Vocabulary for Multiplication Unit

a. **Factor:** The numbers used in a multiplication problem OR A factor of a given number is any number that divides evenly into a given number with ***no remainder.***

b. **Product:** The answer to a multiplication problem.

c. **Prime number:** A number that has only two factors: the number 1 and itself.

d. **Composite number:** A number that has more than 2 factors.

e. **#1:** The number 1 is neither prime nor composite because it has only 1 factor: itself. It is considered a "unique" number.

f. **Multiple:** A multiple of a given number is the product of that number and any natural number (counting numbers).

Ex. The multiples of 4 are 4, 8, 12, 16, 20, 24, etc.
because $1 \cdot 4 = 4$, $2 \cdot 4 = 8$, $3 \cdot 4 = 12$,
$4 \cdot 4 = 16$, $5 \cdot 4 = 20$, $6 \cdot 4 = 24$, etc.

g. **Array:** A rectangular arrangement of objects with an equal number of objects in each row.

h. **PeRIMeter:** The distance around the RIM of a figure.

i. **Area:** The measure of covering inside a figure. It is measured in square units. You count the square units that cover the inside of the figure.

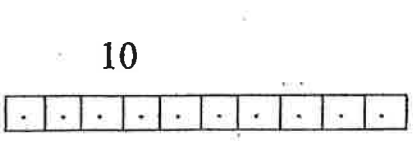
j. **Divisibility:** The first number is divisible by the second number if the second number divides into the first number ***evenly with no remainder.***

Array

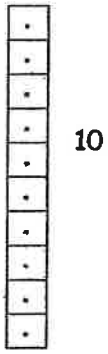
Factor: The numbers used in a multiplication problem OR a factor of a given number is any number that divides evenly into that given number with no remainder.

18 { 1, 2, 3, 6, 9, 18}

Array: (Rows/Columns): A rectangular arrangement of objects with an equal number of objects in each row.



1 • 10



10 • 1

must be rows • columns

PRIME NUMBER 10 { 1,2, 5, 10}

1. *DRAW the array*
2. *LABEL the sides of the array*
3. *NAME the array (row x column) THINK RC COLA*
4. *WRITE the FACTORS within braces { } and separated by commas. Numbers are to be written in order (rainbow shows factor pair)*

Area: The measure covering inside the figure. It is measured in square units.

Area = L x W
= 10 x 1 = 10 units squared or units^2

PeRIMeter: The distance around the RIM of a figure.

Perimeter = 2L + 2 W
= 2 (10) + 2 (1)
= 20 + 2 = 22 units

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For each of the following factor pairs, draw and label the matching array, calculate the perimeter, and calculate the area.

5 X 6

4 X 9

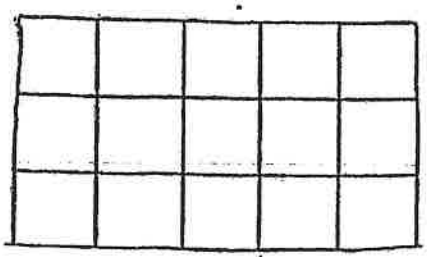
7 X 5

8 X 3

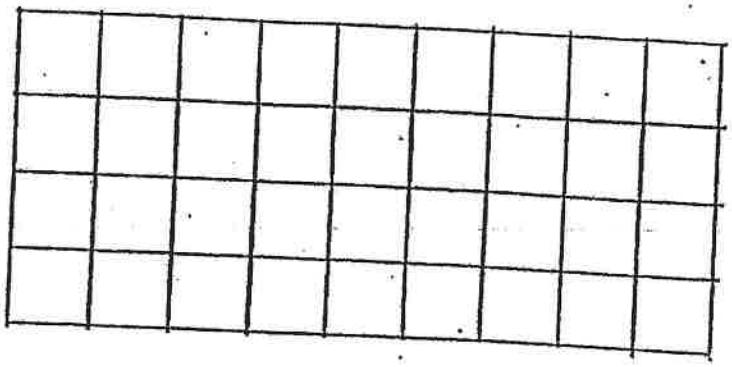
9 x 6

3 X 7

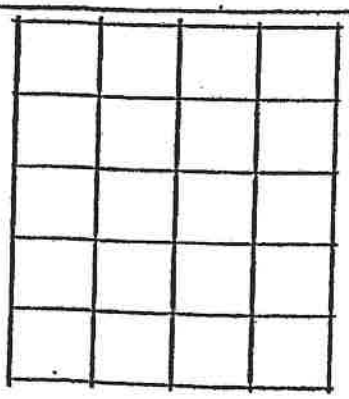
Label the following array. Name the factor pair and calculate the area and perimeter.



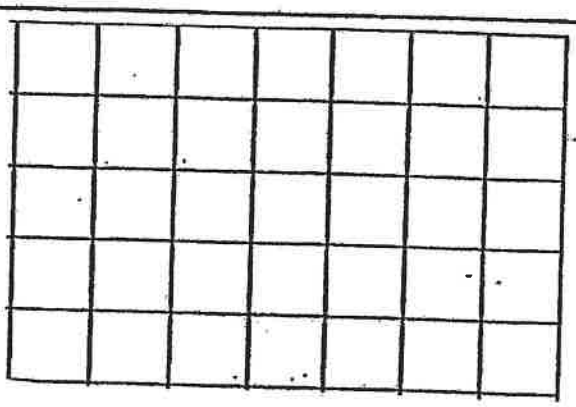
factor pair
Perimeter
Area



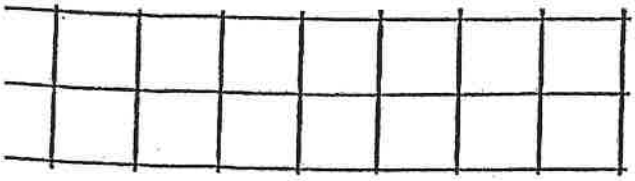
factor pair
Perimeter
Area



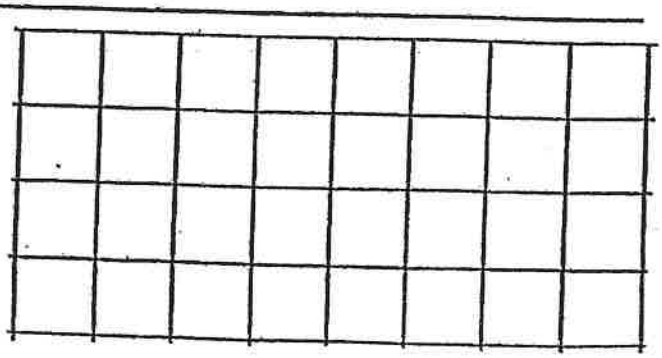
factor pair
Perimeter
Area



factor pair
Perimeter
Area



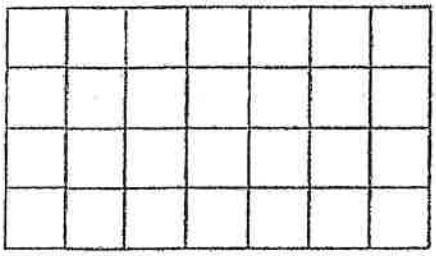
factor pair
erimeter
Area



factor pair
Perimeter
Area

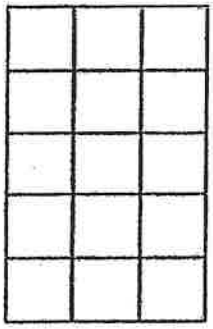
Arrays

Label the rows, columns, and factor pair for each array. Then, calculate the area and perimeter.

1. 

Perimeter _____

Area _____

2. 

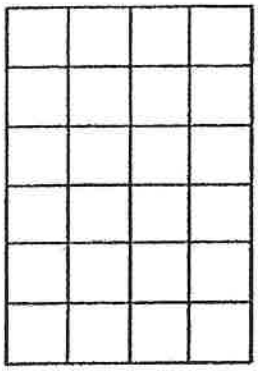
Perimeter _____

Area _____

3. 

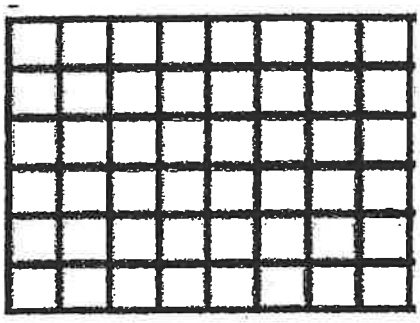
Perimeter _____

Area _____

4. 

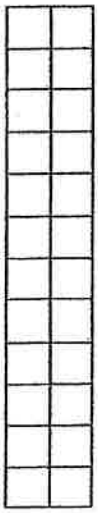
Perimeter _____

Area _____

5. 

Perimeter _____

Area _____

6. 

Perimeter _____

Area _____

Factors vs. Multiples

Factor: A factor of a given number is any number that divides evenly into another with no remainder

Ex. 1, 3, 7, and 21 are all factors of 21 because they all divide evenly into 21

Factors are always listed in braces {1, 3, 7, 21} and there are a certain amount

Multiples: A multiple of a given number is the product of that number and any natural number; multiples of the numbers we say when we count by a number

Ex. 3, 6, 9, 12, 15, 18... are all multiples of 3

There are an infinite amount of multiples. They keep going...

Few Factors, Many Multiples

Finding Factors

Find the factors by working from the outside into the center - Think of partnerships or pairs of factors:

Ex: List the factors of 12

1 - Duh fact

{1 12}

2 - try the next number after 1 - Is it a factor? If so, what is its partner?

{1, 2, 6, 12}

3 - keep going until you reach the middle

{1, 2, 3, 4, 6, 12}

List the factors of 72

{ }

List the factors of 18

8A

Name _____ Date _____

List the factor pairs, factors, draw the arrays, and calculate the perimeter and area for the following numbers.

