Name _____ Period_____ Date _____

UNIT 3: EXPRESSIONS AND EQUATIONS
WEEK 12: Student Packet

FOCUS ON VOCABULARY 12

Match each example with all possible words.

Words	Examples
1. f, i explicit rule	a. $8 \times 12 = \boxed{96}$
2. _____ variable	b. $\boxed{8} \times 12 = 96$
3. _____ input-output rule	c. $2 \times 3 = 6$ 
4. _____ linear function	d. y
5. _____ product	e. $\frac{5}{3}$
6. _____ factor	f. $y = 2x + 3$
7. _____ area model	g. $3\frac{3}{4}$
8. _____ fraction	h. $\frac{1}{2}$
9. _____ proper fraction	i. $\frac{1}{2}x + 1 = y$
10. _____ improper fraction	j. m
11. _____ mixed number	k. $72 = 9 \times \boxed{8}$

INPUTS AND OUTPUTS 1

Ready (Summary)	Set (Goals)
We will use input-output equations, tables, and graphs to find out how much time is needed to save for a camera and for a printer.	• Use tables, graphs, equations, and words to solve problems. • Informally introduce the slope-intercept form of a line.

Go (Warmup)

Rule: Multiply each input number by 3 and then add 5 to get each output number.

Input Number (x)	Output Number (y)
10	$(10)(3)+5 = 35$
1	
0	
9	
11	
20	

What is an equation for this rule? Use x for input and y for output.

$y =$ _____

SAVING FOR A CAMERA: INSTRUCTIONS

A digital camera costs $240.

Julie wants to save for the camera. She has $100 in the bank to start, and she is going to save $10 each month.

Christina also wants to save for the camera. She has $40 in the bank to start, and she is going to save $25 each month.

How many months will it take Julie and Christina to each save up for the digital camera?

- Let ***m*** represent the amount of money that Julie and Christina are going to deposit in their bank accounts each ***month***.

- Let ***b*** represent the amount that Julie and Christina each already have in the ***bank*** to start.

- In the tables on the next page, keep track of the amounts that each girl has when they start to save, and how much they have each month until they each reach their goal.

- Let ***x*** represent the number of months that Julie and Christina have been saving and ***y*** represent the total amount saved.

SAVING FOR A CAMERA: TABLES

To find the total amount saved, use the equation form $y = mx + b$.

JULIE
m = \$10 per month
b = \$100 in the bank

$y = 10x + 100$

x (# of months)	y (total amount saved)
0	$10(0) + 100 = 100$
1	$10(\_\_\_) + 100 = \_\_\_$

