Core Knowledge® MATHEMATICS

# Putting It All Together

## Student Workbook

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Core Knowledge Mathematics™

# Lesson 1: Add, Subtract, and Multiply Fractions

- Let's practice solving problems involving fractions.

## Warm-up: Number Talk: Fluency and Fractions

Find the value of each expression mentally.

- $5 \times \frac{10}{5}$

- $9 \times \frac{6}{3}$

- $8 \times \frac{11}{4}$

- $6 \times \frac{12}{10}$

## 1.1: Let's Make Head Wraps!



Jada and Lin saw a picture of head wraps made of African wax print fabric and would like to make their own.

1. Jada stitches together 5 pieces of fabric that each have a length of $\frac{2}{6}$ yard. Write an equation to show the total length of fabric Jada used.

2. Lin stitches together 3 pieces of fabric that are each $\frac{2}{3}$ yard long. Write an equation to show the total length of fabric Lin used.

3. Who used more fabric? Explain or show your reasoning.

## 1.2: Make 2 Yards of Fabric

Jada and Lin's moms taught the fourth-grade class how to combine and use fabric pieces for head wraps. The lengths of each piece of fabric are listed here.

| | | | |
|---|---|---|---|
| $\frac{2}{6}$ yard | $\frac{2}{6}$ yard | $\frac{2}{6}$ yard | $\frac{11}{10}$ yard |
| $1\frac{2}{5}$ yards | $\frac{9}{10}$ yard | $\frac{2}{6}$ yard | $\frac{6}{12}$ yard |
| $\frac{3}{6}$ yard | $\frac{2}{6}$ yard | $\frac{2}{6}$ yard | $\frac{12}{12}$ yard |
| $\frac{2}{6}$ yard | $\frac{3}{5}$ yard | $\frac{2}{6}$ yard | |

Find as many different combinations of fabric that would have a length of 2 yards as you can. Each piece of fabric can only be used one time. Write an equation for each combination.

## 1.3: Play by the Rules

1. Here are four fractions: $\frac{15}{12}$ $\frac{7}{12}$ $\frac{21}{12}$ $\frac{18}{12}$

   a. What is the sum of all the fractions?

   b. Select two fractions with a difference that is less than $\frac{1}{3}$. Show or explain your reasoning.

   c. Select two fractions with a sum greater than 3. Show or explain your reasoning.

2. Here are four new fractions: $\frac{5}{12}$ $\frac{8}{12}$ $\frac{3}{12}$ $\frac{2}{12}$

   Use them to make the value 1, following these rules:

   - Use addition, subtraction, or both.
   - Use all four fractions.
   - Use each fraction only one time.

3. Try to make the value of 1 again using the following fractions and the same rules.

   $\frac{15}{10}$ $\frac{13}{100}$ $\frac{53}{100}$ $\frac{9}{10}$

# Lesson 2: Sums and Differences of Fractions

- Let's practice solving problems involving fractions.

## Warm-up: Number Talk: Wholes and Units

Find the value of each expression mentally.

- $38 + 62$

- $38\frac{2}{6} + 62\frac{3}{6}$

- $38\frac{2}{6} + 62\frac{3}{6} + 17\frac{1}{6}$

- $138\frac{2}{6} + 162\frac{3}{6} + 17\frac{2}{6}$

## 2.1: Straws for A Roller Coaster

In science class, Noah, Tyler, and Jada are building a model of a roller coaster out of 1-foot-long paper straws.

- Noah needs a piece that is $\frac{7}{12}$ foot long.

- Tyler needs one that is $\frac{1}{4}$ foot long.

- Jada needs one that is shorter than the other two.

Jada says, "We can just use one straw for all these pieces."

1. Draw a diagram to represent this situation and explain to your partner how it matches the situation. Then, find the length of the piece of straw that could be Jada's piece.

2. Did Noah use more than $\frac{1}{2}$ foot or less than $\frac{1}{2}$ foot of straw? Explain or show your reasoning.

3. Tyler says, "If Jada uses a piece that is $\frac{1}{6}$ foot long, there would be a piece of straw that is $\frac{1}{12}$ foot left."

