Super Awesome Fantabulous Math Tutorial:
Ch. 1 Whole Numbers

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Whole Numbers

Whole numbers are the first numbers we learn when we learn to count as children:

1, 2, 3, 4, 5 etc.

Whole numbers include the number zero

Whole numbers **do not** include factions: 1/3

Whole numbers **do not** include decimals: 0.324

Whole numbers **do not** include mixed numbers: 5 1/2

} These types of numbers will be discussed in later sections

Operations with Whole Numbers:

Sum: adding numbers (addition) +

Difference: subtracting numbers (subtraction) -

Product: multiplying numbers (multiplication) x

quotient: dividing numbers (division) ÷

We perform these types of operations in our everyday life. We're going to go through some tips and tricks to make sure you can go through these operations properly and in the correct order.

Finding the Sum of Two Numbers:

$14^{1}54$ + 398 2	Starting with the numbers farthest to the right (the singles column): add 4+8=12 write the 2 below the addition line in the singles column and, because the number is larger than 10, carry the 1 to the tens column
$1^{1}4^{1}54$ + 398 52	Now add the numbers in the tens column: 5 + 9 + 1 that we carried over = 15, write 5 in the tens column and carry the 1 to the hundreds column
$1^{1}4^{1}54$ + 398 852	Now add the numbers in the hundreds column: 4 + 3 + 1 that we carried = 8, write 8 in the hundreds column (because this number is less than 10 nothing carries over)
$1^{1}4^{1}54$ + 398 1852	The only number in the thousands column is 1, so write the 1 in your final answer in the thousands column. The sum is 1 852

You Try:

a) 1674
+2341

b) 37
+2435

c) 326
+ 1267

d) 18273664
+279377162

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Finding the Difference of Two Numbers:

627
-142
5

7 - 2 = 5, write 5 in your answer in the singles column.

$^{5}\cancel{6}^{1}27$
- 142
85

In the tens column we cannot take 2 - 4 because 4 is larger than 2 therefore we must borrow 1 from the next column to the left (the hundreds column). So since we borrowed 1 from the hundreds column we cross out the 6 and note it is now a 5, and we move our borrowed 1 in front of the 2 in the tens column so we now have 12, so our new problem is 12 - 4 = 8, write in your answer in the tens column.

$^{5}\cancel{6}^{1}27$
- 142
485

In the hundreds column subtract: 5 - 1 =4, write 4 in your answer under the hundreds column. The difference is 485

You Try:

e) 524
-32

f) 317
- 264

g) 2673
-1265

h) 9182774775
-897366232

Finding the Product of Two Numbers:

There are many symbols used to indicate the operation of multiplication, they are:
· a dot, () parenthesis, x a cross
The cross "x" is not frequently used in higher math such as Algebra because it is easily confused with the letter "X" which acts as a variable and has a different meaning than multiplication.

$5^{2}23$
x 17
1

Starting at the right in the single column: 7 · 3 = 21, write the 1 in the singles column and carry the 2 to the tens column

$^{1}5^{2}23$
x 17
61

Now multiply 7 by the number in the tens column: 7 · 2 = 14 and add the 2 we carried over from the singles column 14 + 2 = 16, write the 6 in the tens column and carry the 1 to the thousands column

$^{1}5^{2}23$
x 17
3661

Now multiply 7 by the number in the hundreds column: 7 · 5 = 35, add the 1 we carried over 35 + 1= 36, writ this number into your answer

$^{1}5^{2}23$
x 17
3661
0

Now that we have multiplied all the digits in our top number by 7, we must now multiply them by 1 (the other digit in 17), before we do we must move to a new line to our answer and put in a place holder "0" in the singles column

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$^{1}5^{2}23$
x 17
3661
5230

Now we multiply 523 · 1 = 523 (if multiplying by a number other than 1 go through the same multiplication process that we did before for the 7) write 523 into your answer

$^{1}5^{2}23$
x 17
3661
+5230
8891

Now add the two lines of your answer together to get your final answer. The product is 8 891

You Try:

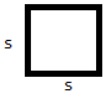
i) (789)(25) j) (23)(452) k) (78195)(67)

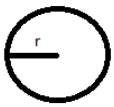
Using Product to solve for the Area of a Region:

A region is a shape with no specific name. There is no formula to solve for the area of a region (The area of this region is highlighted yellow).

There are many formulas to solve for the areas of regular shapes:

Area of a rectangle = length x width 

Area of a square = side^2 (or side x side) 

area of a circle = πr^2 (where r = radius and π=3.14) 

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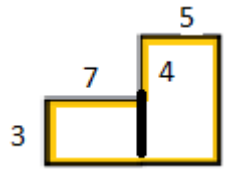
In order to solve the area of a region we must break it into more familiar shapes for which we have formulas.

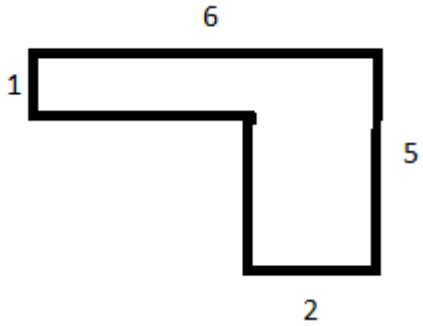


in order solve for the area of this region we must divide the shape into 2 rectangles and then apply our formula to solve for the area of each rectangle.

Area of a rectangle = length x width

in the case of the rectangle on the left:
A= l x w
=7 x 3
=21
in the case of the triangle on the right:
we are not directly given the length of this rectangle but, since we know that oposit sides of a rectanle are of equal length, we can calculate the length of the unknown side by adding 3 + 4 = 7 Therefore:
A= l x w
=7 x 5
=35
So to get the total area just add the areas for the two rectangles together;
35 + 21 = 56
if our unit of measurement was centimeters our answer would be $56cm^2$ (area units are always squared)

You Try:
L)



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Finding the Quotient of Two Numbers:

4976 and 24 - The number listed first is the "dividend" this is the number that will be divided, the second number is the "divisor" which is the number that divides.

The symbol for division can be written different ways:

$24\overline{)4976}$ $\qquad \frac{4976}{24}$ $\qquad$ 4976 ÷ 24

To Solve:

$$\begin{array}{r} 2 \\ 24\overline{)4976} \end{array}$$

Try to divide 24 into the digits of 4976 starting from the left: 24 cannot be divided into 4 (because it is larger) so try adding another digit: 24 can be divided into 49, 2 times - write this first digit into your answer.

$$\begin{array}{r} 2 \\ 24\overline{)4976} \\ -48 \\ \hline 1 \end{array}$$

Multiply the number you just got by your divisor 2 x 24 = 48, subtract 49 - 48 = 1

$$\begin{array}{r} 20 \\ 24\overline{)4976} \\ -48 \\ \hline 17 \\ -\ 0 \\ \hline 17 \end{array}$$

bring down the next number in the dividend- in this case 7 - to make the number 17. 24 does not divide into 17 so we place a 0 as the next digit in our answer, then repeat the same process of multiplication and subtraction as before: 0 x 24 = 0, 17 - 0 = 17

$$\begin{array}{r} 207\ R8 \\ 24\overline{)4976} \\ -48 \\ \hline 17 \\ -\ 0 \\ \hline 176 \\ -168 \\ \hline 8 \end{array}$$

Repeat the process again bringing down the 6 to get 176. If you don't know how many times 24 goes into 176 just try multiplying different numbers by 24 until you get one that's close eg. 24 x 7 = 168 which is close to 176 without being larger, so 7 is the next digit in our answer. Then subtract 176 - 168 = 8. There are not more digits to bring down so the 8 is left over, it is the "remainder" which can be written as R8 or can be turned into a fraction of your remainder over your divisor: 8/24 which can be reduced (because both numbers can be evenly divided by 3) to 1/3 Therefore the quotient is 207 1/3

You Try:

m) 467 ÷ 3 $\qquad$ n) 729 ÷ 26 $\qquad$ o) 2097846 ÷ 64

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Exponents:

Exponents are numbers to which another number , called a base, is 'raised'

eg. 5^2 in this example 5 is the base and 2 is the exponent, you could also say 5 raised to the power of two or 5 squared.