18

24

30

Name: _____ Date: _____

1. List all of the factors of 84.

_____

2. List all of the factors of 50.

_____

3. List all of the factors of 18.

_____

4. List all of the factors of 19.

_____

5. List all of the factors of 100.

_____

6. List all of the factors of 95.

_____

7. List all of the factors of 64.

_____

8. List all of the factors of 25.

9. List all of the factors of 54.

10. List all of the factors of 36.

11. List all of the factors of 75.

12. List all of the factors of 96.

13. List all of the factors of 42.

14. List all of the factors of 13.

Finding Prime Numbers through 100 Using "Sticky Six"

1. Write 2 x 3

2. List multiples of 6

3. Write the numbers that come directly before and directly after each multiple of 6.

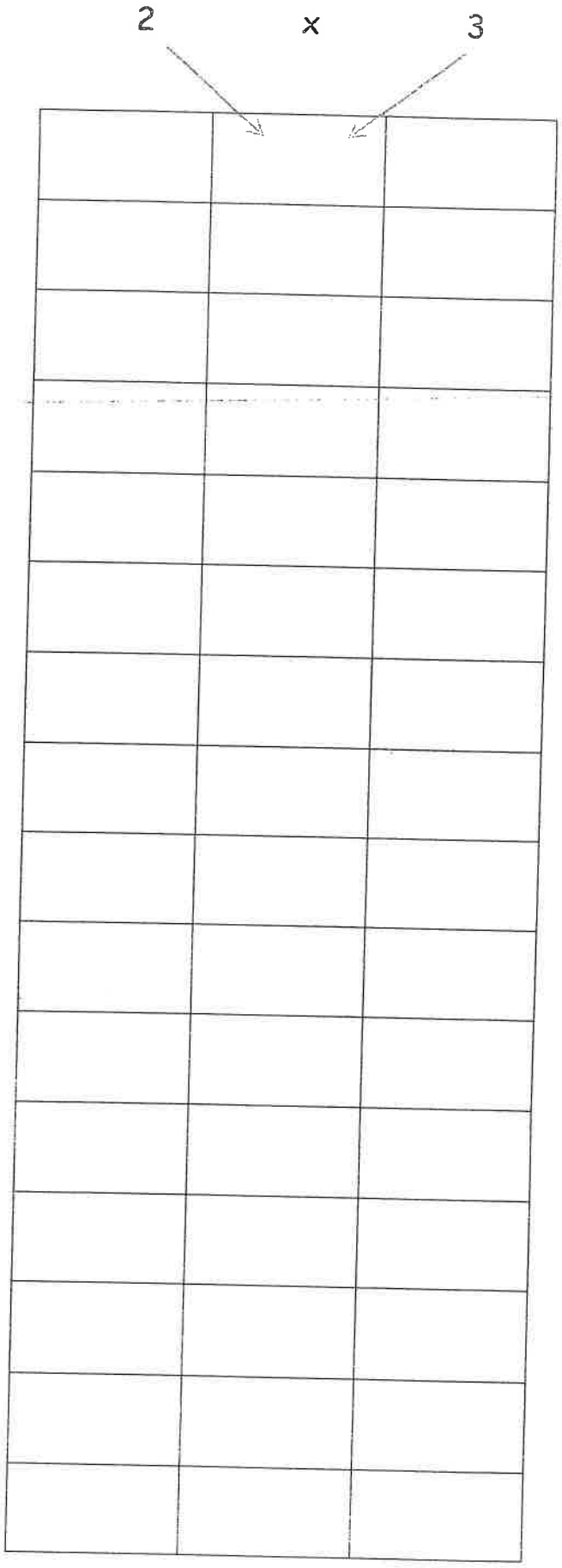
4. Eliminate multiples of 6

   Eliminate multiples of 5 (except for 5)

   Eliminate multiples of 7 (except for 7)

   7 x 7 = 49
   7 x 11 = 77
   7 x 13 = 91
   (lucky 7 and unlucky 13)

5. You are left with 25 Prime numbers.



Name: _____ 12

The Sieve of Eratosthenes

The Sieve of Eratosthenes is a mathematical algorithm for finding prime numbers. It is simply a way of marking composite numbers on a number table.

The first 4 prime numbers (not counting 1) are 2, 3, 5, and 7. All composite numbers are multiples of one or more of these numbers.

Using crayons or colored pencils, mark the numbers on the table according to the key below. Some numbers may be marked with more than one color.

KEY	multiples of 2 - red	multiples of 3 - orange
	multiples of 5 - green	multiples of 7 - purple

The numbers that are not marked are prime numbers. After you've marked all of the composite numbers, circle the prime numbers.

	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

12A

Name : _____ H.W.

Determine if each number is divisible by 2, 5, or 10 by using the divisibility rules. Don't divide!

Put an X in the column if it is divisible by that number.

Number	Divisible by 2	Divisible by 5	Divisible by 10
Ex. 560	X	X	X
450,654			
4,506			
5,680			
10,498,555			
3,098			
2,341,100			

Is 4,561,005 divisible by 5? Explain your answer.

_____

_____

Is 5,678,340 divisible by 10? Explain your answer.

_____

_____

Is 4,658,226 divisible by 2? Explain your answer.

_____

_____

Create a 4 digit number that is divisible by 2: _____

Create a 4 digit number that is divisible by 5: _____

Create a 6 digit number that is divisible by 10: _____ Is this number divisible by 5? Explain.

_____

_____

this number divisible by 2? Explain.

_____

_____

Name_____ Date_____

Write a P if the number is a prime or C if the number is a composite number.

a) 37 _____ b) 42 _____ c) 17 _____

d) 35 _____ e) 11 _____ f) 29 _____

Find which number(s) each of the ex. below is (are) divisible by, then put an "X" in the box. **USE RULES ONLY! DO NOT DIVIDE!**

	2	3	5	6	9	10
396						
29,522						
178						
593						
83,927						
1027						
639						
722						
945						
450						
191						
87,362						
134						
820						

Rules of Divisibility

Category 1 - "Ones Place Rule"

To check if a number is divisible by 2, 5, or 10, look at the last digit only.

First, underline the last digit.

1 3 5, 4 2 9, 6 2 0

2 - If the underlined digit is even (0, 2, 4, 6, or 8), it's divisible by 2

5 - If the underlined digit is 5 or 0, it's divisible by 5.

10 - If the underlined digit is a 0, it's divisible by 10

If the underlined digit is a 0, it is divisible by all three (2, 5, and 10)

Category 2

"Sum of the Digits"

To check if a number is divisible by 3 or 9, you need to add all of the digits together and look at the sum.

Ex. 123 - 1+2+3=6

6 123

Since 6 is a multiple of 3, the whole number 123 is divisible by 3.

6 is <u>not</u> a multiple of 9, so 123 is <u>not</u> divisible by 9.

Category 3

Divisibility by 6

If the number is divisible by **<u>both</u>** 2 and 3, it is divisible by 6.

Ex. 18 19<u>8</u> - divisible by 2 because it's even; divisible by 3 because the sum of the digits is 18, which is a multiple of 3.

Since it is divisible by 2 and 3, it is divisible by 6.

Name:_____ Date:_____

DIVISIBILTY RULES

Find which number(s) each of the examples below is (are) divisible by. DO NOT DIVIDE!! If the example is divisible by the number, put an "X" in the box.

	2	3	5	6	9	10
585						
423						
4296						
2358						
4563						
510						
7308						
56,910						
490						
8605						
8163						
5935						
6282						
819						
7293						

17

Name: _____ Date: _____

DIVISIBILITY RULES/DIVISION SENTENCES

Find which number(s) each of the examples below is (are) divisible by. DO NOT DIVIDE!! If the example is divisible by the number, put an "X" in the box.

	2	3	5	6	9	10
960						
208						
38,000						
60,905						
4,000						
4,905						
604						
286						
44,640						
5,892						
906						
4,050						
150						
440						

[illegible]

[illegible]

[illegible]

Name _____ Date _____

Application of Divisibility rules - Creating numbers

Create a 5 digit number that is divisible by 2, 5, and 10.

_____

Create a 4 digit number that is divisible by 2, 3, and 6.

_____

Create a 5 digit number that is divisible by 3 and 5, but not 2.

_____

Create a 6 digit number that is divisible by 3 and 9, but not 2.

_____

Create a 3 digit number that is divisible by 2, 3, 5, 6, 9, and 10.

_____

Create a 7 digit number that is divisible by 3, 5, 9, but not 10.

_____

Properties of Operations

Commutative Property for Addition
$4 + 5 = 5 + 4$

Changing the order of the addends does not change the sum.

Commutative Property for Multiplication
$4 \cdot 5 = 5 \cdot 4$

Changing the order of the factors does not change the product.

Associative Property for Addition
$23 + (7 + 5) = (23 + 7) + 5$

Changing the grouping of the addends does not change the sum.

Associative Property for Multiplication
$(3 \cdot 4) \cdot 5 = 3 \cdot (4 \cdot 5)$

Changing the grouping of the factors does not change the product.

Property of Zero for Multiplication
$4 \cdot 0 = 0$ or $0 \cdot 4 = 0$

The product of any number and zero (0) is zero (0).

Property of One for Multiplication
$4 \cdot 1 = 4$ or $1 \cdot 4 = 4$

The product of any number and 1 is that number.