   Do you agree or disagree with Tyler? Explain your reasoning.

   _____

   _____

   _____

   _____

## 2.2: Tall Enough for a Ride?

Lin's class is on a trip to the amusement park. Visitors must be at least a certain height to get on rides. Use the table to answer questions about four students' height.

| ride | height requirement |
|---|---|
| tilt and spin | 52 inches |
| roller coaster | 54 inches |
| bumper cars | 44 inches |

1. Andre is $3\frac{3}{8}$ inches shorter than the height requirement for the roller coaster. How tall is Andre?

2. Lin is $\frac{18}{8}$ inches taller than Andre. How tall is Lin?

3. Elena was $1\frac{3}{4}$ inches too short to ride the bumper cars last year. Since then she grew $4\frac{1}{2}$ inches. How tall was Elena last year? How tall is she now?

4. Mai is tall enough to ride all the rides this year. Mai was $51\frac{7}{8}$ inches tall last year. At least how many inches did Mai grow?

# Lesson 3: Stories with Fractions

- Let's add and subtract mixed numbers.

## Warm-up: Number Talk: One Whole, Many Names

Find the value of each expression mentally.

- $1 - \frac{8}{10}$

- $1\frac{4}{10} - \frac{8}{10}$

- $2\frac{4}{10} - \frac{8}{10}$

- $10\frac{5}{10} - \frac{8}{10}$

## 3.1: Relay Race at Recess

Students in the fourth-grade class had a relay race during recess. Each team had four runners. Each runner ran the length of the school playground.

Here are the times of the runners for two teams.

| runner | Diego's team, time (seconds) | Jada's team, time (seconds) |
|--------|------------------------------|------------------------------|
| 1 | $10\frac{25}{100}$ | $11\frac{9}{10}$ |
| 2 | $11\frac{40}{100}$ | $9\frac{8}{10}$ |
| 3 | $9\frac{7}{10}$ | $9\frac{84}{100}$ |
| 4 | $10\frac{5}{100}$ | $10\frac{60}{100}$ |

1. Which team won the relay race? Show your reasoning.

2. How much faster is the winning team than the other team? Show your reasoning.

3. The record time for the playground relay race was 40.27 seconds. Did the winning team beat this record time? Show your reasoning.

## 3.2: You Be the Author

Think of three situations as described here. After each problem is written, trade papers with a partner to compare your problems and check your solutions.

1. A problem that can be solved by addition and has $9\frac{2}{5}$ as an answer

2. A problem that can be solved by subtraction and has $\frac{32}{100}$ as an answer

3. A problem that could be solved by writing the equation: $9 - \underline{\hspace{1cm}} = 3\frac{3}{5}$

# Lesson 4: Another Look at the Standard Algorithm

- Let's subtract from numbers with zeros.

## Warm-up: Number Talk: Differences

Find the value of each difference mentally.

- $87 - 24$

- $387 - 124$

- $6,387 - 129$

- $6,387 - 4,329$

## 4.1: Lots of Zeros

1. Find the value of each difference.

**a.**

```
    7  0  0
 −     1  6
 _____
```

**b.**

```
   7, 0  0  0
 −        1  6
 _____
```

**c.**

```
   7 0, 0  0  0
 −           1  6
 _____
```

**d.**

```
   7 0 0, 0  0  0
 −             1  6
 _____
```

2. Find the number that makes each expression true.

**a.**

```
       4  3
 +
 _____
    2  0  0
```

**b.**

```
          4  3
 +
 _____
    2, 0  0  0
```

**c.**

```
          4  3
 +
 _____
   2 0, 0  0  0
```

**d.**

```
             4  3
 +
 _____
   2 0 0, 0  0  0
```

## 4.2: Ways of Finding Differences

To find the value of $20,000 - 472$, Priya and Han set up their calculations differently.

