above the division bracket in the tens column.
	(Write 3.)
Teacher	**So, now let's multiply 12 times 3. What's 12 times 3?**
Students	36.
Teacher	**Let's write that product of 36 below the 46 in the dividend.**
	(Write 36.)
Teacher	**Now, let's write a minus sign and an equal line to help us subtract 36 from 46. What sign?**
Students	Minus sign.
Teacher	**What do we subtract?**
Students	46 minus 36.
Teacher	**What's 46 minus 36?**
Students	10.
Teacher	**Let's write the difference here under the equal line.**
	(Write 10.)
Teacher	**Now, we bring in the one to our difference. I like to show this by drawing an arrow from the 8 and rewriting the 8 next to 10.**
	(Draw arrow and write 8.)
Teacher	**When I bring in the 8, 10 now becomes 108. This is our new dividend. What's our new dividend?**
Students	108.
Teacher	**So, we followed the steps of division: divide, multiply, subtract, bring in. Say that with me.**
Students	Divide, multiply, subtract, bring in.
Teacher	**But the problem isn't finished. Let's follow the steps again: divide, multiply, subtract, bring in. What do we do?**
Students	Divide, multiply, subtract, bring in.
Teacher	**How many groups of 12 can we make with our new dividend of 108?**
Students	9 groups.
Teacher	**We can make 9 groups. So, let's write 9 above the division bracket in the ones column.**
	(Write 9.)
Teacher	**So, let's multiply. What's 12 times 9?**
Students	108.
Teacher	**Let's write 108 below the 108**.
	(Write 108.)
Teacher	**Now, let's write a minus sign and an equal line. What sign?**

Students	Minus sign.
Teacher	**And let's subtract 108 minus 108. What do we subtract?**
Students	108 minus 108.
Teacher	**What's 108 minus 108?**
Students	0.
Teacher	**Let's write the difference here under the equal line.** (Write 0.)
Teacher	**Now, do we have any remaining?**
Students	No.
Teacher	**We have nothing remaining in our difference. It's time to determine the quotient. Our quotient is the number above the division bracket. Where can you find the quotient?**
Students	Above the division bracket.
Teacher	**What's the quotient?**
Students	39
Teacher	**So, 468 divided by 12 equals 39. Let's say that together.**
Students	468 divided by 12 equals 39.
Teacher	**Let's say it together again.**
Students	468 divided by 12 equals 39.
Teacher	**So, if you have 468 and divide by 12, the quotient is 39. Let's review. What's a dividend?**
Students	The total number that will be divided.
Teacher	**What's a divisor?**
Students	The number of groups we will make.
Teacher	**What's a quotient?**
Students	The result in each group after you equally share or measure groups.
Teacher	**How could you explain dividing to a friend?**
Students	We asked ourselves about how many groups we can make with the divisor from the dividend. The number of groups is the quotient.

(2) Division with Partial Quotients Algorithm*

*For clarity, read **Example** before using **Routines**.

Routine

Materials:

- Module 14 Problem Sets
- Module 14 Vocabulary Cards
  - If necessary, review Vocabulary Cards before teaching

3-DIGIT ÷ 2-DIGIT: ROUTINE WITHOUT MANIPULATIVES

Teacher	**Let's work on division. What does it mean to divide?**
Students	To share equally or measure into groups.
Teacher	**Division means to share equally or to measure into groups. Look at this problem.** (Show problem.)
Teacher	**First, I see a division bracket** (point). **The division bracket tells us to divide. What does the division bracket mean?**
Students	To divide.
Teacher	**Let's do this problem with our pencil, and let's use the partial quotients strategy. If I want to use the partial quotients strategy, I first draw a vertical line down from the end of the division bracket.** (Draw vertical line from end of division bracket.)
Teacher	**Now, we start by dividing the dividend by the divisor. What's our dividend?**
Students	__.
Teacher	**And we'll divide the dividend by the divisor. What's the divisor?**
Students	__.
Teacher	**I don't know exactly how many groups of __** (divisor) **I can make with __** (dividend)**, so the partial quotients strategy can be used with computation that I do know. Which strategy are we using?**
Students	Partial quotients.
Teacher	**With the partial quotients strategy, we divide the dividend a few times. Each time we create a partial quotient. At the end, we add the partial quotients to determine the final quotient. Which strategy are we using again?**
Students	Partial quotients.
Teacher	**How many groups of __** (divisor) **can we make with __** (dividend)**?**
Students	I'm not sure.
Teacher	**I don't know the exact answer either, so I'll use a partial quotient to start solving this problem. I know that __** (friendly number) **groups of __** (divisor) **would be __** (product of friendly number times divisor)**, so I'll write __** (product) **under the __** (original dividend)**. I'll also write __** (partial quotient) **to the right of the vertical line. __** (partial quotient) **is one of my partial quotients.**

