Modifying Children's Mathematical Tasks for Use in Content Courses for Prospective Elementary Teachers

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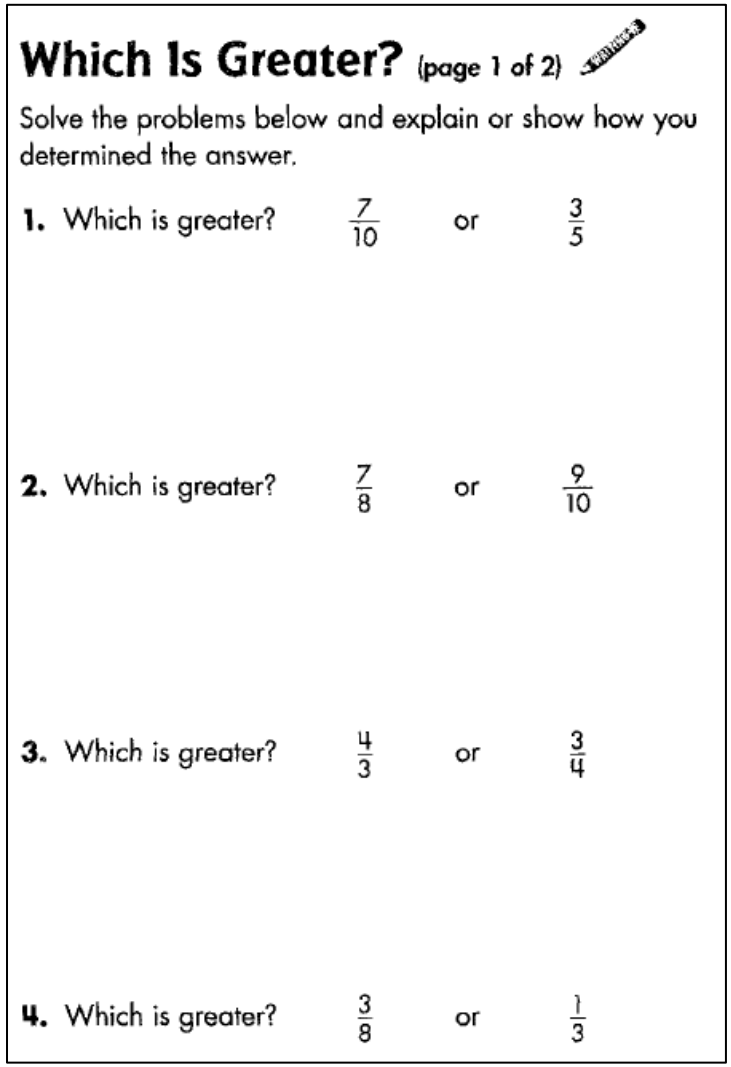
Children's Task: Comparing Fractions



Which Is Greater? (page 1 of 2)

Solve the problems below and explain or show how you determined the answer.

1. Which is greater? $\frac{7}{10}$ or $\frac{3}{5}$

2. Which is greater? $\frac{7}{8}$ or $\frac{9}{10}$

3. Which is greater? $\frac{4}{3}$ or $\frac{3}{4}$

4. Which is greater? $\frac{3}{8}$ or $\frac{1}{3}$

Taken from p. 21 of Russell, S. J., et al. (2008). *Investigations in number, data, and space student activity book, Grade 5* (2nd ed.). Glenview, IL: Scott Foresman.

- What mathematical ideas does the task have the potential to elicit for children? For prospective elementary teachers?
- What would you need to consider and/or plan for in order to modify and implement the task with prospective elementary teachers?
- In what ways would you modify the task for this new audience, and why?

