Divvy Out Greater Numbers Grades 3 and 4

The benefit of divvying out greater numbers is that students get experience trying out different amounts in each group. "Should I put in ten? Should I put in 100?" When students ask themselves these questions and try out different amounts, they develop a deeper number sense. With experience and coaching, their guesses become more accurate and efficient.

The first "We Do" is centered around the simple word problem below. It is meant to give the students a concrete example to work with. This is an enlarged copy to read better on the overhead.

There were 96 students going on a field trip. They were divided equally between 2 buses. How many students were on each bus?

The next couple pages work through the problem below. However, your class may offer different choices, so the work will look different, but the final quotient will be the same.

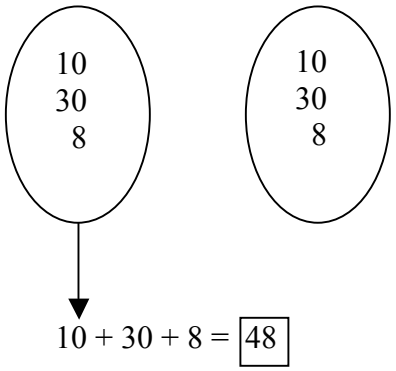
Total Students

96	
48	48
Bus #1	Bus #2

$96 \div 2 = \boxed{48}$

$$2\overline{)96}\quad \boxed{48}$$

$$\frac{96}{2} = \boxed{48}$$



96	Total
− 20 ←	(2 ×10)
76	Left
− 60 ←	(2 ×30)
16	Left
− 16 ←	(2 × 8)
0	Remainder

We Do: 96 ÷ 2

Begin by reading the story from the previous page together.

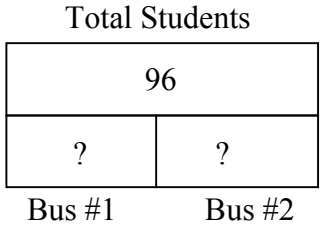
Who are the main characters in this story? (the students)
How many students? (96)
Where did they go? (on a field trip)
How many buses did they have? (2)
What do we need to find out?
(the number of students on each bus)

Write on the board:

***96 students total**
***2 buses**
How many students were on each bus?

What does this look like in a bar model?
Share with your neighbor. I need a quiet hand to share out. (Coach the students as needed.)

We know the total number of students, which is 96. Let's put 96 in the WHOLE or TOTAL. How many buses are there? (2). How many parts will we have? (2) Are these parts the same size? (yes) Yes, we are taking equal amounts out of the total.

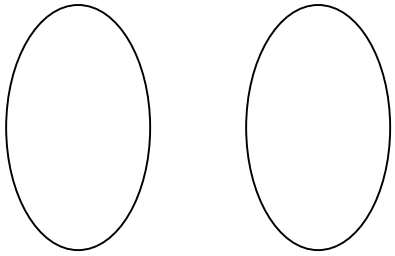


So…the teacher needs to divide the students equally between the two buses.

Think. What would our division sentence be? Share with your neighbor. Everyone tell me. (96 ÷ 2 = ☐.) We can write division 3 ways, remember? Write the 3 different ways the way I am on your paper. Remember to leave a space for the quotient. We will write it in later.

$96 \div 2 = \square$ $\qquad$ $2\overline{)96}$ $\qquad$ $\frac{96}{2} = \square$

Let's get back to our story. We have 2 buses, so draw two groups. Make them long enough because we are working with larger numbers. To the side write "96 Total" because that is the number of students we are working with.



96 Total

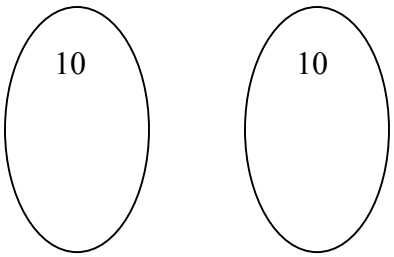
Be sure you have a long column of space to work with under the total. *(Check student notes.)*

Imagine the 96 students waiting patiently to get on the buses. If the teacher asked the students to go on **one at a time**, that would take a **long** time.

Think. How many students should he/she send at a time?
1 at a time? 10 at a time? 100 at a time?

Share with your neighbor. I need a quiet hand to share an idea. *(Students' ideas will vary. The following is an example of how the problem might develop.)*

(A student might suggest 10 at a time.)
Okay. Let's try that out. *(Point to each group as you skip count.)* 10, 20.
That's a good start. Write 10 in each group.
How many students in total are on the buses? (20).