Distributive Property of Multiplication over Addition

$4 \cdot (5 + 6) = 4 \cdot 5 + 4 \cdot 6$
$4 \cdot 11 = 20 + 24$
$44 = 44$

$6 \cdot 3 + 6 \cdot 4 = 6 \cdot 3 + 6 \cdot 4$
$18 + 24 = 6 \cdot (3 + 4)$
$42 = 6 \cdot 7$
$42 = 42$

lame _____ Date _____

Write the name of the property that applies to the example on the corresponding line. (commutative, associative, identity, and zero)

1. $5 \cdot 6 = 6 \cdot 5$ _____

2. $(4 \cdot 7) \cdot 9 = 4 \cdot (7 \cdot 9)$ _____

3. $45 \cdot 1 = 45$ _____

4. $0 \cdot 7 = 0$ _____

5. $9 \cdot 8 = 8 \cdot 9$ _____

6. $3 \cdot (6 \cdot 8) = (3 \cdot 6) \cdot 8$ _____

7. $1 \cdot 105 = 105$ _____

8. $605 \cdot 0 = 0$ _____

9. $10 \cdot 4 \cdot 8 = 4 \cdot 8 \cdot 10$ _____

10. $30 \cdot (40 \cdot 10) = (30 \cdot 40) \cdot 10$ _____

Write one example for each of the properties listed (different from above).

zero property _____

commutative property _____

identity property _____

associative property _____

Properties

Identify which addition or multiplication property represents each example.

1. $9 \times 1 = 9$ _____
2. $52 + 74 = 74 + 52$ _____
3. $(6 \times 9) \times 7 = 6 \times (9 \times 7)$ _____
4. $0 + 38 = 38$ _____
5. $14 + (18 + 22) = (14 + 18) + 22$ _____
6. $23 \times 0 = 0$ _____
7. $16 \times 8 = 8 \times 16$ _____
8. $1 \times 31 = 31$ _____

State the value of n that will make the statement true. Then identify which addition or multiplication property represents each example.

9. $35 + n = 35$ _____
10. $n \times 74 = 74 \times 12$ _____
11. $45 + (25 + 19) = (45 + n) + 19$ _____
12. $0 \times 36 = n$ _____
13. $11 \times (3 \times n) = (11 \times 3) \times 29$ _____
14. $13 + 17 = n + 13$ _____
15. $n \times 28 = 28$ _____

Properties of Operations

Each letter (variable) below represents an unknown number.
Find the value of the variable that makes the equation true.
Then identify the property used in the equation.

1. $16 \cdot 17 = 17 \cdot N$ — N = Property:

2. $218 \cdot R = 0$ — R = Property:

3. $(13 \cdot 14) \cdot 15 = 13 \cdot (P \cdot 15)$ — P = Property:

4. $23 \cdot (8 + 9) = 23 \cdot 8 + 23 \cdot Q$ — Q = Property:

5. $1 \cdot 317 = Y$ — Y = Property:

6. $(22 + 28) + 36 = 22 + (W + 36)$ — W = Property:

7. $52 \cdot 4 + 52 \cdot 5 = C \cdot (4 + 5)$ — C = Property:

8. $B + 35 = 35 + 14$ — B = Property:

9. $(3 \cdot 4) \cdot 5 = 3 \cdot (F \cdot 5)$ — F = Property:

10. $N \cdot 39 = 0$ — N = Property:

11. $(82 + 38) + 47 = R + (38 + 47)$ — R = Property:

12. $43 \cdot S = 43$ — S = Property:

Distributive Property

Today we will be discussing the distributive property for multiplication over addition.

Given the following example:

Simplify: $6 \cdot (5 + 8)$

Step 1: Simplify the expression in the parentheses or the grouping symbols.

$6 \cdot 13$

Step 2: Multiply the two factors for a product of **78.**

If you apply the distributive property to simplify the expression then the steps are as follows:

Simplify: $6 \cdot (5 + 8)$

Step 1: "Distribute" the factor in front of the parentheses (grouping symbol) to each addend inside the parentheses.

$6 \cdot (5 + 8)$

$6 \cdot 5 + 6 \cdot 8$

Step 2: Simplify each multiplication expression.

$30 + 48$

Step 3: Calculate the sum.

78

Sometimes applying the distributive property to simplify expressions helps us to be more accurate with our computation skills and enables us to use mental math.

Given the following example:

Simplify: $6 \cdot 13 + 6 \cdot 7$

Usually, you would simplify this expression as follows:

$$78 + 42$$

$$120$$

Sometimes we can apply the distributive property "in reverse" to help us with our computation skills. This means that we have to find the common factor that has been "distributed" to more than one expression.

Given the same example:

Simplify: $6 \cdot 13 + 6 \cdot 7$

Step 1: Find the common factor in each multiplication expression.

$$6 \cdot 13 + 6 \cdot 7$$

Step 2: The number 6 is the common factor.

Steps 3 & 4: Remove the factor of 6 from both expressions and write the remaining addends in a set of parentheses (grouping symbol).

$$\cancel{6} \cdot 13 + \cancel{6} \cdot 7$$

$$6 \cdot (13 + 7)$$

Step 5: Simplify the expression in the parentheses or the grouping symbols.

$$6 \cdot 20$$

Step 6: Calculate the product.

$$120$$

Apply the distributive property to complete the following number sentences:

Examples: $5 \cdot (7 + 6) = 5 \cdot 7 + 5 \cdot 6$

$9 \cdot 11 + 9 \cdot 22 = 9 \cdot (11 + 22)$

$12 \times (4 + 8)$ $(12 \times 4) + (12 \times 8)$

$23 \times (12 + 19)$ $(23 \times 12) + (23 \times 19)$

$34 \cdot (22 + 26)$ _____

$6\ (10 + 7)$ _____

$7\ (9 + 6)$ _____

$21 \cdot (13 + 18)$ _____

$8 \times 13 + 8 \times 14$ _____

$4 \times 3 + 4 \times 6$ _____

$13 \cdot 23 + 13 \cdot 64$ $13 \times (23 + 64)$

$15 \cdot 12 + 15 \cdot 17$ _____

$12 \cdot 31 + 12 \cdot 20$ _____

$7 \cdot 15 + 7 \cdot 26$ _____

$9 \cdot 30 + 9 \cdot 20$ _____

Distributive Property

State whether the sentence is correct application of the distributive property. If it is not correct, rewrite the sentence correctly.

1. $12 \cdot (6 + 11) = 12 \cdot 6 + 12 \cdot 11$

2. $13 \cdot (4 + 5) = 13 + 13 \cdot 5$

3. $8 \cdot (22 + 26) = 8 \cdot 22 + 8 \cdot 26$

4. $14 \cdot (7 + 48 = 14 \cdot 7 + 8$

5. $19 \cdot (6 + 13) = 19 + 6 \cdot 13$

6. $31 \cdot (5 + 12) = 31 \cdot 5 + 31 \cdot 12$

7. $43 \cdot (8 + 11) = 43 + 8 \cdot 11$

8. $16 \cdot 5 + 16 \cdot 8 = 16 \cdot (5 + 8)$

9. $27 \cdot 6 + 27 \cdot 9 = 27 \cdot (6 + 8)$

10. $3 \cdot 27 + 3 \cdot 32 = 3 \cdot (27 + 32)$

11. $18 \cdot 4 + 18 \cdot 8 = 18 \cdot (4 + 8)$

12. $36 \cdot 9 + 36 \cdot 14 = 36 \cdot (9 + 14)$

Simplify the expressions below by applying the distributive property to make the computation easier.

13. $11 \cdot 16 + 11 \cdot 24 =$

14. $21 \cdot 32 + 21 \cdot 18 =$

15. $320 \cdot 2 + 320 \cdot 2 + 320 \cdot 6 =$

Apply the distributive property to complete the following number sentences.

Example: $5 \cdot (7 + 9)$

Answer: $5 \cdot (7 + 9) = 5 \cdot 7 + 5 \cdot 9$

16. $12 \cdot (4 + 8) =$

17. $23 \cdot (12 + 19) =$

18. $34 \cdot (22 + 26) =$

19. $8 \cdot 13 + 8 \cdot 14 =$

20. $15 \cdot 12 + 15 \cdot 17 =$

Prime Factorization

Find the prime factorization of a given number.

Definition: Prime factorization is a way to represent a number as a product of prime factors **ONLY**.

NOTE: Factor trees are not acceptable. The method to be used to find the prime factorization of a number is ***subsequent division.***

Ex. Find the prime factorization of 150.

$$\begin{array}{r|l} 2 & 150 \\ 3 & 75 \\ 5 & 25 \\ 5 & 5 \\ & 1 \end{array}$$

Prime Factorization: $2^1 \cdot 3^1 \cdot 5^2$

OR

$2 \cdot 3 \cdot 5^2$

Procedure:

1. Start with the smallest prime number that divides evenly into the number without a remainder. Continue dividing by that prime number until it is no longer possible.
2. Divide by the next possible prime number in sequential order that divides evenly into the number without a remainder. Continue dividing by that prime number until it is no longer possible.
3. Repeat step #2 until the number left to be divided equals 1.

NOTE: Although it is not necessary to record the value of 1 as an exponent, it is recommended that you do so.

Prime Factorization

Find the prime factorization of each number.

1. 20

2. 70

3. 24

4. 64

5. 41

6. 55

7. 42

8. 112

9. 48

Prime Factorization

Given the prime factorization of a number, state the number being represented.

Ex. #1: State the number being represented by the following prime factorization.

$2^2 \cdot 3^1 \cdot 5^1 =$
$4 \cdot 3 \cdot 5 = 60$

Ex. #2: State the number being represented by the following prime factorization.

$2^3 \cdot 5^1$
$8 \cdot 5 = 40$

State the number being represented by the following prime factorizations.