**Priya**

$$
\begin{array}{r}
2\ 0,0\ 0\ 0 \\
-\ \ \ \ \ \ 4\ 7\ 2 \\
\hline
\end{array}
$$

**Han**

$$
\begin{array}{r}
4\ 7\ 2 \\
+\ \ \ \ \ \ \ \ \ \ \\
\hline
2\ 0,0\ 0\ 0 \\
\end{array}
$$

1. Use both methods to find the difference of 20,000 and 472.

2. Kiran uses another method. Explain how Kiran found the value of $20,000 - 472$.

$$472 + 8 = 480$$
$$480 + 20 = 500$$
$$500 + 500 = 1,000$$
$$1,000 + 19,000 = 20,000$$

$$19,000 + 500 + 20 + 8 = 19,528$$

_____

_____

_____

_____

3. Which method do you prefer? Or do you prefer another way? Explain your reasoning.

_____

_____

4. Find the value of $50{,}400 - 1{,}389$. Show your reasoning.

# Lesson 5: Multiplication of Multi-digit Numbers

- Let's multiply multi-digit numbers.

## Warm-up: Estimation Exploration: A Silly Riddle

- Seven teachers are going to the park.

- Each teacher is taking 7 students.

- Each student is bringing 7 fishbowls.

- Each fishbowl has 7 fish.

How many are going to the park?

Record an estimate that is:

| too low | about right | too high |
|---------|-------------|----------|
|         |             |          |

## 5.1: Two Methods Revisited

1. Earlier in the course, we used these two ways to multiply numbers:

   **A**

   ```
         4  1  6
      ×        2
         1  2
         2  0
      +  8  0  0
         8  3  2
   ```

   **B**

   ```
                1
         4  1  6
      ×        2
         8  3  2
   ```

   a. In method A, where do the 12, 20, and 800 come from?

   b. In method B, where does the 1 above 416 come from?

2. Diego used both methods to find the value of $215 \times 3$ but ended up with very different results.

   ```
         2  1  5
      ×        3
         1  5
         3  0
      +  6  0  0
         6  4  5
   ```

   ```
            2  1  5
      ×           3
      6,  3  1  5
   ```

   a. Without calculating anything, can you tell which method shows the correct product? How do you know the other one is not correct?

   b. For the incorrect result, explain what was correct and what was incorrect in his steps. Then, show the correct calculation using method B.

3. Use either way to find the value of each product. Show your reasoning.

a. $521 \times 3$

b. $6{,}121 \times 4$

c. $305 \times 9$

## 5.2: Two by Two

Here are two ways to find the value of $34 \times 21$.

**A**

```
      3 4
  ×   2 1
  1
        4
      3 0
      8 0
+   6 0 0
    7 1 4
```

**B**

```
      3 4
  ×   2 1
  1
      3 4
+   6 8 0
    7 1 4
```

1. In method A, where do the 4, 30, 80, and 600 come from?

2. In method B, which two numbers are multiplied to get:

    a. 34?

    b. 680?

3. Use the two methods to show that each equation is true.

   **a.** $44 \times 12 = 528$

```
      4 4
  ×   1 2
  ┌─────┐
  └─────┘
  ┌─────┐
  └─────┘
  ┌─────┐
  └─────┘
  ┌─────┐
+ └─────┘
    5 2 8
```

```
      4 4
  ×   1 2
  ┌─────┐
  └─────┘
  ┌─────┐
+ └─────┘
    5 2 8
```

   **b.** $63 \times 21 = 1{,}323$

```
      6 3
  ×   2 1
  ┌─────┐
  └─────┘
  ┌─────┐
  └─────┘
  ┌─────┐
  └─────┘
  ┌─────┐
+ └─────┘
  1, 3 2 3
```

```
      6 3
  ×   2 1
  ┌─────┐
  └─────┘
  ┌─────┐
+ └─────┘
  1, 3 2 3
```

# Lesson 6: What's the Quotient?

- Let's find some quotients of multi-digit numbers.

## Warm-up: Number Talk: Divide by 3 and by 6

Find the value of each expression mentally.

- $48 \div 3$

- $480 \div 3$

- $528 \div 3$

- $5{,}280 \div 3$

## 6.1: Unfinished Divisions

Here are four calculations to find the value of $7{,}465 \div 5$, but each one is unfinished.