Modified Task for Prospective Teachers: Comparing Fractions

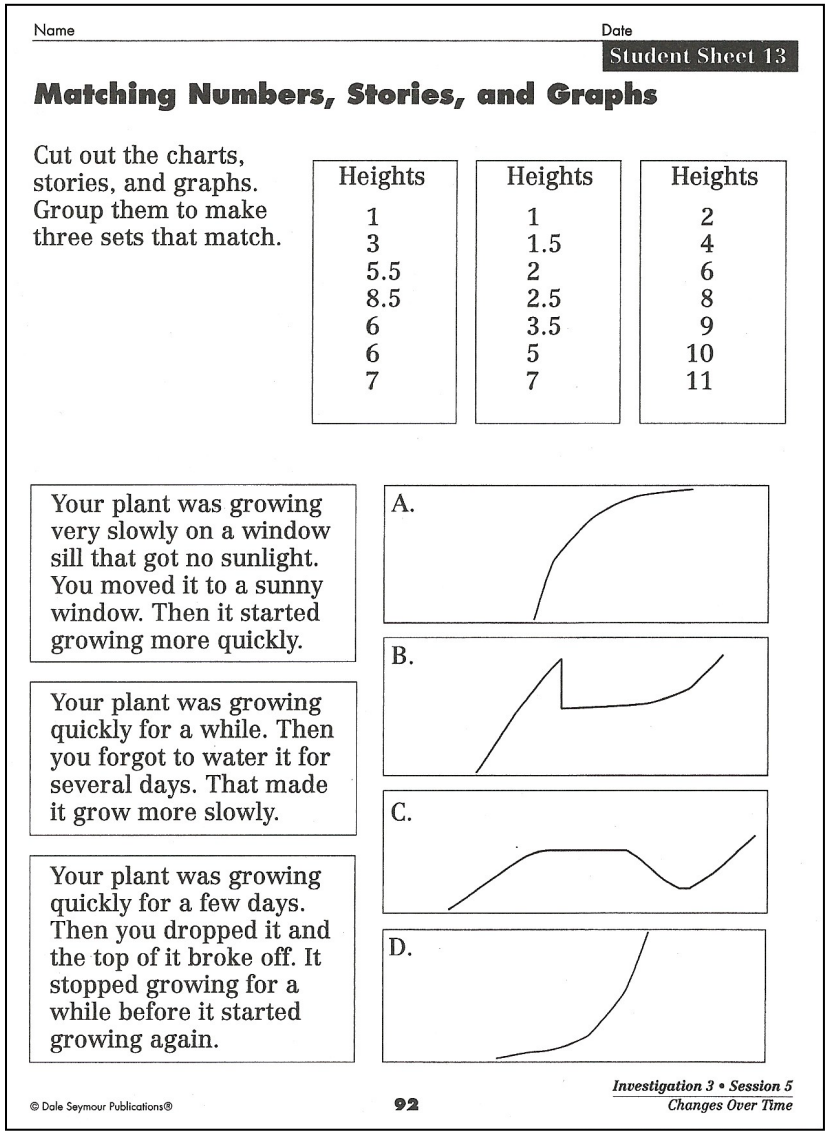
For each set of fractions below, circle the fraction that is greater (or if the fractions are equivalent, write "=" in between them), and provide a "sense-making" explanation for how you know. You may use pictures if that is helpful to you, but your explanation cannot rely solely on a picture.

Notes:

- *Calculators may not be used. Feel free to work on these problems in any order that makes sense to you.*
- *If you find yourself struggling with any of the problems, skip them and revisit them later.*

1)	$\frac{1}{2}$	$\frac{17}{31}$	6)	$\frac{13}{15}$	$\frac{17}{19}$	11)	$\frac{2}{7}$	$\frac{3}{8}$
2)	$\frac{2}{17}$	$\frac{2}{19}$	7)	$\frac{15}{17}$	$\frac{19}{18}$	12)	$\frac{25}{12}$	$\frac{31}{15}$
3)	$\frac{4}{7}$	$\frac{9}{14}$	8)	$\frac{7}{10}$	$\frac{8}{9}$	13)	$\frac{11}{20}$	$\frac{19}{36}$
4)	$\frac{3}{7}$	$\frac{6}{11}$	9)	$\frac{1}{4}$	$\frac{25}{99}$	14)	$\frac{2}{9}$	$\frac{3}{8}$
5)	$\frac{8}{9}$	$\frac{12}{13}$	10)	$\frac{24}{7}$	$\frac{34}{15}$	15)	$\frac{18}{25}$	$\frac{16}{27}$

Children's Task: Algebra



Name _____ Date _____

Student Sheet 13

Matching Numbers, Stories, and Graphs

Cut out the charts, stories, and graphs. Group them to make three sets that match.

Heights	Heights	Heights
1	1	2
3	1.5	4
5.5	2	6
8.5	2.5	8
6	3.5	9
6	5	10
7	7	11

Your plant was growing very slowly on a window sill that got no sunlight. You moved it to a sunny window. Then it started growing more quickly.

Your plant was growing quickly for a while. Then you forgot to water it for several days. That made it grow more slowly.