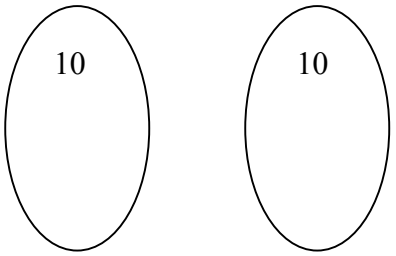


96 Total
20

*We started with 96 students on the sidewalk.
*We sent a total of 20 students to the buses.
*Think. How do we figure out how many students are left on the sidewalk?
Share with your neighbor. Thumbs up if you know. Everyone answer. (subtract)

I need a quiet hand to tell me what to subtract. (96 – 20).
Thumbs up if you agree.
Okay. Find out how many students are left.

(Sometimes referring to one part of the room as the "sidewalk" and another part of the room as the buses helps the students visualize what is happening.)



96 Total
− 20 ← (2 ×10)
76 Left

We can label 76 "Left" because that's the amount leftover.

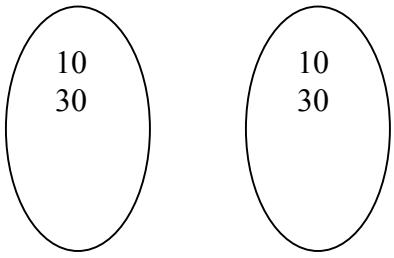
Take another look at 20. We have to justify why we subtracted 20. We got 20 by adding 10 and 10. What's the multiplication way of saying that? (2 × 10 or 10 × 2) Write 2 × 10 or 10 × 2 next to 20).

Now how many students should we send to each bus? Last time we sent 10 in at a time, and that worked well. Let's see if we could try a greater amount. What if we tried 20? 30? Share with your partner what we should try. I need a quiet hand to share. (30)

Let's try that. *(Point to each group as you skip count.)* 30, 60. That could work.

What if we tried 40? *(Point to each group.)* 40, 80. Could that work? (No) Why? (It's too much. We only have 76, and 80 is more than 76.)

Okay. Put 30 in each group and find out how much is left. Remember to label your work.



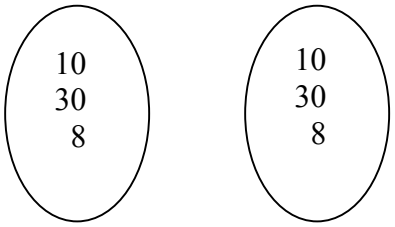
96 Total
− 20 ← (2 ×10)
76 Left
− 60 ← (2 × 30)
16 Left

(Pull up a student's work to use as a model.)
How much is left? (16) Did you label it *Left*?
What multiplication fact did you write next to 60? (2 ×30)
Do your notes look like this? *(Check student notes.)*

There are 16 students left. There are two buses. Hmmm…. that sounds like a basic fact to me. Show me on your fingers how many we should put in each group. (8) Go ahead and finish. *(Circulate to check student work.)* How much is left? (0)

When we don't have anything left to divvy out, we call that the *remainder*. Write "Remainder" next to 0.

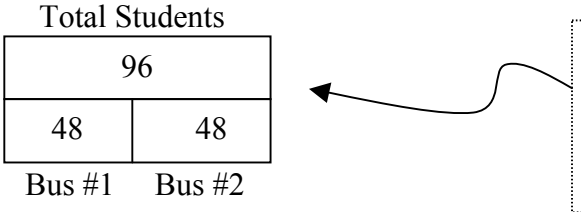
By the way, if I didn't know that 16 ÷ 2 = 8, then I could have put a number like 4 in each group. It would take longer, but it would still work.



96	Total
− 20	← (2 ×10)
76	Left
− 60	← (2 ×30)
16	Left
− 16	← (2 × 8)
0	Remainder

Finally all the students are on the buses and none are left on the sidewalk.
So…let's go back to the original question…How many students were each bus?
Where is our answer? Is it here? *(Point to the Remainder.)* Is it here? *(Point to the Total.*)
Share with your neighbor how to figure out how many students are on each bus.
Quiet hand to share. (I add the numbers in one of the groups)
Why only one group? (…because we need to know how much in one of the buses)

Okay, how many in each group? 10 + 30 = 40. 40 + 8 = 48. There were 48 students on each bus. That's our quotient. Write them into your division equations and in your bar model.



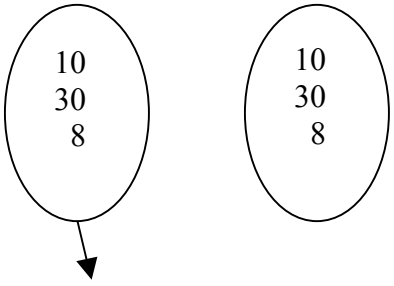
Let's read each of these together:
96 divided into 2 groups equals 48 in each group.