Complete at least two of the unfinished calculations. Be prepared to explain how you know what to do to complete the work.

$$
\begin{array}{r}
200 \\
80 \\
13 \\
5\,\overline{)7{,}465} \\
-\quad 65 \\
\hline
7{,}400 \\
-\quad 400 \\
\hline
7{,}000 \\
-\ 1{,}000 \\
\hline
\end{array}
\qquad\qquad
\begin{array}{r}
400 \\
1{,}000 \\
5\,\overline{)7{,}465} \\
-\ 5{,}000 \\
\hline
2{,}465 \\
-\ 2{,}000 \\
\hline
\end{array}
$$

$$
\begin{aligned}
5{,}000 \div 5 &= 1{,}000 \\
60 \div 5 &= \phantom{0}12 \\
5 \div 5 &= \phantom{00}1
\end{aligned}
\qquad\qquad
\begin{aligned}
&\text{7,465 is a little less than 7,500.} \\[4pt]
7{,}500 \div 5 &= 1{,}500 \\
35 \div 5 &= \phantom{00}7
\end{aligned}
$$

## 6.2: Where Do We Begin?

1. Jada and Noah are finding the value of $3{,}681 \div 9$. Jada says to start by dividing 81 by 9. Noah says start by dividing 3,600 by 9.

   a. Explain why each suggestion is helpful for finding the quotient.

   _____

   _____

   _____

   _____

   b. Find the value of $3{,}681 \div 9$. Show your reasoning.

2. Find the missing numbers such that each calculation shows a correct division calculation.

| $\boxed{7\,0\,3}$ | | |
|---|---|---|
| 3 | 4 | 6 |
| 1 0 0 | 1 0 | 7 0 |

**First calculation:**

```
        7 0 3
          3
        1 0 0
      [      ]
      [      ]
   6 ) 4, 2 1 8
     - 3, 0 0 0
       1, 2 1 8
     -    6 0 0
          6 1 8
       [      ]
            1 8
       [      ]
             0
```

**Second calculation:**

```
   [      ]
       4
      1 0
   [      ]
   [      ]
  4 ) [      ]
    -    4 0 0
      [      ]
    -    1 0 0
      [      ]
    -     4 0
          1 6
    -     1 6
           0
```

**Third calculation:**

```
   [      ]
       6
      7 0
   [      ]
   [      ]
  7 ) [      ]
    -    7 0 0
      [      ]
    -    7 0 0
      [      ]
    -    4 9 0
          4 2
    -     4 2
           0
```

3. Consider the expression $5{,}016 \div 8$.

    a. What would you do to start finding the value of the quotient?

    b. Show how you would find the value with as few steps as possible.

# Lesson 7: Solve Multiplicative Comparison Problems

- Let's solve real-world multiplicative comparison problems.

## Warm-up: Notice and Wonder: Two Cities

What do you notice? What do you wonder?

|  | San Francisco, CA | Fort Wayne, IN |
|---|---|---|
| population | 805,235 | 253,691 |
| milk (1 gallon) | $4.45 | $2.14 |
| bread (1 loaf) | $3.54 | $1.82 |
| gasoline (1 gallon) | $3.70 | $2.42 |
| movie ticket | $15 | $12 |
| internet connection (1 month) | $70 | $50 |
| rent for a 3 bedroom apartment in the city center (1 month) | $6,000 | $1,500 |
| cost of a house | $1,400,000 | $160,000 |

# 7.1: The Most and Least Expensive

Bermuda is the most expensive country in the world and India is one of the least expensive.



1. The table shows how prices of some things in the two countries compare. Estimate or calculate the missing costs and complete the table.

|  | Bermuda | cost in Bermuda is _____ as in India | India |
|---|---|---|---|
| a meal with drink (1 person) |  | 12 times as much | $2 |
| gasoline (1 gallon) | $8 | 2 times as much |  |
| brand-name jeans |  | 2.5 times as much | $31 |
| men's leather shoes | $143 | 4 times as much |  |
| internet connection |  | 14 times as much | $13 |

2. In India, rent for a 1-bedroom apartment outside of a city center costs about $76 per month. A similar apartment in Bermuda costs 23 times as much.

