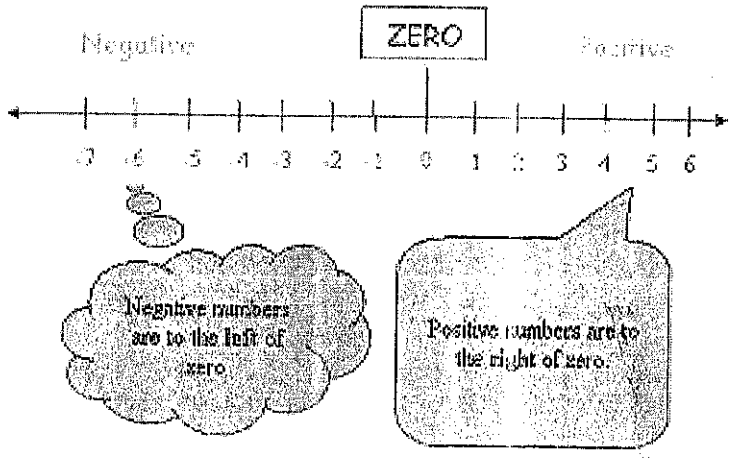
Grade 6
Math in Focus
Chapters 1 and 2



Name: *Key*

Lesson 1.1 Recall Prior Knowledge

Recall Prior Knowledge

Finding factors of a whole number

Find the factors of 24.

$24 = 1 \times 24$
$24 = 2 \times 12$
$24 = 3 \times 8$
$24 = 4 \times 6$

The factors of 24 are 1, 2, 3, 4, 6, 8, 12, and 24.

Quick Check

Find the factors of each number.

1. 30

1, 2, 3, 5, 6, 10, 15, 30

1×30
2×15
3×10
5×6

2. 63

1, 3, 7, 9, 21, 63

1×63
3×21
7×9

*(Challenge)

3. 56

1, 2, 4, 7, 8, 14, 28, 56

1×56
2×28
4×14
7×8

4. 84

1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84

1×84
2×42
3×28
4×21
6×14
7×12

Finding multiples of a whole number

Find the first six multiples of 7.

$1 \times 7 = 7$
$2 \times 7 = 14$
$3 \times 7 = 21$
$4 \times 7 = 28$
$5 \times 7 = 35$
$6 \times 7 = 42 \ldots$

7, 14, 21, 28, 35, and 42 are the first six multiples of 7.

Quick Check

Find the first five multiples of each number.

5. 4

4, 8, 12, 16, 20

4 × 1 = 4
4 × 2 = 8
4 × 3 = 12 ...

6. 6

6, 12, 18, 24, 30

7. 9

9, 18, 27, 36, 45

* Challenge

8. 13

13, 26, 39, 52, 65

Vocab.

Identifying prime numbers

A prime number has only two different factors, 1 and the number itself.

Decide whether 11 and 14 are prime numbers.

Find the factors of 11.

$11 = 1 \times 11$

The factors of 11 are 1 and 11.
11 is a prime number.

Find the factors of 14.

$14 = 1 \times 14$
$14 = 2 \times 7$

The factors of 14 are 1, 2, 7, and 14.
14 is not a prime number.

Quick Check

Complete.

9. Identify all the prime numbers in the following set of numbers.

2, 5, 13, 21, 23, 39, 47, 51, 53, 57

Using order of operations to simplify a numerical expression

STEP 1 Work inside parentheses.

STEP 2 Multiply and divide from left to right.

STEP 3 Add and subtract from left to right.

1st expression	$(98 + 34) - 6 \times 7$	Perform operations in parentheses.
2nd expression	$132 - 6 \times 7$	Then multiply.
3rd expression	$132 - 42$	Then subtract.
	90	

P
E
MD
AS

4
75
× 9
675

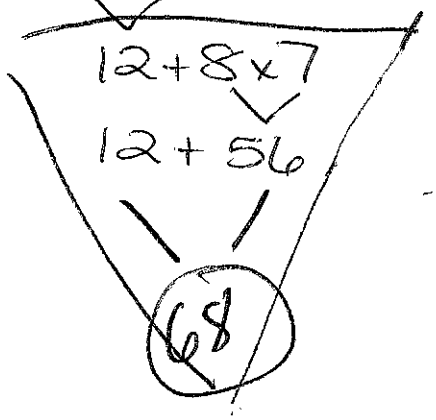
2
75
× 5
375

Quick Check

Simplify.

10. $(40 - 28) + 8 \times 7$

3
40
-28
12
+56
68



11. $75 \times (45 \div 5) - 70$

75×9-70
675-70=
605

675
-70
605

375
-70
305

1.1 The Number Line

Lesson Objectives

- Represent whole numbers, fractions, and decimals on a number line.
- Interpret and write statements of inequality for two given positive numbers using the symbols > and <.

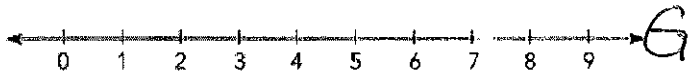
Vocabulary

number line
positive number
whole number
inequality

Represent numbers on a number line.

Area Capture

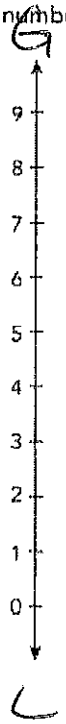
In this chapter, you will learn about various ways of representing numbers.
A number line can be used to represent the set of **whole numbers** (0, 1, 2, 3, 4, ...).



A number line can be horizontal or vertical.

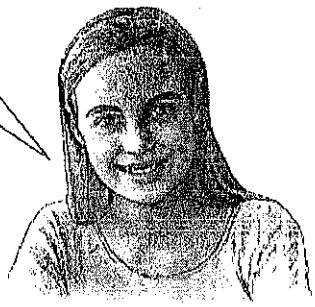
On a horizontal number line, the lesser number always lies to the left of the greater number.

On a vertical number line, the lesser number always lies below the greater number.



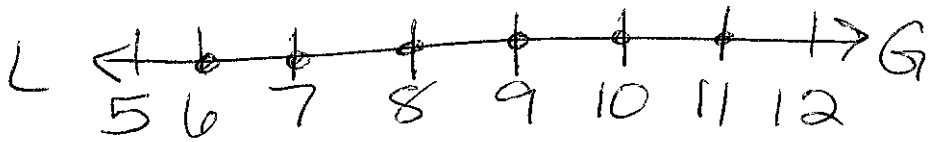
Positive numbers are all the numbers greater than 0. On a horizontal number line, they are to the right of 0. On a vertical number line, they are above 0.

The set of positive numbers also includes positive fractions and decimals.

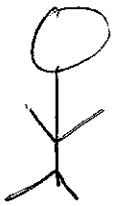


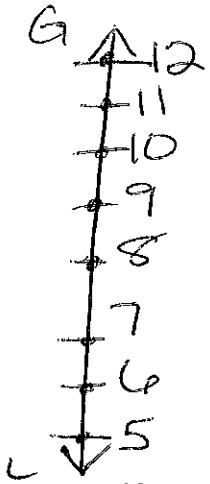
Plot dot! Between + from

a) Draw a horizontal number line to represent the whole numbers between 5 and 12.



b) Draw a vertical number line to represent the whole numbers from 5 to 12.

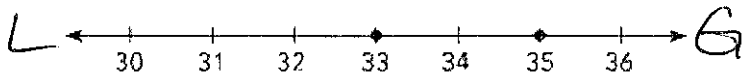




Write statements of inequality comparing two whole numbers using the symbols > and <.

You can use a number line to compare whole numbers.

For example, in the number line shown, 35 lies to the right of 33.

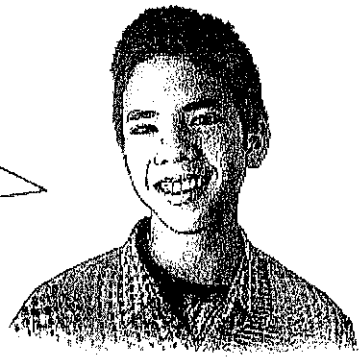


So, 35 is greater than 33.

This can be represented by 35 > 33.

Write the statement "110 is less than 250" using > or <.