Your plant was growing quickly for a few days. Then you dropped it and the top of it broke off. It stopped growing for a while before it started growing again.

A.

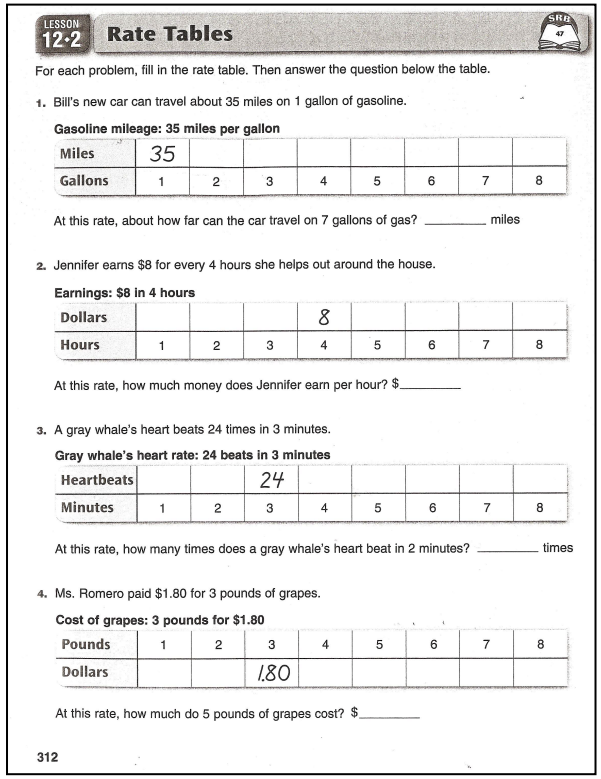
B.

C.

D.

Taken from p. 92 of Tierney, C., Nemirovsky, R., & Weinberg, A. S. (1998). *Changes over time, Grade 4*. Palo Alto, CA: Pearson Education, Inc.

Children's Tasks: Rates and Ratios



LESSON 12·2 **Rate Tables** SRB 47

For each problem, fill in the rate table. Then answer the question below the table.

1. Bill's new car can travel about 35 miles on 1 gallon of gasoline.

Gasoline mileage: 35 miles per gallon

Miles	35							
Gallons	1	2	3	4	5	6	7	8

At this rate, about how far can the car travel on 7 gallons of gas? _____ miles

2. Jennifer earns $8 for every 4 hours she helps out around the house.

Earnings: $8 in 4 hours

Dollars				8				
Hours	1	2	3	4	5	6	7	8

At this rate, how much money does Jennifer earn per hour? $_____

3. A gray whale's heart beats 24 times in 3 minutes.

Gray whale's heart rate: 24 beats in 3 minutes

Heartbeats			24					
Minutes	1	2	3	4	5	6	7	8

At this rate, how many times does a gray whale's heart beat in 2 minutes? _____ times

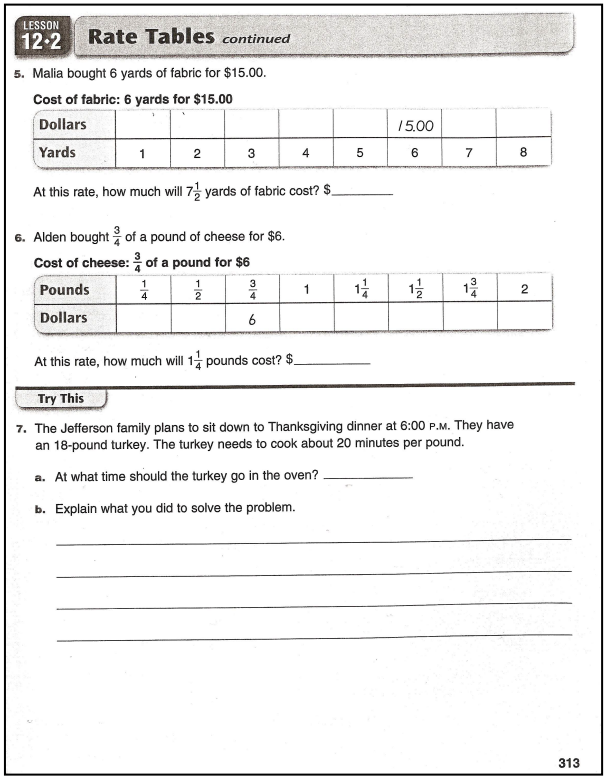
4. Ms. Romero paid $1.80 for 3 pounds of grapes.