Utilities (electric, gas, water, and heating) for a small apartment costs about $27 per month in India and 7 times as much in Bermuda.

If a person earns $2,000 per month, can they afford to pay rent and utilities in Bermuda?

# 7.2: The Cost of Living

The cost of living in the United States is higher than in Ghana.



1. The table shows how the prices of some other things in the two countries compare. Estimate or calculate the missing information in the table.

| monthly cost | United States | cost in the US is _____ as in Ghana | Ghana |
|---|---|---|---|
| 1-bedroom apartment in city center | $1,300 | 2 times as much | |
| 1-bedroom apartment outside of city center | | 9 times as much | $112 |
| utilities for a 915 square foot apartment | $152 | | $73 |
| transportation pass | $70 | 3 times as much | |
| private preschool for 1 child | $906 | | $162 |

2. Suppose a family has $3,000 for housing and wants a 1-bedroom apartment outside of a city center. With that amount of money, how many months of rent can they afford in:

    a. the United States? Explain or show your reasoning.

    b. Ghana? Explain or show your reasoning.

# Lesson 8: Solve Problems with Multiplication and Division

- Let's make sense of situations and solve word problems.

## Warm-up: Number Talk: Divide by 8

Find the value of each expression mentally.

- $848 \div 8$

- $4{,}848 \div 8$

- $4{,}852 \div 8$

- $5{,}848 \div 8$

## 8.1: Two Truths and a Lie, or Two Lies and a Truth?

Here are three situations. Which ones are true?
Which ones are not true?

Show how you know.

- Situation A: A high-rise building has 53 stories. The first floor is 17 feet tall, but all other stories are each 11 feet tall. The building is 610 feet tall.

- Situation B: A window washer has 600 seconds to wash 17 windows of a building. It takes 54 seconds to wash each window. The washer will finish washing all the windows and have 11 seconds to spare.

- Situation C: Eleven students set a goal to raise at least $600 for charity. Each student raised $17 each day. After 3 days of fundraising, the group will still be short by $54.

## 8.2: Buses for a Field Trip

A school is taking everyone on a field trip. It needs buses to transport 375 people.

Bus Company A has small buses with 27 seats in each.

Bus Company B has large buses with 48 seats in each.

1. What is the smallest number of buses that will be needed if the school goes with:

   ○ Bus Company A? Show your reasoning.

   ○ Bus Company B? Show your reasoning.

2. Which bus company should the school choose? Explain your reasoning.

_____

_____

_____

_____

3. Bus Company C has large buses that can take up to 72 passengers.

   Diego says, "If the school chooses Bus Company C, it will need only 6 buses, but the buses will have more empty seats."

   Do you agree? Explain your reasoning.

   _____

   _____

   _____

   _____

# Lesson 9: Create Word Problems

- Let's write our own word problems.

## Warm-up: Number Talk: Difference and Thousands

Find the value of each expression mentally.

- $5{,}000 - 403$

- $5{,}300 - 473$

- $25{,}300 - 493$

- $26{,}000 - 1{,}493$

## 9.1: What's the Question?

George Meegan walked 19,019 miles between 1977 and 1983. He finished at age 31. He wore out 12 pairs of hiking boots.

Jean Beliveau walked 46,900 miles between 2000 and 2011 and finished at age 56.

Here are the responses Kiran gave to answer some questions about the situation.

Write the question that Kiran might be answering. In the last row, write a new question about the situation and show the answer, along with your reasoning.

| question | response and reasoning |
|---|---|
| 1. | $1983 - 1977 = 6$<br>$12 \div 6 = 2$<br>2 pairs of hiking boots |
| 2. | $56 - 31 = 23$<br>23 years |
| 3. | $2011 - 2000 = 11$<br>11 years<br><br>$11 \times \underline{\phantom{xxxx}} = 46{,}900$<br>$11 \times 4{,}000 = 44{,}000$<br>$11 \times 200 = 2{,}200$<br>$11 \times 70 = 770$<br><br>$44{,}000 + 2{,}200 + 770 = 46{,}970$<br>$4{,}000 + 200 + 70 = 4{,}270$<br>4,270 miles |
| 4. | |

# 9.2: What's the Problem?

Elena, Noah, and Han each created a problem with an answer of 1,564.