$96 \div 2 = \boxed{48}$

$2\overline{)96}$ with $\boxed{48}$

$\frac{96}{2} = \boxed{48}$

96 divided by 2 equals 48.



$10 + 30 + 8 = \boxed{48}$

96	Total
− 20	← (2 ×10)
76	Left
− 60	← (2 ×30)
16	Left
− 16	← (2 × 8)
0	Remainder

We Do: 129 ÷ 3 = ☐

Our next example is 129 ÷ 3 = ☐

Copy the division equation and draw a bar model for 129 ÷ 3. Give me a thumbs up when you are ready.

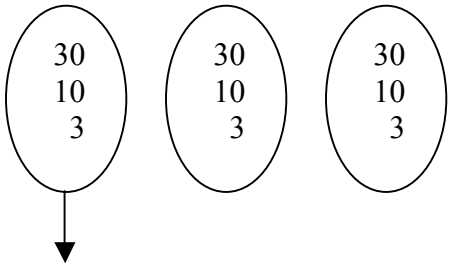
Now set up your groups and write the total, just like last time. How many groups this time? (3) Remember to leave room under the Total like last time.

(Coach the students on what amounts to try. Have the class agree on what amounts to put in. They should be more independent about finding what is left and notating the multiplication expression. It's suggested that the teacher circulates to be sure students are following through.)

(Since the second example should go quicker, the teacher can have the students also check with multiplication.)

129 ÷ 3 = 43

129		
43	43	43



30 + 10 + 3 = 43

129	Total
−90 ←	(3 × 30)
39	Left
−30 ←	(3 × 10)
9	Left
−9 ←	(3 × 3)
0	Reminder

Now that we've found the quotient, let's check our work. How do we check division? (Multiplication) What do we multiply? *(This may take some prompting.)*
Look back at the original problem. 129 ÷ 3 = ☐. If 129 ÷ 3 = 43, then 3 × 43 should equal 129.

Check: 43
×3
129 ✓

We Do/You Try: $4\overline{)224}$

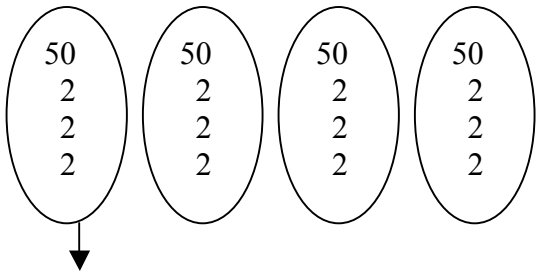
Here is our next example. Write your division equation and your bar model. Get your groups set up and the total. Discuss with your partner how much we should put in each group.

At this point, the students might be ready to do one all on there own. You might get them started with the first amount, encouraging larger amounts. Some students will feel more comfortable putting in 10 at a time initially.

Possible Coaching:	Try 10: What's 4 × 10? (40) Try 20: What's 4 × 20? (80) That could work, but I want to get closer to 224. Try 100: What's 4 × 100? (400) Too much. Back Up: I know 4 × 5 = 20, so what is 4 ×50? (200) 200 is very close to 224. Let's put 50 in each.
Another Way:	Look at our basic facts. 4 × 2 = 8, so 4 × 20 equals what? (80) 4 ×3 = 12, so 4 × 30 equals what? (120) Better. 4 × 4 = 16, so 4 × 40 equals what? (160) Better. 4 × 5 = 20, so 4 × 50 equals what? (200) That's really close!

$4\overline{)224}$ $\boxed{56}$

224			
56	56	56	56



$50 + 2 + 2 + 2 = \boxed{56}$

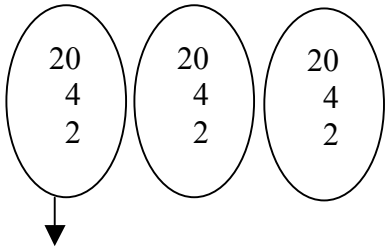
224	Total
− 200 ←	(4 × 50)
24	Left
− 8 ←	(4 × 2)
16	Left
− 8 ←	(4 × 2)
8	Left
− 8 ←	(4 × 2)
0	Remainder

Check:
$$\begin{array}{r} 56 \\ \times 4 \\ \hline 24 \\ +200 \\ \hline 224 \end{array} \checkmark$$

You Tries: Below are three You Tries that demonstrate different levels of difficulty. You can give all three and have students choose which one to try or have them do one after the other. Having extra You Tries allows the more accelerated students to try more difficult problems, while giving other students extra time to finish at least one of the problems.

