

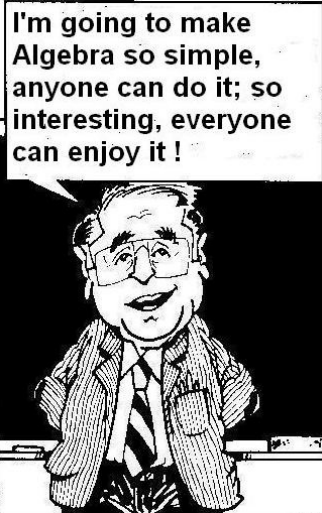
Lesson Number 4

Division Of Whole Numbers

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Professor Weissman's Algebra Classroom

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What Are Different Ways To Show Division?

There are lots of ways to show that you are dividing. The traditional way is to use a long division symbol. Others ways are to write the problem as a fraction since, every fraction means that you are dividing the numerator by the denominator. Perhaps the simplest way is to use one of these symbols between the two numbers being divided: \div , $:$, or $/$.

$$6)48$$

$$48/6$$

$$48 \div 6$$

$$48:6$$

How Are Multiplication And Division Related?

Multiplication and Division are opposite, or inverse, operations. For example, if you multiply a number, 20, by 5 then the result, called the product is 100.

We just changed 20 into 100. How can we change the 100 back to 20? Just divide.

If we divide 100 by 5 then the result, called the quotient, is 20.

$$20 \cdot 5 = 100$$

$$100 \div 5 = 20$$

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What Are The Important Parts Of A Division Problem?

There are 4 important words that we use with a division problem.

Divisor is 6

Dividend is 31

Quotient is 5

Remainder is 1

$$6 \overline{)31} \begin{array}{r} 5 \\ 30 \\ \hline 1 \end{array}$$

Can I Use A Calculator To Find The quotient In A Division Problem?

When Professor Weissman was in the third grade (1952 A.D.) he learned the steps that are used to find the Quotient. True, today it is possible and probably easier to divide with a calculator. However, the Division process (or algorithm) will be the same when we divide in Algebra. And, you can't use the calculator to divide in Algebra. So, it's best to master your Division skills now.

What Do I Do With The Remainder Of 1?

You can write the answer several ways.

Correct.

Correct.

Correct

Correct

Incorrect

5 Remainder 1

5 R 1

5 R 1/6

5 1/6

5.1

What Properties Does Division Have?

Division, like Subtraction is neither Commutative Property. If you change the order of the numbers, the result is different.

$$10 \div 2 \neq 2 \div 10$$

Division like Subtraction, does not have an Associative Property. If you're dividing 3 numbers then you get different answers if you group the middle number differently.

$$(8 \div 4) \div 2 \neq 8 \div (4 \div 2)$$

Division does have an Identity Property. If you divide any number by 1 you don't change its value.

$$8 \div 1 = 8$$

Can I Divide With Zero?

Yes, you can divide with zero, if zero is in the first number or in the numerator.

$$0 \div 5 = 0$$

$$\frac{0}{5} = 0$$

No, you cannot divide with zero, if zero is in the second number or in the denominator.

$$5 \div 0 = \text{undefined}$$

$$\frac{5}{0} = \text{undefined}$$

How Can I Divide Numbers That End With Zeros?

If you need to divide numbers which end with zeros, you can simplify the division process by crossing off an equal amount of zeroes from each number.

Example #1 Divide 35000000 by 50000

Since each number ends in at least 4 zeros, rewrite the problem with each number having 4 less zeros.

Divide 3500 by 5

$$5)3500 = 700$$

Where Is Division Used?

Division is used to find an average. For example, to find the average High F (Fahrenheit) temperature over the next 5 days for New York (zip code 10001) you would add the 5 temperatures and divide by 5.

$$85+87+90+89+89 = 440$$

$$440 \div 5 = 88$$

You won't get 100 miles per gallon in a car like for the scooter. To find how many miles per gallon (mpg) you do get, just divide miles by gallons. If you travel 300 miles and use 15 gallons then

$$\text{mpg} = \text{miles} / \text{gallons}$$






$$300 \text{ miles} / 15 \text{ gallons}$$

$$20 \text{ miles per gallon}$$

Use division to find unit cost. If 12 gallons of gasoline cost \$36 what is the unit cost? Always put the money on top before you divide.

$$\text{Unit cost} = \$36 / 12 \text{ gallons}$$

$$= \$3 / \text{gallon}$$

5-Day Forecast for ZIP Code 10001				
Monday	Tuesday	Wednesday	Thursday	Friday
				
85° F 68° F 29° C 20° C	87° F 71° F 31° C 22° C	90° F 68° F 32° C 20° C	89° F 73° F 32° C 23° C	89° F 73° F 32° C 23° C

100 Miles Per Gallon!

- Save \$ on gas
- Street legal
- No parking hassles
- No special license



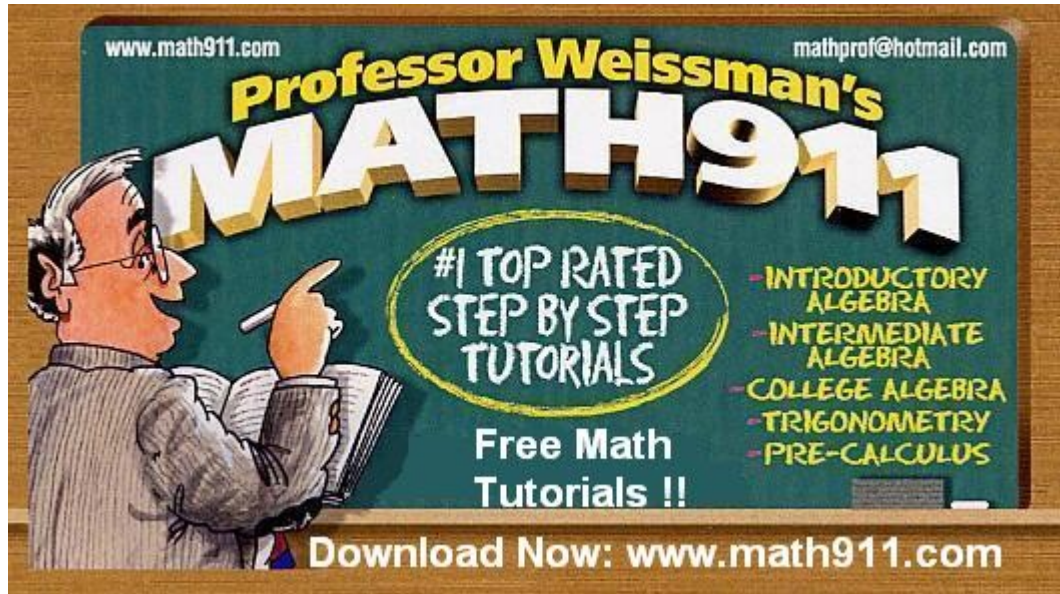
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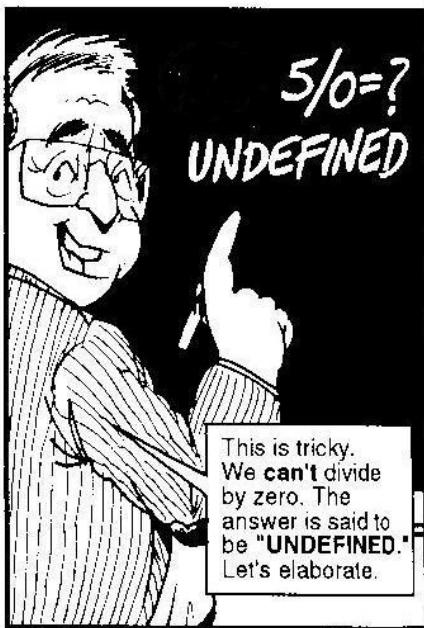
The advertisement features a cartoon illustration of a professor with glasses, a white shirt, and a tie, pointing with a pencil at a chalkboard. The chalkboard is green and contains the text and graphics described above.



IS THERE REALLY A PROFESSOR WEISSMAN?

Professor Weissman started teaching Mathematics with the Board of Education in New York City in 1963. He has been on the faculty of Essex Country College (NJ) since 1969.

The image shows a photograph of a man with glasses, wearing a dark suit, white shirt, and patterned tie. The background of the photograph is a solid blue color.



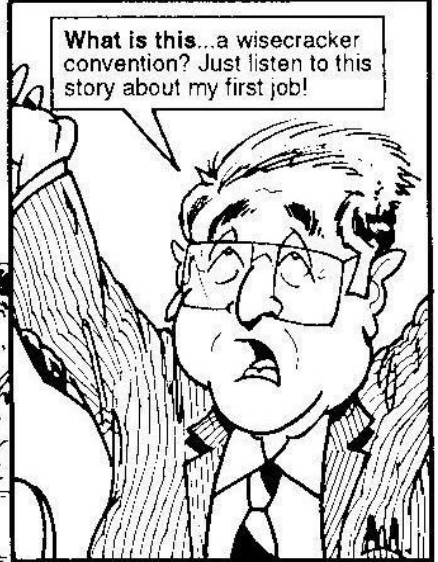
**$5/0=?$
UNDEFINED**

This is tricky. We can't divide by zero. The answer is said to be "UNDEFINED." Let's elaborate.



I'll tell you what I will do. Let me tell you a little story...

Oh goody...make me some warm milk...then you'll tuck me in...



What is this...a wisecracker convention? Just listen to this story about my first job!



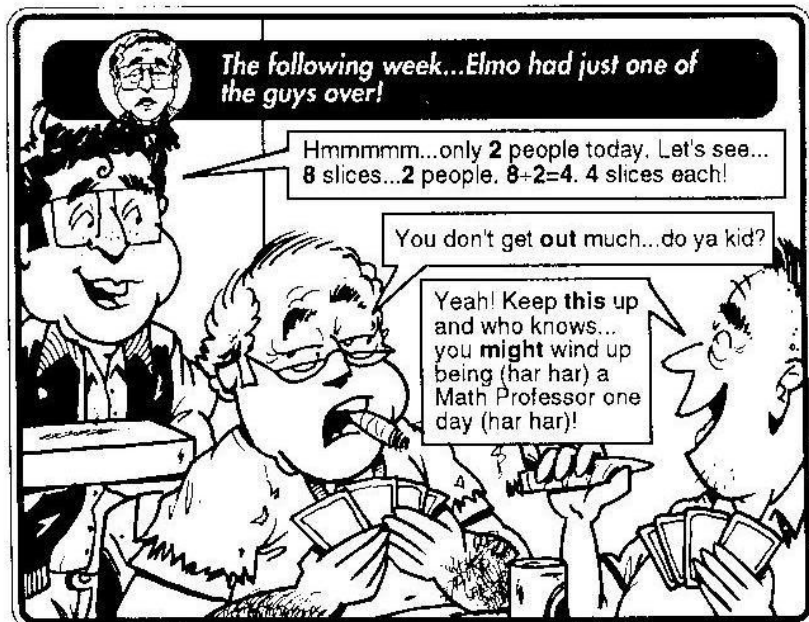
During high school, I used to eat...er...I mean deliver pizzas in my spare time. Every Saturday night...just like clockwork...I'd deliver a pizza to Elmo Needleman's house for the weekly poker game with his buddies. Even back then, in high school, the budding Math Professor in me would surface rather frequently.



One week I showed up with the pizza pie as usual and Elmo had three friends over.

Hey Mr. Needleman...check it out. 8 slices of pizza... 4 people. $8 \div 4 = 2$. That's 2 slices each!

Cee...thanks kid! We never would have figured that out without you!

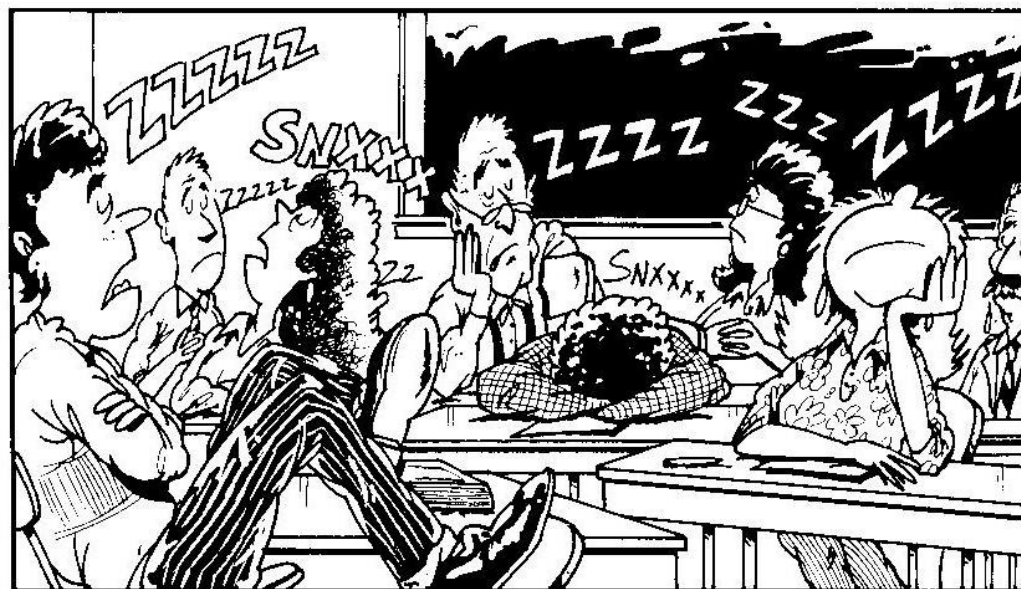
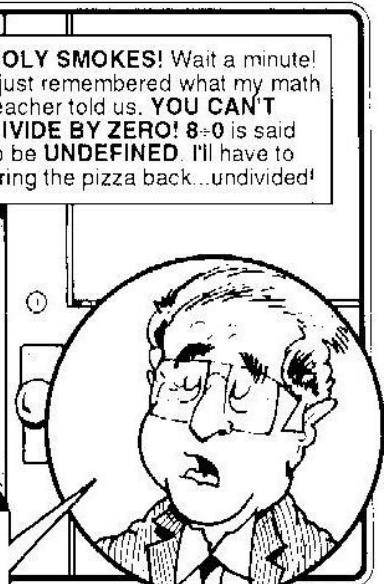
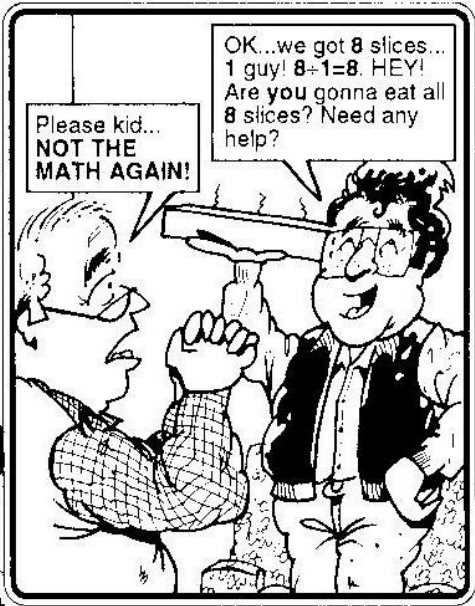


The following week...Elmo had just one of the guys over!