- Elena used multiplication.
- Noah used multi-digit numbers and addition only.
- Han used multiplication and subtraction.

Write a problem that each student could have written. Show that the answer to the question is 1,564.

- Elena's problem:

  _____

  _____

  Solution:

- Noah's problem:

  _____

  _____

  Solution:

- Han's problem:

  _____

  _____

  Solution:

# Lesson 10: Estimation Exploration

- Let's design an Estimation Exploration activity.

## Warm-up: Estimation Exploration: No Driver Required

Here are pictures showing the exterior and interior of a parking tower in Wolfstadt, Germany. The parking is automated: each car goes up on a lift and is then placed in a parking space.
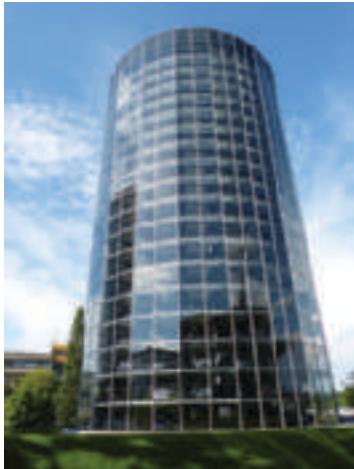


How many cars can fit in the tower?

Record an estimate that is:

| too low | about right | too high |
|---------|-------------|----------|
|         |             |          |

## 10.1: Dental Care

Jada brushes for 2 minutes, twice a day. She changes her toothbrush every 3 months.

Based on this information, make some estimates and show your reasoning:

   1. In a lifetime, approximately:

      a. How many toothbrushes will she use?

      b. How many dollars will she spend on toothbrushes?

   2. About how many minutes would she spend brushing her teeth:

      a. in a year?

      b. in a lifetime?

   3. Think of another estimation question you could ask about this situation.

## 10.2: Get Your Classmates to Estimate

It's your turn to create an estimation problem.

1. Think of situations or look around for images that would make interesting estimation problems. Write down 4–5 ideas or possible topics.

2. Choose your favorite idea. Then:

   ○ Write an estimation question that would encourage others to use multiplication of multi-digit numbers to answer.

   ○ Record an estimate that is:

   | too low | about right | too high |
   |---------|-------------|----------|
   |         |             |          |

   Be prepared to explain your reasoning.

## 10.3: Facilitate Your "Estimation Exploration" Activity

Follow these steps to facilitate your Estimation Exploration activity for another group:

- Display your image or present your scenario.

- Ask your classmates: "What is an estimate that's too high? Too low? About right?"

- Give them 1 minute of quiet think time.

- Give them 1–2 minutes to discuss together.

- Invite them to share their estimates and how they made them. Record their ideas.

- If you know the actual number or quantity, consider revealing it.

# Lesson 11: Which One Doesn't Belong?

- Let's complete and create Which One Doesn't Belong sets.

## Warm-up: Which One Doesn't Belong: Strings of Numbers

Which one doesn't belong?

A. 0, 4, 8, 12, 16

B. 3, 6, 9, 12, 15

C. 5, 105, 205, 305, 405

D. 6, 60, 600, 6,000, 60,000

## 11.1: Add One That Doesn't Belong

Here are two incomplete Which One Doesn't Belong sets, each with one item missing. For each set:

- Find at least one reason that all items belong in the set.
- Find at least one reason that each item doesn't belong.
- Add an item to complete each set. Make sure there is at least one reason it belongs and one reason it doesn't belong.

1. Set 1

A
4.8

B

C
13.05

D
5

a. A, C, and D all belong because . . .

b. A doesn't belong because . . .

C doesn't belong because . . .

D doesn't belong because . . .

c. Add a new item B. It belongs because . . .

It doesn't belong because . . .