(Write.)

Teacher **Now, I'll subtract __** (product) **from the dividend of __ to determine a new dividend. I write a minus sign and an equal line.**

(Write minus sign and equal line.)

Teacher **__** (dividend) **minus __** (product) **equals what?**

Students __.

Teacher **Let's write the difference of __ below the equal line.**

(Write.)

Teacher **Now, how many groups of __** (divisor) **can we make with __** (new dividend)**?**

Students I'm not sure.

Teacher **Again, I don't know the exact answer either, so I'll use a partial quotient. I know that __** (friendly number) **groups of __** (divisor) **would be __** (product of friendly number times divisor)**. I'm using computation that's easier for me to do. So, __** (friendly number) **groups of __** (divisor) **equals __** (product)**. I'll write __** (product) **under the __** (new dividend)**. I'll also write __** (partial quotient) **to the right of the vertical line. __** (partial quotient) **is one of my partial quotients.**

(Write.)

Teacher **Now, I'll subtract __** (product) **from the dividend of __ to determine a new dividend. I write a minus sign and an equal line.**

(Write minus sign and equal line.)

Teacher **__** (dividend) **minus __** (product) **equals what?**

Students __.

Teacher **Let's write the difference of __ below the equal line.**

(Write.)

Teacher **Now, how many groups of __** (divisor) **can we make with __** (new dividend)**?**

Students I'm not sure.

Teacher **Let's use a partial quotient. I know that __** (friendly number) **groups of __** (divisor) **would be __** (product of friendly number times divisor)**. I'll write __** (product) **under the __** (new dividend)**. I'll also write __** (partial quotient) **to the right of the vertical line. __** (partial quotient) **is one of my partial quotients.**

(Write.)

Teacher **Now, I'll subtract __** (product) **from the dividend of __ to determine a new dividend. I write a minus sign and an equal line.**

(Write minus sign and equal line.)

Teacher **__** (dividend) **minus __** (product) **equals what?**

Students __.

Teacher **Let's write the difference of __ below the equal line.**

(Write.)

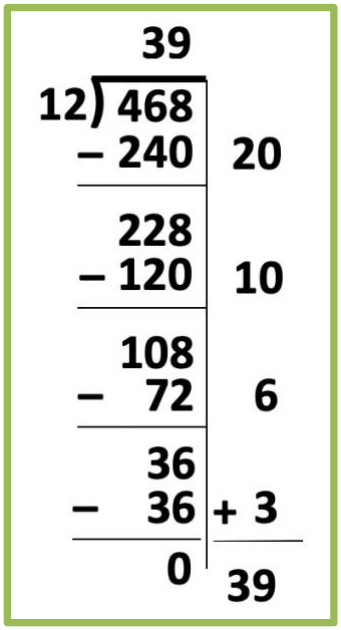
Teacher **Now, how many groups of __** (divisor) **can we make with __** (new dividend)**?**

Students __!