You Try: $78 \div 3 =$ $\boxed{26}$

78		
26	26	26



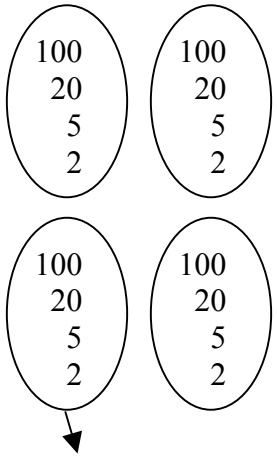
$20 + 4 + 2 = \boxed{26}$

78 Total
-60 ← (3×20)
18 Left
-12 ← (3×4)
6 Left
-6 ← (3×2)
0 Remainder

Check:
$$\begin{array}{r} {\scriptstyle 1\ \ \ } \\ 26 \\ 26 \\ +\,26 \\ \hline 78 \end{array} \checkmark$$

You Try: $\boxed{127}$
$4\overline{)508}$

508			
127	127	127	127



$100 + 20 + 5 + 2 = \boxed{127}$

508 Total
-400 ← (4×100)
108 Left
-80 ← (4×20)
28 Left
-20 ← (4×5)
8 Left
-8 ← (4×2)
0 Remainder

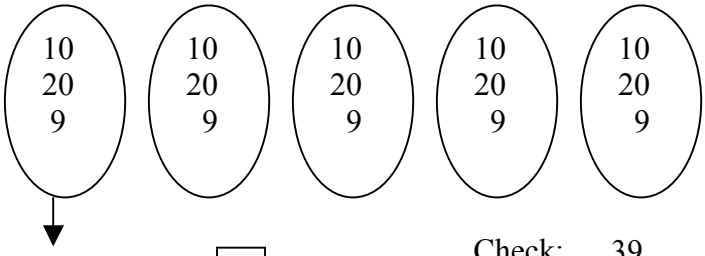
Check:

	100 +	20 +	7
4	400	80	28

$$\begin{array}{r} {\scriptstyle 1\ \ \ } \\ 400 \\ 80 \\ +\,28 \\ \hline 508 \end{array} \checkmark$$

You Try:
$\frac{195}{5} = \boxed{39}$

195				
39	39	39	39	39



$10 + 20 + 9 = \boxed{39}$

Check:
$$\begin{array}{r} {\scriptstyle 4\ } \\ 39 \\ \times\,5 \\ \hline 195 \end{array} \checkmark$$

195 Total
-50 ← (5×10)
145 Left
-100 ← (5×20)
45 Left
-45 ← (5×9)
0 Remainder

Next Steps: Divvy Out with 4 –Digit Dividends

$6\overline{)6{,}492}$

1,000	6,492
20	−6,000
40	492
20	−120
2	372
1,000	−240
20	132
40	−120
20	12
2	−12
1,000	0
20	
40	
20	
2	
1,000	
20	
40	
20	
2	

1,000 + 20 + 40 + 20 + 2
= 1,082

Check:

$\overset{4\ 1}{1{,}082}$
× 6
6,492 ✓

$\frac{5{,}922}{7} =$ ☐

300	5,922
400	−2,100
100	3,822
40	−2,800
6	1,022
300	−700
400	322
100	−280
40	42
6	−42
300	0
400	
100	
40	
6	
300	
400	
100	
40	
6	
300	
400	
100	
40	
6	

300 + 400 + 100 + 40 + 6
= 846

Check:

$\overset{3\ 4}{846}$
× 7
5,922 ✓

8,955 ÷ 3 = ☐

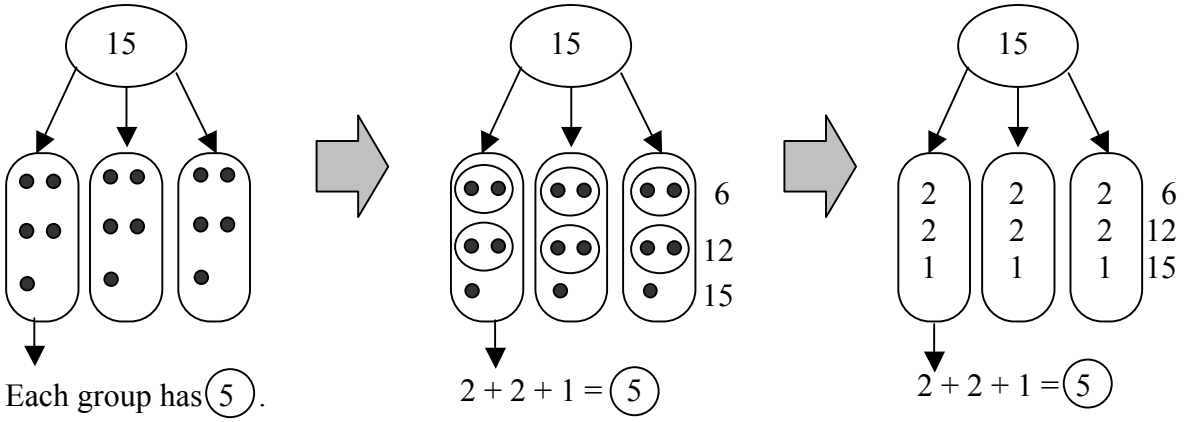
1,000	8,955
1,000	−3,000
700	5,955
200	−3,000
80	2,955
5	−2,100
1,000	855
1,000	−600
700	255
200	−240
80	15
5	−15
1,000	0
1,000	
700	
200	
80	
5	