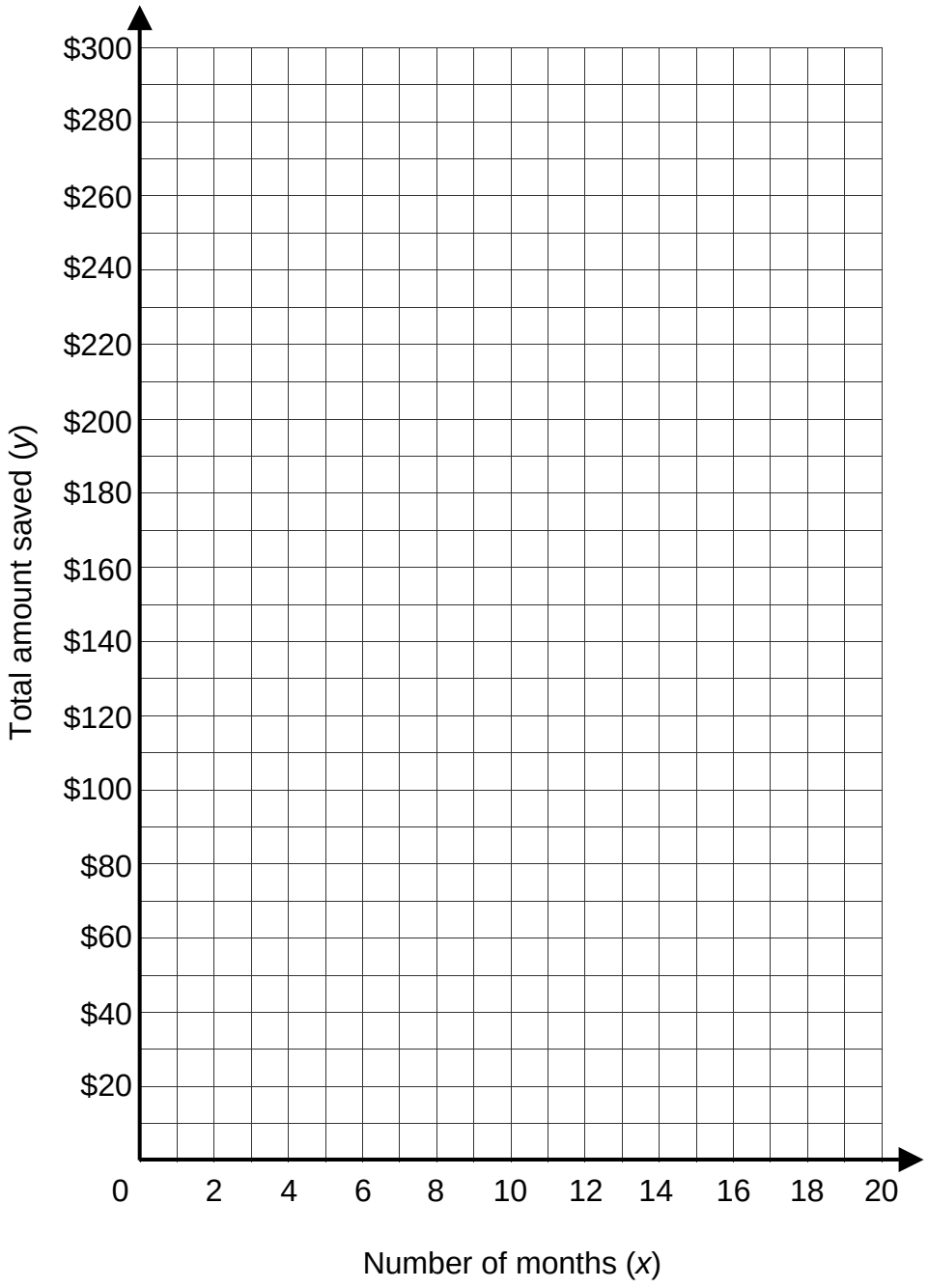
CHRISTINA
m = \$25 per month
b = \$40 in the bank

$y = 25x + 40$

x (# of months)	y (total amount saved)

SAVING FOR A CAMERA: GRAPHS

Use the data from the previous page to make graphs representing the total amount of money that Julie and Christina will save each month. Use one color for Julie's graph and another color for Christina's graph.



SAVING FOR A CAMERA: QUESTIONS

1. Who starts out with more money in the bank? How do you know?

2. Who is saving at a faster rate? How do you know?

3. When will both girls have saved the same amount of money? How do you know?

4. How long will it take Julie to save for the camera?

5. How long will it take Christina to save for the camera?

6. Who will be the first to save enough money for the camera?

SAVING FOR A PRINTER: INSTRUCTIONS AND TABLES

A photo printer costs for $150.

Theresa wants to save for a photo printer. She has $10 in the bank to start, and she is going to save $20 each month.

Cary also wants to save for the photo printer. She has $25 in the bank to start, and she is going to save $15 each month.

How many months will it take Theresa and Cary to each save up for the photo printer?

To find the total amount saved, use the equation form $y = mx + b$.

Theresa
m = $20 per month
b = $10 in the bank

y = _____

x (# of months)	y (total amount saved)