Teacher **I know that __** (friendly number) **groups of __** (divisor) **would be __** (product of friendly number times divisor)**. I'll write __** (product) **under the __** (new

	dividend)**. I'll also write __** (partial quotient) **to the right of the vertical line. __** (partial quotient) **is one of my partial quotients.** (Write.)
Teacher	**Now, I'll subtract __** (product) **from the dividend of __ to determine a new dividend. I write a minus sign and an equal line.** (Write minus sign and equal line.)
Teacher	**__ minus __ equals what?**
Students	__.
Teacher	**Let's write the difference of __ below the equal line.** (Write.)
Teacher	**Can we make any more groups of __** (dividend)**?**
Students	No!
Teacher	**We can't make any more groups of __** (dividend)**, so let's determine our quotient. We do this by adding the partial quotients together. How do we determine the quotient?**
Students	Add the partial quotients together.
Teacher	**Let's write a plus sign and equal line.** (Write plus sign and equal line.)
Teacher	**What's __ plus __ plus …?** (partial quotients)
Students	__.
Teacher	**Let's write the sum of the partial quotients below the equal line.** (Write.)
Teacher	**We could also write the quotient above the division bracket.** (Write.)
Teacher	**What's the quotient?**
Students	__.
Teacher	**So, __ divided by __ equals __. Let's say that together.**
Students	__ divided by __ equals __.
Teacher	**Let's say it together again.**
Students	__ divided by __ equals __.
Teacher	**Let's review. What's a dividend?**
Students	The total number that will be divided.
Teacher	**What's a divisor?**
Students	The number of groups we will make.
Teacher	**What's a quotient?**
Students	The result in each group after you equally share or measure groups.
Teacher	**How could you explain dividing to a friend?**
Students	We kept asking how many groups we could make with the dividend. We didn't know the exact answer, so we used computation we did know as partial quotients. At the end, we added the partial quotients for the final quotient.

Example



3-DIGIT ÷ 2-DIGIT: EXAMPLE WITHOUT MANIPULATIVES

Teacher	**Let's work on division. What does it mean to divide?**
Students	To share equally or measure into groups.
Teacher	**Division means to share equally or to measure into groups. Look at this problem.** (Show problem.)
Teacher	**First, I see a division bracket** (point). **The division bracket tells us to divide. What does the division bracket mean?**
Students	To divide.
Teacher	**Let's do this problem with our pencil, and let's use the partial quotients strategy. If I want to use the partial quotients strategy, I first draw a vertical line down from the end of the division bracket.** (Draw vertical line from end of division bracket.)
Teacher	**With the partial quotients strategy, we divide the dividend a few different times. Each time we create a partial quotient. At the end, we add the partial quotients to determine the final quotient. Which strategy are we using again?**
Students	Partial quotients.
Teacher	**Now, we start by dividing the dividend by the divisor. What's our dividend?**
Students	468.
Teacher	**And we'll divide the dividend by the divisor. What's the divisor?**
Students	12.
Teacher	**I don't know exactly how many groups of 12 I can make with 468, so the partial quotients strategy can be used with computation that I do know. Which strategy are we using?**
Students	Partial quotients.
Teacher	**How many groups of 12 can we make with 468?**

Students I'm not sure.

Teacher **I don't know the exact answer either, so I'll use a partial quotient to start solving this problem. I know that 20 groups of 12 would be 240, so I'll write 240 under the 468. I'll also write 20 to the right of the vertical line. 20 is one of my partial quotients.**

(Write 240 and 20.)

Teacher **Now, I'll subtract 240 from the dividend of 468 to determine a new dividend. I write a minus sign and an equal line.**

(Write minus sign and equal line.)

Teacher **468 minus 240 equals what?**

Students 228.

Teacher **Let's write the difference of 228 below the equal line.**

(Write 228.)

Teacher **Now, how many groups of 12 can we make with 228?**

Students I'm not sure.

Teacher **Again, I don't know the exact answer either, so I'll use a partial quotient. I know that 10 groups of 12 would be 120. I'm using computation that's easier for me to do – so I like to think about 20 groups of 12 or 10 groups of 12. What's another group of 12 that might be easy to remember or to figure out?**

Students 12 groups of 2 (or 4 or 5).

Teacher **So, 10 groups of 12 equals 120. I'll write 120 under the 228. I'll also write 10 to the right of the vertical line. 10 is one of my partial quotients.**

(Write 120 and 10.)

Teacher **Now, I'll subtract 120 from the dividend of 228 to determine a new dividend. I write a minus sign and an equal line.**

(Write minus sign and equal line.)