1,000 + 1,000 + 700 + 200 + 80 + 5
= 2,000 + 900 + 80 + 5
= 2,985

Check:

$\overset{2\ 2\ 1}{2{,}985}$
× 3
8,955 ✓

Divvy Out with Basic Facts



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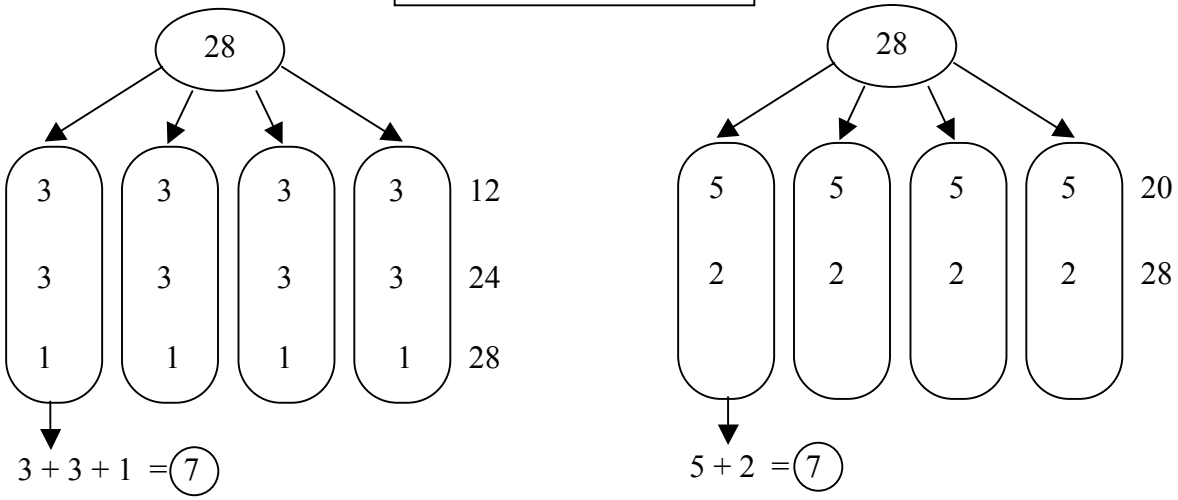
28 ÷ 4
Two Different Ways



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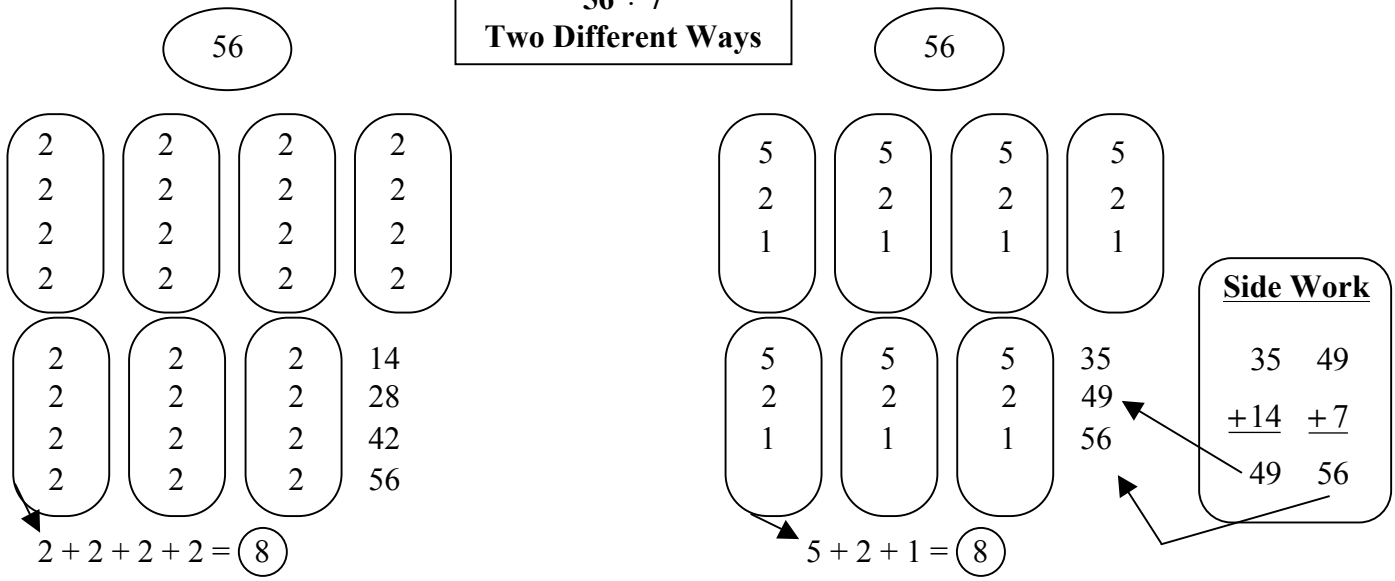
56 ÷ 7
Two Different Ways