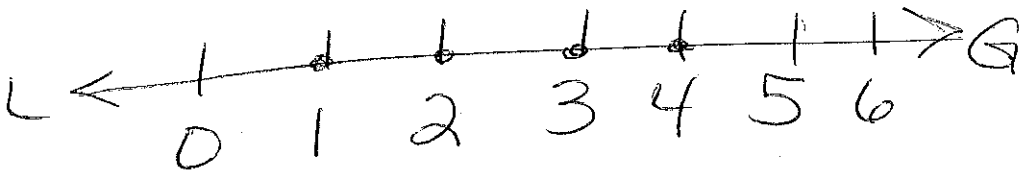
110 < 250



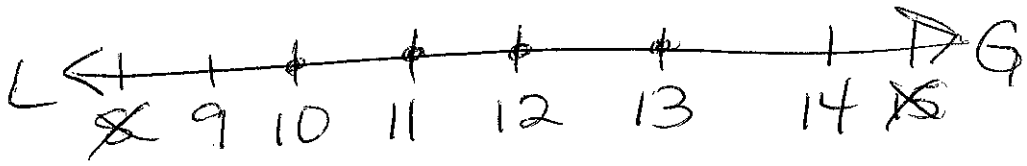
Guided Practice

Draw a horizontal number line to represent each set of whole numbers.

1. Positive whole numbers less than 5

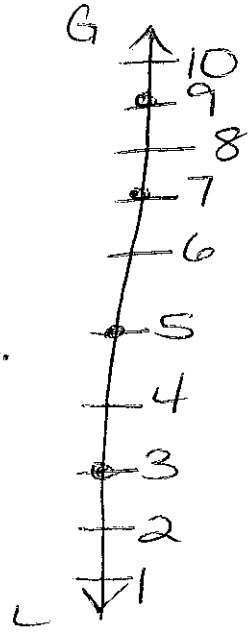


2. Whole numbers greater than 9 but less than 14



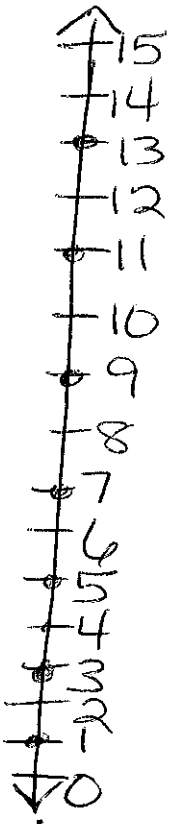
Draw a vertical number line to represent each set of whole numbers.

3. Odd numbers between 1 and 10



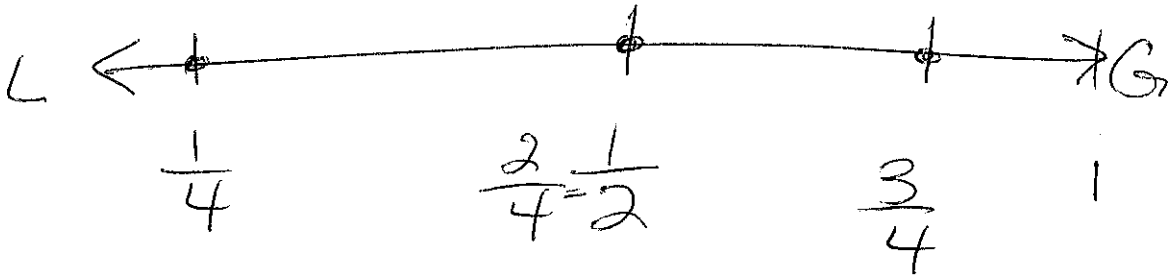
line here (#3)

4 Positive odd numbers < 15

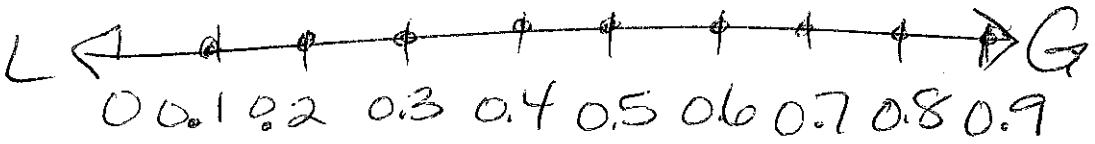


Represent fractions, mixed numbers, and decimals on a horizontal number line.

a) Represent the fractions $\frac{1}{4}$, $\frac{2}{4}$, and $\frac{3}{4}$ on a number line.



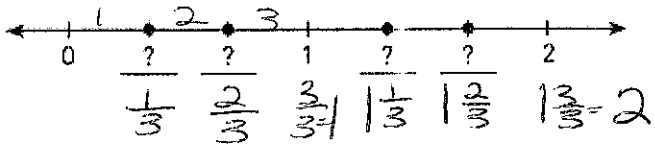
b) Represent the decimals from 0.1 to 0.9 on a horizontal number line. Use an interval of 0.1 between each decimal.



Guided Practice

Complete each ___?___ with the correct value, and each ? with > or <.

5 Fill in the missing fractions and mixed numbers on the number line. Then complete the statements of inequality.



$\frac{2}{3}$? 1

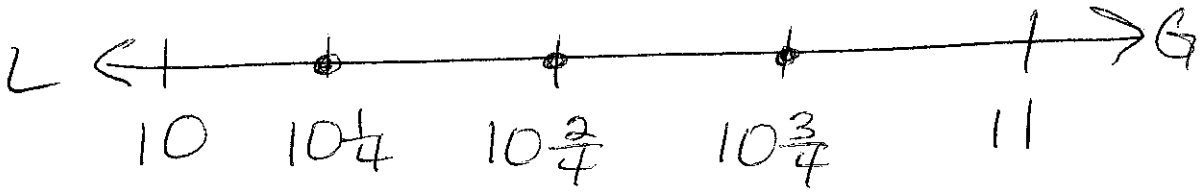
2 ? $1\frac{1}{3}$

whole # and a fraction

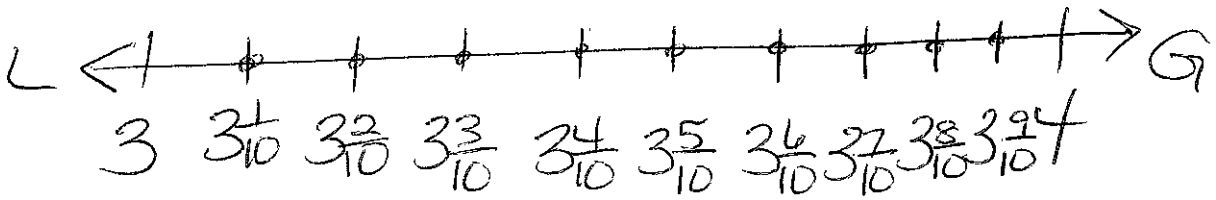
Draw a horizontal number line to represent each set of numbers.

6 Mixed numbers greater than 10 but less than 11

Use an interval of $\frac{1}{4}$ between each pair of mixed numbers.

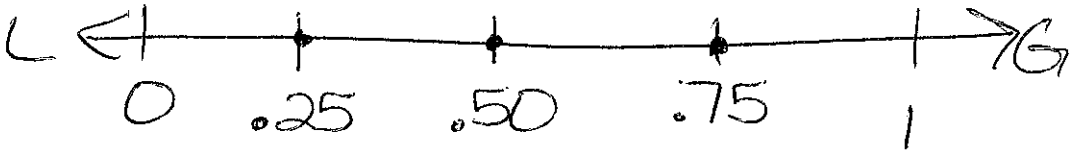


7. Mixed numbers from 3 to 4, with an interval of $\frac{1}{10}$ between each pair of mixed numbers



8. Decimals between 0 and 1, with an interval of 0.25 between each pair of decimals

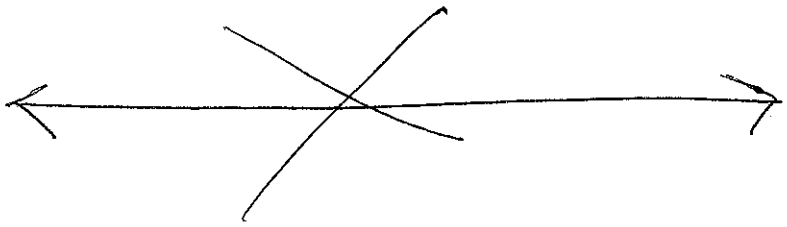
Think cents!