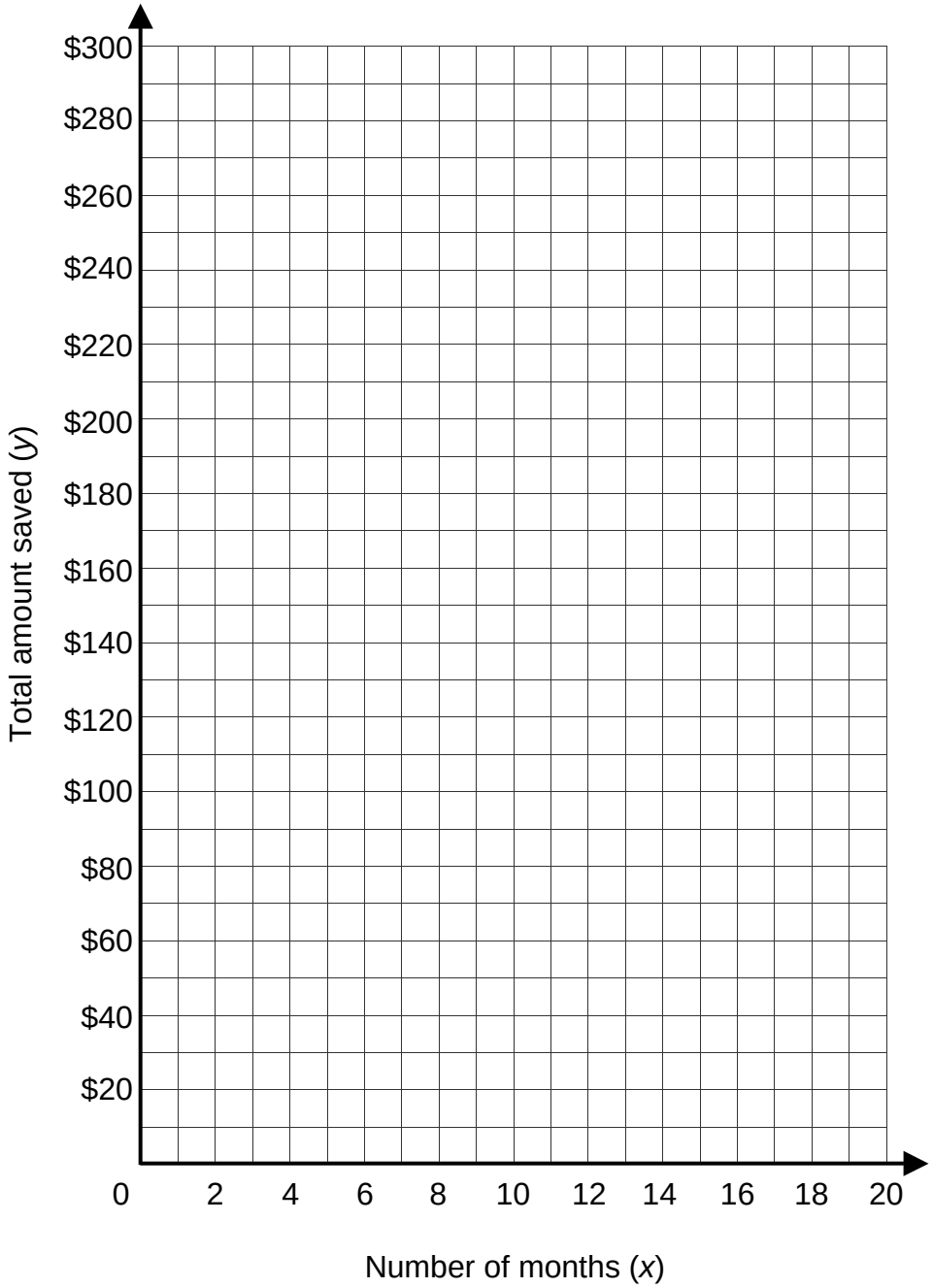
Cary
m = $_____ per month
b = $_____ in the bank

y = _____

x (# of months)	y (total amount saved)

SAVING FOR A PRINTER: GRAPHS

Use the data from the previous page to make graphs representing the total amount of money that Theresa and Cary will save each month. Use one color for Theresa's graph and another color for Cary's graph.



SAVING FOR A PRINTER: QUESTIONS

1. Who starts out with more money in the bank? How do you know?

2. Who is saving at a faster rate? How do you know?

3. When will both girls have saved the same amount of money? How do you know?

4. How long will it take Theresa to save for the printer?

5. How long will it take Cary to save for the printer?

6. Who will be the first to save enough money for the printer?

BRIAN'S PROBLEM: INSTRUCTIONS AND TABLE

Brian wants to save for both a camera and a photo printer. A digital camera costs $240 and a photo printer costs $150. He has $100 saved in the bank and is going to save $20 each month.