What the exponent means is how many times you multiply a number times itself. So 5^2 means 5 x 5 = 25

A common mistake students make is to multiply the base by the exponent: 5^2 **does not** means 5 x 2 = 10

another eg. 7^3 = 7 x 7 x 7 = 343 7 x 7 is 49 x 7 again is 343

watch out for negative numbers because a negative number x a negative number is always a positive number

eg. $(-7)^2$ = (-7)(-7)= 21 a positive number
BUT $(-7)^3$ = (-7)(-7)(-7) = -343 a negative number

You Try:

p) 3^3 q) 6^5 r)$(-3)^5$ s)1^{26}

Order of Operations (BEDMAS):

BEDMAS is an acronym to help you remember the order in which to perform operations (each letter stands for an operation)

Brackets ( ) [ ] { }
Exponents
Division
Multiplication
Addition
Subtraction

Evaluate (find the answer) to the following problem:

18 - 6 ÷ 2

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Two operations are present in this problem: subtraction and division. You must perform the operations in the order in which they appear in BEDMAS - division appear before subtraction in BEDMAS so it must be performed first:
6 ÷ 2 = 3
so the new problem is:
18 - 3 = 15

The Wrong Way (not following BEDMAS):
18 - 6 ÷ 2
= 18 - 6 = 12
12 ÷ 2 = 6 <-- though all mathematical operations were performed correctly, they were performed in the wrong order, yielding a **Wrong Answer**

Another BEDMAS eg. 24 ÷ 6 - 4 ÷ 2
Division comes before subtraction in BEDMAS so both divisions must be performed first:
24 ÷ 6 = 4 and 4 ÷ 2 = 2
so the new problem becomes:
4 - 2 = 2

Even though in the acronym BEDMAS Division comes before Multiplication, these two operations actually have the same rank, so you should perform them as they appear from left to right in the problem:
eg. 12 x 2 ÷ 3
even though Division comes before multiplication in BEDMAS because they actually have the same importance you should perform the multiplication first because it appears first when reading left to right
12 x 2 = 24
24 ÷ 3 = 8

Addition and subtraction also have equal importance with each other and should be performed as they appear from left to right

So BEDMAS could be written out;

Brackets → Exponent → Division or Multiplication (as they appear from left to right) → Addition or Subtraction (as they appear from left to right)

You Try:
t) (6-2) x 3 u) $(3 - 1 \times 6)^2 + 3$

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Averages:

We use averages all the time. A particularly relevant example is calculating grade averages:
Calculate the average of the following grades:

100 , 95 , 86 , 79 , 52 ← someone had an off day :/

To find the average we find the sum of all the numbers in our list and then divide the total by the number of entries in our list (the number of numbers we added together- in this case there are 5 numbers in our list)

$$= \frac{100 + 95 + 86 + 79 + 52}{5}$$

$$= \frac{412}{5}$$

$= 82\ ^{2/5}$ or 82.4 if written as a decimal

You Try:

v) Find the average of the following numbers: 67, 35, 26, 100, 67, 78, 92, 87

Properties:

Property	Addition	Multiplication
Identity	The addition identity refers to the number which can be added to any number to get back the number itself. eg. 5 → the only number which can be added to 5 to get 5 as the answer is 0 5 + 0 = 5 The Additive Identity is 0	The identity for multiplication refers to the number which can be multiplied with any number to get back the number itself. eg. 5 → the only number which can be multiplied by 5 to get 5 as the answer is 1 5 x 1 = 5 The Identity for multiplication is 1
Commutative	4 + 6 = 6 + 4 The order of the numbers around the operation does not matter	6(4) = 4(6) The order of the numbers around the operation does not matter
Associative	(3 + 7) + 8 = 3 + (7 + 8) You will get the same answer regardless	(3 · 7) · 8 = 3 · (7 · 8) You will get the same answer regardless of

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	of the order in which you add the numbers	the order in which you multiply the numbers
Property of zero	---	Anything multiplied by zero equals zero 7 (0) = 0

Clue words (hint for what type of operation you should perform):

Clue words for addition: add, sum, total, plus, more, increase, or gain
Clue words for subtraction: subtract, difference, take away, minus

Practice Problem Answers: (always a good idea to double check these with a calculator)

a) 4015	b) 2472	c) 1593	d) 297650826
e) 492	f) 53	g) 1508	h) 8285408543
i) 19752	j) 10396	k) 5239065	
l) 14			
m) 155 R2	n) 28 R1	o) 32778 R 54	
p) 27	q) 7776	r) -243	s) 1
t) 12	u)12		
v) 69			

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