Cost of grapes: 3 pounds for $1.80

Pounds	1	2	3	4	5	6	7	8
Dollars			1.80					

At this rate, how much do 5 pounds of grapes cost? $_____

312



LESSON 12·2 **Rate Tables** *continued*

5. Malia bought 6 yards of fabric for $15.00.

Cost of fabric: 6 yards for $15.00

Dollars						15.00		
Yards	1	2	3	4	5	6	7	8

At this rate, how much will $7\frac{1}{2}$ yards of fabric cost? $_____

6. Alden bought $\frac{3}{4}$ of a pound of cheese for $6.

Cost of cheese: $\frac{3}{4}$ of a pound for $6

Pounds	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2
Dollars			6					

At this rate, how much will $1\frac{1}{4}$ pounds cost? $_____

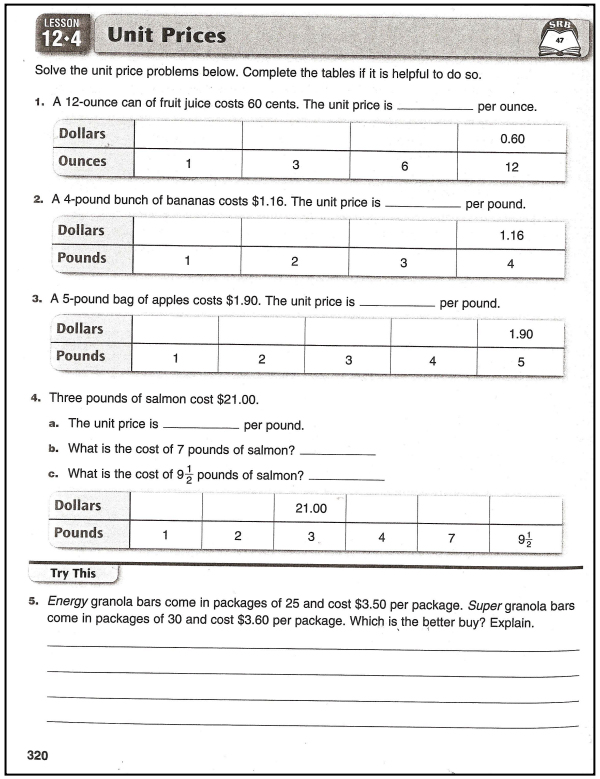
Try This

7. The Jefferson family plans to sit down to Thanksgiving dinner at 6:00 P.M. They have an 18-pound turkey. The turkey needs to cook about 20 minutes per pound.

a. At what time should the turkey go in the oven? _____

b. Explain what you did to solve the problem.

313



LESSON 12·4 **Unit Prices** SRB 47

Solve the unit price problems below. Complete the tables if it is helpful to do so.

1. A 12-ounce can of fruit juice costs 60 cents. The unit price is _____ per ounce.

Dollars				0.60
Ounces	1	3	6	12

2. A 4-pound bunch of bananas costs $1.16. The unit price is _____ per pound.

Dollars				1.16
Pounds	1	2	3	4

3. A 5-pound bag of apples costs $1.90. The unit price is _____ per pound.

Dollars					1.90
Pounds	1	2	3	4	5

4. Three pounds of salmon cost $21.00.

a. The unit price is _____ per pound.