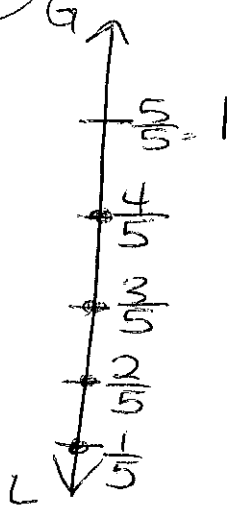


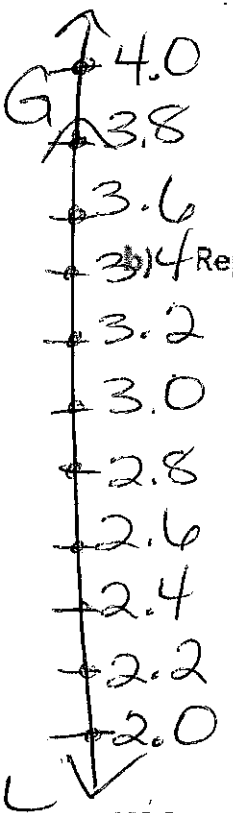
~~9.~~ Decimals greater than 8.0 but less than 12.0
Use an interval of 0.8 between each pair of decimals.

Represent fractions, mixed numbers, and decimals on a vertical number line.

a) Represent the fractions $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$ on a vertical number line.







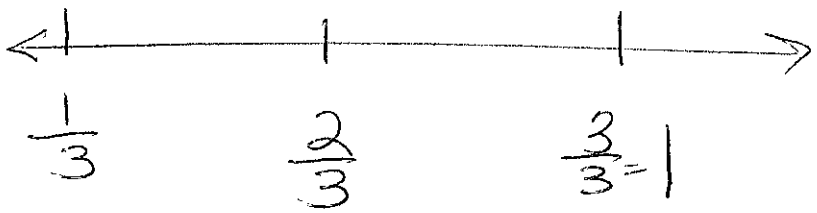
Represent the decimals 2.0, 2.2, 2.4, 2.6, ..., 4.0 on a vertical number line.

Write statements of inequality comparing two fractions or two decimals using the symbols > and <.

You can use a number line to compare fractions and decimals.

a) Compare the two fractions, $\frac{2}{3}$ and $\frac{5}{6}$.

$\frac{4}{6} < \frac{5}{6}$

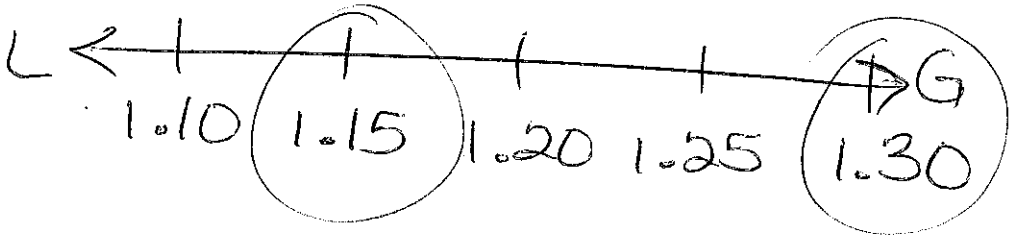


think cents ↓ $

b) Compare the two decimals, 1.3 and 1.15. Use a number line to help you.

1.30

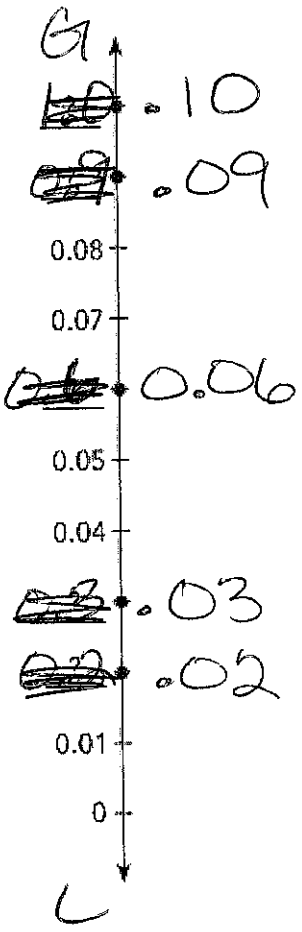
$1.30 > $1.15



Guided Practice

Complete each ___?___ with the correct value, and each ? with > or <.

10 a) Fill in the missing decimals on the number line.



b) Compare each pair of decimals using < or >. Use the number line in a) to help you.

Think cents

0.1 ? 0.05

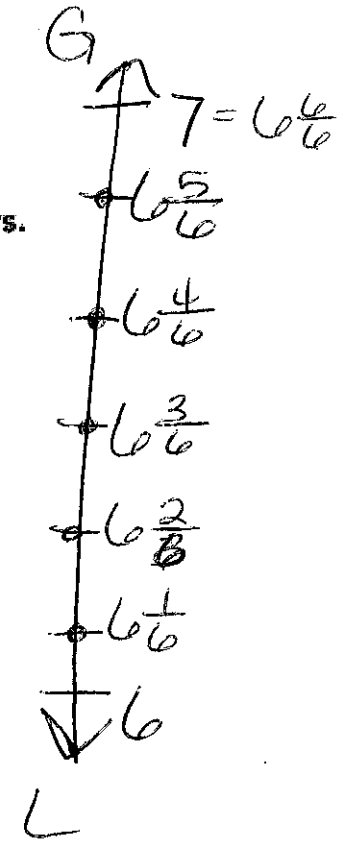
0.10 0.05

0.02 ? 0.07

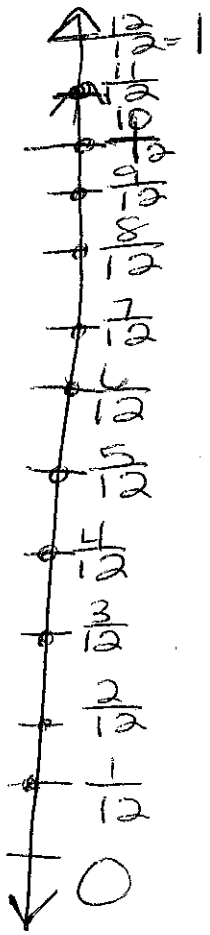
Draw a vertical number line to represent each set of numbers.

11 Mixed numbers greater than 6 but less than 7

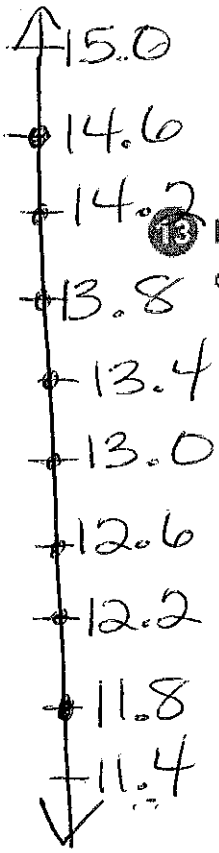
Use an interval of $\frac{1}{6}$ between each pair of mixed numbers.



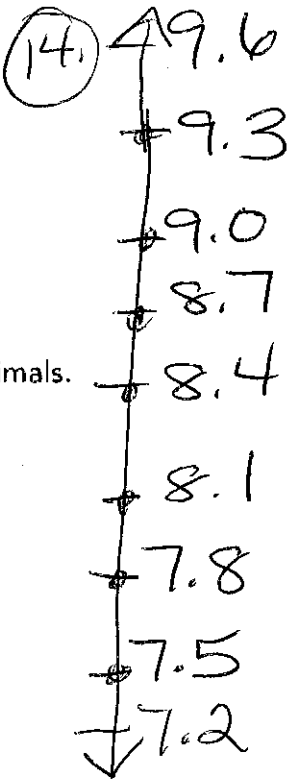
12 Positive fractions less than 1, with an interval of $\frac{1}{12}$ between each pair of fractions



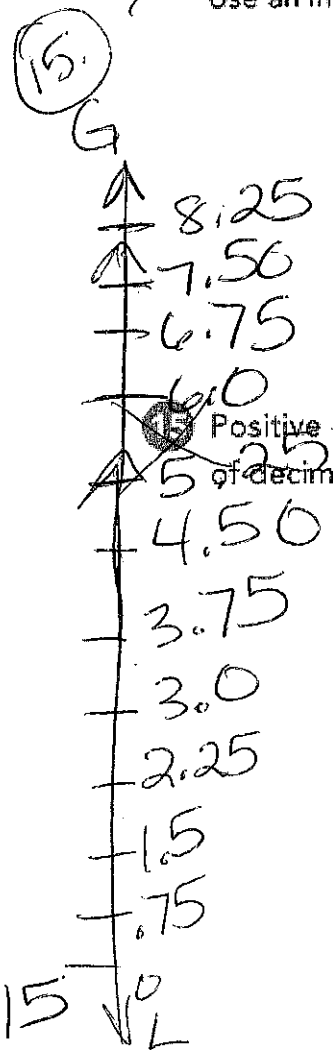
13. Decimals between 11.4 and 15.0, with an interval of 0.4 between each pair of decimals



14. Decimals greater than 7.2 but less than 9.6
Use an interval of 0.3 between each pair of decimals.



15. Positive decimals less than 7.5, with an interval of 0.75 between each pair of decimals



Compare each pair of numbers using > or <. Use a number line to help you.