Cost of camera: _____

Cost of printer: _____

Total amount Brian needs to save: _____

To find the total amount saved, use the equation form:

$y = mx + b$

m = the amount of money Brian is going to deposit in his bank account each month

b = the amount of money Brian already has in the bank

x = the number of months he has been saving

y = total amount saved

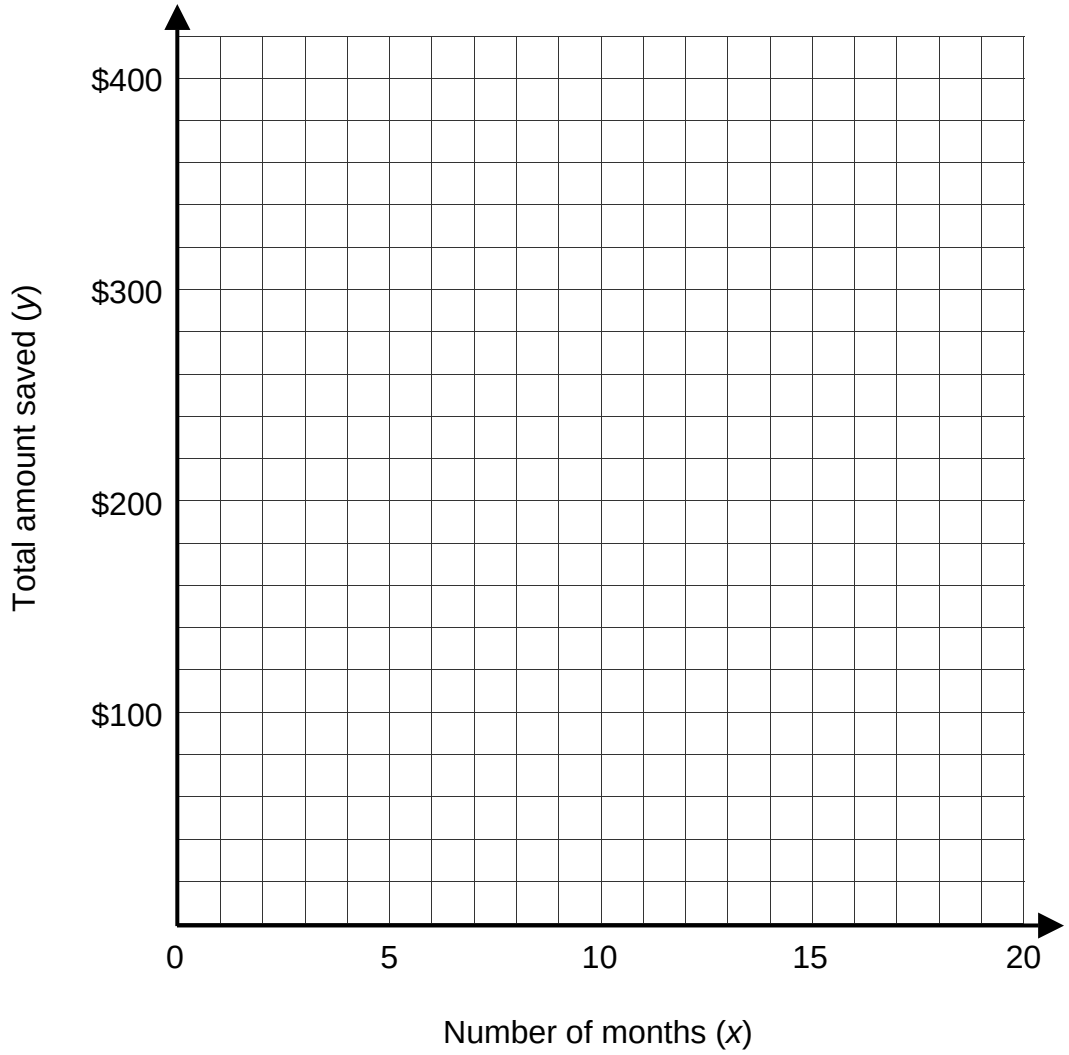
Write an equation to show the total amount of money Brian has saved at the end of each month.