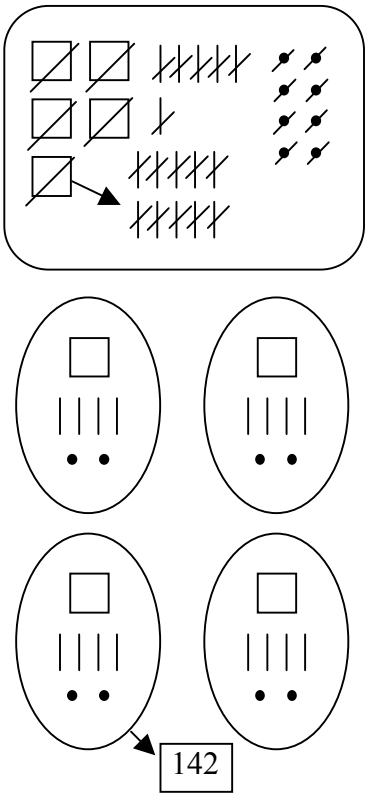


Dividing Whole Numbers: Multiple Methods

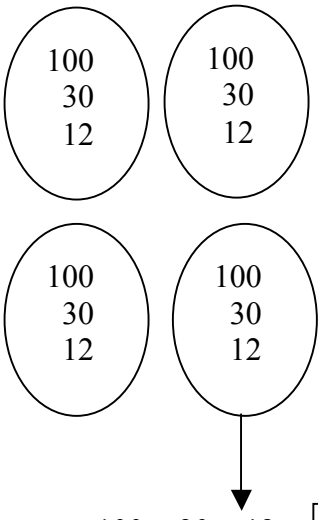
568			
?	?	?	?

$568 \div 4 = \square$ $\quad 4\overline{)568}$ $\quad \frac{568}{4} = \square$

Models



Divvy Out



568
−400
168
−120
48
−48
0

$100 + 30 + 12 = \boxed{142}$

Partial Quotient

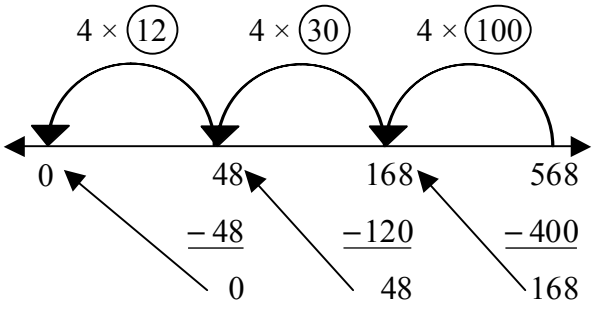
4	568	
	−400	100
	168	
	−120	30
	48	
	−48	12
	0	

$100 + 30 + 12 = \boxed{142}$

Fractional Decomposition

$$\frac{568}{4}$$
$$= \frac{400+100+40+20+8}{4}$$
$$= \frac{400}{4}+\frac{100}{4}+\frac{40}{4}+\frac{20}{4}+\frac{8}{4}$$
$$= 100+25+10+5+2$$
$$= 100+25+5+10+2$$
$$= 100+30+10+2$$
$$= 100+40+2$$
$$= \boxed{142}$$

Number Line



$100 + 30 + 12 = \boxed{142}$

Stacking

12
30
100 } 142

4	568
	−400
	168
	−120
	48
	−48
	0

Warm Up

Review: Grade 3

Find the quotient 2 different ways.

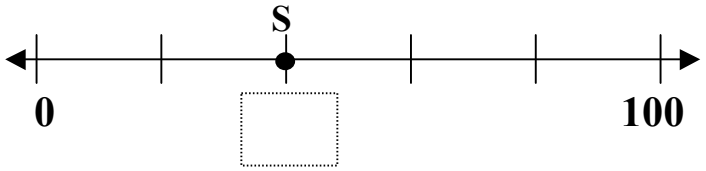
$42 \div 6 = \square$ $\quad 6\overline{)\square 42}$ $\quad \frac{42}{6} = \square$

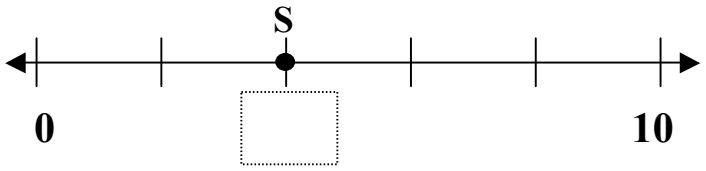
One Way: Divvy Out

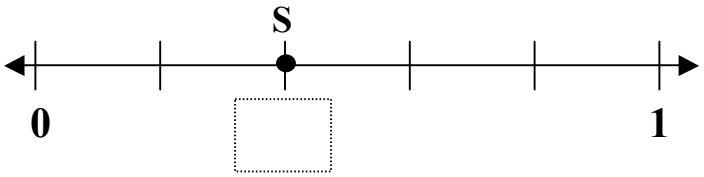
Choose Another Way

Other: Grade 3

Write the value for point **S** on each number line.

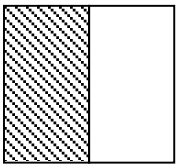




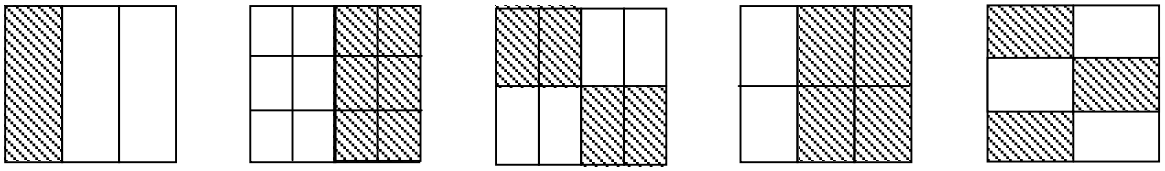


Current: Grade 3

This model represents $\frac{1}{2}$ shaded.



Which of the following shaded areas are equivalent to $\frac{1}{2}$?



A B C D E

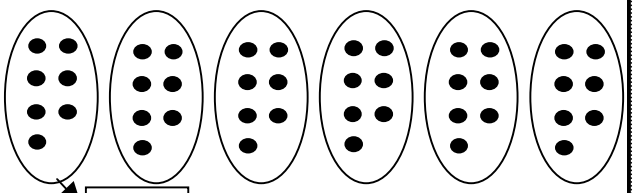
Warm Up *Debrief*

Review: Grade 3

Find the quotient 2 different ways.

$42 \div 6 = \boxed{7}$ $\quad 6\overline{)42}\ \boxed{7}$ $\quad \frac{42}{6} = \boxed{7}$

Divvy Out Possible Ways

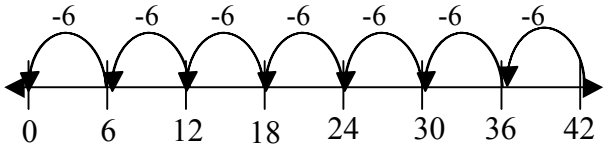


7 each

2	2	2	2	2	2	12
2	2	2	2	2	2	24
2	2	2	2	2	2	36
1	1	1	1	1	1	42

$2 + 2 + 2 + 1 = \boxed{7}$

Other Ways Students Might Choose



I subtracted 6 seven times, so $42 \div 6 = \boxed{7}$

$6 \times \boxed{7} = 42$

So, $42 \div 6 = \boxed{7}$

42					
7	7	7	7	7	7

OR

42						
6	6	6	6	6	6	6

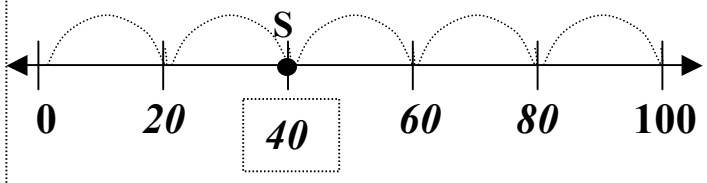
Have students share out their work. Remind students of the different ways to write a division equation and what a bar model looks for 42 ÷ 6.

