1 Exploring Division

Goal **Solve division problems using models.**

You will need 40 bread tags, toothpicks, coins, buttons, or something else to use as counters.

1. Use counters. Show how 40 band members would group themselves as they march each way. Then sketch a diagram.

   a) 2 equal columns   **b)** 4 equal columns   **c)** 5 equal columns

2. Use counters. Can 40 band members group themselves in equal columns if they march each way? Why or why not?

   a) 6 columns _____ *No, because 6 does not divide equally into 40.*

   b) 7 columns _____ *No, because 7 does not divide equally into 40.*

   c) 8 columns _____ *Yes, because 8 divides 5 times into 40.*

3. Use counters. There are between 25 and 35 students working in groups planting trees. Which numbers of students could there be in each case?

   a) All students are working in groups of 5. *25, 30, 35 (if between is considered to include 25 and 35, otherwise 30)*

   b) All students are working in groups of 4. *28, 32*

   c) All students are working in groups of 3. *27, 30, 33*

4. What number in each part of Question 3 is the divisor?

   a) ___ *5* ___   **b)** ___ *4* ___   **c)** ___ *3* ___

2 Using Repeated Subtraction to Divide

Goal Use repeated subtraction to divide.

1. 72 muffins are to be put in packages of 5 muffins each. To find how many packages are needed, divide.

```
5)72    ←——— Start with 72 muffins
 −50  10 ←— At least 10 packages are needed.
  22    ←——— Now 22 muffins are left.
 −20   4 ←— 4 more packages are needed
   2    ←——— Now 2 muffins are left.
```

10 + 4 = 14 packages are needed.
But 2 muffins are left over.

At–Home Help

When dividing larger numbers, you can use **repeated subtraction**.

If you need to find 102 ÷ 8, you know that the answer is at least 10 because 80 ÷ 8 = 10. Then you can subtract to see how many more are needed. (See Question 1 for an example.)

a) How many muffins were there at the beginning? __72__

b) After they were packaged, how many muffins were left over? __2__

c) What is the number in part b) called? ___remainder___

d) Which number is the divisor? __5__

e) Why was it known that at least 10 bags were needed? _5 x 10 = 50,_ which is less than 72.

f) Why was it known that 4 more bags would be needed? _4 x 5 = 20,_ which is less than the 22 left after subtracting 50.

2. 72 muffins were put in packages of 6. How many packages are needed? How many muffins are left over?

12 needed

0 left over

3. Use repeated subtraction to divide. Show your steps.

```
     12 R1            12 R1            13               16 R2
a) 4)49         b) 7)85         c) 3)39          d) 6)98
   −40             −70             −30              −60
     9              15              9               38
    −8             −14             −9              −36
     1               1              0                2
```

3 Interpreting Remainders

Goal Decide how to treat the remainder in a division problem.

1. 75 students travel by minivan to an amusement park. Each minivan can take 6 students. How many minivans are needed?

13

2. 75 slices of pizza were eaten. Each pizza was cut into 6 slices. How many pizzas were eaten?

$12\frac{1}{2}$

3. 75¢ is to be shared equally among 6 students.

   a) How much will each student get?

   12¢

   b) How much money will be left over?

   3¢

4. Tickets costing $3 each were bought with $125.

   a) How many tickets were bought?

   41

   b) How much was the change?

   $2

5. One car of an amusement park ride holds 4 people. 62 people take the ride. How many cars are needed?

16

6. 50 pictures are put in an album. Each page holds 4 pictures.

   a) Exactly how many pages are used?

   $12\frac{1}{2}$

   b) How many pages are full?

   12

   c) How many pages are needed?

   13

4 Dividing 2 Digits by 1 Digit

Goal Use base ten blocks and pencil and paper to divide a 2-digit number by a 1-digit number.
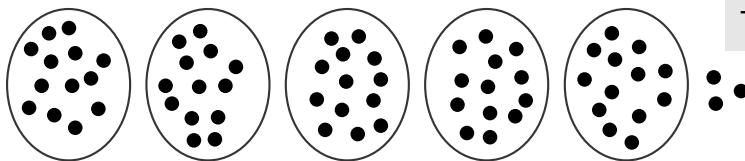
1. 5 people share 68 strawberries.

a) Without dividing, tell if there will be any berries left over. How do you know?

Yes, there will be berries left over because 5 only divides equally into numbers ending in 5 or 0.

b) Estimate the number that each person will get.