_____

x (# of months)	y (amount saved)

BRIAN'S PROBLEM: GRAPH AND QUESTIONS

1. Make a graph to show the total amount of money Brian has saved each month.



2. How long will it take Brian to save for the camera?

3. How long will it take him to save for the printer?

4. How long will it take him to save for both the printer and the camera?

FRACTIONS: MULTIPLICATION 1

Ready (Summary)	Set (Goals)
We will use whole number multiplication concepts to provide meaning for fraction multiplication.	• Extend concepts of whole number multiplication to fraction multiplication. • Develop fraction multiplication concepts and procedures.

Go (Warmup)

Write each multiplication expression as a repeated addition expression. Then, find the sum.

1. 6(5) = ____ + ____ + ____ + ____ + ____ + ____ = _____

2. 4(7) = _____ = _____

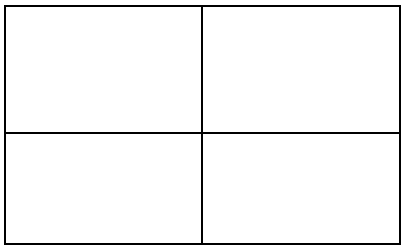
Compute each sum.

3. $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$

4. $1\frac{1}{4}+1\frac{1}{4}+1\frac{1}{4}$

Multiply using an area model (not drawn to scale).

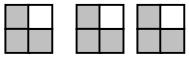
5. 38(72)



FRACTION MULTIPLICATION: REPEATED ADDITION

One way to interpret multiplication is using repeated addition.
That is, 2 groups of 3 can be written as: $2 \times 3 = 3 + 3 = 6$

This works for fractions as well: 3 groups of $\frac{3}{4}$ can be written as:



$$3 \times \frac{3}{4} = \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$$

Write each statement as a product and as repeated addition. Then, draw a picture to represent the repeated addition.

1. 3 groups of 8 can be written as:

   $3 \times 8 =$ _____ + _____ + _____ = _____

   Picture:

2. 2 groups of $\frac{2}{5}$ can be written as:

   $2 \times \frac{2}{5} = \frac{\square}{\square} + \frac{\square}{\square} = \frac{\square}{\square}$

   Picture:

3. 3 groups of $\frac{2}{7}$ can be written as:

   $\square \times \frac{\square}{\square} = \frac{\square}{\square} + \frac{\square}{\square} + \frac{\square}{\square} = \frac{\square}{\square}$

4. 4 groups of $\frac{2}{3}$ can be written as:

Multiply using repeated addition.

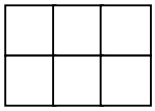
5. $5 \times \frac{1}{6}$

6. $8 \times \frac{1}{4}$

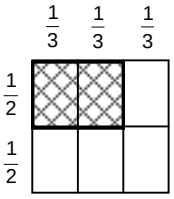
7. $6 \times \frac{2}{3}$

FRACTION MULTIPLICATION: AREA MODEL

An area model is another way to explain multiplication.
This 2 by 3 rectangle has an area of $2 \times 3 = 6$

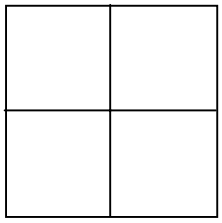


An area model is also useful for multiplying proper fractions. This is a square whose side length is 1 unit. A rectangle that is $\frac{1}{2}$ by $\frac{2}{3}$ is shaded inside of it. The shaded area shows that $\frac{1}{2} \times \frac{2}{3} = \frac{2}{6}$.



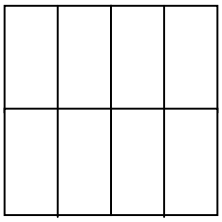
Use an area model to find each product.

1. This is a 1 unit by 1 unit square. Mark the side lengths. Shade a rectangle that is $\frac{1}{2}$ by $\frac{1}{2}$.



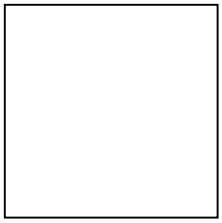
$\frac{1}{2} \times \frac{1}{2} = \frac{\square}{\square}$

2. This is a 1 unit by 1 unit square. Mark the side lengths. Shade a rectangle that is $\frac{1}{2}$ by $\frac{1}{4}$.



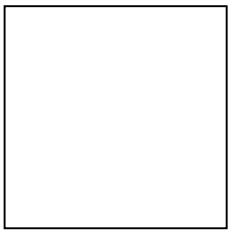
$\frac{1}{2} \times \frac{1}{4} = \frac{\square}{\square}$