2. Set 2
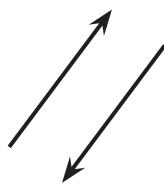
A      B
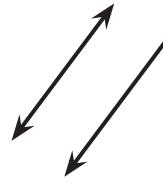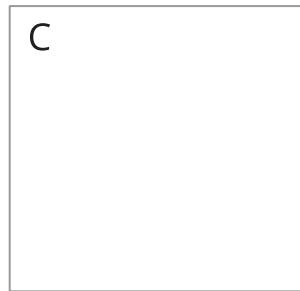
C    D
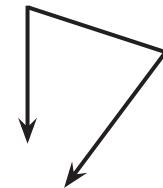
a. A, B, and D all belong because . . .

b. A doesn't belong because . . .

    B doesn't belong because . . .

    D doesn't belong because . . .

c. Add a new item C. It belongs because . . .

    It doesn't belong because . . .

# 11.2: Add Two That Don't Belong

Here is an incomplete Which One Doesn't Belong set. It has two missing items.

A
$$(4 + 3) \times (2 - 1)$$

B
$$(4 + 3) + (2 - 1)$$

| C |
|---|
| D |

1. Find at least one reason that the first two items, A and B, belong in the set.

2. Add two items to complete the set. Make sure there is at least one reason that each new item belongs and at least one reason it doesn't belong.

   ○ C and D both belong because . . .

   ○ C doesn't belong because . . .

   ○ D doesn't belong because . . .

3. After you've completed the set, check items A and B. Does each one still have a reason not to belong? If not, adjust your new items so that A and B are each still unique in some way.

## 11.3: Add Three That Don't Belong

Here is an incomplete Which One Doesn't Belong set. It has three missing items.

| A | B | C | D |
|---|---|---|---|
| $\begin{array}{r} 4\ 2\ 3 \\ \times\ \ \ \ \ 6 \\ \hline 1\ 8 \\ 1\ 2\ 0 \\ +\ 2{,}4\ 0\ 0 \\ \hline 2{,}5\ 3\ 8 \end{array}$ | | | |

Add three items to complete the set. Make sure there is at least one reason that all items belong and at least one reason each item doesn't belong.

- They all belong in the set because . . .

- A doesn't belong because . . .

- B doesn't belong because . . .

- C doesn't belong because . . .

- D doesn't belong because . . .

# Lesson 12: Number Talk

- Let's create our own Number Talks.

## Warm-up: Number Talk: A Whole Number and a Fraction

Find the value of each expression mentally.

- $6 \times \frac{1}{4}$

- $6 \times \frac{3}{4}$

- $18 \times \frac{3}{4}$

- $180 \times \frac{3}{4}$

## 12.1: Related Numbers, Related Expressions

1. Here are two addition expressions. Think of at least two different ways to find the value of each sum mentally.

   a. $15 + 29$

   b. $30 + 58$

2. Here are three subtraction expressions. Think of at least two different ways to find the value of each difference mentally.

   a. $91 - 11$

   b. $91 - 16$

   c. $391 - 86$

3. Can you write a fourth subtraction expression that uses the same strategy you used to find the value of the other differences?

## 12.2: Add One New Expression, Then Two

1. Here are three division expressions. Find the value of each quotient mentally and think about how they might be related.

   - $35 \div 5$

   - $70 \div 5$

   - $210 \div 5$

   - _____

   Write a new division expression whose value can be found more easily after working through the first three.

2. Here are two multiplication expressions. Analyze them and think about how they might be related.

   - $21 \times 7$

   - $42 \times 7$

   - _____

   - _____

   Write two new expressions. Be prepared to explain your reasoning for each expression.

## 12.3: Add Three New Expressions

Here are four expressions you could use to start a Number Talk activity.

$$75 + 30 \qquad 160 - 51 \qquad 24 \div 8 \qquad 3 \times \frac{1}{6}$$

1. Choose one starting expression. Think of at least two different ways to find its value mentally.

2. Write three equations to create a Number Talk activity. Be prepared to explain your reasoning for writing each expression.

    _____ (starting expression)

    _____

    _____

    _____

3. Create an answer key for your Number Talk. Include at least one way to find the value of each expression mentally.

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