16 $3\frac{9}{10} > 3\frac{3}{10}$

17 2.17 < 2.71

whole #s

18 14.4 > 13.38

14 13

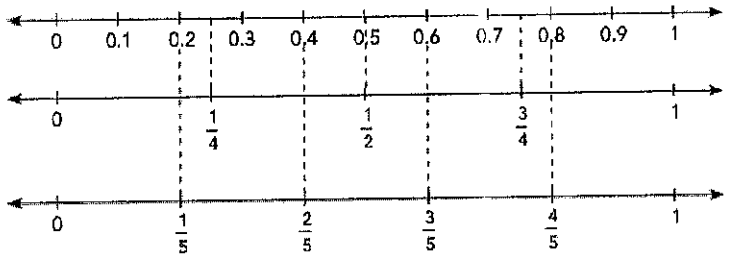
19 $8\frac{5}{12} > \frac{100}{12} = 8\frac{4}{12}$

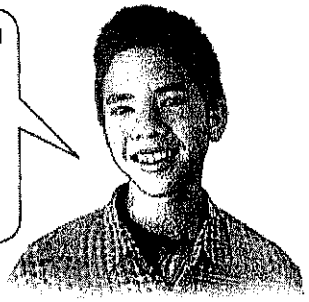
$8\frac{5}{12} > 8\frac{4}{12}$

Ref NB

Compare numbers in different forms.

Look at these number lines.





You can see that $\frac{1}{4} = 0.25$, $\frac{1}{2} = 0.5$, and $\frac{3}{4} = 0.75$.

You can also see that $\frac{1}{5} = 0.2$, $\frac{2}{5} = 0.4$, $\frac{3}{5} = 0.6$, and $\frac{4}{5} = 0.8$.

think Quarters

a) Which is greater, $\frac{1}{4}$ or 0.30?

.25 or 0.30 is greater

b) Which is lesser, 0.62 or $\frac{3}{5}$?

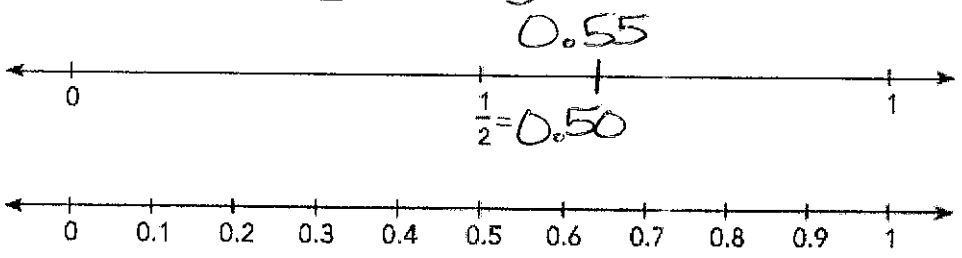
$\frac{3}{5}$ = 0.60 is lesser

Guided Practice

$\frac{1}{2} = .50$

Complete.

20 Which is greater, $\frac{1}{2}$ or 0.55? is greater



$\frac{1}{2}$ = .50

.50 lies to the left of 0.55.

So, 0.55 > $\frac{1}{2}$.

Compare each ? using > or <. Use a number line to help you.

0.20

21 0.2 < $\frac{1}{4}$ = 0.25

22 $\frac{3}{4}$ > 0.7 (.75 > 0.70)

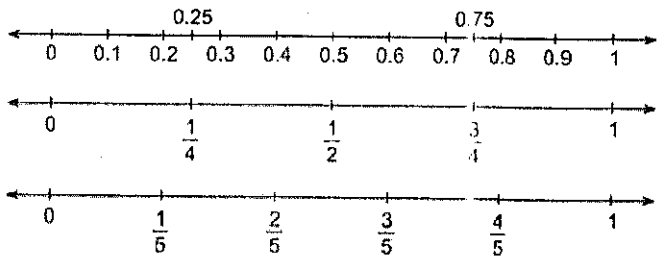
23 0.89 > $\frac{4}{5}$ = 0.80

24 0.25 > $\frac{1}{5}$ = .20

25 $\frac{2}{5}$ > 0.3 (0.40 > 0.30)

26 3.26 ? $3\frac{5}{8}$ = 3.62

$8\overline{)5.00}$ → .62, 48, 20, −16, 4



1.2 Prime Factorization

Lesson Objective

- Express a whole number as a product of its prime factors.

Vocabulary

composite number
factor
prime number
prime factor

Identify composite numbers.

Another way to represent a whole number is to write it as a product of its **factors**.

Find all the factors of 18.

1 x 18
2 x 9
3 x 6

A composite number has more than two different whole-number factors.

The number 3 is an example of a **prime number**. A prime number has only two factors, the number itself and 1.

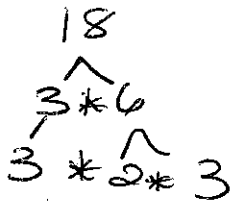
In the list of factors for 18, 2 and 3 are the only prime numbers. 2 and 3 are the prime factors of 18.

Write a composite number as a product of its prime factors.

A composite number can be written as a product using only its **prime factors.** This is known as prime factorization.

For example, you can write 18 as a product using only its prime factors.

$18 = 2 \times 3 \times 3$

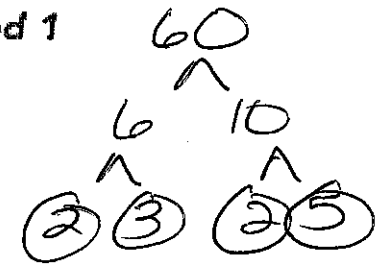


Math Note

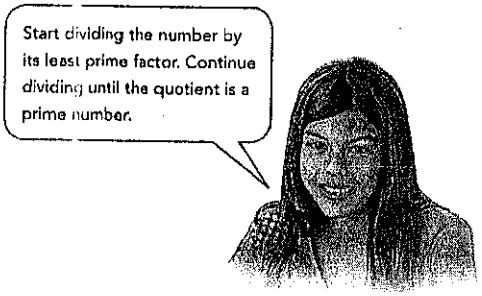
Finding the prime factorization of a number is not the same as finding the factors of a number. A composite number can be written as the product of different pairs of its factors. But there is one and only one prime factorization for a given composite number.

Express 60 as a product of its prime factors.

Method 1



$2 \cdot 2 \cdot 3 \cdot 5$



Mrs. Wesolek

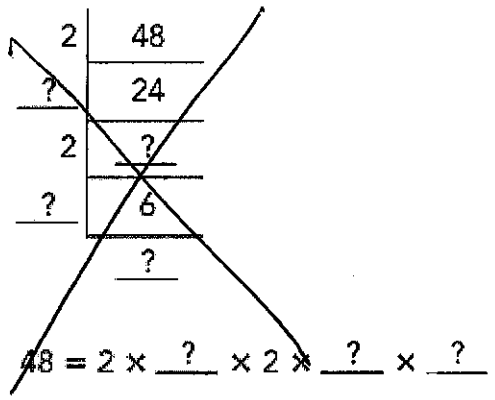
~~Method 2~~

Guided Practice

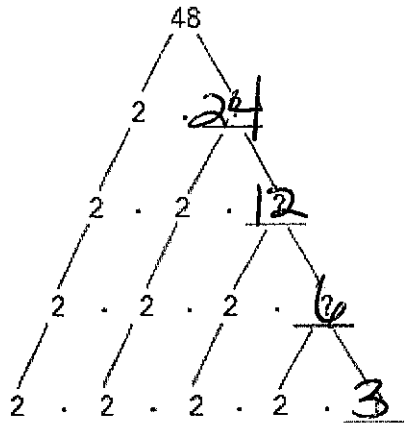
Complete.

1. Express 48 as a product of its prime factors.

Method 1



Method 2



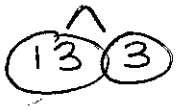
$48 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$

Lesson 1.2 Prime Factorization

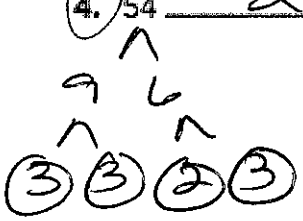
Express each number as a product of its prime factors.