3. This is a 1 unit by 1 unit square. Mark the side lengths. Shade a rectangle that is $\frac{1}{4}$ by $\frac{3}{4}$.



$\frac{1}{4} \times \frac{3}{4} = \frac{\square}{\square}$

4. This is a 1 unit by 1 unit square. Mark the side lengths. Shade a rectangle that is $\frac{2}{3}$ by $\frac{3}{4}$.



$\frac{2}{3} \times \frac{3}{4} = \frac{\square}{\square}$

FRACTION MULTIPLICATION: AREA MODEL (continued)

Multiply using an area model.

5. $\frac{1}{2}\times\frac{1}{6}$	6. $\frac{1}{2}\times\frac{2}{3}$	7. $\frac{2}{5}\times\frac{2}{3}$

8. Use the results of the shaded rectangles to state a multiply across rule.

$$\frac{a}{b}\times\frac{c}{d} = \frac{\square}{\square}$$

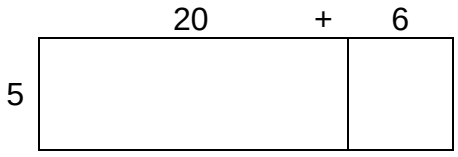
The numerator of the product represents _____

The denominator of the product represents_____

We will call this the “multiply across rule”.

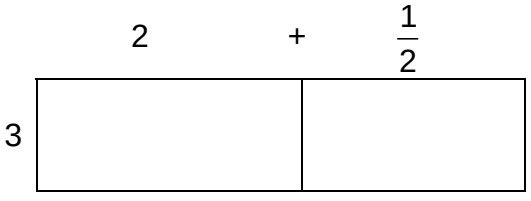
Use an area model to find each product (rectangles are not drawn to scale).

9. $5\times 26 = 5\times(20+6)$



Answer: _____ + _____ = _____

10. $3\times 2\frac{1}{2} = (3)\left(2+\frac{1}{2}\right)$



Answer: _____ + _____ = _____

MORE FRACTION MULTIPLICATION

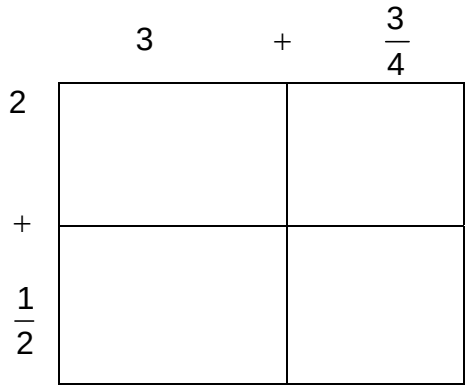
Multiply.

1. $7 \times 2\frac{1}{2}$	2. $6 \times 1\frac{1}{8}$	3. $12 \times 3\frac{2}{5}$

To multiply mixed numbers, use an area model diagram or use the multiply across rule (rectangles are not drawn to scale).

4. This rectangle is $2\frac{1}{2}$ by $3\frac{3}{4}$.

Find the area of each smaller rectangle.



Rectangle is not drawn to scale.

This shows that

$2\frac{1}{2} \times 3\frac{3}{4}$ = _____ + _____ + _____ + _____

= _____

5. To use the multiply across rule, change each mixed number to an improper fraction and then multiply.

$2\frac{1}{2}$ = _____ $3\frac{3}{4}$ = _____

$2\frac{1}{2} \times 3\frac{3}{4}$ =

$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$

FRACTION MULTIPLICATION PRACTICE

Compute using an area model, repeated addition, or the multiply across rule.

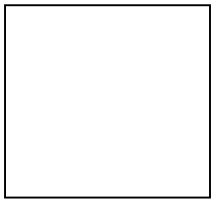
1. $4 \times \frac{3}{7}$	2. $5 \times 4\frac{2}{3}$
3. $\frac{1}{5} \times \frac{2}{3}$	4. $\frac{3}{5} \times \frac{5}{9}$
5. $2\frac{2}{3} \times 1\frac{1}{2}$	6. $1\frac{1}{2} \times 3\frac{3}{8}$

SKILL BUILDER 1A

Find each product as instructed.