Teacher **228 minus 120 equals what?**

Students 108.

Teacher **Let's write the difference of 108 below the equal line.**

(Write 108.)

Teacher **Now, how many groups of 12 can we make with 108?**

Students I'm not sure.

Teacher **Let's use a partial quotient. I know that 6 groups of 12 would be 72. I'll write 72 under the 108. I'll also write 6 to the right of the vertical line. 6 is one of my partial quotients.**

(Write 72 and 6.)

Teacher **Now, I'll subtract 72 from the dividend of 108 to determine a new dividend. I write a minus sign and an equal line.**

(Write minus sign and equal line.)

Teacher **108 minus 72 equals what?**

Students 36.

Teacher **Let's write the difference of 36 below the equal line.**

(Write 36.)

Teacher **Now, how many groups of 12 can we make with 36?**

Students	3!
Teacher	**Yes! I know that 3 groups of 12 would be 36. I'll write 36 under the 36. I'll also write 3 to the right of the vertical line. 3 is one of my partial quotients.** (Write 36 and 3.)
Teacher	**Now, I'll subtract 36 from the dividend of 36 to determine a new dividend. I write a minus sign and an equal line.** (Write minus sign and equal line.)
Teacher	**36 minus 36 equals what?**
Students	0.
Teacher	**Let's write the difference of 0 below the equal line.** (Write 0.)
Teacher	**This 0 is our new dividend. Can we make any more groups of 12?**
Students	No!
Teacher	**We can't make any more groups of 12, so let's determine our quotient. We do this by adding the partial quotients together. How do we determine the quotient?**
Students	Add the partial quotients together.
Teacher	**Let's write a plus sign and equal line.** (Write plus sign and equal line.)
Teacher	**What's 20 plus 10 plus 6 plus 3?**
Students	39.
Teacher	**Let's write the sum of the partial quotients below the equal line.** (Write 39.)
Teacher	**We could also write the quotient above the division bracket.** (Write 39.)
Teacher	**What's the quotient?**
Students	39.
Teacher	**So, 468 divided by 12 equals 39. Let's say that together.**
Students	468 divided by 12 equals 39.
Teacher	**Let's say it together again.**
Students	468 divided by 12 equals 39.
Teacher	**So, if you have 468 and divide by 12, the quotient is 39. Let's review. What's a dividend?**
Students	The total number that will be divided.
Teacher	**What's a divisor?**
Students	The number of groups we will make.
Teacher	**What's a quotient?**
Students	The result in each group after you equally share or measure groups.
Teacher	**How could you explain partial quotients to a friend?**
Students	We kept asking how many groups of 12 we could make with the dividend. We didn't know the exact answer, so we used computation we did know as partial quotients. At the end, we added the partial quotients for the final quotient.

D. Problems for Use During Instruction

See Module 14 Problem Sets.

E. Vocabulary Cards for Use During Instruction

See Module 14 Vocabulary Cards.

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Module 14:

Division of Whole Numbers

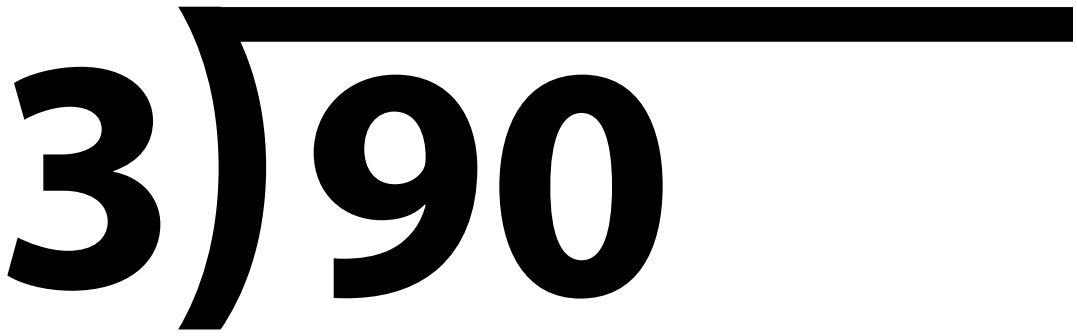
Problem Sets

A. 2-digit by 1-digit; no remainder (10)
B. 2-digit by 1-digit; remainder (10)
C. 3-digit by 1-digit; no remainder (10)
D. 3-digit by 1-digit; remainder (10)
E. 4-digit by 1-digit; no remainder (10)
F. 4-digit by 1-digit; remainder (10)
G. 3-digit by 2-digit; no remainder (10)
H. 3-digit by 2-digit; remainder (10)

A.

$$2\overline{)48}$$

A.