For example, 13.

c) Sketch a picture to show the sharing.

d) Record the division. Show all the steps.

$$
\begin{array}{r}
13\ R3 \\
5\overline{)68} \\
-50 \\
\hline
18 \\
-15 \\
\hline
3
\end{array}
$$

e) How many berries did each person get? How many were left over?

13 berries

3 left over

At–Home Help

The number you divide into parts is the dividend.

$53 \div 4 = 13\ R1$
dividend

$$
\begin{array}{r}
\left.\begin{array}{r} 3 \\ 10 \end{array}\right\} 10 + 3 = 13 \\
4\overline{)53} \\
-40 \\
\hline
13 \\
-12 \\
\hline
1
\end{array}
$$

The remainder is 1.

2. Divide. Show your work.

a)
$$
\begin{array}{r}
11\ R1 \\
6\overline{)67} \\
-60 \\
\hline
7 \\
-6 \\
\hline
1
\end{array}
$$

b)
$$
\begin{array}{r}
11\ R1 \\
5\overline{)56} \\
-50 \\
\hline
6 \\
-5 \\
\hline
1
\end{array}
$$

c)
$$
\begin{array}{r}
16\ R2 \\
3\overline{)50} \\
-30 \\
\hline
20 \\
-18 \\
\hline
2
\end{array}
$$

d)
$$
\begin{array}{r}
11\ R5 \\
8\overline{)93} \\
-80 \\
\hline
13 \\
-8 \\
\hline
5
\end{array}
$$

5 Solve Problems By Guessing and Testing

Goal Use a guess-and-test strategy to solve problems.

1. Jalissa has 66 chairs to arrange for the show. She makes 5 equal rows and has 1 chair left over. How many chairs are in each row?

13

2. Derek has between 40 and 50 clothespins to put equally in 2 bags.

   a) How many clothespins could there be if there are none left over?

   40, 42, 44, 46, 48, 50 (if between is considered to include 40 and 50, otherwise 42, 44, 46, 48)

   b) How many clothes pins could there be if there is 1 left over?

   41, 43, 45, 47, 49

At-Home Help

Guessing and testing is a useful strategy for solving problems. For example, a number between 25 and 35 is divided by 7 and the remainder is 3. To find the number, think:
35 ÷ 7 = 5, but there is no remainder.
7 × 4 = 28
To have a remainder of 3, use 28 + 3 = 31.
So 31 ÷ 7 = 4 R3.
The number is 31.

3. Chloe has 87 books to place on 7 shelves. How many more books does she need to have an equal number on each shelf?

4

4. Ryan used between 50 and 60 cards to make an array with 4 rows. He has 1 card left over. How many cards did he start with? Find more than one answer.

   If he started with 53 cards, there would be 13 in each row with 1 left over.

   If he started with 57 cards, there would be 14 in each row with 1 left over.

6 Estimating with 3–Digit Dividends

Goal Use multiplication and division facts to estimate quotients.

1. Choose the correct answer.
To estimate $290 \div 7$, this fact is useful.

A. $30 \div 5 = 6$ **C.** $28 \div 7 = 4$ (circled)

B. $27 \div 9 = 3$ **D.** $25 \div 5 = 5$

2. Choose the correct answer.
If I know $36 \div 4 = 9$, then I know _____.

E. 36 tens $\div 4 = 90$ (circled)   **G.** $360 \div 40 = 90$

F. 36 tens $\div 4 = 9$ **H.** $360 \div 4 = 900$

> ### At–Home Help
>
> Using basic facts and extending them helps you to estimate quotients.
>
> For example, you know $18 \div 3 = 6$, so
> $$180 \div 3 = 18 \text{ tens} \div 3$$
> $$= 6 \text{ tens}$$
> $$= 60$$
> This helps you to estimate that $185 \div 3$ is about 60.

3. Doug wants to read a 168-page book in 6 days.

a) What fact will help him to estimate how many pages he needs to read each day?

$$180 \div 6 = 30$$

b) About how many pages should he read each day?

30

4. Emma has
- 125 blue beads
- 200 red beads
- 160 yellow beads

To make 1 bracelet, she needs
- 4 blue beads
- 6 red beads
- 5 yellow beads

Estimate how many bracelets she can make with each colour of bead.

a) blue   **b)** red   **c)** yellow

Answers will vary. For example:

30 30 30

5. Estimate each quotient. Explain your thinking.

Answers will vary. For example:

a) $6\overline{)617}$ **b)** $8\overline{)509}$

100 because $600 \div 6 = 100$. 60 because $480 \div 8 = 60$.

7 Dividing in Parts

Goal Divide in steps using simpler numbers.

1. Barb, Cameron, and Rory have coin collections.
   Barb has the greatest number, 390 coins.
   She has 5 times as many coins as Cameron.
   She has 3 times as many as Rory.

   At-Home Help

   285 ÷ 3 can be found by
   renaming 285 as 270 + 15
   because 270 ÷ 3 is 90
   and 15 ÷ 3 is 5.
   So 285 ÷ 3 is 90 + 5, or 95.

   a) Why is renaming 390 as 350 + 40 useful in
      finding out how many coins Cameron has?

      Both 350 and 40 can be related to multiplication facts:

      350 ÷ 5 = 70 and 40 ÷ 5 = 8.

   b) Calculate $5\overline{)350}$ + $5\overline{)40}$.
                    78

   c) How many coins does Cameron have?   78

   d) Why is renaming 390 as 350 + 40 not useful in finding out
      how many coins Rory has?

      3 does not divide equally into 350 or 40.

   e) Why is renaming 390 as 300 + 90 useful?

      3 divides equally into both 300 and 90.

   f) Why is renaming 390 as 360 + 30 useful?

      3 divides equally into both 360 and 30.

   g) Find the number of coins Rory has, using the renaming
      in part e) or f).

                         130

2. Divide into parts and find the quotient.

   a) $6\overline{)618}$ 103

   b) $8\overline{)500}$ 62 R4

   c) $5\overline{)710}$ 142

8 Dividing 3 Digits by 1 Digit

Goal Use base ten blocks and pencil and paper to divide a 3-digit number by a 1-digit number.

1. A class drinks 165 cartons of milk starting on Monday and ending on Friday. They drink the same number of cartons each day. How many cartons do the students drink each day?

33

At-Home Help

$267 \div 7 = 38 \, R1$

$$
\begin{array}{r}
38 \\
7\overline{)267} \\
-210 \\
\hline
57 \\
-56 \\
\hline
1
\end{array}
$$

2. 780 tickets were sold for 4 performances of a play. The same number of tickets were sold for each performance. How many tickets were sold for each performance?

195

3. Carolyn's class baked 276 cupcakes for a bake sale. They want to package all the cupcakes. Should they put them in packages of 6 or 8? Show your work.

packages of 6

276 ÷ 6 = 46, but 276 ÷ 8 = 34 R4.

4. Divide.

a) 184 ÷ 4

46

c) 511 ÷ 7

73

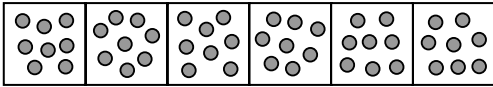**b)** 336 ÷ 6

56

d) 616 ÷ 8

77

Test Yourself

Circle the correct answer.

1. Which division equation matches the diagram?

    A. $8 \div 6 = 48$ **B.** $48 \div 8 = 8$ **C.** $48 \div 8 = 6$ **D.** $48 \div 12 = 4$

2. 4 students are sharing 56 minutes of computer time equally. How many minutes does each student get?

    E. 14   **F.** 16   **G.** 18   **H.** 20

3. 57 students will receive certificates of achievement in mathematics. The certificates come in packages of 5. How many packages need to be bought?

    A. 8   **B.** 9   **C.** 10   **D.** 12

4. What is the remainder when 89 is divided by 8?

    E. 9   **F.** 1   **G.** 5   **H.** 11

5. 7 classes are sharing the planting of 500 spring bulbs equally. What is a reasonable estimate of the number of bulbs each class will plant?

    A. 30   **B.** 70   **C.** 90   **D.** 100

6. 132 students will be divided into teams of 4 for the science fair. How many teams will there be?

    E. 15   **F.** 27   **G.** 33   **H.** 44

7. 264 students are sitting in 8 equal rows for the assembly. How many students are in each row?

    A. 22   **B.** 33   **C.** 44   **D.** 55

8. Chloe is reading a 326-page book. She has read the same number of pages each day for 7 days. How many pages does she have left?

    E. 4   **F.** 6   **G.** 8   **H.** 10