Use repeated addition.	Use the multiply across rule.	Use the multiply across rule with simplification.
1. $2\times\frac{3}{4}$ $=$ ____ + ____ $=$	2. $2\times\frac{3}{4}=\frac{2}{1}\times\frac{3}{4}$ $=\frac{2\times3}{1\times4}$ $=\frac{6}{4}=\frac{\square}{\square}$	3. $2\times\frac{3}{4}=\frac{2}{1}\times\frac{3}{4}$ $=\frac{\cancel{2}^{1}\times3}{1\times\cancel{4}_{2}}$ $=\frac{3}{2}$
4. $6\times\frac{5}{8}$	5. $6\times\frac{5}{8}$	6. $6\times\frac{5}{8}$

Find each product as instructed.

Use an area model.	Use the multiply across rule.	Use the multiply across rule with simplification.
7. $\frac{3}{5}\times\frac{5}{6}$ 	8. $\frac{3}{5}\times\frac{5}{6}$	9. $\frac{3}{5}\times\frac{5}{6}$

SKILL BUILDER 1B

Find each product using repeated addition, an area model, or the multiply across rule as needed. Simplify when possible.

10. $4 \times \frac{5}{8}$	11. $\frac{3}{5} \times \frac{5}{12}$	12. $8 \times 2\frac{1}{3}$
13. $1\frac{1}{3} \times \frac{2}{9}$	14. $1\frac{1}{4} \times 1\frac{1}{15}$	15. $\frac{4}{9} \times \frac{3}{16}$
16. $\frac{2}{3} \times 3\frac{3}{4}$	17. $5\frac{1}{4} \times 5\frac{1}{3}$	18. $\frac{5}{6} \times \frac{24}{25}$

SKILL BUILDER 2

Compute. Simplify when possible.

1. $6 \times \frac{5}{6}$	2. $\frac{3}{4} \times \frac{2}{5}$	3. $\frac{2}{5} \times 4\frac{1}{6}$

4. What is a prime number? _____

5. What is a composite number? _____

6. All even numbers are divisible by _____

7. List the first ten prime numbers. _____

8. Even numbers end in _____, _____, _____, _____, _____ .

9. Circle all prime numbers. 7 18 36 2 50

10. Circle all composite numbers. 5 16 39 7 24

Change each fraction to a decimal and a percent.

Example: $\frac{1}{2} = \frac{50}{100}$ $= 0.50$ $= 50\%$	11. $\frac{6}{60} = \frac{1}{10} = \frac{\quad}{100}$ $= 0.\_\_\_\_\_$ $= \_\_\_\_\_\%$	12. $\frac{3}{4} = \_\_\_\_\_$ $= 0.\_\_\_\_\_$ $= \_\_\_\_\_\%$

SKILL BUILDER 3A

Compute. Simplify when possible.

1. $5 \times \frac{8}{9}$	2. $\frac{2}{5} \times \frac{3}{8}$	3. $2\frac{1}{2} \times 1\frac{1}{2}$

4. Circle all odd numbers. 3 27 52 3,063 5,714

5. Circle all composite numbers. 453 3,064 72 5 2

6. What are the factors of 31? _____

7. If a number is greater than 1, and it is not composite, then it is _____

Compute.

8. $3.5 - 0.9$	9. $\begin{array}{r} 12.8 \\ -\ 0.53 \\ \hline \end{array}$
10. $\begin{array}{r} 7\frac{7}{8} \\ +\ 5\frac{1}{4} \\ \hline \end{array}$	11. $\begin{array}{r} \frac{2}{9} \\ -\ \frac{7}{9} \\ \hline \end{array}$

SKILL BUILDER 3B

Use mental math to multiply.

12. $25 \times 1{,}000$	13. $10{,}000 \times 20$
14. 20×300	15. 500×500

Evaluate for $x = 2$ and $y = -3$.