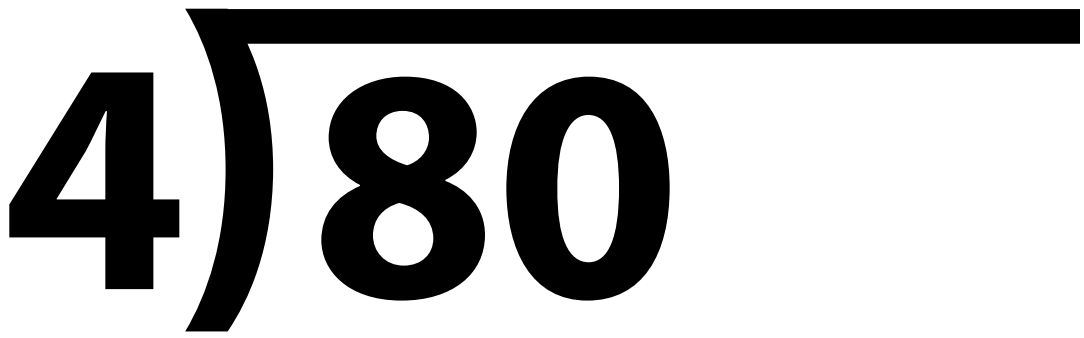


A.

A.

A.

A.



A.

A.

A.

A.

B.

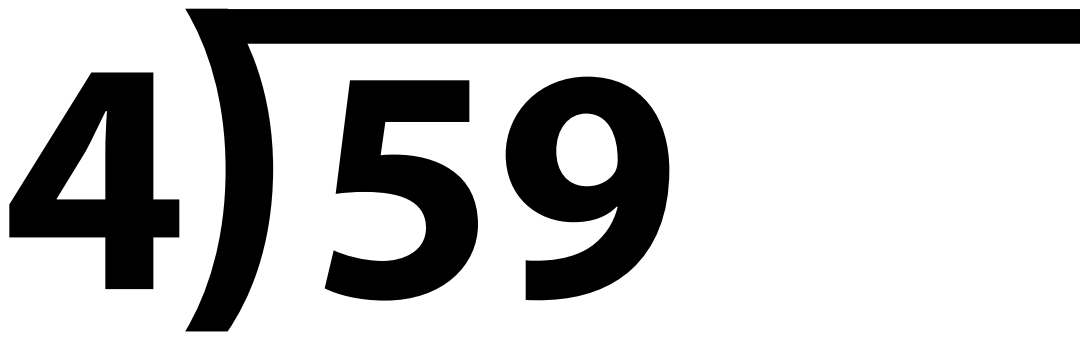
B.

B.

B.

B.

B.



B.

B.

B.

B.

c.

c.

c.

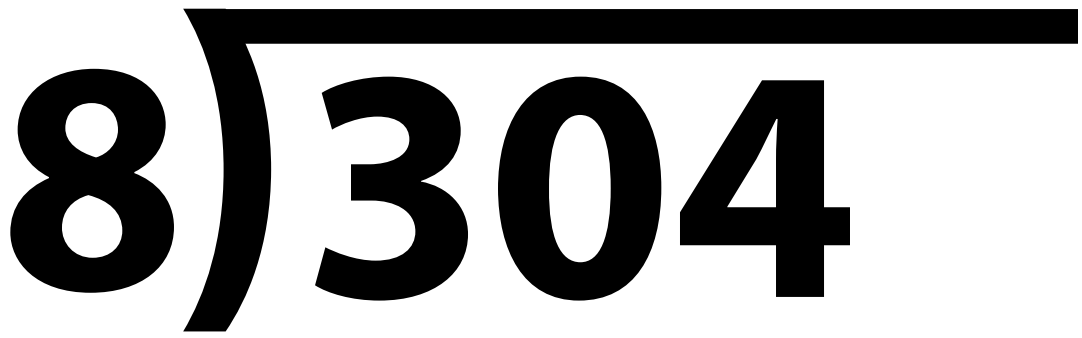
c.

$$2\overline{)720}$$

c.

c.

c.