1. $3^2 \cdot 7^1 =$
2. $2^2 \cdot 5^2 \cdot 7^1 =$
3. $2^1 \cdot 5^3 =$
4. $2^2 \cdot 29^1 =$
5. $2^1 \cdot 3^2 \cdot 5^1 =$
6. $3^2 \cdot 11^1 =$
7. $2^1 \cdot 3^3 =$
8. $2^5 \cdot 3^1 =$
9. $2^2 \cdot 3^1 \cdot 5^2 =$
10. $2^1 \cdot 7^2 =$
11. $2^2 \cdot 3^1 \cdot 5^2 =$
12. $2^3 \cdot 5^1 \cdot 7^1 =$

Prime Factorization: Solve using subsequent division. 3c

10. 50

11. 125

12. 80

13. 37

14. 90

15. 75

16. 105

17. 36

18. 81

19. 104

20. 68

21. 94

Greatest Common Factor (GCF)

The GCF of two numbers is the largest number that divides evenly into both numbers. There are two methods for finding the GCF.

Method 1: List all factors of each number and find the GREATEST factor in both lists.

Example: Find the GCF of 90 and 126

90: {1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90}

126: {1, 2, 3, 6, 7, 9, 14, 18, 21, 42, 63, 126}

Method 2: Use prime factorization (monkey division) to find the GCF.

The GCF is the product of the common factors (along the left side).

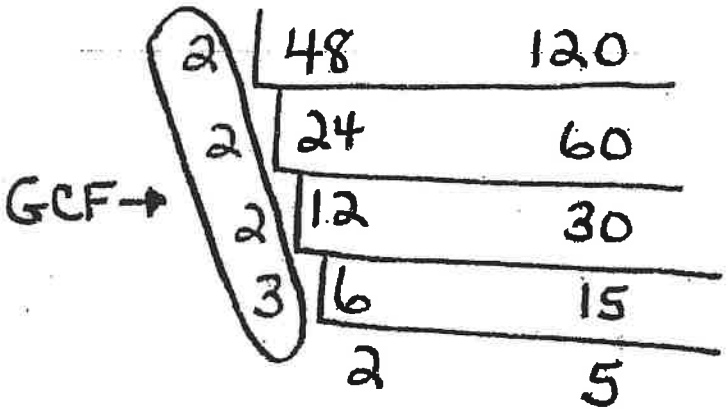
Example: Find the GCF of 90 and 126

Greatest Common Factor

Definition: The greatest common factor (GCF) of two numbers is the largest number that divides evenly into both numbers with no remainder.

Find the greatest common factor (GCF) of two numbers using subsequent division.

Ex. #2: Find the GCF of 48 and 120.



The GCF is 2 • 2 • 2 • 3 = 24.
This means that 24 is the largest number that divides into 48 *and* 120 with no remainder.

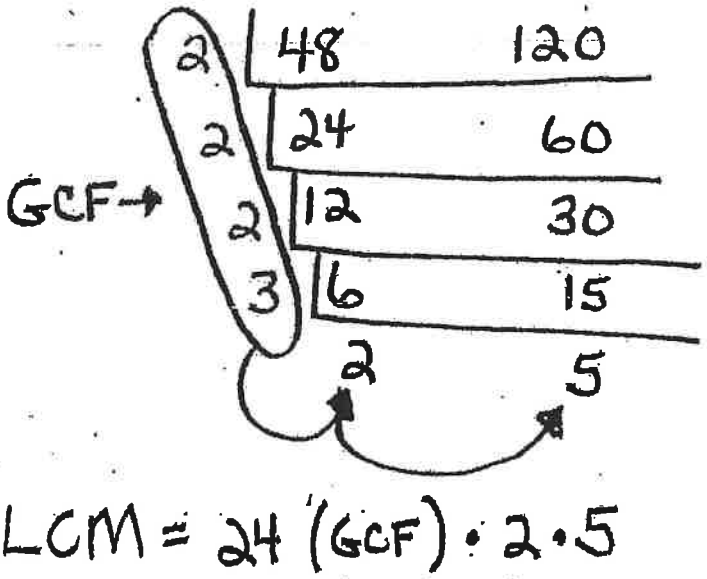
Procedure:

1. Use subsequent division on both numbers ***at the same time.***
2. Repeat the subsequent division process until the remaining numbers have no common factor other than the #1.
3. The product of the common factors is the GCF of the two original numbers.

Least Common Multiple

Definition: The least common multiple (LCM) of two numbers is the smallest number that the two given numbers divide into evenly with no remainder.

Ex. #2: Find the LCM of 48 and 120.



The LCM is 2 • 2 • 2 • 3 • 2 • 5 = 240.
This means that 240 is the smallest number that 48 *and* 120 divide into evenly with no remainder. The LCM is equal to the product of the GCF and the remaining factors.

Procedure:

1. Determine the GCF of the two numbers using subsequent division.
2. Multiply the GCF by the remaining factors of the original two numbers.

Least Common Multiple

1. Find the LCM of each of the pairs of numbers on pages 7-10.

Greatest Common Factor

Find the greatest common factor (GCF) of each pair of numbers.

1. 27 and 63

GCF = _____

LCM = _____

2. 16 and 36

GCF = _____

LCM = _____

3. 24 and 64

GCF = _____

LCM = _____

4. 36 and 90

GCF = _____

LCM = _____

5. 60 and 84

GCF = _____

LCM = _____

6. 17 and 19

GCF = _____

LCM = _____

7. 72 and 180

GCF = _____

LCM = _____

8. 64 and 96

GCF = _____

LCM = _____

Greatest Common Factor (GCF) and Least Common Multiple (LCM)

Find the greatest common factor (GCF) and least common multiple (LCM) of each pair of numbers.

1. 48 and 80

GCF = _____

LCM = _____

2. 19 and 23

GCF = _____

LCM = _____

3. 54 and 90

GCF = _____

LCM = _____

4. 17 and 51

GCF = _____

LCM = _____

5. 23 and 29

GCF = _____

LCM = _____

6. 72 and 96

GCF = _____

LCM = _____

7. 68 and 85

GCF = _____

LCM = _____

8. 19 and 38

GCF = _____

LCM = _____

1. Bob likes to stay active by playing a variety of sports. Every 12th day he plays hockey. Every 20th day he plays baseball. If a season is 90 days long, how many times during the season did Bob play both baseball and hockey on the same day?

2. Paul works out at the YMCA regularly. Every 14th day he runs on the treadmill. Every 10th day he swims. How many times during a year (365 days) does he swim and run on the treadmill on the same day?

3. Grandma Smith takes different medicine on specific days. Every 3rd day she takes a green pill, and every 4th day she takes a red pill. How many times during the last 200 days did she take a green and red pill on the same day?

4. The citizens in Greenwood are very committed to recycling. Every 8th day, the town collects glass bottles. Every 18th day, the town collects newspaper. How many times during a 90-day period does the town collect glass bottles and newspaper on the same day?

5. The citizens in Blackwood are very committed to recycling. Every 11th day, the town collects glass bottles. Every 20th day, the town collects newspaper. How many times during a year (365 days) does the town collect glass bottles and newspaper on the same day?

CHALLENGE:

A. John likes to stay active by playing A LOT of sports. Every 3rd day he plays golf. Every 6th day he plays badminton. Every 9th day he plays squash. In a given year (365 days), how many times did Joe play all three sports on the same day?

B. Joe also likes to stay active by playing A LOT of sports. Every 3rd day he plays tennis. Every 6th day he plays football. Every 7th day he plays lacrosse. In a given year (365 days), how many times did Joe play all three sports on the same day?

5. Susan likes to stay active by participating in a variety of sports. Every second day, she rides her bike. Every fourth day, she swims and every ninth day, she goes for a hike at the reservation.

   How many times during the first 300 days of 2013 did Susan ride her bike, swim and hike all on the same day? Explain your answer.

6. Bob likes to stay active by participating in a variety of sports. Every third day, he rides his bike. Every fifth day, he plays hockey and every fifteenth day, he plays tennis.

   How many times during 2013 did Bob ride his bike, play hockey and play tennis all on the same day? Explain your answer.

Multiply Numbers by Multiples of 10, 100, 1000, etc.

1. Box out the digits (natural/counting numbers). Multiply them together.
2. Count the zeroes in both FACTORS using a ✓. Place that many zeroes in the PRODUCT.
   - ➢ The TOTAL number of zeroes in both factors should equal the number of zeroes in the product.

Be careful when dealing with products that are multiples of 10- make sure you are not short a zero!*

3,000 x 70 = *210,000*

600 x 8,000

_____ x *500* = *30,000*

4,000 x 80 =

90 x *600,000* =

800 x _____ = 80,000

_____ x 60 = 30,000

400 x _____ = 2,000

Name: _____ Date: _____ 44

Math Worksheet

1 a. _____ × 602 = 60,200

1 b. _____ × 100 = 51,700

2 a. 46 × _____ = 46,000

2 b. _____ × 79 = 79,000

3 a. 28 × _____ = 280

3 b. 10 × _____ = 220

4 a. 138 × _____ = 13,800

4 b. 568 × _____ = 5,680

5 a. 158 × _____ = 158,000

5 b. 1000 × _____ = 180,000

6 a. 100 × _____ = 26,300

6 b. 335 × _____ = 33,500

7 a. _____ × 343 = 343,000

7 b. 649 × _____ = 649,000

8 a. _____ × 513 = 5,130

8 b. _____ × 95 = 95,000

9 a. _____ × 10 = 3,040

9 b. 69 × _____ = 690

10 a. 100 × _____ = 17,600

10 b. _____ × 1,000 = 451,00

Name: _____ Date: _____ 45

Math Worksheet

1 a.	_____ × 10 = 30,000	**1 b.**	_____ × 100 = 40,000
2 a.	_____ × 3,000 = 24,000,000	**2 b.**	_____ × 600 = 12,000
3 a.	_____ × 300 = 150,000	**3 b.**	_____ × 90 = 9,000
4 a.	700 × _____ = 63,000	**4 b.**	5,000 × _____ = 150,000
5 a.	1,000 × _____ = 4,000,000	**5 b.**	50 × _____ = 1,000
6 a.	500 × _____ = 35,000	**6 b.**	40 × _____ = 240,000
7 a.	_____ × 70 = 560,000	**7 b.**	90 × _____ = 360,000
8 a.	1,000 × _____ = 400,000	**8 b.**	60 × _____ = 120,000
9 a.	80 × _____ = 8,000	**9 b.**	_____ × 40 = 320,000
10 a.	_____ × 100 = 500,000	**10 b.**	_____ × 90 = 7,200

Multiplying Multiples of 10 Using Exponents

I Can rename multiples of ten using exponents.

You could rewrite 15,000 as 15×10^3.

$15 \times 10^3 = 15 \times 1000 = 15{,}000$

How can I rewrite the following problems using base 10 with an exponent?

1,700 _____

170 _____

21,000 _____

800,000 _____

14 _____

110,000 _____

50,000 _____

12,000 _____

3,200,000 _____

190 _____

Estimating Products

Rule for estimating a product:

Example: Estimate the product of 2,475 x 387

2,475 rounds to _____

387 rounds to _____

Rewrite new multiplication problem:

Estimate: _____

Estimate the following products:

1) 574 x 19,375

2) 2,987 x 1,499

3) 342 x 997

4) 875 x 62

5) 275 x 87 x 133

6) 96 x 712 x 35

7) 525 x 9,476

8) 74 x 45 x 23

Name: _____

Estimate the following products:

1) 32 x 6,219

2) 5,621 x 7

3) 187 x 9,740

4) 4 x 7,914

5) 379 x 62 x 12

6) 74 x 338 x 24

7) 659 x 29,740

8) 3,975 x 86

9) 912 x 649

10) 4,759 x 4,399

Three Ways to Multiply

The Traditional Method

$$\begin{array}{r} 249 \\ \times\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 44 \\ \times\ 12 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 2}\ {\scriptstyle 3} \\ 543 \\ \times\ 86 \\ \hline 3258 \\ +\ 43440 \\ \hline 46{,}698 \end{array}$$

Partial Products

$$\begin{array}{r} 249 \\ \times\ 8 \\ \hline \end{array}$$

(8x9)
(8x40)
(8x200)

$$\begin{array}{r} 44 \\ \times\ 12 \\ \hline \end{array}$$

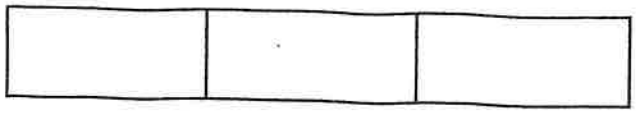
8 (2x4)
80 (2x40)
40 (10x4)
+400 (10x40)
528

$$\begin{array}{r} 543 \\ \times\ 86 \\ \hline \end{array}$$

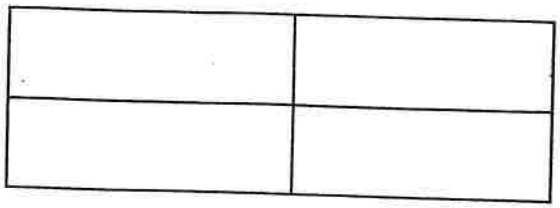
18 (6x3)
240 (6x40)
3000 (6x500)
240 (80x3)
3200 (80x40)
+ 40,000 (80x500)
46,698

Area Model

249
x 8



44
x 12



543
x 86

500 + 40 + 3

80 +			
	40,000	3,200	240
	3,000	240	18

43,000 + 3,440 + 258

3,440
+ 258

46,698

Name: _____ 50

Multiplication

① 926 × 8

② 676 × 4

③ 174 × 6

④ 594 × 5

⑤ 866 × 7

⑥ 821 × 9

⑦ 210 × 5

⑧ 674 × 9

⑨ 291 × 8

⑩ 361 × 3

⑪ 747 × 4

⑫ 545 × 6

Name: _____ 51

Multiplication

① 2,483 × 9

② 5,294 × 5

③ 6,991 × 4

④ 2,797 × 5

⑤ 1,288 × 3

⑥ 5,878 × 3

⑦ 7,324 × 7

⑧ 6,190 × 4

⑨ 3,868 × 4

⑩ 6,562 × 6

⑪ 2,808 × 3

⑫ 7,897 × 7

Name: _____

Multiplication

①	②	③	④
24 x 46	94 x 40	44 x 54	61 x 58
⑤	⑥	⑦	⑧
58 x 39	75 x 21	30 x 57	18 x 61
⑨	⑩	⑪	⑫
42 x 21	72 x 24	34 x 36	46 x 68
⑬	⑭	⑮	⑯
84 x 62	69 x 20	65 x 77	29 x 56

Name: _____

Multiplication

305 x 65	832 x 501	8,937 x 478
352 x 553	522 x 30	710 x 184
610 x 732	256 x 186	926 x 529
585 x 89	747 x 83	2,817 x 494

54

Name:_____ Date:_____

2 x 3 digit

Compute using the Traditional Method. Show your work.

TRADITIONAL METHOD

Example:

$$\begin{array}{r} {\scriptstyle 7\ \ \cancel{1}} \\ 491 \\ \times\ 82 \\ \hline 982 \\ +3928 \\ \hline 40262 \end{array}$$

$$\begin{array}{r} 704 \\ \times\ 37 \\ \hline \end{array}$$

$$\begin{array}{r} 821 \\ \times\ 84 \\ \hline \end{array}$$

$$\begin{array}{r} 305 \\ \times\ 28 \\ \hline \end{array}$$

$$\begin{array}{r} 694 \\ \times\ 52 \\ \hline \end{array}$$

$$\begin{array}{r} 682 \\ \times\ 47 \\ \hline \end{array}$$

$$\begin{array}{r} 619 \\ \times\ 32 \\ \hline \end{array}$$

Name:_____ Date:_____

TRADITIONAL METHOD

Estimate, then compute using the TRADITIONAL METHOD.

1. 56 x 42=

2. 372 x 39=

3. 81 x 27 =

4. 75 x 82 =

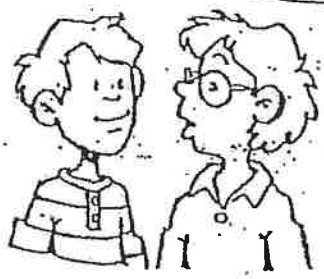
5. 638 x 49 =

6. 392 x 57 =

Name _____ Multiplying Whole Numbers

Who Am I?

Find each product. Use your answers to solve the riddle below.
(Hint: Not all numbers will be used.)



You are my brother, but I am not your brother.
Who am I?

A. 45 x 15	B. 786 x 13	E. 654 x 23	I. 375 x 12	I. 269 x 43	M. 412 x 49	N. 998 x 15	O. 379 x 28
R. 84 x 31	R. 718 x 36	S. 49 x 22	S. 147 x 78	T. 209 x 53	T. 610 x 38	U. 407 x 19	Y. 802 x 59

11,567		675	20,188		47,318	10,612	7,733	2,604			
11,466	4,500	1,078	23,180	15,042	25,848						

56A

Name:_____

3 digit x 3 digit Multiplication Practice

312 x 115	693 x 302	537 x 831
701 x 126	442 x 317	280 x 205
814 x 479	215 x 875	648 x 239

Name:_____

3 digit x 3 digit Multiplication Practice

482 x 391	714 x 801	397 x 238
276 x 702	538 x 215	210 x 406
572 x 268	118 x 303	831 x 518

Four Step Problem Solving Method

Mark lives on a farm where he grows fruits and vegetables. He planted 25 rows of corn with 30 plants in each row. How many corn plants did Mark plant?

1 – FIND OUT- what does the problem mean? What question must you answer?

X = _____

2 – CHOOSE A STRATEGY – write an equation.

3 – SOLVE IT – work it out; find the answer; record your work.

4 – LOOK BACK – check the problem; check your work; ***rewrite the equation with the answer.***

Name _____ Date _____

Word Problems - Solve the following word problems using the 4 step problem solving method. Show all work.

1. Jackie collects stamps. She has an album to keep her stamps safe and organized. Each page of the album holds 24 stamps. There are 58 pages in the album. How many stamps can the album hold?

2. My neighbor and I go strawberry picking every fall. This fall we filled 23 cartons with 18 strawberries in each carton. How many strawberries did we pick?

Name _____ Date _____

Word Problems - please use the 4 step problem solving method for the following problems.

1. Jack and John were collecting marbles. Jack bought 5 bags of marbles which held 23 marbles in each bag. John bought 8 bags of marbles which held 23 marbles in each bag. How many marbles did they have altogether?

2. At Lindsay's graduation party I set 12 tables with 15 guests at each table. How many guests attended the party?

3. Sally swims 25 laps per day, six days per week. How many laps does Sally swim in 4 weeks?

Multiplication Word Problems

Directions: *Solve using the 4-step problem solving plan*

1. Mary does 120 sit-ups per day. She does these 5 days per week. How many sit-ups will Mary do over the next 8 weeks?

2. Mrs. Gemellaro was doing an experiment with his 5th grade class. He needed to get 17 large marbles and 27 small marbles for each group. If there are 6 groups in his class, how many marbles does he need to have altogether?

3. John runs 18 miles a day, 4 days per week. How many miles does John run in 6 weeks?

4. The length of the gymnasium is 27 feet, and the width is 15 feet. What is the area of the gymnasium?

5. During Mark's basketball career he average 18 points per game. He has played in 34 games during his career. How many points did Mark score during his soccer career?

6. Mrs. Fischer's car gets 27 miles per gallon of gasoline. Her gas tank holds 23 gallons of gasoline. How many miles can she ride on each tank of gasoline?

VOLUME

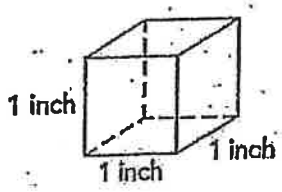
Volume: Volume is the measurement of space inside a 3-dimensional figure.

Volume is measured in cubic units, which means it tells you how many cubes of a given size it takes to fill the 3-dimensional figure.

The units used to measure volume are based on the units used to measure length.

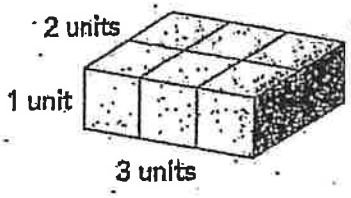
For example, volume can be measured in cubic inches. A cubic inch is the size of a cube that is exactly 1 inch on each edge.

Example #1:
Write: 1 $in.^3$
Say: one cubic inch



For example, volume can be measured in cubic centimeters. A cubic centimeter is the size of a cube that is exactly 1 centimeter on each edge.

Example #2:
Write: 6 $cm.^3$
Say: six cubic centimeters

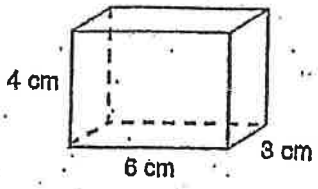


Here are some units for measuring volume:

Customary Units of Volume
Cubic inch ($in.^3$)
Cubic foot ($ft.^3$)

Metric Units of Volume
cubic centimeter (cm^3)
cubic meter (m^3)

Example: How many centimeter cubes will this box hold?



Method #2: Find the volume by multiplying. Volume = length x width x height

Step 1: Find the *length* of the rectangular prism. The length is the longest side of the flat surface of the rectangle on the top or bottom of the rectangular prism. (Length = 6 centimeters)

Step 2: Find the *width* of the rectangular prism. The width is the shorter side of the flat surface of the rectangle on the top or bottom of the rectangular prism. (Width = 3 centimeters)

Step 3: Find the *height* of the rectangular prism. The height is the part of the rectangular prism that rises up. Imagine that the height is what stretches up a flat rectangle until it becomes a three-dimensional shape. (Height = 4 centimeters)

Step 4: Multiply the length (*L*), the width (*W*) and the height (*H*).
Volume = Length x Width X Height or $V = L \times W \times H$.
$6 \times 3 \times 4 = 72$.

Step 5: State your answer in cubic units. Volume = 72 cubic centimeters ($cm.^3$)

Name _____

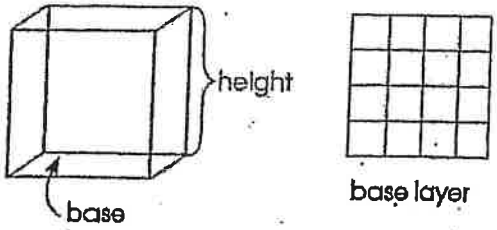
65

Find the volume of each rectangular prism.

1. Area of the base: _____ sq cm

   Height: 4 cm

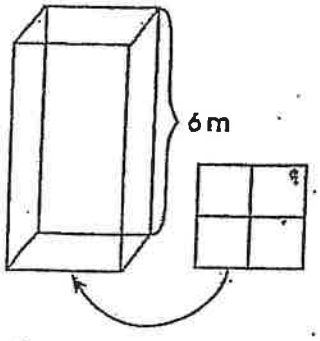
   Volume: _____ x _____ = _____



2. Area of the base: _____ sq m

   Height: _____

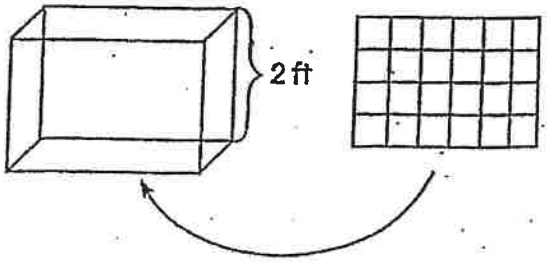
   Volume: _____ x _____ = _____



3. Area of the base: _____ sq ft

   Height: _____

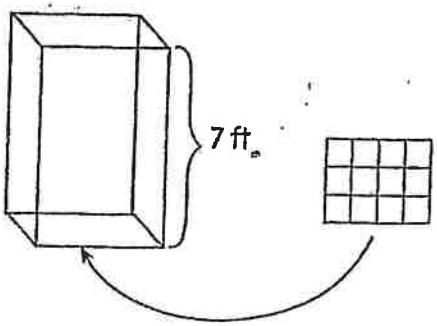
   Volume: _____ x _____ = _____



4. Area of the base: _____ sq ft

   Height: _____

   Volume: _____ x _____ = _____



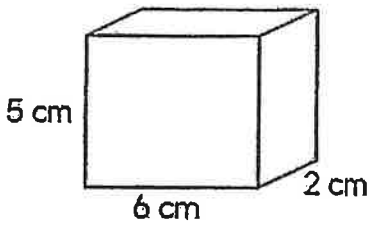
☆ **Tell how you can use area to find volume.**

66

Name_____

5.MD.5, 5.MD.5a, 5.MD.5b

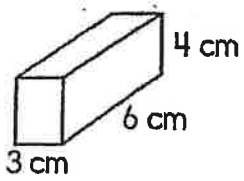
Volume tells the number of cubic units within a solid figure. To find the volume of a rectangular prism, multiply the length by the width by the height ($V = l \times w \times h$).



Volume (V) = $l \times w \times h$
V = 6 cm × 2 cm × 5 cm
V = 60 cm^3

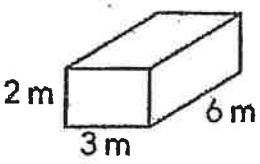
Find the volume of each figure. Label your answer.

1.



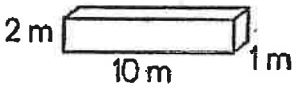
V =_____

2.



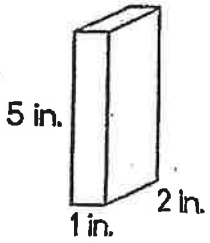
V =_____

3.



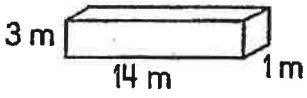
V =_____

4.



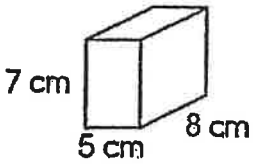
V =_____

5.



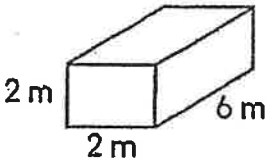
V =_____

6.



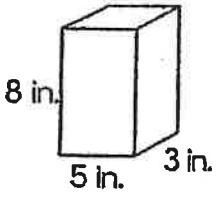
V =_____

7.



V =_____

8.



V =_____

Use the given dimensions to find the volume of each rectangular prism. Label your answer.

9. l = 2 cm
w = 4 cm
h = 3 cm

V =_____

10. l = 5 m
w = 3 m
h = 4 m

V =_____

11. l = 10 in.
w = 3 in.
h = 5 in.

V =_____

12. l = 3.5 ft.
w = 1 ft.
h = 2 ft.

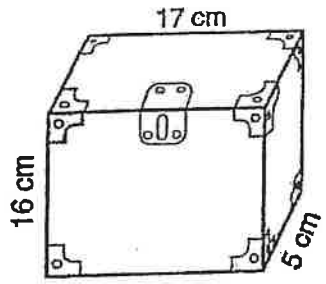
V =_____

☐ I can find the volume of a right rectangular prism by using models and formulas.

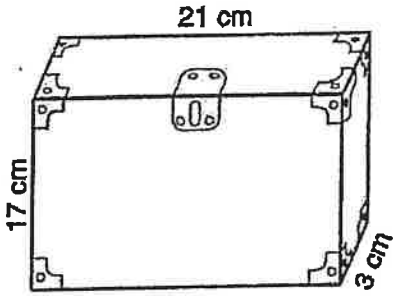
Name _____ Date _____

Loading the Loot

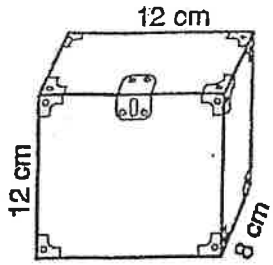
The Polygon Pirate is looking for the treasure chest that can hold the most loot.
Find the volume of each treasure chest below. Color the one with the largest volume.



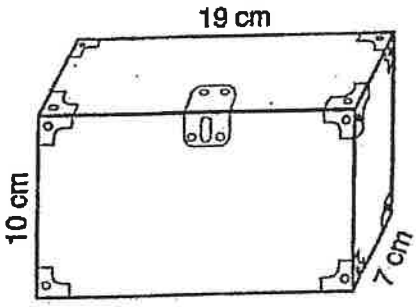
1. _____ cm^3



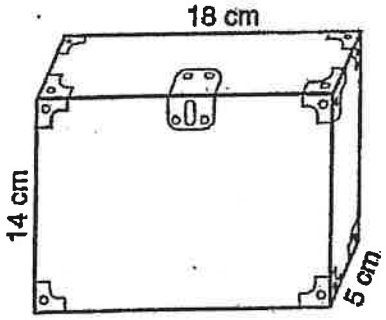
2. _____ cm^3



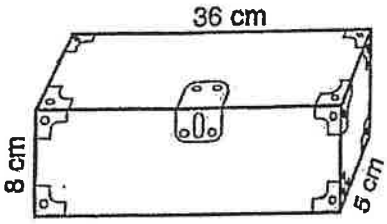
3. _____ cm^3



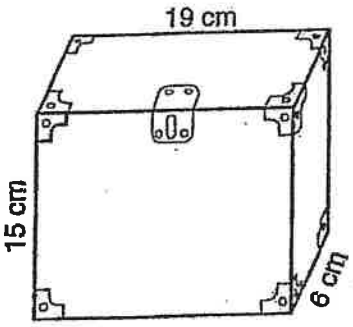
4. _____ cm^3



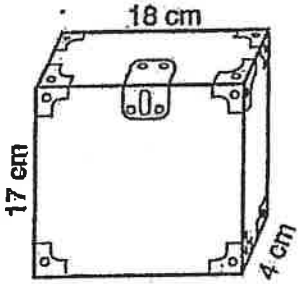
5. _____ cm^3



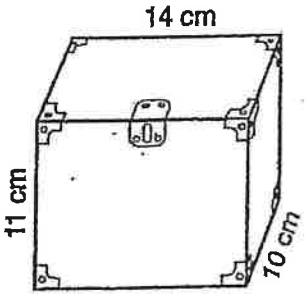
6. _____ cm^3



7. _____ cm^3

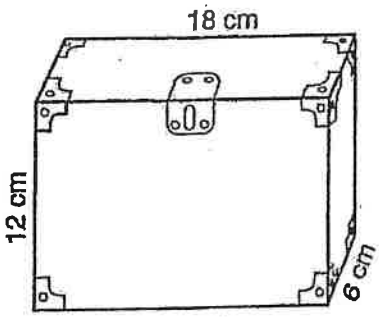


8. _____ cm^3



9. _____ cm^3

Volume is the number of cubic units needed to fill a container. To find the volume of a rectangular prism, multiply the length, the width, and the height *(l x w x h)*.



10. _____ cm^3

92

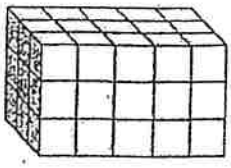
68

Finding Volume with Unit Cubes

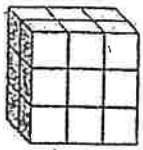
Name:

Find the length, width and height of the rectangular prism. Then find the volume.

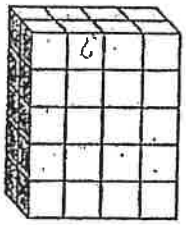
Ex)



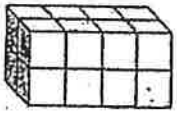
1)



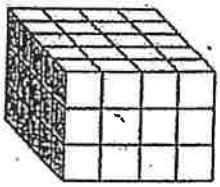
2)



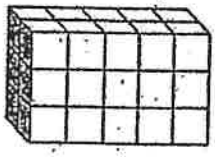
3)



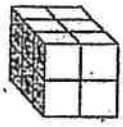
4)



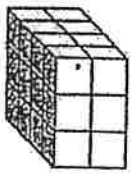
5)



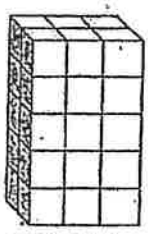
6)



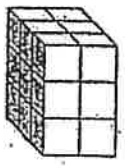
7)



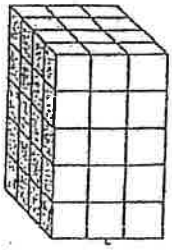
8)



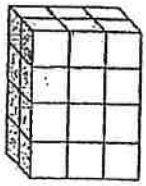
9)



10)



11)



Answers

	L	W	H	V
Ex.	5	3	3	45
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				

1-10	91	82	73	64	55	45	36	27	18	9
11	0									

Name_____

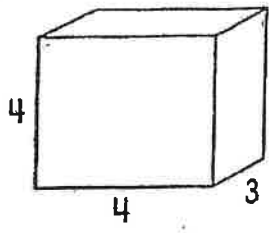
5.MD.5, 5.MD.5b

You can use $l \times w$ to find the area of a rectangle. This is also called the **base**.

$3 \times 4 = 12$ square units

Then, multiply the *base* times the *height*, or $B \times h$, to find the volume.

$12 \times 4 = 48$ cubic units



For each problem, sketch a picture of the figure. Then, find the volume.

1. base area = 6 square inches
   height = 3 inches

   V = _____

2. base area = 9 square centimeters
   height = 10 centimeters

   V = _____

3. base area = 42 square feet
   height = 7 feet

   V = _____

4. base area = 20 square inches
   height = 6 inches

   V = _____

5. base area = 55 square centimeters
   height = 6 centimeters

   V = _____

6. base area = 112 square yards
   height = 8 yards

   V = _____

- ☐ I understand that the volume of a right prism can be found by multiplying the area of the base by the height.
- ☐ I can use formulas to find the volume of rectangular prisms.

Name _____

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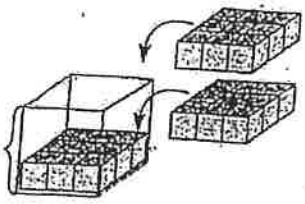
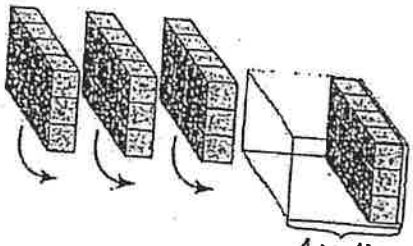
Find the volume.

1



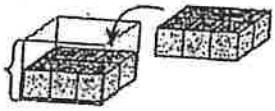
Number of cubic units in one layer: ____
Number of layers: ____
Volume: ____ + ____ + ____ = ____

2



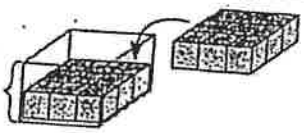
Number of cubic units in one layer: ____
Number of layers: ____
Volume: ____ + ____ + ____ + ____ = ____

3



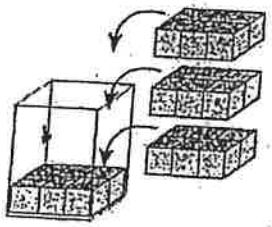
Number of cubic units in one layer: ____
Number of layers: ____
Volume: ____ x ____ = ____

4



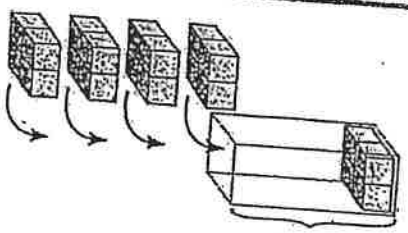
Number of cubic units in one layer: ____
Number of layers: ____
Volume: ____ x ____ = ____

5



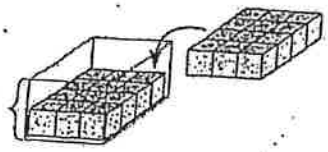
Number of cubic units in one layer: ____
Number of layers: ____
Volume: _____

6



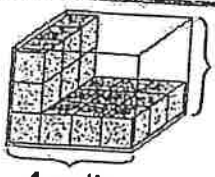
Number of cubic units in one layer: ____
Number of layers: ____
Volume: _____

7



Number of cubic units in one layer: ____
Number of layers: ____
Volume: _____

8



Number of cubic units in one layer: ____
Number of layers: ____
Volume: _____

Tell how you solved the problem.

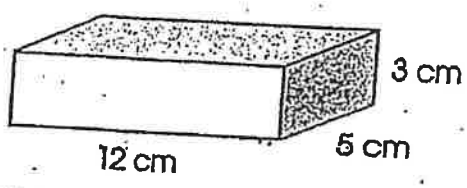
formula to find volume. Show your work.

Formulas for Volume of a Rectangular Prism

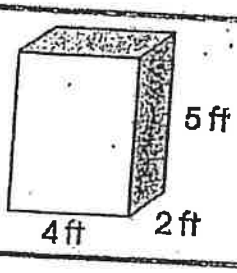
Volume = base (area of) x height	$V = B \times h$
Volume = length x width x height	$V = l \times w \times h$

Remember: You can multiply in any order.

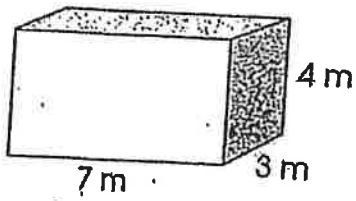
1. length _____ width _____ height _____
   area of base _____
   Volume _____



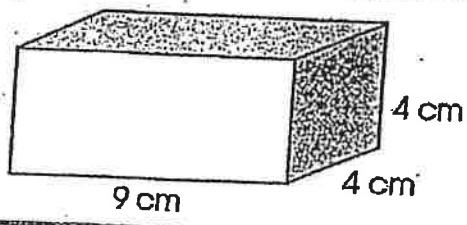
2. length _____ width _____ height _____
   area of base _____
   Volume _____



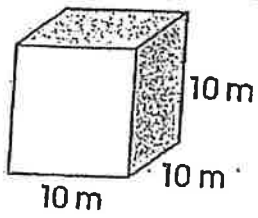
3. length _____ width _____ height _____
   area of base _____
   Volume _____



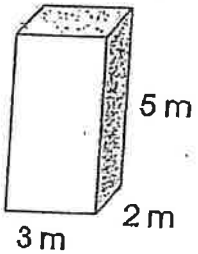
4. length _____ width _____ height _____
   area of base _____
   Volume _____



5. length _____ width _____ height _____
   area of base _____
   Volume _____

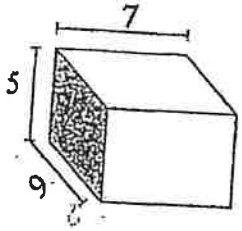


6. length _____ width _____ height _____
   area of base _____
   Volume _____

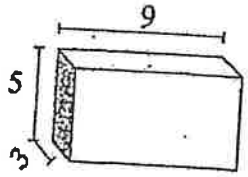


Tell how you found the volume.

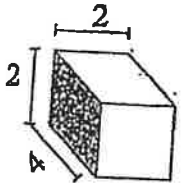
Identify the length, width and height of each rectangular prism. Then calculate the volume of the figure.

1) 

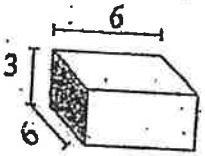
L=
W=
H=
V=

2) 

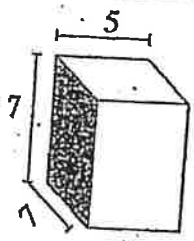
L=
W=
H=
V=

3) 

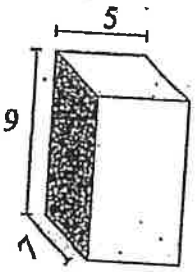
L=
W=
H=
V=

4) 

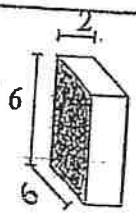
L=
W=
H=
V=

5) 

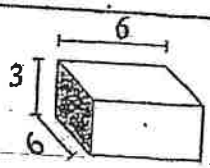
L=
W=
H=
V=

6) 

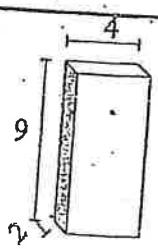
L=
W=
H=
V=

7) 

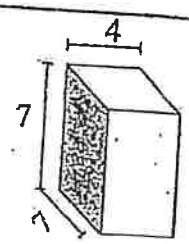
L=
W=
H=
V=

8) 

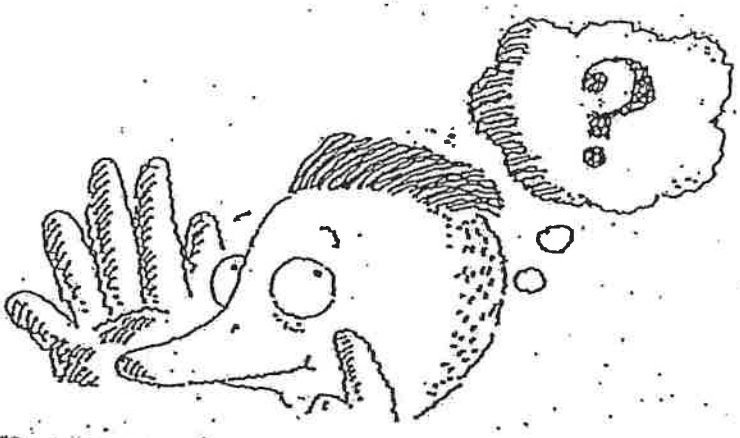
L=
W=
H=
V=

9) 

L=
W=
H=
V=

10) 

L=
W=
H=
V=

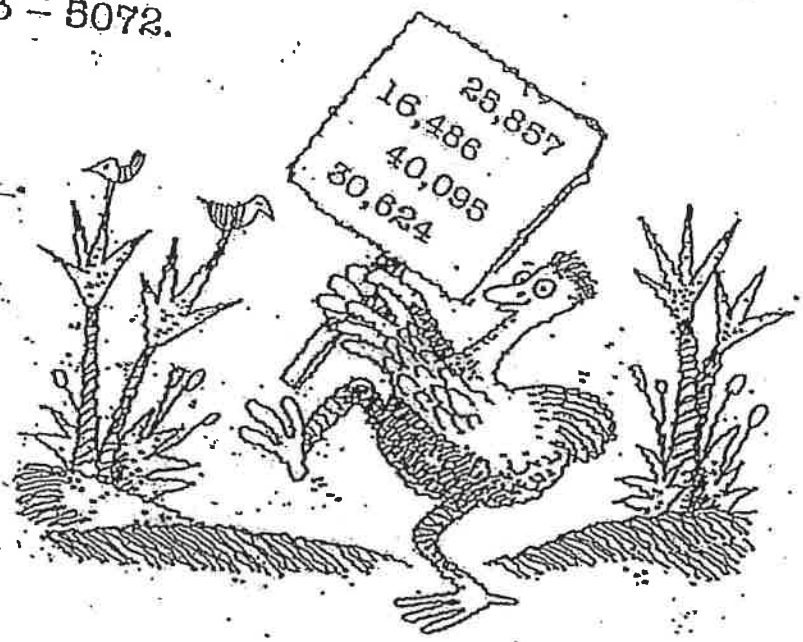


I'm thinking of a number less than 500.
It is divisible by 2, 3, and 5.
Its digits add to 12.
What is the number?
Is another answer possible?

The mystery number is on the sign.
The number is

- greater than 10,495 + 6253.
- less than 41,833 − 5072.
- divisible by 9.

The mystery number is _____.

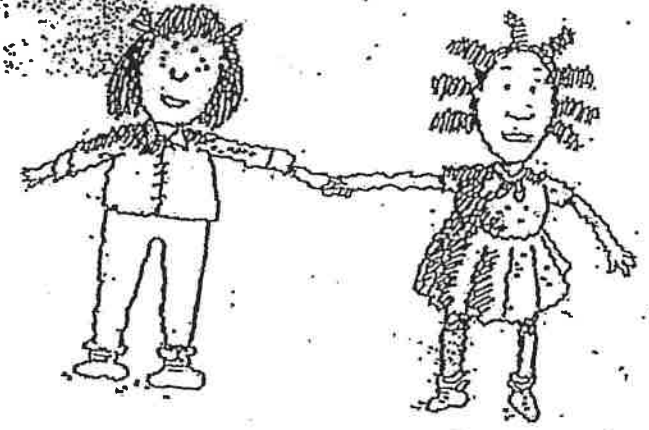


95

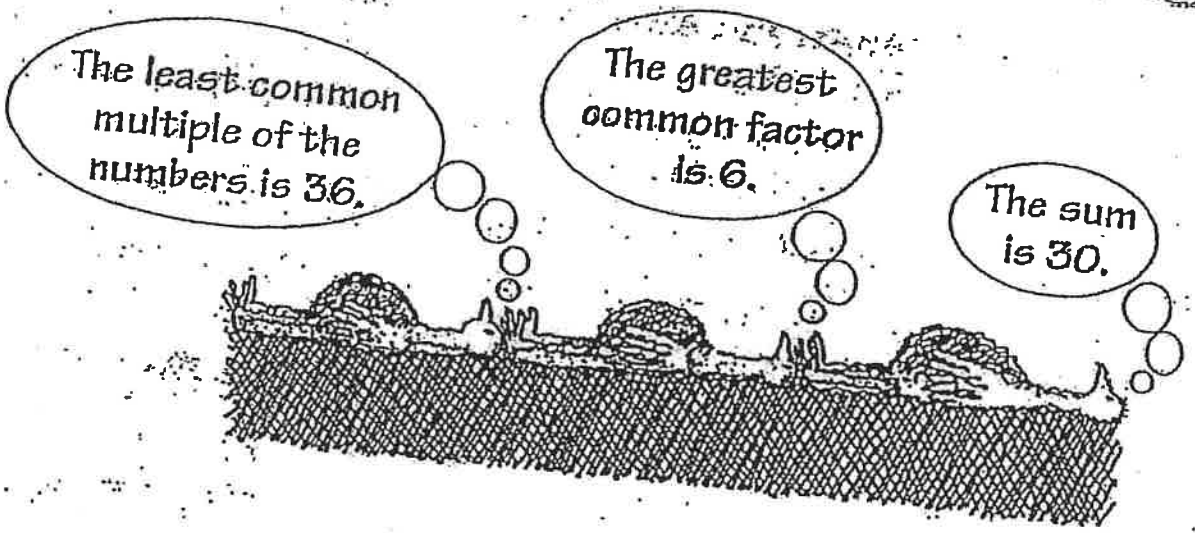
Angel and Angelique have birthdays on the same day.

- The sum of their ages is the greatest square number less than 40.
- Both of their ages are prime numbers.
- Angelique is 2 years older than Angel.

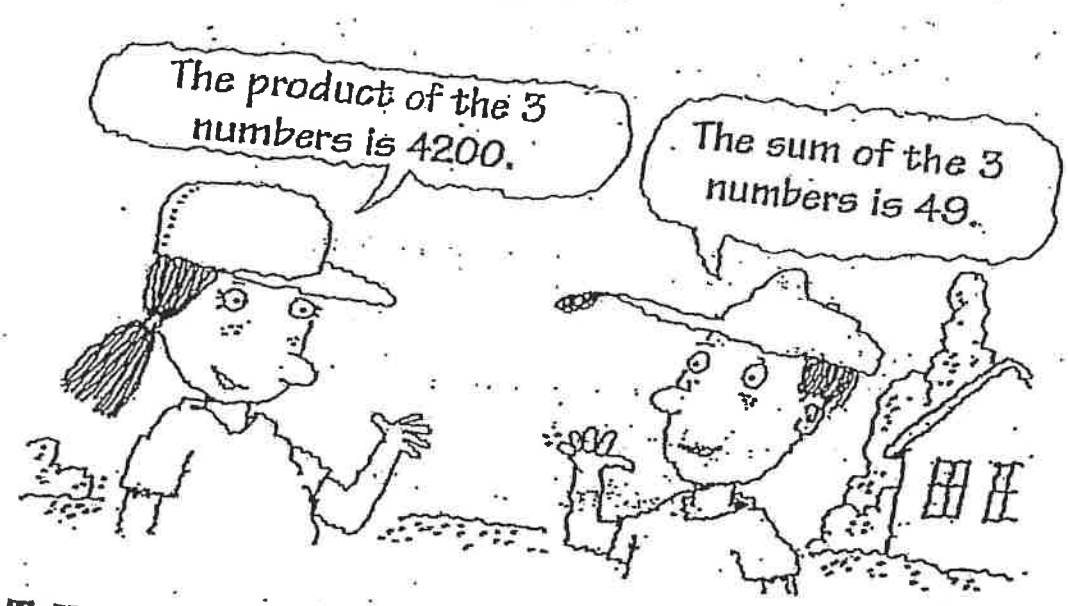
How old are Angel and Angelique?



The birds are thinking of a pair of numbers.
What are the 2 numbers?



What are the 3 numbers?



Tell the steps you used to find the numbers.