b. What is the cost of 7 pounds of salmon? _____

c. What is the cost of $9\frac{1}{2}$ pounds of salmon? _____

Dollars			21.00			
Pounds	1	2	3	4	7	$9\frac{1}{2}$

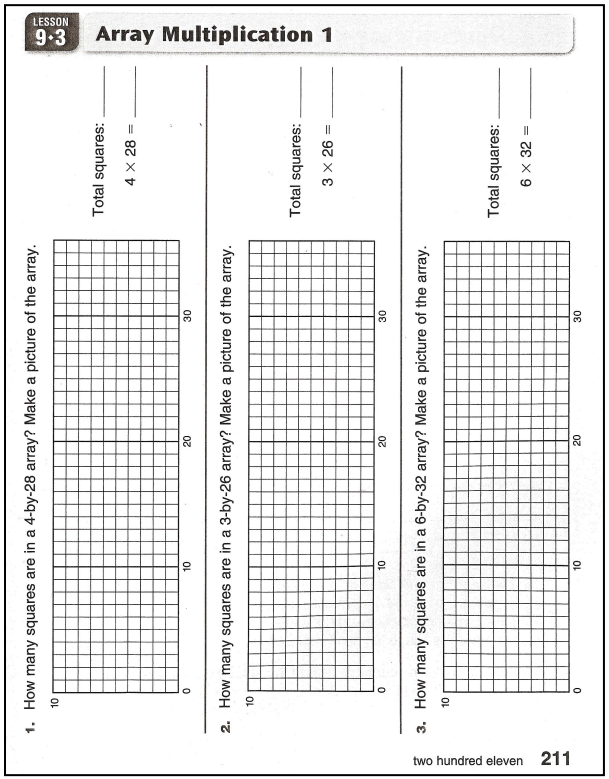
Try This

5. *Energy* granola bars come in packages of 25 and cost $3.50 per package. *Super* granola bars come in packages of 30 and cost $3.60 per package. Which is the better buy? Explain.

320

Taken from p. 312-313, 320 of Bell, M. et al. (2007). *Everyday Mathematics student math journal, Grade 4* (vol. 2). Chicago, IL: Wright Group/McGraw-Hill.

Children's Tasks: Whole Number Operations



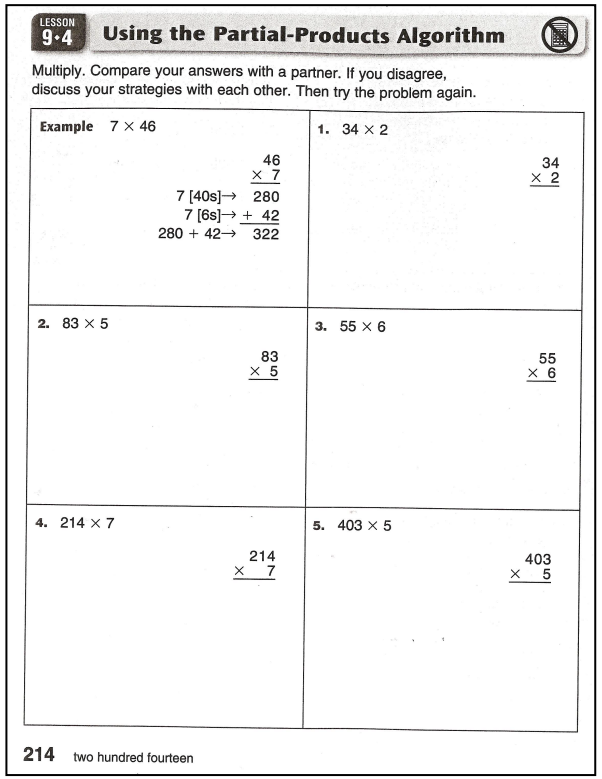
LESSON 9·3 **Array Multiplication 1**

1. How many squares are in a 4-by-28 array? Make a picture of the array.
Total squares: 4 × 28 =

2. How many squares are in a 3-by-26 array? Make a picture of the array.
Total squares: 3 × 26 =

3. How many squares are in a 6-by-32 array? Make a picture of the array.
Total squares: 6 × 32 =

two hundred eleven **211**



LESSON 9·4 **Using the Partial-Products Algorithm**

Multiply. Compare your answers with a partner. If you disagree, discuss your strategies with each other. Then try the problem again.

Example 7 × 46

46
× 7
7 [40s]→ 280
7 [6s]→ + 42
280 + 42→ 322

1. 34 × 2

34
× 2

2. 83 × 5

83
× 5

3. 55 × 6

55
× 6

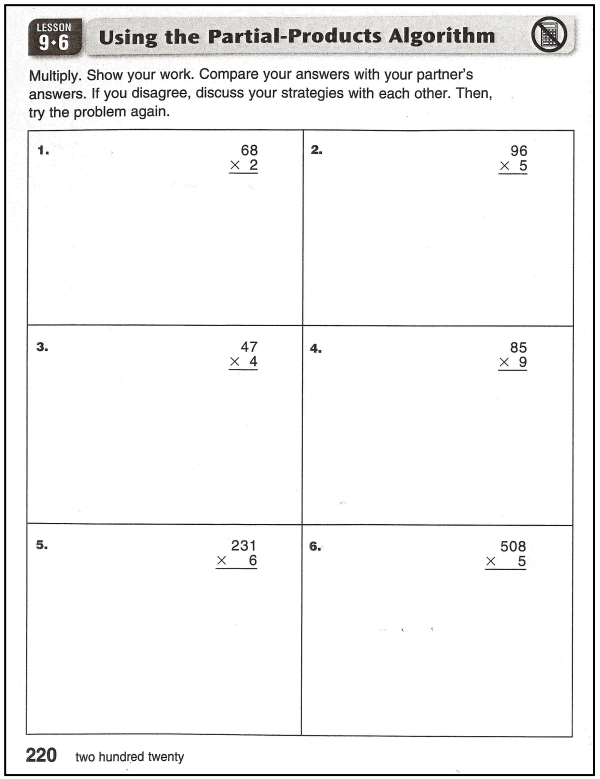
4. 214 × 7

214
× 7

5. 403 × 5

403
× 5

214 two hundred fourteen



LESSON 9·6 **Using the Partial-Products Algorithm**

Multiply. Show your work. Compare your answers with your partner's answers. If you disagree, discuss your strategies with each other. Then, try the problem again.

1. 68 × 2
2. 96 × 5
3. 47 × 4
4. 85 × 9
5. 231 × 6
6. 508 × 5

220 two hundred twenty

Taken from p. 211, 214, 220 of Bell, M. et al. (2007). *Everyday Mathematics student math journal, Grade 3* (vol. 2). Chicago, IL: Wright Group/McGraw-Hill.

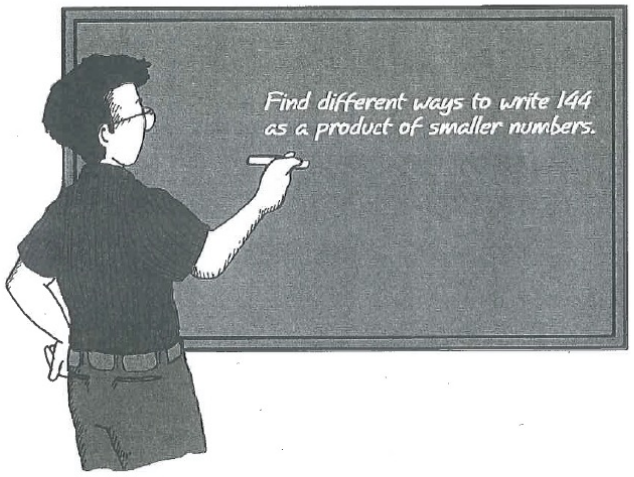
Children's Task: Number Theory

MATH TRAILBLAZERS (GR. 5)

Finding Prime Factors

Discuss

Mr. Moreno challenged his class to find different ways to name 144 as a product of smaller numbers.



"I found that one way to factor 144 is to use two factors such as 2×72 or 4×36," shared Romesh.

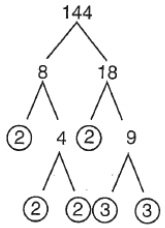
1. Write 144 as a product of two factors in as many ways as you can.

"You can also write 144 as the product of more than two factors, such as $2 \times 2 \times 36$ or $2 \times 3 \times 4 \times 6$," added Alexis.

2. Find at least two other ways to write 144 as the product of three or more factors.

"In fourth grade you learned to write numbers as a product of primes. Can you write 144 as the product of prime factors?" asked Mr. Moreno. "This is called **prime factorization.** A **factor tree** is one way to organize your work."

3. Brandon made a factor tree for 144. Look at his factor tree and read the explanation.



Begin by writing 144 as a product of two factors, for example 8×18. Next, write 8 as 2×4 and 18 as 2×9. Since 2 is a prime number, circle both 2s. Write 4 as 2×2 and circle both 2s as prime numbers. Write 9 as 3×3. 3 is a prime number so circle both 3s. You have now identified the prime factors of 144. These can be written as a prime factorization: $2 \times 2 \times 2 \times 2 \times 3 \times 3 = 144$.

A. Make a different factor tree for 144.

B. What prime factors were identified using your factor tree from Question 3A?

Brandon rewrote his prime factorization using **exponents.**

$2 \times 2 \times 2 \times 2 \times 3 \times 3 = 144$ can also be written as: $2^4 \times 3^2 = 144$.

4. A. Make a factor tree for 180.

B. Write the prime factorization for 180 without exponents.

C. Use exponents to write the prime factorization for 180.

Taken from p. 360-361 of Wagreich, P. et al. (2003). *Math Trailblazers, Grade 5* (2nd Ed.). Chicago, IL: Kendall/Hunt Publishing Company.