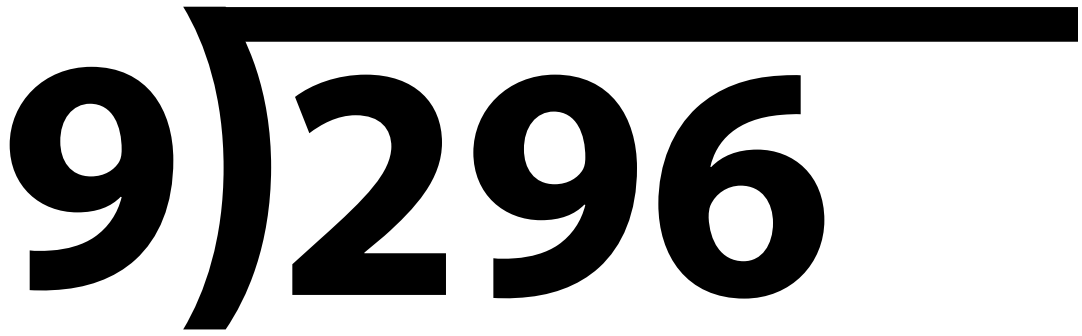
c.

c.

c.

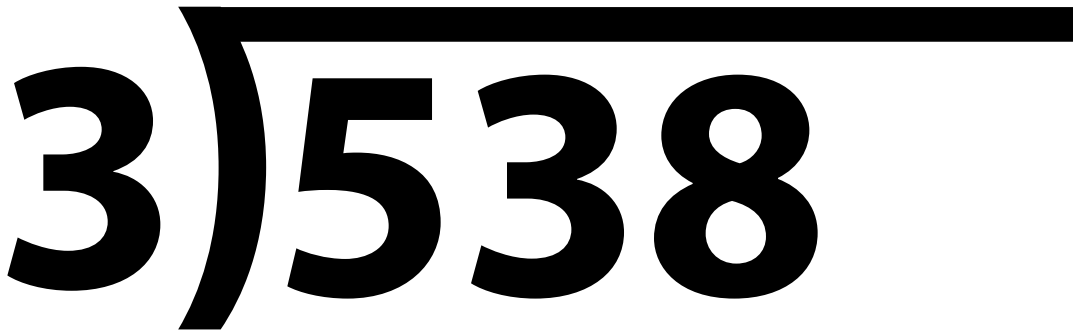
D.

D.



D.

D.



D.

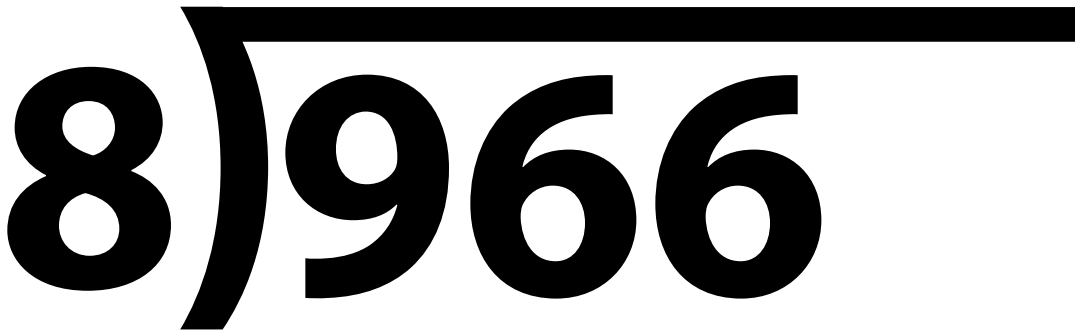
D.

D.

D.

D.

D.



E.

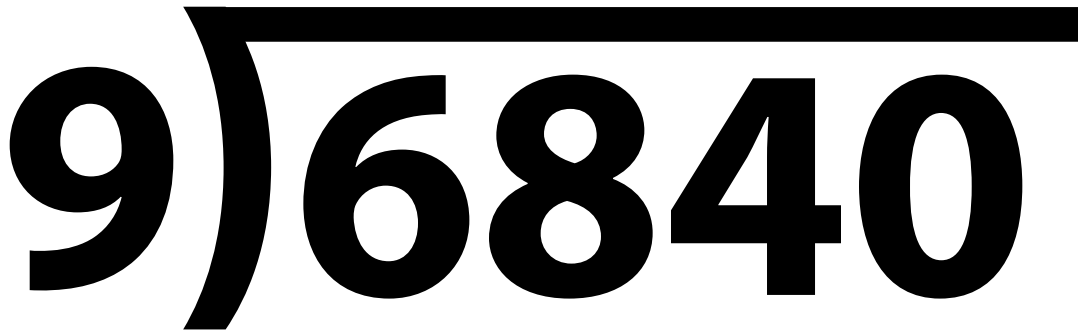
E.

$$7\overline{)1204}$$

E.

E.

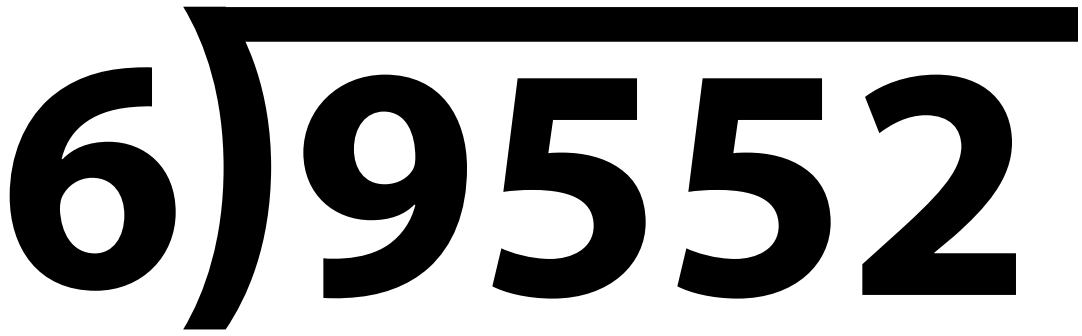
E.



E.

$$8\overline{)7848}$$

E.



E.

E.

E.

$$5\overline{)2835}$$

F.

$$4\overline{)6743}$$

F.

$$2\overline{)7685}$$

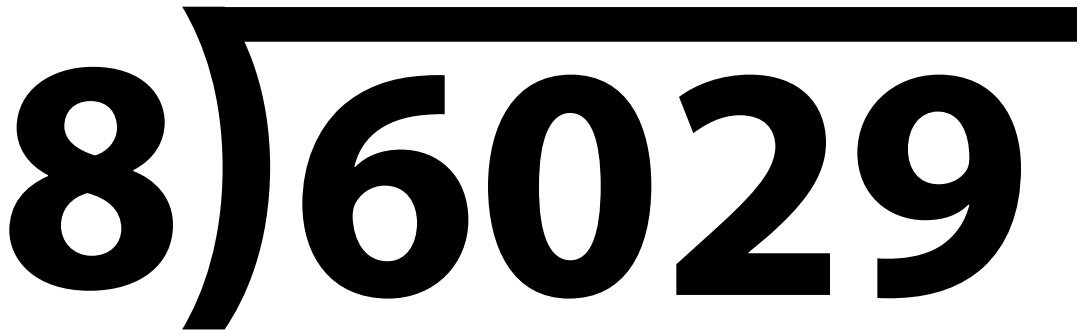
F.

$$5\overline{)4817}$$

F.

$$4\overline{)5910}$$

F.