Other: Grade 3

Write the value for point **S** on each number line.

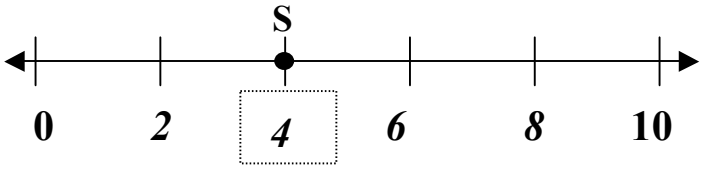
How many jumps are there? (5) Let's check.

1 jump 2 jumps 3 jumps 4 jumps 5 jumps

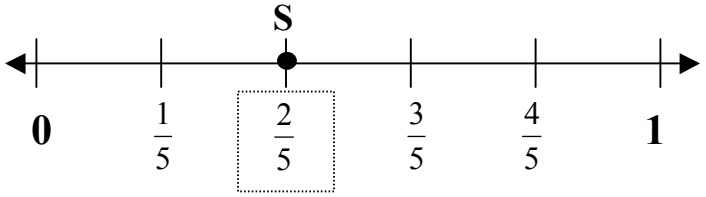


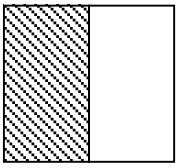
If we start at 0 and end at 100, how much is each jump worth? (20) Try: 20, 40, 60, 80, 100. That works. What is the value of S? (40)
If students guess something else, try it out.

How many jumps are there for this number line? (5)
How much is each jump worth? (2) Try it.
2, 4, 6, 8, 10. That works.
What is the value of S? (4)

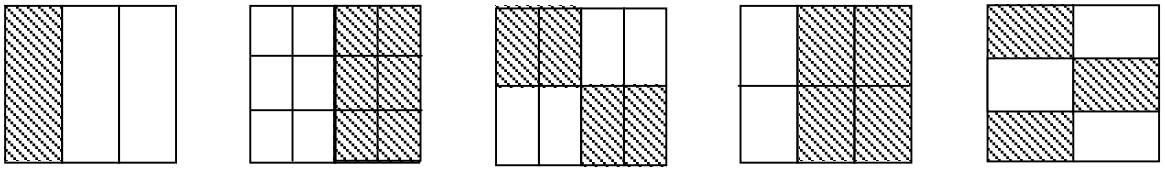


Will the value for S on this number line be greater than 1 or less than 1? (less than 1)
How many jumps? (5) So what is the value of each jump? (one-fifth) Try: one-fifth, two-fifths, three-fifths, four-fifths, five-fifths or 1 whole. (Draw a model if necessary.) What is the value of S? (two-fifths)



This model represents $\frac{1}{2}$ shaded. 

Which of the following shaded areas are equivalent to $\frac{1}{2}$?



A B C D E

A is incorrect

*What fraction describes **A**?* $\left(\frac{1}{3}\right)$. *Is* $\frac{1}{3}$ *the same amount as* $\frac{1}{2}$*? (No)* $\frac{1}{3}$ *is less than* $\frac{1}{2}$.

B is correct.

*What fraction describes **B**?* $\left(\frac{6}{12}\right)$ *Is* $\frac{6}{12}$ *the same amount as* $\frac{1}{2}$*? (Yes) It is the same amount, even though the pieces are smaller. Six is half of twelve, so* $\frac{6}{12}$ *is equal to* $\frac{1}{2}$.

C is correct.

*What fraction describes **C**?* $\left(\frac{4}{8}\right)$ *Is* $\frac{4}{8}$ *the same amount as* $\frac{1}{2}$*? (Yes) It is the same amount even though the pieces are in a different order. Four is half of eight, so* $\frac{4}{8} = \frac{1}{2}$.

D is incorrect.

*What fraction describes **D**?* $\left(\frac{4}{6}\right)$ *Is* $\frac{4}{6}$ *the same amount as* $\frac{1}{2}$*? (No) It is greater than* $\frac{1}{2}$.

E is correct.

*What fraction describes **E**?* $\left(\frac{3}{6}\right)$ *Is* $\frac{3}{6}$ *the same amount as* $\frac{1}{2}$*? (Yes) It is the same amount even though the pieces are in a different order. Three is half of six, so* $\frac{3}{6} = \frac{1}{2}$.