Hmmmm...only 2 people today. Let's see... 8 slices... 2 people. $8 \div 2 = 4$. 4 slices each!

You don't get out much...do ya kid?

Yeah! Keep this up and who knows... you might wind up being (har har) a Math Professor one day (har har)!



Exercise Set 4

1. Divide

- a. $406 \div 7$
- b. $612 \div 9$
- c. $648 \div 6$
- d. $440 \div 5$
- e. $4060 \div 7$
- f. $1608 \div 8$
- g. $1111 \div 9$
- h. $6526 \div 13$
- i. $6720 \div 12$

2. Division with a zero

- a. $0 \div 8$
- b. $0 \div 125$
- c. $8 \div 0$
- d. $125 \div 0$

3. Division with zeros

- a. $56,000 \div 1000$
- b. $56,000 \div 100$
- c. $56,000 \div 10$
- d. Find the quotient of 45 and 9
- e. What is 3000 divided by 50 ?

4. Divisions

- a. $638 \div 21$
- b. $5232 \div 58$
- c. $2279 \div 45$
- d. $2695 \div 13$
- e. $8424 \div 12$
- f. $84240 \div 12$

5. Estimate by rounding then find the exact quotient.

- a. $37516 \div 39$
- b. $827 \div 21$

6. Evaluate a/b for the given values.

- a. $a=45$ $b=9$
- b. $a=72$ $b=8$
- c. $a=0$ $b=23$
- d. $a=5$ $b=0$
- e. $a=12000$ $b=400$

7. Is the given value a solution to the given equation?

- a. $28/x=7$ $x=4$
- b. $x/20=5$ $x=4$
- c. $3=12/x$ $x=4$
- d. $6=x/18$ $x=3$
- e. $0/x=0$ $x=1$
- f. $50/x=5$ $x=10$

8. Averages

- a. Find the average of these numbers: 7,8,3,10, and 2
- b. A student scores 70, 80 and 60 on three exams. What must the student get on the next exam to average 75?

9. Find each unit rate.

- a. 12 apples cost \$5
- b. A car goes 500 miles on 20 gallons of gas.
- c. 64 ounces of orange juice cost \$3.20
- d. You read 10 pages in 5 minutes.
- e. Your printer prints 40 pages in 8 minutes
- f. You walk 20 blocks in 8 minutes.
- g. 2 gallons of paint will cover 380 square feet.
- h. You travel 500 miles in 8 hours.

10. For each Property listed tell if Division has it. If not, give an example.

- a. Commutative
- b. Associative
- c. Identity

Jokes Set #4

Two Math teachers are sitting in a pub. "What a shame.", the first one complains, "how little the general public knows about mathematics?" "Well", his colleague replies, "you're perhaps a bit too pessimistic." "I don't think so", the first one replies. "And anyhow, I have to go

to the washroom now." He goes off, and the other professor decides to use this opportunity to play a prank on his colleague. He makes a sign to the waitress to come over. "When my friend comes back, I'll wave you over to our table, and I'll ask you a question. I would like you to answer:

About 22 over 7. Can you do that?" "Sure." The girl giggles and repeats several times: "About 3, about 3, about 3..." When the first professor comes back from the washroom, his colleague says: "I still think, you're way too pessimistic. I'm sure the waitress knows a lot more about mathematics than

you imagine." He makes her come over and asks her: "Can you tell us what the value of the Greek letter pi is?" She replies: "About 3." The other professor's mouth drops wide open, and his colleague grins smugly when the waitress adds: "...more accurately approximately 3.14159265."