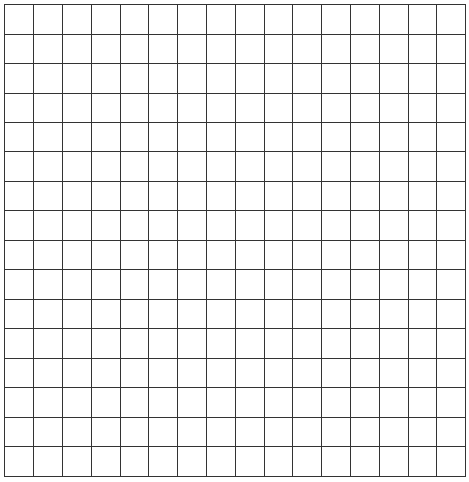
16. $3x + 9y - 31$	17. $16 \div x \bullet y$

18. Complete the table, graph the values, and write an equation for the line. Be sure to label your axes.

There are 2 nickels in 1 dime.

dimes (x)	0	1	2	3	4	5	x
nickels (y)		2					

$y =$ _____



TEST PREPARATION 12

Show your work on a separate sheet of paper and choose the best answer.

1. Sierra is saving for a printer that costs $150. She has $75 already saved in the bank and is going to save $35 each month. If *x* represents the number of months and *y* represents the total amount saved, which equation shows the total amount of money Sierra will have at the end of each month?

   A. $y = 35x + 75$ B. $y = 35x + 150$ C. $y = 75x + 35$ D. $y = 75x + 150$

---

2. Which of the following statements is not correct?

   E. 7 dimes $>$ 12 nickels F. 8 quarts = 2 gallons

   G. 67 hours $<$ 4 days H. 147 inches $>$ 16 feet

---

3. One loaf of bread requires $\frac{1}{8}$ cup of walnuts. How many cups of walnuts are needed for three loaves of bread?

   A. $\frac{3}{8}$ B. $\frac{4}{8}$ C. $\frac{1}{24}$ D. $\frac{8}{24}$

---

4. Which is a composite number?

   E. 2 F. 13 G. 31 H. 33

---

5. Loren got $72.50 for his birthday. He spent $6.28 buying lunch at school. How much money does Loren have now?

   A. $6.22 B. $13.53 C. $66.22 D. $97.00

---

6. Noreen has 5 yards of fabric. If she uses $\frac{3}{4}$ yards of the fabric for a project, how much fabric does Noreen have left?

   E. $\frac{2}{4}$ F. $4\frac{1}{4}$ G. $4\frac{3}{4}$ H. $5\frac{3}{4}$

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KNOWLEDGE CHECK 12

Show your work on a separate sheet of paper and write your answers on this page.

12.1 Inputs and Outputs 1

1. Use the rule to find each output number.
   Rule: Multiply each input number by 4, and then add 2.

Input (x)	Output (y)
3	
10	
0	
11	
20	

2. Write an equation that fits the rule in #1. Use x for input and y for the output number.

   y = _____

12.2 Fractions: Multiplication 1

Find each product as instructed.

3. Use repeated addition: $4 \times \frac{3}{5}$

4. Use an area model: $1\frac{1}{3} \times \frac{3}{4}$

12.3 Fractions: Multiplication 2

Multiply.

5. Use the multiply across rule: $2\frac{3}{5} \times 1\frac{2}{3}$

6. Use the multiply across rule with simplification: $\frac{4}{9} \times \frac{3}{20}$

Highlighted Review: Factorization

7. Circle the prime numbers. 51 61 71 81 91

8. Circle the composite numbers. 29 39 49 59 69

Home-School Connection 12

Here are some questions from this week's lessons to review with your young mathematician.

1. Write an equation for this input-output rule:
   To get each output number (y), multiply each input (x) by 25, and then add 15.

2. Use repeated addition to compute $2 \times \frac{3}{5}$.

3. Compute $\frac{10}{11} \times 4\frac{2}{5}$.

Parent (or Guardian) signature _____

Selected California Mathematics Content Standards

NS 2.3.1	Use repeated addition, arrays, and counting by multiples to do multiplication.
NS 6.2.2	Explain the meaning of multiplication and division of positive fractions and perform the calculations (e.g., $5/8 + 15/16 = 5/8 \times 16/15 = 2/3$).
NS 7.1.2	Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers.
AF 4.1.5	Understand that an equation such as $y = 3x + 5$ is a prescription for determining a second number when a first number is given.
AF 5.1.5	Solve problems involving linear functions with integer values; write the equation; and graph the resulting ordered pairs of integers on a grid.
AF 7.1.5	Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph.