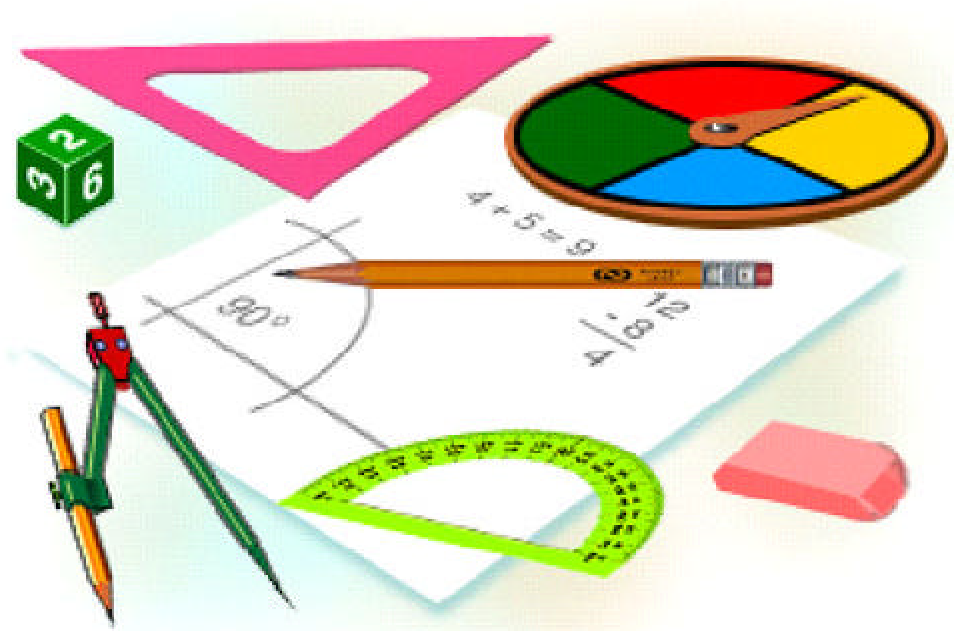
The Next Step

Mathematics Applications for Adults



<u>Book 14013 – Whole Numbers</u>

INTRODUCTION

Why Math?

The most important reason for learning math is that it teaches us how to think. Math is more than adding and subtracting, which can easily be done on a calculator; it teaches us how to organize thoughts, analyze information, and better understand the world around us.

Employers often have to re-educate their employees to meet the demands of our more complex technological society. For example, more and more, we must be able to enter data into computers, read computer displays, and interpret results. These demands require math skills beyond simple arithmetic.

Everyone Is Capable of Learning Math

There is no **type** of person for whom math comes easily. Even mathematicians and scientists spend a lot of time working on a single problem. Success in math is related to practice, patience, confidence in ability, and hard work.

It is true that some people can solve problems or compute more quickly, but speed is not always a measure of understanding. Being “faster” is related to **more practice or experience.**

For example, the reason why math teachers can work problems quickly is because they've done them so many times before, not because they have "mathematical minds".

Working with something that is familiar is natural and easy. For example, when cooking from a recipe we have used many times before or playing a familiar game, we feel confident. We automatically know what we need to do and what to expect. Sometimes, we don't even need to think. However, when using a recipe for the **first** time or playing a game for the **first** time, we must concentrate on each step. We double-check that we have done everything right, and even then we fret about the outcome. The same is true with math. When encountering problems for the very first time, **everyone must have patience** to understand the problem and work through it correctly.

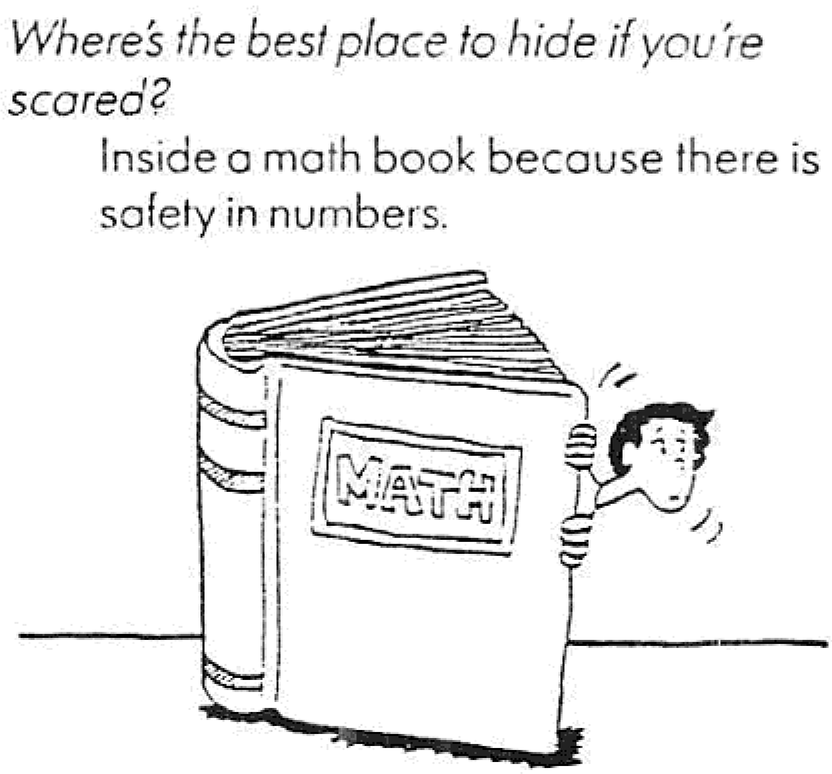
It's Never Too Late to Learn

One of the main reasons people don't succeed in math is that they don't start at the right place. **IMPORTANT! You must begin where *you* need to begin.** Could you hit a homerun if you hadn't figured out which end of the bat had to make contact with the ball? Why should learning math be any different?

If it has been a while since your last math class, **you must determine what level math you should take.** A teacher or trained tutor can help determine this with a few placement tests and questions.

Sometimes a few tutoring sessions can help you fill gaps in your knowledge or help you remember some of the things you have simply forgotten. It could also be the case where your foundations may be weak and it would be better for you to relearn the basics. **Get some help** to determine what is best for you.

Feeling good about ourselves is what all of us are ultimately striving for, and nothing feels better than conquering something that gives us difficulty. This takes a great deal of courage and the ability to rebound from many setbacks. This is a natural part of the learning process, and when the work is done and we can look back at our success, nothing feels better.



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OUTLINE

Mathematics - Book 14013

Whole Numbers
Number/Word Recognition
orally name each number when presented with a list of random Arabic numbers (0 – 1,000).
convert Arabic numbers to Roman numerals and vice versa (I – XXXIX…1 – 39).
correctly write the number words for Arabic numbers (0 – 1,000).
correctly write the Arabic numerals for any number word (0 – 1,000).
Place Value
recognize the place value of each digit of a number to the thousand's place.
determine how many thousands, hundreds, tens and ones in any number (0 – 1,000).
Counting
count orally from 0 – 100,000 starting at any point in between those numbers.
count orally by 2's, 5's, and 10's to 100.
write all the even numbers from 2 - 100 and all the odd numbers from 1 - 99.
order numbers from greatest to least and least to greatest. (0 – 100,000)
Addition
find the sum of whole numbers up to 4 digits.
use addition facts to compute sums up to and including 18.

Subtraction
subtract two whole numbers up to 4 digits (using borrowing/regrouping).
use subtraction facts to compute differences up to and including 18.
Multiplication
write the times tables to 12 x 12 (within a specified time).
multiply by 1 and 10 quickly (within a specified time).
Division
write division facts to 144 ÷ 12.
divide by 1 and 10 quickly (within a specified time).
Word Problems with Whole Numbers
solve one/two step problems with addition, subtraction, multiplication or division of whole numbers.

THE NEXT STEP

Book 14013

Whole Numbers

Number Recognition

Digit is a counting word. A digit is any of the numerals from **1** to **9.** The word "digit" is also the name for a finger. So number digits can be counted on finger digits.

Our modern system of counting probably came from counting on fingers. Fingers and hands were among the earliest known calculators!

A CLOSER LOOK AT ROMAN NUMERALS

Roman numerals were created over 2,000 years ago. They are still used today. You can find Roman numerals on clock and watch faces, on monument and building inscriptions, and on official papers, magazines, and books.

The Roman numeral system uses letters to represent numbers. Combinations of these letters represent other numbers.

I	**=**	**1**
V	**=**	**5**
X	**=**	**10**

Combining Roman Numerals

To make the Roman numeral for 2, I is added to I, so II = 2 (and II + I = III, or 3).

1 = I
2 = I + I or **II**
3 = I + I + I or **III**

1) **As a rule, no letter should be repeated more than three times.**
2) **When a letter representing a number of lesser value appears to the left of a letter of greater value, the lesser value is subtracted from the greater value.**

To make the Roman 4, subtract one from five, or V – I = IV

4 = **V** – **I** or **IV**

five minus one   one less than five

9 = **X** – **I** or **IX**

ten minus one   one less than ten

Get to know the Roman numerals from 1 to 39:

1 = I	**21 = XXI**
2 = II	**22 = XXII**
3 = III	**23 = XXIII**
4 = IV	**24 = XXIV**
5 = V	**25 = XXV**
6 = VI	**26 = XXVI**
7 = VII	**27 = XXVII**
8 = VIII	**28 = XXVIII**
9 = IX	**29 = XXIX**
10 = X	**30 = XXX**
11 = XI	**31 = XXXI**
12 = XII	**32 = XXXII**
13 = XIII	**33 = XXXIII**
14 = XIV	**34 = XXXIV**
15 = XV	**35 = XXXV**
16 = XVI	**36 = XXXVI**
17 = XVII	**37 = XXXVII**
18 = XVIII	**38 = XXXVIII**
19 = XIX	**39 = XXXIX**
20 = XX	

Practice Exercise

Fill in the blanks with the correct Roman Numeral.

13____________	4 ____________	28_____________
5 ____________	29 ____________	11 ____________
14 ____________	36 ____________	20 ____________
2_____________	19 ____________	32 ____________

Fill in the blanks:

XXX __________	VII __________	IX___________
XIV __________	XXXII__________	XXIX___________
XXXVI__________	XXI __________	XVI ___________
III __________	IV __________	V ___________

Number/Word Recognition

Every number can be written two ways.
It can be written as a numeral.
Or it can be written as a word.
The numeral and word stand for the same thing.

Numeral	**Word**
0	zero
1	one
2	two
3	three
4	four
5	five
6	six
7	seven
8	eight
9	nine

Learn to say these 2-place numbers:

10	ten
11	eleven
12	twelve
13	thirteen
14	fourteen
15	fifteen
16	sixteen
17	seventeen
18	eighteen
19	nineteen

The 2-place numbers go from 10 (ten) to 99 (ninety-nine).
We have just learned about the 2-place numbers from 10 to 19.
Now learn these 2-place numbers:

20	twenty
21	twenty-one

22	twenty-two
23	twenty-three
24	twenty-four
25	twenty-five
26	twenty-six
27	twenty-seven
28	twenty-eight
29	twenty-nine
30	thirty
31	thirty-one
32	thirty-two
33	thirty-three
34	thirty-four
35	thirty-five
36	thirty-six
37	thirty-seven
38	thirty-eight
39	thirty-nine
40	forty
41	forty-one
42	forty-two
43	forty-three
44	forty-four
45	forty-five
46	forty-six
47	forty-seven
48	forty-eight
49	forty-nine
50	fifty
51	fifty-one
52	fifty-two
53	fifty-three

54	fifty-four
55	fifty-five
56	fifty-six
57	fifty-seven
58	fifty-eight
59	fifty-nine
60	sixty
61	sixty-one
62	sixty-two
63	sixty-three
64	sixty-four
65	sixty-five
66	sixty-six
67	sixty-seven
68	sixty-eight
69	sixty-nine
70	seventy
71	seventy-one
72	seventy-two
73	seventy-three
74	seventy-four
75	seventy-five
76	seventy-six
77	seventy-seven
78	seventy-eight
79	seventy-nine
80	eighty
81	eighty-one
82	eighty-two
83	eighty-three
84	eighty-four
85	eighty-five

86	eighty-six
87	eighty-seven
88	eighty-eight
89	eighty-nine
90	ninety
91	ninety-one
92	ninety-two
93	ninety-three
94	ninety-four
95	ninety-five
96	ninety-six
97	ninety-seven
98	ninety-eight
99	ninety-nine

The number 99 is the greatest 2-place number.
The next number in order is 100 (one hundred).

100 is one more than 99.
It is a 3-place number.
It has three numerals: 1, 0, and 0.
They stand for 1 hundred, 0 tens, and 0 ones

The greatest 3-place number is 999 (nine hundred ninety-nine).
It stands for 9 hundreds, 9 tens, and 9 ones.

Every 3-place number tells how many hundreds, tens, and ones the number stands for.

The number 999 is the greatest 3-place number.
The next number in order is 1,000 (one thousand).
It is one more than 999.

It is a 4-place number.
It has four numerals: 1, 0, 0, and 0.
They stand for 1 thousand, 0 hundreds, 0 tens, and 0 ones.

We use a comma after the number in the thousands' place.
The comma makes large numbers easier to read.

Practice Exercise

Number Words

Read the number word and write the number.

1. five hundred six **506**
2. five hundred fifty ________________
3. three hundred forty-one ________________
4. one thousand ________________
5. four hundred nine ________________
6. eight ________________
7. eight hundred nineteen ________________
8. three hundred thirteen ________________

9. seven hundred seven ______________________________

10. thirty-nine ______________________________

11. thirty-two ______________________________

12. two hundred six ______________________________

13. five hundred eighty-six ______________________________

14. ninety-nine ______________________________

15. seven hundred eighty-four ______________________________

16. one hundred sixty-five ______________________________

17. fifty ______________________________

18. nine hundred forty-two ______________________________

Write the numeral as a number word.
The first one has been done for you.

1. 843 **eight hundred forty-three**

2. 569 ____

3. 42 ____

4. 411 ____

5. 54 ____

6. 422 ____

7. 628 ____

8. 74 ____

9. 2 ____

10. 382 ____

11. 38 ____

12. 130 ____

13. 50 ____

14. 232 ____

15. 62 ____

16. 854 ____

17. 419 ____

18. 958 ____

Place Value

In the number ***111***, each numeral ***1*** means a different number: ***one, ten,*** and ***one hundred.*** How can the numeral ***1*** stand for so many numbers? That's called ***place value***. The ***value*** of a numeral depends on what ***place*** it's in. If our number system didn't use place value, we would need a lot more than ten numerals (0, 1, 2, 3, 4, 5, 6, 7, 8, and 9)----we'd need millions!

hundreds	tens	ones
1	**1**	**1**

1 x 10 x 10 ® 1 x 10 ® 1

100 + 10 + 1 = 111

To read the place value of numerals in a number, read from left to right.
Each column has a value 10 times greater than the column to its right.

What do these numbers have in common?

4,321	1,234	3,412	2,143

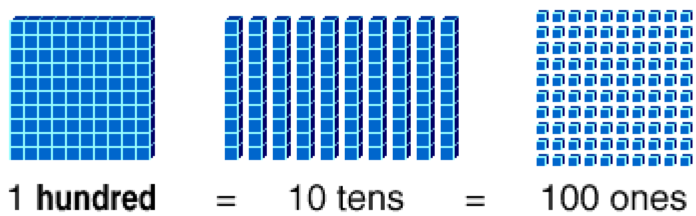
You probably noticed that they are all 4-**digit** numbers, but did you notice that all four numbers are made up of the same digits: 1, 2, 3, and 4? The digits are the same, but each number has a different value. This is because the digits are in different **places** in each number, and in our number system the place of the digit tells you its value. In other words, each digit in a number has a **place value**.

On the next page, each number is arranged with each digit under the name of the place in which it stands:

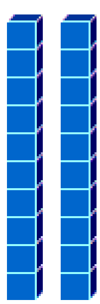
thousands	**hundreds**	**tens**	**units** *or* **ones**
4	3	2	1
1	2	3	4
3	4	1	2
2	1	4	3

Notice that the 4 in the first number is in the thousands place. That means it is worth 4 thousand. In the second number, the 4 is in the units or ones place. It is worth 4 ones or just plain 4. In the third number, the 4 is in the hundreds place, and it is worth 4 hundred. In the last number, the 4 is in the tens place. That means it is worth 4 tens or 40.

Hundred

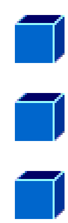


Tens



20 ones = 2 tens

Ones



3 ones

Practice Exercise

Thousands, Hundreds, Tens, and Ones

Write the place value of the bold number in each numeral.

1. 4,59**6**	Ones	2. 8**8**,462	________________
3. 4**7**,087	________________	4. 43,81**6**	________________
5. 95,9**0**4	________________	6. 7**0**,617	________________
7. 3**8**,736	________________	8. 21,**1**59	________________
9. 55,8**9**2	________________	10. 9,**3**03	________________
11. 89,9**1**6	________________	12. 45,**1**22	________________
13. 34,36**4**	________________	14. 42,**6**71	________________
15. 5,52**9**	________________	16. 55,1**6**9	________________
17. 30,**9**56	________________	18. 4**7**,261	________________
19. 7,23**0**	________________	20. 50,4**3**4	________________
21. 3**3**,042	________________	22. 6,95**5**	________________
23. 75,95**3**	________________	24. 87,30**4**	________________

25. 45,7**4**4 ________________ 26. **9**,288 ________________

27. 41,68**3** ________________ 28. 8**8**,279 ________________

29. 6**6**,449 ________________ 30. 81,**5**05 ________________

Which is the greatest number?
That is, which has the most value?

21
29
27

Look at the numbers in the tens' place.
They are all 2s!
So we have to look at the ones' place to find which number is the greatest.

The numbers in the ones' place are 1, 9, and 7.
We know that 9 stands for more ones than 1 or 7.
So 29 is the greatest number.
That is, 29 has the most value.

There is a pattern in our number system.
The more places there are, the greater the number.
The number 40 is greater than 4.
The number 500 is greater than 50.

Counting

The set of counting numbers has no end. It can go on forever. The idea that counting numbers can go on and on is called ***infinity***.

The set of ***counting numbers***, or ***natural numbers***, begins with the number **1** and continues into infinity.

{1,2,3,4,5,6,7,8,9,10...}

The set of ***whole numbers*** is the same as the set of counting numbers, except that it begins with **0**.

{0,1,2,3,4,5,6,7,8,9,10...}

☞ ***All counting numbers are whole numbers. Zero is the only whole number that is not a counting number.***

Even numbers include the numbers ***0*** and ***2*** and all numbers that can be divided evenly by ***2***. ***Odd numbers*** are all numbers that cannot be divided evenly by ***2***.

Odd and **Even** Numbers to 100

1	3	5	7	9	11	13	15	17	19	21
0	2	4	6	8	10	12	14	16	18	20
23	25	27	29	31	33	35	37	39	41	
22	24	26	28	30	32	34	36	38	40	
43	45	47	49	51	53	55	57	59	61	
42	44	46	48	50	52	54	56	58	60	
63	65	67	69	71	73	75	77	79	81	
62	64	66	68	70	72	74	76	78	80	
83	85	87	89	91	93	95	97	99		
82	84	86	88	90	92	94	96	98	100	

Skip Counting

To count by 2’s, simply count all the even numbers: 0, 2, 4, 6, 8, 10…and so on.

To count by 5’s: 0, 5, 10, 15, 20…and so on.

To count by 10’s: 0, 10, 20, 30, 40…and so on.

To count by 100’s: 0, 100, 200, 300, 400…and so on.

Practice Exercise

Fill in the blanks to complete the numerical sequence.
The first one is already done for you.

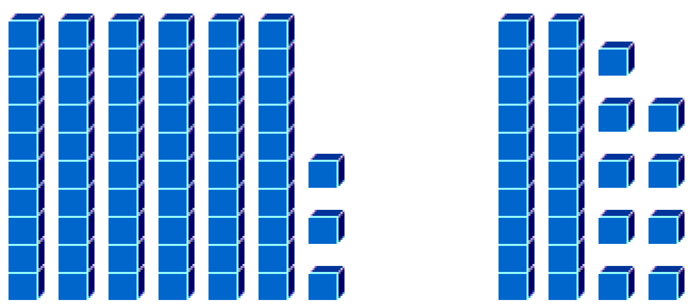
1.	3	6	9	12	**15**	**18**
2.	26	32	38	______	50	______
3.	307	314	______	328	______	342
4.	904	908	912	______	920	924
5.	8,018	8,036	______	8,072	8,090	______
6.	40,012	40,024	______	40,048	40,060	______
7.	50,009 50,063	50,018	50,027	______	50,045	______

8.	70,021	70,042	70,063	70,084	______	70,126
9.	60,050	60,065	______	60,095	60,110	60,125
10.	62	55	48	______	34	______
	20	______				
11.	230	260	______	320	350	______
12.	3,162	3,148	3,134	3,120	______	3,092
13.	90,065	90,130	90,195	______	90,325	90,390
	______					
14.	80,043	80,039	80,035	80,031	80,027	80,023
	______	______				
15.	64	59	______	49	44	______
	34					

Ordering numbers means listing numbers from least to greatest, or from greatest to least. Two symbols are used in ordering.

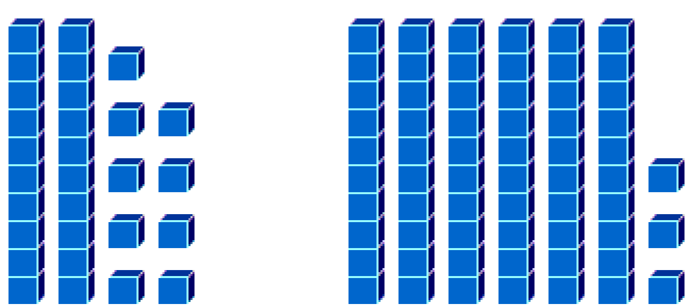
<	>
is less than	**is greater**
2 < 10	**10 > 2**

Greater Than >



63 is **greater than** 29.
63 > 29

Less Than <



29 is **less than** 63.
29 < 63

Practice Exercise

Compare the two numbers.
In the middle of the two numbers, write either > (greater than), < (less than), or = (equals) to complete the problem.

1.	71	<	190
2.	376	______	815
3.	69	______	750
4.	569	______	317
5.	74	______	738
6.	510	______	260
7.	33	______	523
8.	five hundred forty-five	______	six hundred fifty-six
9.	730	______	191
10.	three hundred fifty-eight	______	six hundred eighty-one
11.	753	______	350
12.	two hundred sixty-three	______	312
13.	eight hundred twenty-three	______	358

14.	two hundred forty-nine	_______	885
15.	976	_______	168
16.	472	_______	eight hundred twenty-one
17.	337	_______	613
18.	160	_______	449
19.	672	_______	847
20.	195	_______	545
21.	319	_______	133
22.	51	_______	58
23.	20	_______	87
24.	753	_______	one hundred sixty-four

Addition

Combining two or more numbers is called ***addition***. The term for addition is ***plus***, and the symbol for plus is +. The numbers that are combined in addition are called ***addends*** and together they form a new number called a ***sum***.

2 ---- addends ---- 3
+ 2   + 1
4 ---- sum --------- 4

Adding whole numbers is as simple as 2 + 2! To add two whole numbers, you can simply follow the number line and complete the addition fact.

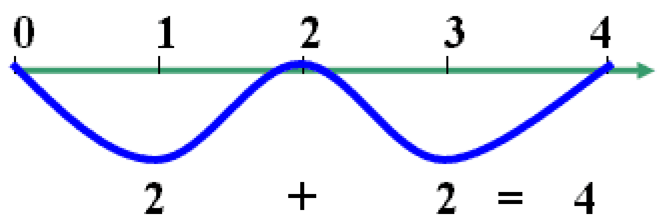
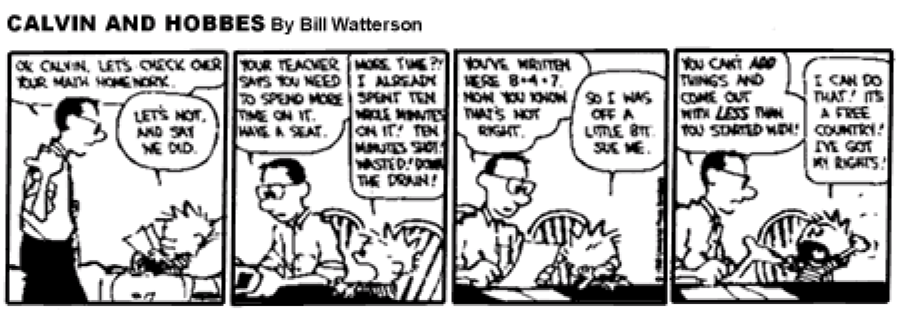


Table of Addition Facts

+	1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10	11
2	3	4	5	6	7	8	9	10	11	12
3	4	5	6	7	8	9	10	11	12	13
4	5	6	7	8	9	10	11	12	13	14
5	6	7	8	9	10	11	12	13	14	15
6	7	8	9	10	11	12	13	14	15	16
7	8	9	10	11	12	13	14	15	16	17
8	9	10	11	12	13	14	15	16	17	18
9	10	11	12	13	14	15	16	17	18	19
10	11	12	13	14	15	16	17	18	19	20



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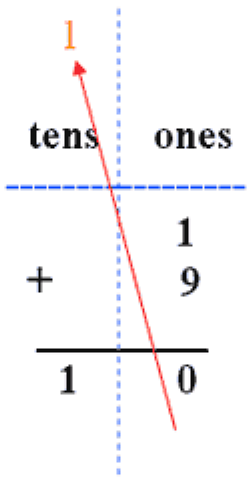
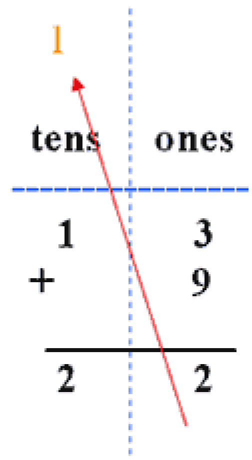
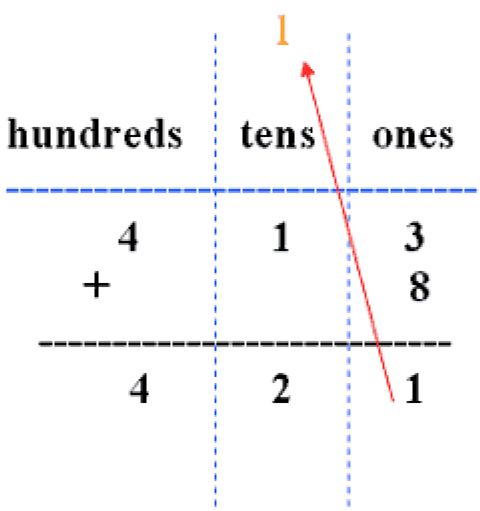
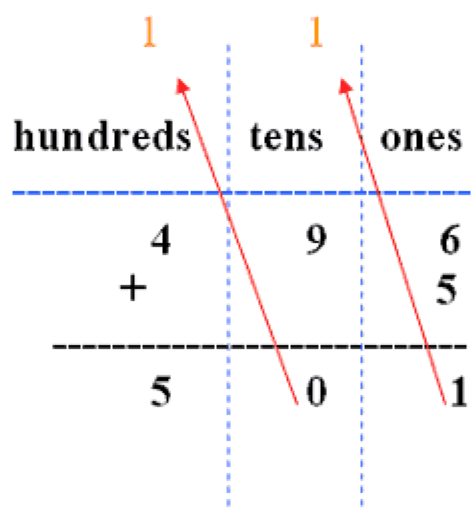
Regrouping Numbers in Addition

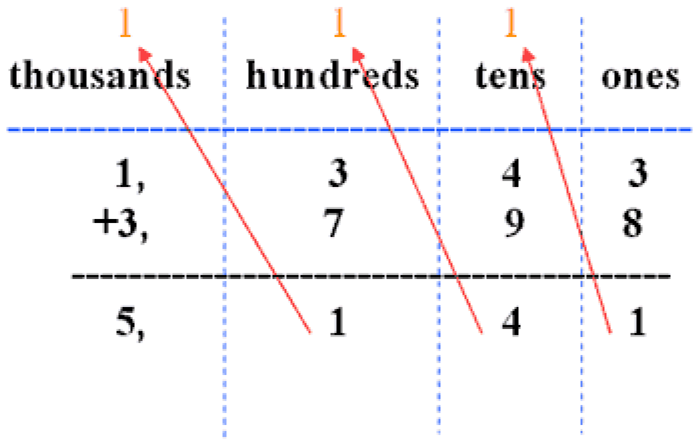
Addition often produces sums with a value greater than ***9*** in a given place. The value of ten is then ***regrouped*** (or ***carried***) to the next place.











To explain addition another way, it can be done by adding the place value amounts separately.

e.g.   69
+ 8
17
60 (the 6 in the tens place means 6 tens or "60")
77

⟹ If there are not enough digits in each number to make even columns under each place value, then zeros may be used **before** a given number to make adding easier. Do **not** add zeros **after** a number because it changes the value of the whole number.

e.g. 69 + 8 + 125 could be added as:

069
008
+125

Practice Exercise

Solve for each of the given problems.

1.	**21 + 99**	**2.**	**91 + 28 =**	**3.**	**59 + 64 =**	**4.**	**78 + 45**
5.	**988 + 138**	**6.**	**479 + 24 =**	**7.**	**314 + 391 =**	**8.**	**467 + 377**
9.	**224 + 115**	**10.**	**181 + 251**	**11.**	**297 + 226**	**12.**	**244 + 275**
13.	**394 + 316**	**14.**	**270 + 605**	**15.**	**173 + 973**	**16.**	**790 + 637**
17.	**7,753 +1,591**	**18.**	**4,853 + 2,535**	**19.**	**5,583 + 4,201**	**20.**	**3,329 + 612**

Subtraction

"Taking away" one or more numbers from another number is called ***subtraction***. The term for subtraction is ***minus***, and the symbol for minus is **-**. The number being subtracted is called a ***subtrahend***. The number being subtracted from is called a ***minuend***. The new number left after subtracting is called a ***remainder*** or ***difference***.

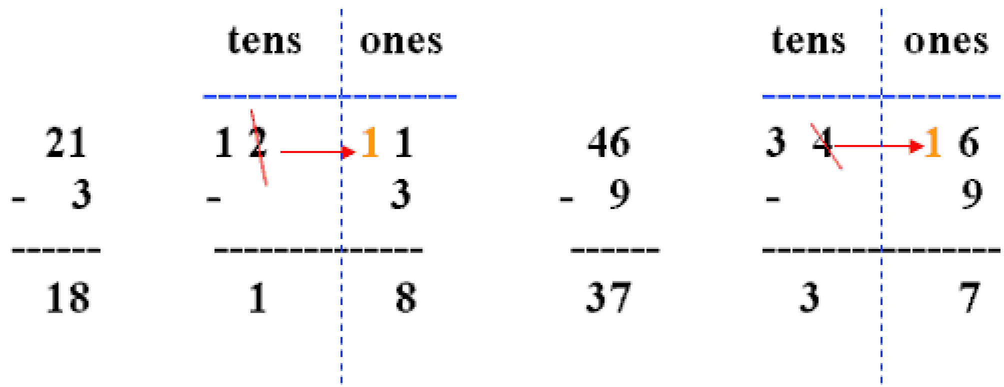
4	**---- minuend ----**	**4**
- 2	**--subtrahend -**	**- 1**
2	**– difference ----**	**3**

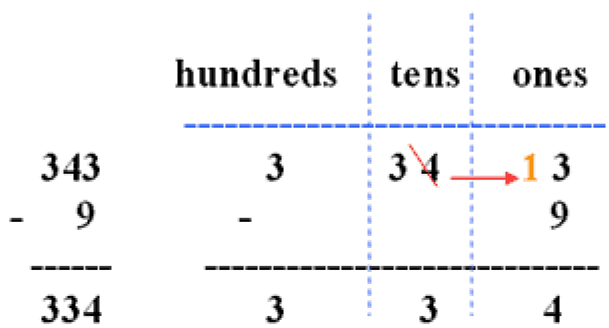
The complete addition or subtraction "sentence" is called an ***equation***. An equation has two parts. The two parts are separated by the ***equal sign***, **=**. For example, ***the minuend minus the subtrahend equals the difference***. An ***addition fact*** or a ***subtraction fact*** is the name given to specific addition or subtraction equations.

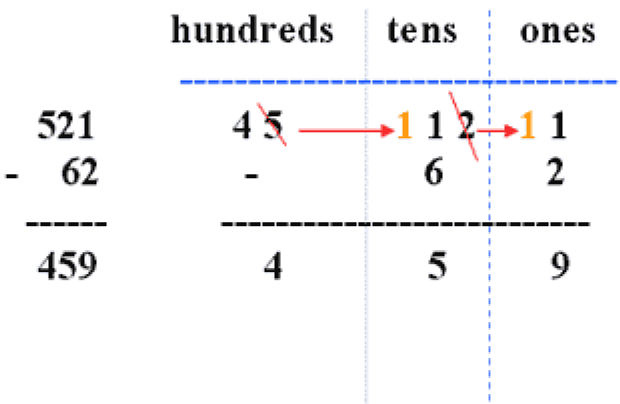
0 + 1 = 1	**1 – 1 = 0**
1 + 1 = 2	**2 – 1 = 1**
2 + 1 = 3	**3 – 1 = 2**
3 + 1 = 4	**4 – 1 = 3**
4 + 1 = 5	**5 – 1 = 4**
5 + 1 = 6	**6 – 1 = 5**
6 + 1 = 7	**7 – 1 = 6**
7 + 1 = 8	**8 – 1 = 7**
8 + 1 = 9	**9 – 1 = 8**

Regrouping in Subtraction

Regrouping, sometimes called ***borrowing***, is used when the subtrahend is greater than the minuend in a given place. Regrouping means to take a group of tens from the next greatest place to make a minuend great enough to complete the subtraction process.






hundreds
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521
- 62
459
4 5
1 1 2
1 1
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6
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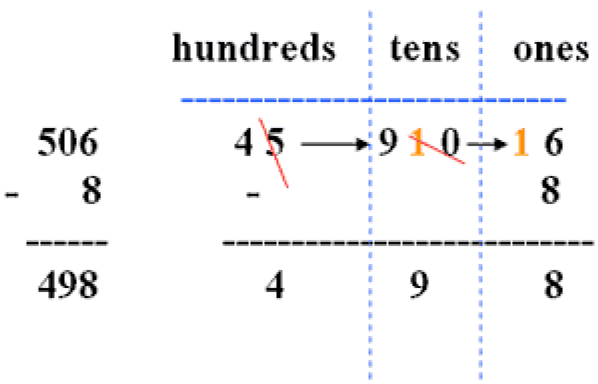
9


hundreds
tens
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506
- 8
498
4 5
9 1 0
1 6
-
8
4
9
8

Practice Exercise

Solve for each of the given problems.

1.	**94 - 61**	**2.**	**27 – 23 =**	**3.**	**11 – 8 =**	**4.**	**85 - 34**
5.	**493 - 392**	**6.**	**394 - 196**	**7.**	**825 - 553**	**8.**	**12 - 11**
9.	**26 - 13**	**10.**	**73 - 71**	**11.**	**105 - 35**	**12.**	**201 - 131**
13.	**741 - 521**	**14.**	**677 - 180**	**15.**	**736 - 515**	**16.**	**595 - 555**
17.	**5,236 -3,377**	**18.**	**7,326 - 1,981**	**19.**	**3,255 - 300**	**20.**	**9,802 - 525**

Multiplication

Multiplication is a quick form of addition. By multiplying numbers together, you are really adding a series of one number to itself. For example, you can add ***2*** plus ***2***. Both ***2 plus 2*** and ***2 times 2*** equal ***4***.

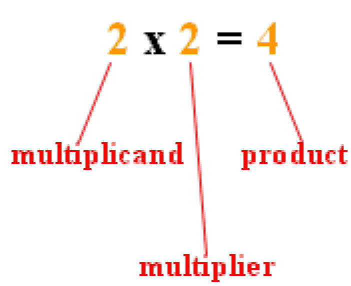
2 + 2 = 4
2 x 2 = 4

$$\begin{array}{r} 2 \\ \underline{+\,2} \\ 4 \end{array} \qquad \begin{array}{r} 2 \\ \underline{\times\,2} \\ 4 \end{array}$$

But what if you wanted to calculate the number of days in five weeks? You could add *7* days + *7* days + *7* days + *7* days + *7* days or you could multiply *7* days times ***5***. Either way you arrive at ***35***, the number of days in five weeks.

7 + 7 + 7 + 7 + 7 = 35
5 x 7 = 35

Although multiplication is related to addition, the parts of multiplication are not known as addends. Instead, the parts are known as ***multiplicands*** and ***multipliers***. A multiplication sentence, like an addition sentence, is called an ***equation***. But a multiplication sentence results in a ***product***, not a sum.



2 —— multiplicand

x 2 —— multiplier

----

4 —— product

X	0	1	2	3	4	5	6	7	8	9	10	11	12
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

When you multiply whole numbers, the ***product*** usually has a greater value than either the ***multiplicand*** or the ***multiplier***.

But there are exceptions:

A number multiplied by ***1*** is always equal to itself.

$$\begin{array}{r} 1 \\ \times\ 1 \\ \hline 1 \end{array} \qquad 21 \times 1 = 21 \qquad \begin{array}{r} 36 \\ \times\ 1 \\ \hline 36 \end{array}$$

A number multiplied by ***0*** is always equal to ***0***.

$$\begin{array}{r} 1 \\ \times\ 0 \\ \hline 0 \end{array} \qquad 21 \times 0 = 0 \qquad \begin{array}{r} 36 \\ \times\ 0 \\ \hline 0 \end{array}$$

Order Property of Multiplication

Two numbers can be multiplied in any order and the product is the same

Example:

3 X 2 = 6

2 X 3 = 6

Practice Exercise

Equivalent Addition and Multiplication

Solve the problems below.

1.	9 9 + 9 27	9 × 3 27	**2.**	12 12 +12	12 × 3	**3.**	8 8 + 8	8 × 3
4.	10 10 10 10 10 +10	10 × 6	**5.**	8 8 8 8 8 + 8	8 × 6	**6.**	12 12 12 12 12 +12	12 × 6
7.	9 9 9 + 9	9 × 4	**8.**	11 11 11 +11	11 ×4	**9.**	10 10 10 +10	10 × 4

10.	11 11 11 11 +11	11 × 5	11.	12 12 12 12 +12	12 × 5	12.	8 8 8 8 + 8	8 × 5
13.	10 10 10 10 +10	5 ×10	14.	9 9 9 9 + 9	5 × 9	15.	8 × 5	8 8 8 8 + 8

Solve each problem.

1.	6 × 4	2.	5 × 8	3.	8 x 2 =	4.	7 × 7	5.	2 × 5
6.	4 × 9	7.	9 × 8	8.	2 x 9 =	9.	9 × 9	10.	6 × 7
11.	9 × 7	12.	6 × 5	13.	7 x 5 =	14.	2 × 8	15.	8 × 3
16.	8 × 7	17.	2 × 2	18.	7 x 3 =	19.	9 × 2	20.	5 × 3
21.	2 × 4	22.	5 × 6	23.	2 x 6 =	24.	9 × 6	25.	4 × 7

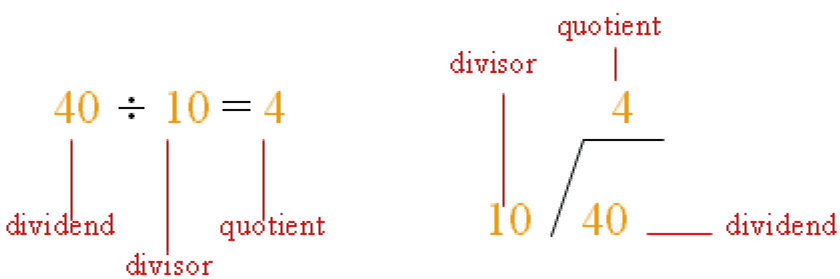
26. $\begin{array}{r} 6 \\ \times\ 3 \\ \hline \end{array}$ 27. $\begin{array}{r} 6 \\ \times\ 2 \\ \hline \end{array}$ 28. $5 \times 4 =$ 29. $\begin{array}{r} 6 \\ \times\ 5 \\ \hline \end{array}$ 30. $\begin{array}{r} 6 \\ \times\ 9 \\ \hline \end{array}$

Division

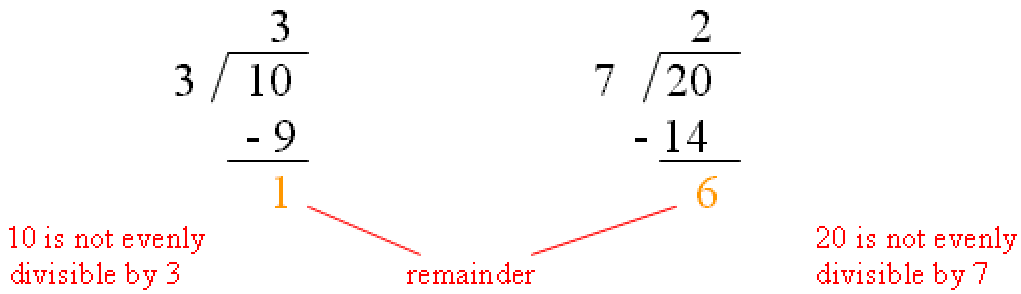
Division is the process of finding out how many times one number, the ***divisor***, will fit into another number, the ***dividend***. The division sentence results in a ***quotient***. The signs of division are ÷ and , and mean ***divided by***. You can think of division as a series of repeated subtractions. For example, ***40 ¸ 10*** could also be solved by subtracting ***10*** from ***40*** four times:

40 – 10 – 10 – 10 – 10 = 0

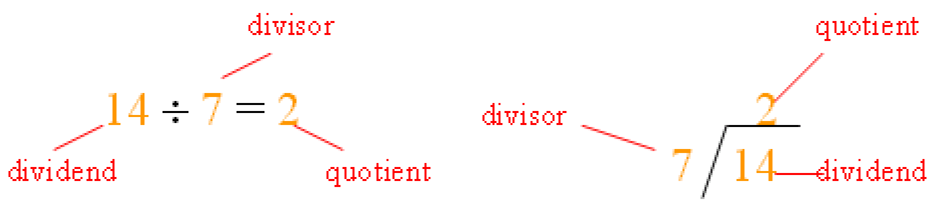
Because ***10*** can be subtracted four times, you can say that ***40*** can be divided by ***10*** four times, or ***40 ¸ 10 = 4***.



Many numbers do not fit evenly into other numbers. They are ***not evenly divisible by*** those numbers, and the number left over is called the ***remainder***.



To divide whole numbers, reverse the process of multiplication. For example, if ***2 x 7 = 14*** in a multiplication equation, then in a division sentence, ***14*** is the ***dividend*** and ***7*** is the ***divisor*** with a ***quotient*** of ***2***.



A whole number divided by ***1*** will always equal itself.

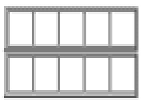
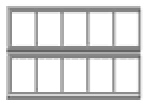
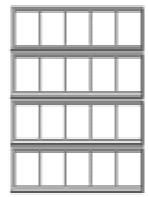
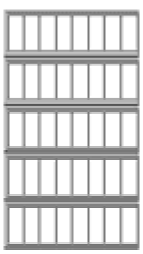
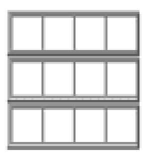
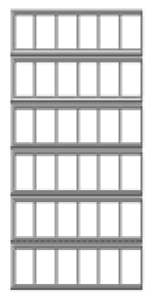
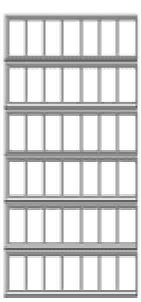
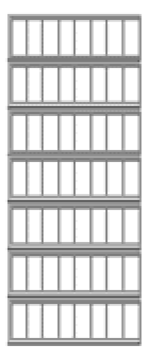
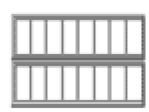
1 ¸ 1 = 1   **1 / 21** (quotient **21**)   **36 ¸ 1 = 36**

Zero divided by a whole number will always equal ***0***.

0 ¸ 12 = 0   **3 / 0** (quotient **0**)   **0/7 = 2**

Practice Exercise

Solve each division problem.
Use the illustration to help you.

1.  $10 \div 2 = 5$ $2 \times 5 = 10$	**2.**  $10 \div 5 =$ _______ $5 \times$ _______ $= 10$	**3.**  $10 \div 2 = 5$ $2 \times 5 = 10$
4.  $40 \div 8 =$ _______ $8 \times$ _______ $= 40$	**5.**  $12 \div 3 =$ _______ $3 \times$ _______ $= 12$	**6.**  $36 \div 6 =$ _______ $6 \times$ _______ $= 36$
7.  $42 \div 7 =$ _______ $7 \times$ _______ $= 42$	**8.**  $56 \div 7 =$ _______ $7 \times$ _______ $= 56$	**9.**  $16 \div 2 =$ _______ $2 \times$ _______ $= 16$

Word Problems with Whole Numbers

Within every story (word) problem are several ***clue words (key words)***. These words tell you the kind of math sentence (equation) to write to solve the problem.

Addition Clue Words

add
sum
total
plus
in all
both
together
increased by
all together
combined

Subtraction Clue Words

subtract
difference
take away
less than
are not
remain
decreased by
have or are left
change (money problems)
more
fewer

Multiplication Clue Words

times
product of
multiplied by
by (dimension)

Division Clue Words

quotient of
divided by
half [or a fraction]
split
separated
cut up
parts
shared equally

⇒ ***Division clue words are often the same as subtraction clue words. Divide when you know the total and are asked to find the size or number of "one part" or "each part."***

Following a system of steps can increase your ability to accurately solve problems. Use these steps to solve word problems.

1. Read the problem carefully. Look up the meanings of unfamiliar words.

2. Organize or restate the given information.

3. State what is to be found.

4. Select a strategy (such as making a chart of working backward) and plan the steps to solve the problem.

5. Decide on an approximate answer before solving the problem.

6. Work the steps to solve the problem.

7. Check the final result. Does your answer seem reasonable?

The Problem Solving System was used to solve the following problem:

Mary has ten marbles. Lennie has thirteen. How many marbles do they have in all?

1. **Mary has ten marbles. Lennie has thirteen. How many marbles do they have in all?**
2. **Mary – 10 marbles**
   Lennie – 13 marbles

3. **How many marbles in all?**

4. **Add**

5. **A little over 20 marbles (10 + 10 = 20)**

6. $$\begin{array}{r} 10 \\ +13 \\ \hline 23 \end{array}$$ **marbles**

7. **The final sum of 23 marbles is close to the estimated answer of 20 marbles. The final result is reasonable.**

Þ ***Be sure to label answers whenever possible. For example: marbles, grams, pounds, feet, dogs, etc.***

Þ ***Some problems may require several steps to solve. Some may have more than one correct answer. And some problems may not have a solution.***

For some problems, you have to write two or three equations to solve the problem. For others, you may need to make charts or lists of information, draw pictures, find a pattern, or even guess and check. Sometimes you have to work backwards from a sum, product, difference, or quotient, or simply use your best logical thinking.

List/Chart

Marty's library book was six days overdue. The fine is $.05 the first day, $.10, the second, $.20 the third day, and so on. How much does Marty owe?

Marty's library book was six days overdue. The fine is $.05 the first day, $.10, the second, $.20 the third day, and so on. How much does Marty owe?

Days	**1**	**2**	**3**	**4**	**5**	**6**
Fine	**$.05**	**$.10**	**$.20**	**$.40**	**$.80**	**$1.60**

Answer: $1.60

Veronica, Archie, and Betty are standing in line to buy tickets to a concert. How many different ways can they order themselves in line?

Veronica, Archie, and Betty are standing in line to buy tickets to a concert. How many different ways can they order themselves in line?

Veronica	**Veronica**	**Archie**	**Archie**
Archie	**Betty**	**Veronica**	**Betty**

Betty Archie Betty Veronica

Betty Veronica Archie

Betty Archie Veronica

Answer: 6 ways

Find a Pattern

Jenny's friend handed her a code and asked her to complete it. The code read 1, 2, 3 Z 4, 5, 6 Y 7, 8, 9 X_______. How did Jenny fill in the blanks?

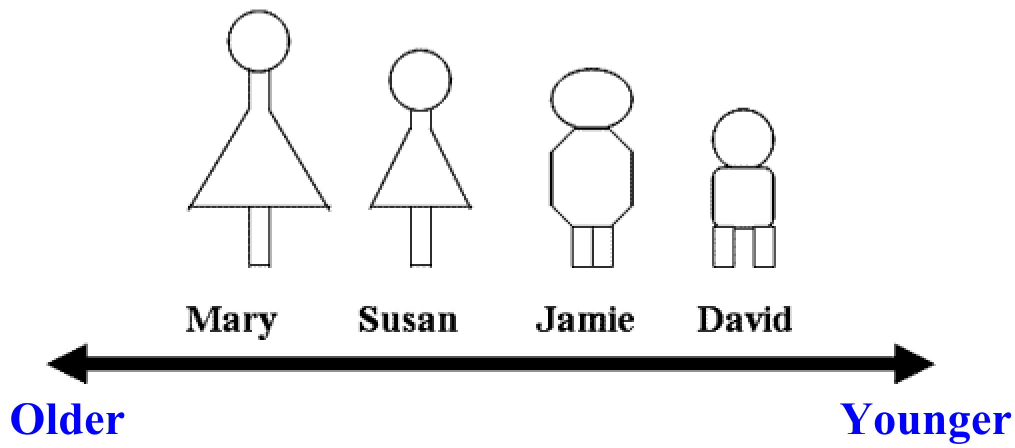
Jenny's friend handed her a code and asked her to complete it. The code read 1, 2, 3 Z 4, 5, 6 Y 7, 8, 9 X_______. How did Jenny fill in the blanks?

Answer: 10, 11, 12 W

Draw a Picture

Mary is older than Jamie. Susan is older than Jamie, but younger than Mary. David is younger than Jamie. Who is oldest?

Mary is older than Jamie. Susan is older than Jamie, but younger than Mary. David is younger than Jamie. Who is oldest?



Answer: Mary is oldest.

Guess and Check

Farmer Joe keeps cows and chickens in the farmyard. All together, Joe can count 14 heads and 42 legs. How many cows and how many chickens does Joe have in the farmyard?

Farmer Joe keeps cows and chickens in the farmyard. All together, Joe can count 14 heads and 42 legs. How many cows and how many chickens does Joe have in the farmyard?

6 cows
+8 chickens
14 heads

Guess a number of cows. Then add the number of chickens to arrive at the sum of 14 heads. Then check the total legs.

6 cows = 24 legs
+8 chickens = 16 legs
40 legs

7 cows +7 chickens 14 heads	Adjust your guesses. Then check again until you solve the problem.	7 cows = 28 legs +7 chickens = 14 legs 42 legs

Answer: 7 cows and 7 chickens

Work Backwards

Marsha was banker for the school play. She took in $175 in ticket sales. She gave Wendy $75 for sets and costumes and Paul $17.75 for advertising and publicity. After paying for the props, Marsha had $32.25 left. How much did the props cost?

Marsha was banker for the school play. She took in $175 in ticket sales. She gave Wendy $75 for sets and costumes and Paul $17.75 for advertising and publicity. After paying for the props, Marsha had $32.25 left. How much did the props cost?

$ 175.00 tickets - 75.00 costumes $ 100.00 - 17.75 advertising $ 82.25	$ 82.25 - 32.25 $ 50.00 cost of props

Logical Reasoning

Jim challenged Sheila to guess his grandmother's age in ten questions or less. It took her six. Here's what Sheila asked:

Jim challenged Sheila to guess his grandmother's age in ten questions or less. It took her six. Here's what Sheila asked:

"Is she less than fifty?" "No."	**50+ years old**
"Less than seventy-five?" "Yes."	**50 to 74 years old**
"Is her age an odd or even number?" "Odd."	**ends in 1, 3, 5, 7 or 9**
"Is the last number less than or equal to five?" "No."	**ends in 7 or 9**
"Is it nine?" "No."	**ends in 7 – 57 or 67**
"Is she in her sixties?" "No."	**57 years old**

Practice Exercise

Solve for each of the given problems.

1. Jane was 35 when Amy was born. How old will Jane be when Amy is fourteen?

2. A small business employs 29 men and 23 women. How many more men than women work at this small business?

3. A crate of tangerines weighs 150 pounds. A crate of pears weighs 210 pounds. How many pounds do both crates weigh?

4. A machine costs $9 an hour to operate. How much will it cost to operate the machine for eight hours?

5. Albert watched 4 hours of TV on Sunday, 3 hours of TV on Monday, 5 hours of TV on Tuesday, 5 hours of TV on Wednesday, 8 hours of TV on Thursday, 3 hours of TV on Friday, and 8 hours of TV on Saturday. How many more hours of TV did Albert watch from Monday to Saturday than from Tuesday to Saturday?

6. Paul's son will be twelve this Sunday. If Paul is 44 years old, how old was Paul when Paul's son was born?

7. At a dinner party, seven people are seated at each table. There are 63 people in all. How many tables are there?

8. Jill runs 2 miles each day. How many miles does Jill run in a week?

9. Greg worked twenty-two hours. Amy worked ten. How many more hours did Greg work than Amy?

10. CDs are on sale. 2 CDs are $8. If you want to buy 6 CDs, how much will it cost?

11. Greg drove 1,020 miles on Sunday. Paul drove 302 miles on Tuesday. How many more miles did Greg drive?

12. At 5 cents a piece, how many cents will 3 candies cost?

13. Greg needs rope that is 3 meters long. Greg bought a long piece of rope that was 15 meters long. How many pieces of 3 meter long rope can be cut from the longer piece?

14. The library started the year with 5,680 books. If the library purchased 568 books during the year, how many do they now have?

15. At a restaurant a group of people ordered 27 tacos. 3 tacos are placed on a plate. How many plates were there?

16. Bill practices the piano for two hours during every practice session. Bill has 4 practice sessions each week. During a 3 week period, how many hours will Bill practice the piano?

17. The newspaper reported that three hundred forty people went to the mall on Saturday. The same number of people went to the mall on Sunday. How many people went to the mall for the entire weekend?

18. A store had a sale on all of its 900 DVDs. It only sold 66 DVDs. How many DVDs does the store have left?

19. In Math 101, twenty-five students are in class

today. However, that does not include 6 students who are absent. How many total students are in Math 101?

20. The pizza delivery consisted of 10 pizzas. Michael cut 9 slices in each of 4 pizzas. Jane cut each of the rest of the pizzas into 8 pieces each. How many slices are there?

21. A Math book has 375 pages. If Amy has finished reading 142 pages, how many more pages are left to read?

22. Bill has 8 pennies. How many piles of four pennies each can be made?

Answer Key

Book 14013 – Whole Numbers

Page 10 **Row 1:** XIII, IV, XXVIII
Row 2: V, XXIX, XI
Row 3: XIV, XXXVI, XX
Row 4: II, XIX, XXXII
Row 5: 30, 7, 9
Row 6: 14, 32, 29
Row 7: 36, 21, 16
Row 8: 3, 4, 5

Page 15 **2.** 550 **3.** 341 **4.** 1000 **5.** 409 **6.** 8
7. 819 **8.** 313 **9.** 707 **10.** 39 **11.** 32
12. 206 **13.** 586 **14.** 99 **15.** 784
16. 165 **17.** 50 **18.** 942

Page 16 **2.** five hundred sixty-nine **3.** forty-two
4. four hundred eleven **5.** fifty-four
6. four hundred twenty-two
7. six hundred twenty-eight **8.** seventy-four
9. two **10.** three hundred eighty-two
11. thirty-eight **12.** one hundred thirty
13. fifty **14.** two hundred thirty-two
15. sixty-two **16.** eight hundred fifty-four
17. four hundred nineteen
18. nine hundred fifty-eight

Page 21 **2.** Thousands **3.** Thousands **4.** Ones
5. Tens **6.** Thousands **7.** Thousands
8. Hundreds **9.** Tens **10.** Hundreds
11. Tens **12.** Hundreds **13.** Ones
14. Hundreds **15.** Ones **16.** Tens
17. Hundreds **18.** Thousands **19.** Ones
20. Tens **21.** Thousands **22.** Ones
23. Ones **24.** Ones **25.** Tens
26. Thousands **27.** Ones **28.** Thousands
29. Thousands **30.** Hundreds

Page 24 **2.** 44, 56 **3.** 321, 335 **4.** 916, 928
5. 8054, 8108 **6.** 40036, 40072
7. 50036, 50054 **8.** 70105, 70147
9. 60080, 60140 **10.** 41, 27, 13
11. 290, 380 **12.** 3106, 3078
13. 90260, 90455 **14.** 80019, 80015
15. 54, 39

Page 27 **2.** < **3.** < **4.** > **5.** < **6.** > **7.** <
8. < **9.** > **10.** < **11.** > **12.** < **13.** >
14. < **15.** > **16.** < **17.** < **18.** <
19. < **20.** < **21.** > **22.** < **23.** <
24. >

Page 33 **1.** 120 **2.** 119 **3.** 123 **4.** 123 **5.** 1126
6. 503 **7.** 705 **8.** 844 **9.** 339 **10.** 432
11. 523 **12.** 519 **13.** 710 **14.** 875
15. 1146 **16.** 1427 **17.** 9344 **18.** 7388
19. 9784 **20.** 3941

Page 37 **1.** 33 **2.** 4 **3.** 3 **4.** 51 **5.** 101
6. 198 **7.** 272 **8.** 1 **9.** 13 **10.** 2
11. 70 **12.** 70 **13.** 220 **14.** 497
15. 221 **16.** 40 **17.** 1859 **18.** 5345
19. 2955 **20.** 9277

Page 40 **2.** 36 **3.** 24 **4.** 60 **5.** 48 **6.** 72
7. 36 **8.** 44 **9.** 40 **10.** 55 **11.** 60
12. 40 **13.** 50 **14.** 45 **15.** 40

Page 41 **1.** 24 **2.** 40 **3.** 16 **4.** 49 **5.** 10
6. 36 **7.** 72 **8.** 18 **9.** 81 **10.** 42
11. 63 **12.** 30 **13.** 35 **14.** 16 **15.** 24
16. 56 **17.** 4 **18.** 22 **19.** 18 **20.** 15
21. 8 **22.** 30 **23.** 12 **24.** 54 **25.** 28
26. 18 **27.** 12 **28.** 20 **29.** 30 **30.** 54

Page 44 **2.** 2 **3.** 5 **4.** 5 **5.** 4 **6.** 6 **7.** 6
8. 8 **9.** 8

Page 52 **1.** 49 years old **2.** 6 more men than women
3. 360 pounds **4.** $72 **5.** 3 hours more
6. 32 years old **7.** 9 tables **8.** 14 miles
9. 12 more hours **10.** $24
11. 718 more miles **12.** 15 cents
13. 5 pieces of rope **14.** 6248 books
15. 9 plates **16.** 24 hours **17.** 680 people
18. 834 DVDs **19.** 31 students
20. 84 slices **21.** 233 pages **22.** 2 piles