2. 28 $2 \cdot 2 \cdot 7$

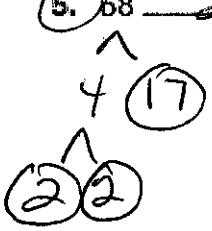
3. 39 $3 \cdot 13$



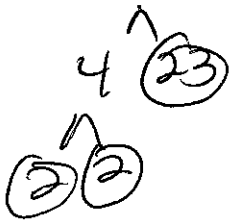
4. 54 $2 \cdot 3 \cdot 3 \cdot 3$



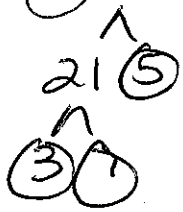
5. 68 $2 \cdot 2 \cdot 17$



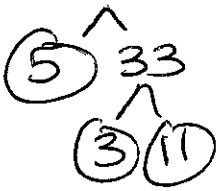
6. 92 $2 \cdot 2 \cdot 23$



7. 105 $3 \cdot 5 \cdot 7$

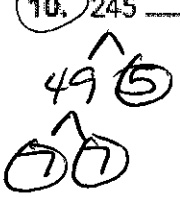


8. 165 $3 \cdot 5 \cdot 11$

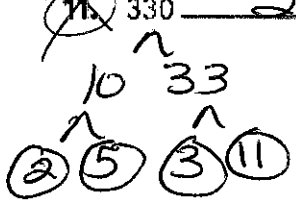


9. 210 $2 \cdot 3 \cdot 5 \cdot 7$

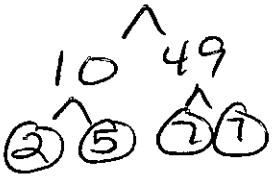
10. 245 $5 \cdot 7 \cdot 7$



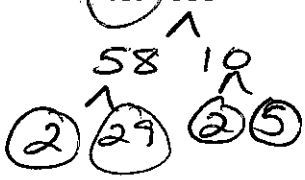
11. 330 $2 \cdot 3 \cdot 5 \cdot 11$



12. 490 $2 \cdot 5 \cdot 7 \cdot 7$



13. 580 $2 \cdot 2 \cdot 5 \cdot 29$



14. 858 _____

15. 1,020 _____

1.3 Common Factors and Multiples

Lesson Objectives

- Find the common factors and the greatest common factor of two whole numbers.
- Find the common multiples and the least common multiple of two whole numbers.

Vocabulary

common factor
common multiple
least common multiple
greatest common factor
multiple

Identify the common factors of two whole numbers.

Find the common factors of 12 and 30.

Factors of 12	Factors of 30
1 2 3 4 6 12	1 2 3 5 6 10 15 30

12
3 x 4
3 x 2 x 2

30
5 x 6
5 x 2 x 3

* only circle the #s they share!

GCF = 2 x 3 = 6

Common Factors:

1, 2, 3 and 6

What are the common factors of 16 and 24?

Factors of 16	Factors of 24
16 4 × 4 2×2 2×2	24 6 × 4 2×3 2×2

2·2·2·2 = 2^4

Common Factors:
1, 2, 4 and 8

GCF = 2·2·2 = (8) GCF

Find the greatest common factor of two whole numbers.

Find the greatest common factor of 45 and 75.

45
9 × 5
3 × 3 × 5

75
3 25
3 × 5 × 5

GCF = 3·5 = (15)

(Same) Use this method

45
9 (5)
(3)(3)

3·3·5

75
(3) 25
(5)(5)

3·5·5

GCF
3·5 = (15)

Guided Practice

Complete.

6 Find the greatest common factor of 20 and 32.

Method 1

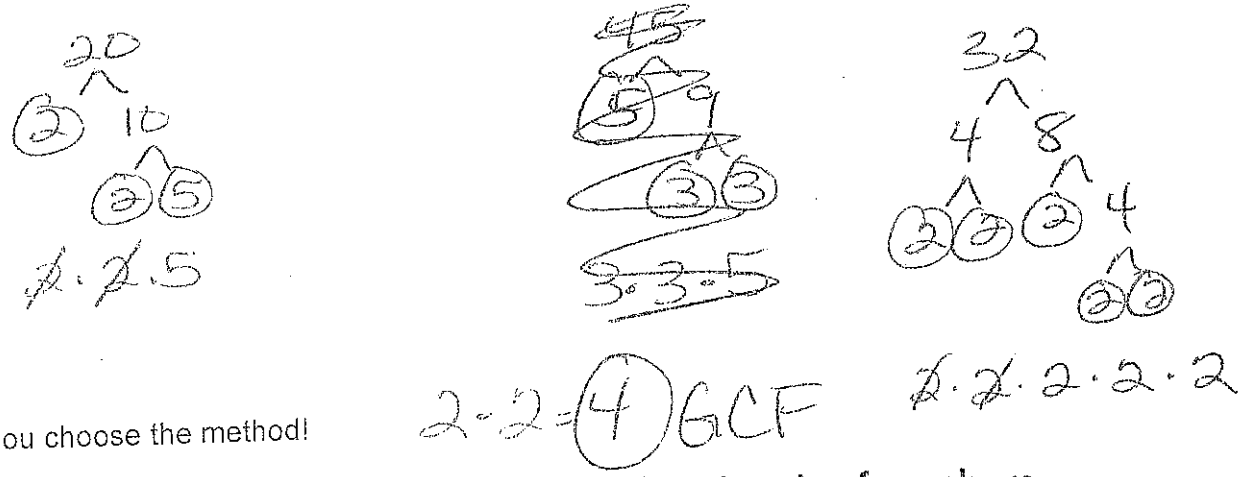
Factors of 20	Factors of 32
1 x 20	1 x 32
2 x 10	2 x 16
4 x 5	4 x 8

1, 2, 4, 5, 10, 20

1, 2, 4, 8, 16, 32

GCF = 4

Method 2

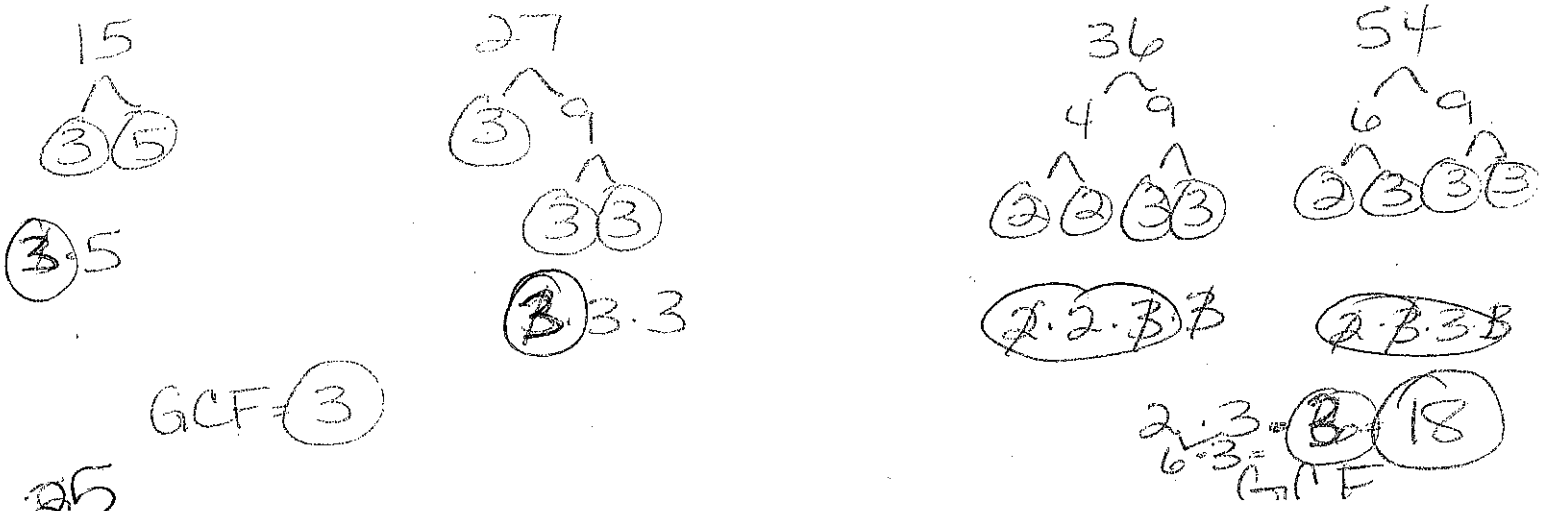


You choose the method!