F.

$$5\overline{)7664}$$

F.

$$3\overline{)2009}$$

F.

F.

$$3\overline{)3622}$$

F.

G.

$$28\overline{)112}$$

G.

$$12\overline{)528}$$

G.

$$58\overline{)986}$$

G.

$$11\overline{)836}$$

G.

$$35\overline{)420}$$

G.

$$15\overline{)585}$$

G.

$$13\overline{)637}$$

G.

$$35\overline{)735}$$

G.

$$10\overline{)900}$$

G.

$$94\overline{)188}$$

H.

$$23\overline{)202}$$

H.

$$16\overline{)124}$$

H.

$$11\overline{)104}$$

H.

$$28\overline{)114}$$

H.

$$17\overline{)122}$$

H.

$$24\overline{)108}$$

H.

$$63\overline{)933}$$

H.

$$18\overline{)547}$$

H.

$$24\overline{)786}$$

H.

$$35\overline{)265}$$

Module 14:

Division of Whole Numbers

Vocabulary Cards

algorithm
computation
divide/division
dividend
division sign
divisor
equal groups
equal sign
hundreds column
ones column
quotient
regroup/trade/exchange
remainder
tens column

algorithm

A procedure or description of steps that can be used to solve a problem.

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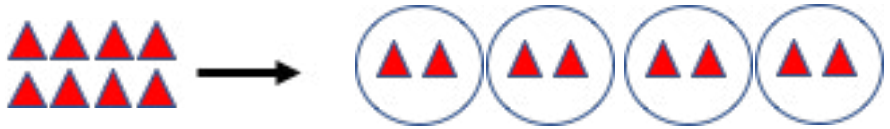
computation

The action used to solve a problem.

divide/division

To separate into equal groups.



8 ÷ 4 = 2

---

dividend

The number that is to be divided in a division problem.

16 ÷ 8 = 2

16 is the dividend

division sign

The symbol that tells you to divide.

$$16 \div 8 = 2$$

÷ is the division sign

---

divisor

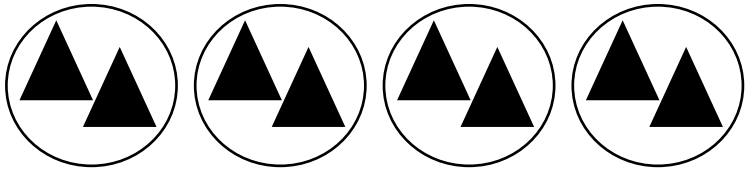
The number that the dividend is divided by.

$$16 \div 8 = 2$$

8 is the divisor

equal groups

Groups with the same number of objects or items in each group.



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equal sign

The symbol that tells you that two sides of an equation are the same, balanced, or equal.

16 ÷ 8 = 2

= is the equal sign

hundreds column

The column with digits in the hundreds place.

In the number 423, 4 is in the hundreds place.

---

ones column

The column with digits in the ones place.

In the number 423, 3 is in the ones place.

quotient

The number that results when one number is divided by another number.

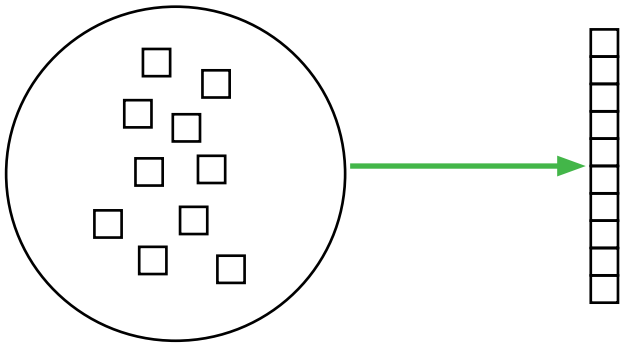
16 ÷ 8 = 2

2 is the quotient

---

regroup/trade/exchange

The process of exchanging 10 ones for 1 ten, 10 tens for 1 hundred, 10 hundreds for 1 thousand, etc.



remainder

The amount remaining in a division problem.

---

tens column

The column with digits in the tens place.

In the number 423, 2 is the in the tens column.