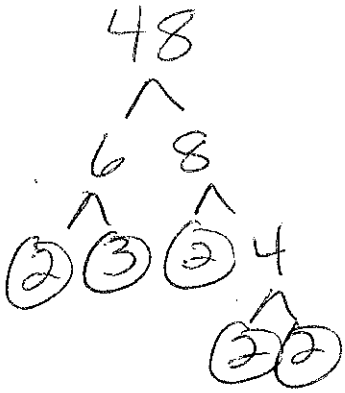
Find the greatest common factor of each pair of numbers.

7 15 and 27

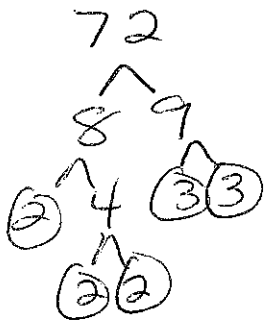
8 36 and 54



9 48 and 72



$2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$

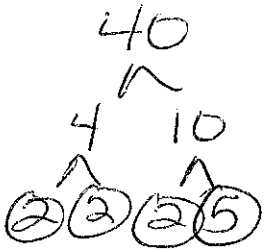


$2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$

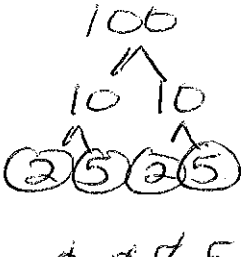
GCF

$2 \cdot 2 \cdot 2 \cdot 3 = 8 \cdot 3 = 24$

10 40 and 100



$2 \cdot 2 \cdot 2 \cdot 5$



$2 \cdot 2 \cdot 5 \cdot 5$

$2 \cdot 2 \cdot 5$

$4 \cdot 5 = 20$

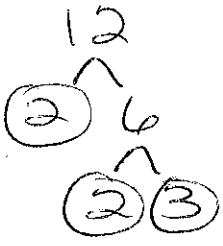
GCF

David is making baskets of fruit. He has 12 apples and 20pears. If each basket will contain the same number of apples and the same number of pears, what is the greatest number of baskets he can make?

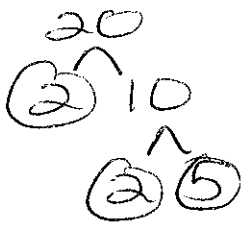
What is problem asking you to find? GCF

What do you need to find to solve the problem? prime factorization of each + GCF

How can you find the GCF of 12 and 20?



$2 \cdot 2 \cdot 3$



$2 \cdot 2 \cdot 5$

GCF

$2 \cdot 2 = 4$ We can make 4 baskets.

1. A pet store fills aquariums with fish. The store has 27 angelfish and 45 lionfish. If the aquariums will contain the same number of each kind of fish, what is the greatest number of aquariums the store can fill?




27 → 9 × 3 → 3 × 3 → 3 · 3 · 3

45 → 9 × 5 → 3 × 3 → 3 · 3 · 5

3 · 3 = (9)

The store can fill 9 aquariums.

Use the greatest common factor with the distributive property.

Express 12 + 20 as a product of the greatest common factor of the numbers and another sum.

First find the greatest common factor of the two numbers.

12 → 2 × 6 → 2 × 3 → 2 · 2 · 3

20 → 2 × 10 → 2 × 5 → 2 · 2 · 5

2 · 2 = (4) GCF

~~Then write the sum a different way. You know that~~

Go back to starting numbers...
use GCF as a factor,
find missing factor,
pull out GCF( )
add remaining factors

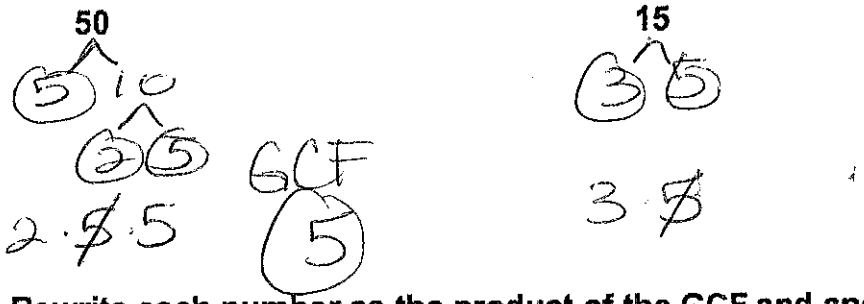
$12 = \frac{4}{GCF} \times 3$

$20 = \frac{4}{GCF} \times 5$

$4(3+5)$

You can use common factors to write equivalent expressions.

You can use the GCF of 50 and 15 to write an equivalent expression to 50 - 15.
The GCF of 50 and 15 is 5



Rewrite each number as the product of the GCF and another factor.

50 = 5 **x** 10 **15 =** 5 **x** 3

GCF **GCF**

So 50 - 15 is equivalent to 5(10 + 3)

Use the distributive property to write 5(10) - 5(3) as 50 + 15

You can use common factors to write equivalent expressions.

You can use the GCF of 35 and 15 to write an equivalent expression to 35 + 15.
The GCF of 35 and 15 is 5

35

7 · 5

5 · 7

15

3 · 5

GCF

5

Rewrite each number as the product of the GCF and another factor.

35 = 5 **x** 7 **15 =** 5 **x** 3

GCF **GCF**

So 35 + 15 is equivalent to 5(7 + 3)

Use the distributive property to write 5(7) + 5(3) as 35 + 15

5 | 35
5 | 15
3 | 7
35 = 5 · 7
15 = 5 · 3

Multiply the left overs!

Express the sum of each pair of numbers as a product of the greatest common factor of the numbers and another sum.

12 35 + 91

35 = 7 · 5 (left overs: 5)

91 = 13 · 7 (left overs: 13)

GCF = 7

7(5 + 13)

13 60 + 85

60 = 6 · 10 = 2 · 3 · 2 · 5

85 = 5 · 17

2 · 2 · 3 · 5

5 GCF

60 = 5 x —

85 = 5 x —

5(12 + 17)

14 24 + 64

24 = 8 · 3 = 2 · 4 = 2 · 2 · 2 · 3

64 = 8 · 8 = 2 · 4 · 2 · 4 = 2 · 2 · 2 · 2 · 2 · 2

2 · 2 · 2

4 · 2 = 8 GCF

24 = 8 x 3

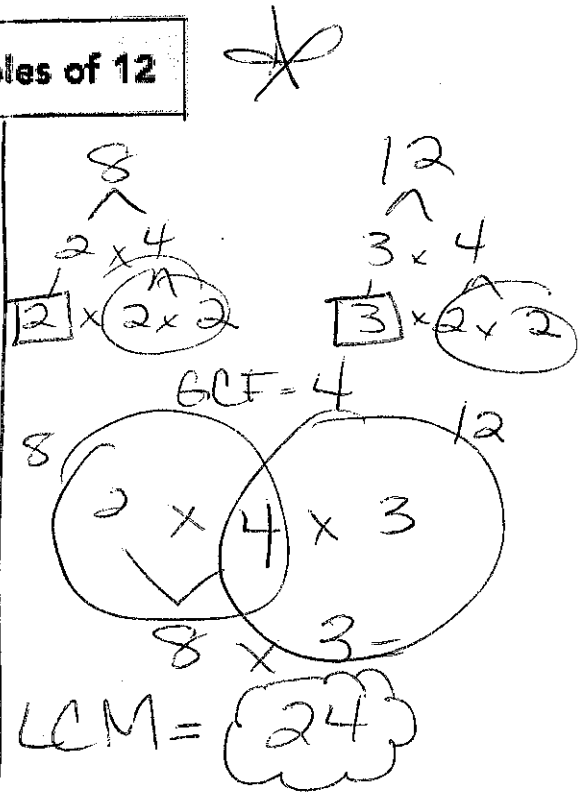
64 = 8 x 8

8(3 + 8)

Find the common multiples of two whole numbers.

Find the first two common multiples of 8 and 12.

Multiples of 8	Multiples of 12

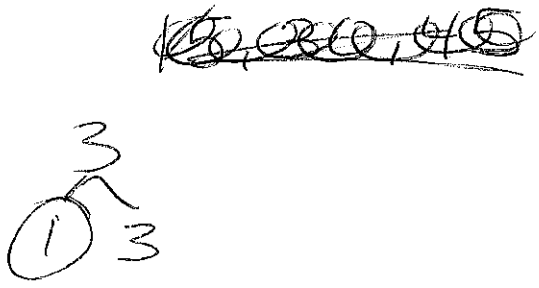


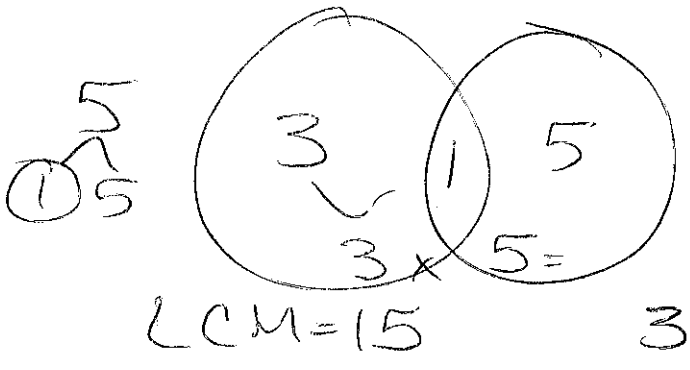
Guided Practice

Complete.

15 Find the first three common multiples of 3 and 5.

Multiples of 3	Multiples of 5





30

Find the least common multiple of two whole numbers.

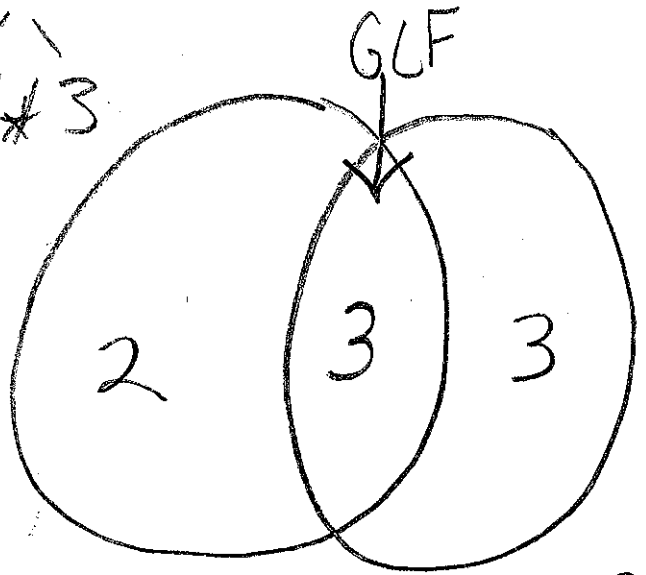
Find the least common multiple of 6 and 9.

Method 1

Multiples of 6	Multiples of 9

6
/ \
2 * 3

9
/ \
3 * 3



Method 2

LCM = 2 * 3 * 3
/ \
6 * 3
/ \
18

Guided Practice

Complete.

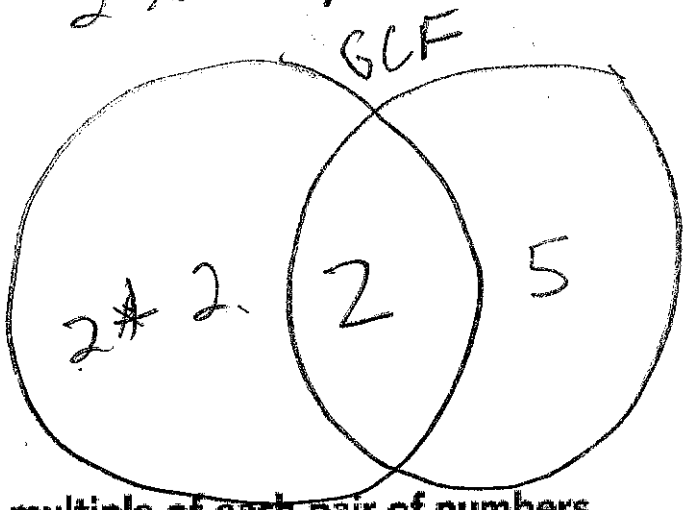
18 Find the least common multiple of 8 and 10.

Method 1

8 → 2 * 4 → 2 * 2 * 2

10 → 2 * 5

~~***Method 2***~~



LCM

2 * 2 * 2 * 5

4 * 10

40

You choose the method!

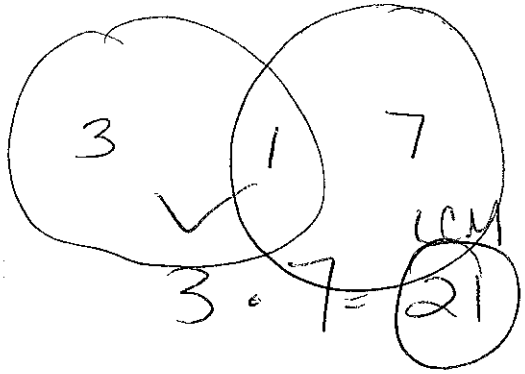
12 × 3 = 60

Find the least common multiple of each pair of numbers.

19 3 and 7

3 → 3

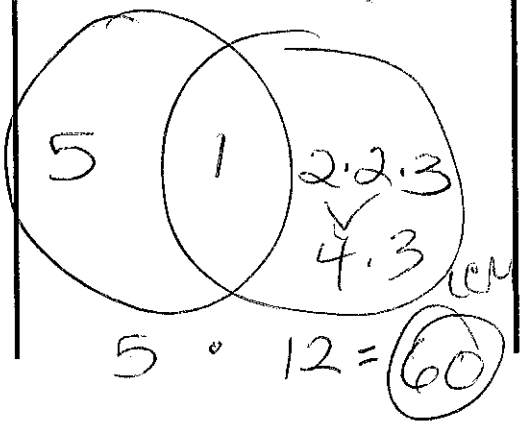
7 → 7



20 5 and 12

5 → 5 1

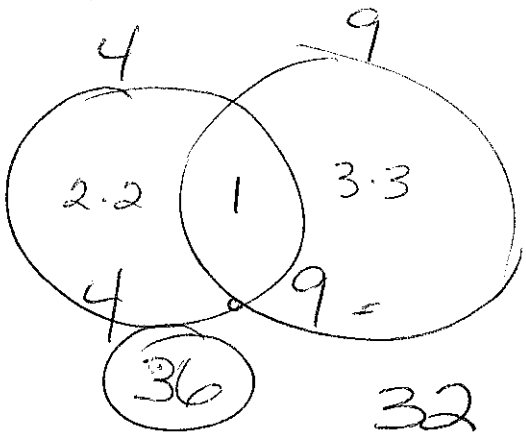
12 → 3 4 → 3 2 2



21 4 and 9

4 → 2 · 2

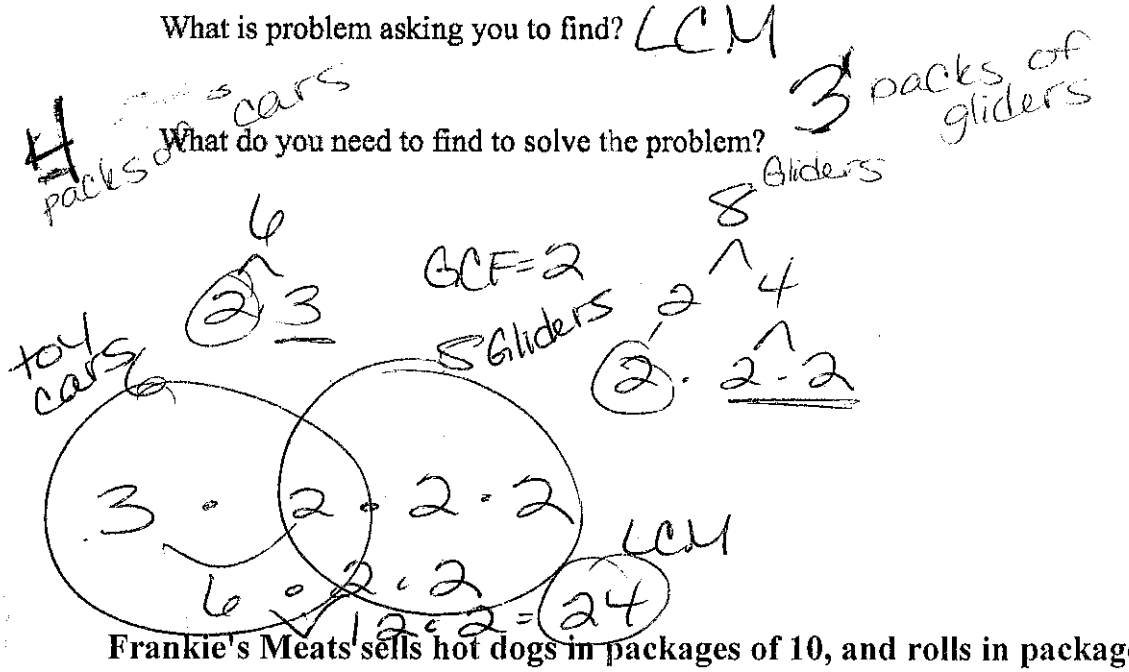
9 → 3 · 3



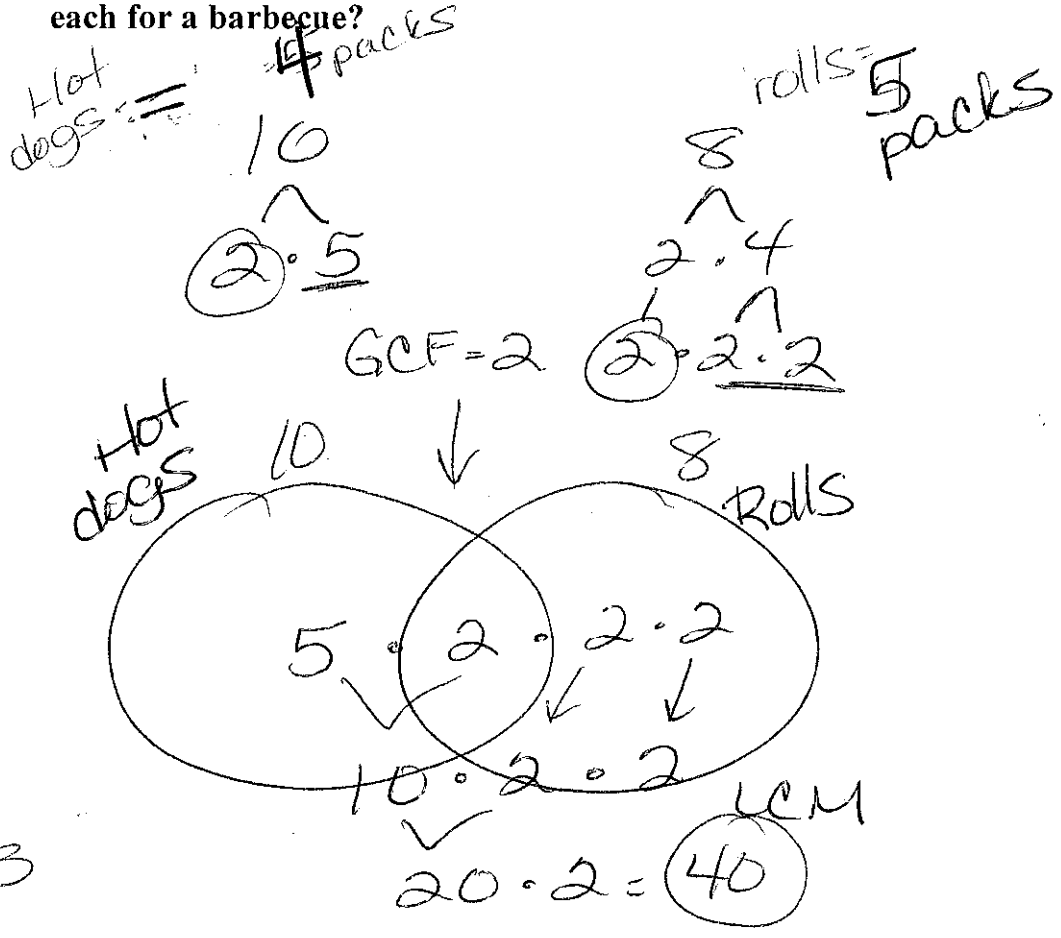
Wyatt wants to make bags of party favors to give to his friends. Toy cars come in packages of 6. Gliders come in packages of 8. What is the least number of toy cars and gliders Wyatt can buy to have an equal number of each?

What is problem asking you to find? LCM

What do you need to find to solve the problem?



Frankie's Meats sells hot dogs in packages of 10, and rolls in packages of 8. What is the least number of hot dogs and rolls Selma can buy to have an equal number of each for a barbecue?



Common Factors =
1, 2, 4, 7, 14, 28
1, 2, 4, 5, 8, 10, 20, 40

Lesson 1.3 Common Factors and Multiples

Find the common factors of each pair of numbers.

1. 28 and 40 — 4 = GCF

28 = 4 × 7 = 2 · 2 · 7

40 = 4 · 10 = 2 · 2 · 2 · 5

(2 · 2) GCF = 4

Common Factors = 1, 2, 4

2. 45 and 63 — 1, 3, 9

45 = 5 · 9 = 5 · 3 · 3

63 = 7 · 9 = 7 · 3 · 3

1, 3, 5, 9, 15, 45

1, 3, 7, 9, 21, 63

Find the greatest common factor of each pair of numbers.

5. 18 and 48 — 6

18 = 3 · 6 = 3 · 2 · 3

48 = 6 · 8 = 2 · 3 · 2 · 4 = 2 · 3 · 2 · 2 · 2

GCF = 2 · 3 = 6

6. 40 and 64 — 8

40 = 4 · 10 = 2 · 2 · 2 · 5

64 = 8 · 8 = 2 · 4 · 2 · 4 = 2 · 2 · 2 · 2 · 2 · 2

GCF = 2 · 2 · 2 = 8

Express the sum of each pair of numbers as a product of the greatest common factor of the numbers and another sum.

9. 42 + 105 — 21(2 + 5)

42 = 6 · 7 = 2 · 3 · 7

105 = 5 · 21 = 5 · 3 · 7

GCF = 3 · 7 = 21

21(2 + 5)

10. 54 + 90 — 18(3 + 5)

54 = 6 · 9 = 2 · 3 · 3 · 3

90 = 9 · 10 = 3 · 3 · 2 · 5

GCF = 2 · 3 · 3

6 · 3 = 18

18(3 + 5)

Find the first three common multiples of each pair of numbers.

11. 3 and 8 — 24, 48, 72

3 = 1 · 3

8 = 2 · 4 = 2 · 2 · 2

3 · 1 · 2 · 2 · 2

3 · 2 · 2 · 2

6 · 2 · 2 = 24

12. 4 and 9 — 36, 72, 108

4 = 2 · 2

9 = 3 · 3

2 · 2 · 1 · 3 · 3

4 · 1 · 9

4 · 9 = 36 LCM

Find the least common multiple of each pair of numbers.

15. 16 and 24 48

16 = 4 × 4 = 2 × 2 × 2 × 2

24 = 6 × 4 = 2 × 3 × 2 × 2

GCF = 8

2 · 8 · 3 = 48

16. 15 and 24 _____

15 = 3 · 5

24 = 3 · 8 = 3 · 2 · 4 = 3 · 2 · 2 · 2

5 · 3 · 8

Find the greatest common factor of each set of numbers.

19. 15, 45, and 60 15

15 = 3 × 5

45 = 9 × 5 = 3 × 3 × 5

60 = 6 × 10 = 2 × 3 × 2 × 5

3 · 5 = 15

20. 28, 42, and 70 14

28 = 4 · 7 = 2 · 2 · 7

42 = 7 · 6 = 7 · 2 · 3

70 = 7 · 10 = 7 · 2 · 5

2 · 7 = 14

Find the least common multiple of each set of numbers.

23. 12, 20, and 24 360

12 = 3 × 4 = 3 × 2 × 2

20 = 4 × 5 = 2 × 2 × 5

24 = 6 × 4 = 2 × 3 × 2 × 2

GCF = 4

All share 4

3 · 4 · 5 · 6 = 360

24. 20, 30, and 40 240

20 = 2 · 10 = 2 · 2 · 5

30 = 3 · 10 = 3 · 2 · 5

40 = 4 · 10 = 2 · 2 · 2 · 5

2 · 5 = 10

2 × 3 × 10 × 4

6 × 10 × 4

60 × 4 = 240

Find the greatest common factor and the least common multiple of each set of numbers.

27. 12, 28, and 36 GCF = 4 LCM = 756

12 = 3 · 4 = 3 · 2 · 2

28 = 4 · 7 = 2 · 2 · 7

36 = 6 · 6 = 2 · 3 · 2 · 3

2 · 2 = 4 GCF

9

3 × 4 × 7 × 9

12 × 7 × 9

84 × 9 = 756

28. 18, 24, and 30 _____

35