Brain Teasers Set #4

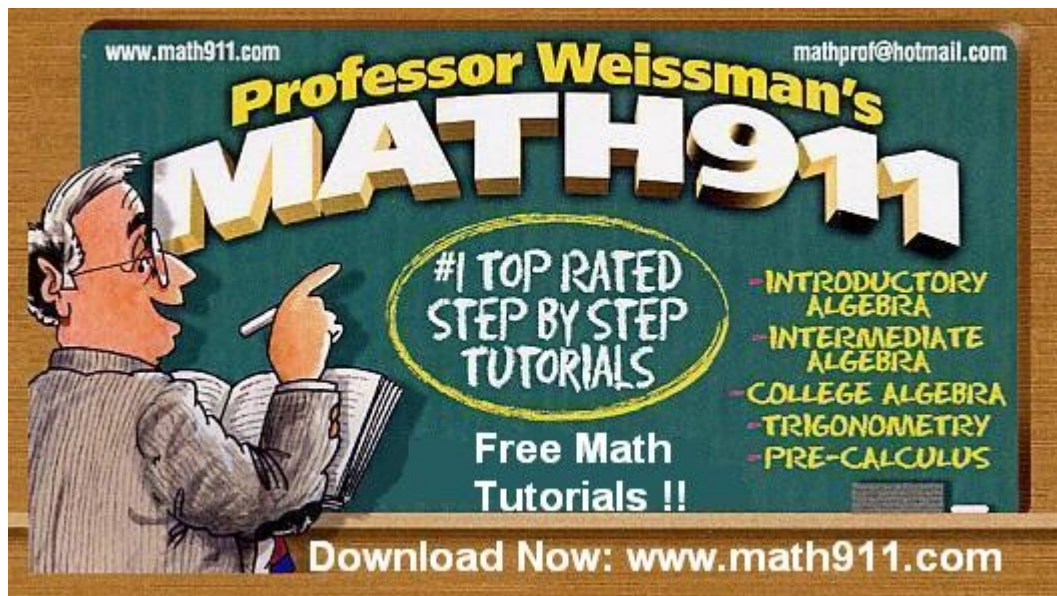
One morning as Paul was getting ready for people to visit his house that he was selling, he noticed something that needed to be fixed. Heading over to the hardware store, he spoke to the manager, describing his problem. The manager



said, "I know just what you need". He led Paul down some aisles and stopped in front of some bins. Digging down into some of the bins, he set something up on the shelf. "I saw your



house when it was built", the manager said. "Here's all that you'll need and how much it'll cost... five or six will be 15 cents while 35 will be 30 cents, 704 will be 45 cents, while 2856 will only cost you 60 cents. One lady, about 20 blocks from your house, bought 10287 and only paid 75 cents! These are black, but they also come in gold and silver." What was the manager selling?



Answers to Exercise Set 4

- | | | | | |
|--------------|--------------|--------------------|------------------------|-------------------------------|
| 1a. 58 | d. undefined | e. 702 | 7a. yes | (mpg) |
| b. 68 | | f. 7020 | b. no | c. 5 cents per ounce |
| c. 108 | 3a. 56 | | c. yes | d. 2 pages per minute (ppm) |
| d. 88 | b. 560 | 5a. 1000 ; 961 R37 | d. no | e. 5 pages per minute (ppm) |
| e. 580 | c. 5,600 | b. 40 ; 39 R8 | e. yes | f. 6 blocks per minute |
| f. 201 | d. 5 | | f. yes | g. 190 square feet per gallon |
| g. 123 R4 | e. 60 | 6a. 5 | | h. 27 miles per gallon (mpg) |
| h. 502 | | b. 9 | 8a. 7 | |
| | 4a. 30 R8 | c. 0 | b. 90 | |
| 2a. 0 | b. 90 R12 | d. undefined | | |
| b. 0 | c. 50 R29 | e. 30 | 9a. 40 cents per apple | |
| c. undefined | d. 207 R4 | | b. 25 miles per gallon | |

Brain Teaser #4 Answers

House numbers. each has 1 digit
Each digit costs 15 cents.



5 or 6 will be 15 cents since

digit while 35 will be 30

704 will be 45 cents, since 704 has three digits.

2856 will only cost you 60 cents, it has 4

digits.

The lady, about 20 blocks from

his house,



bought 10287 and only paid 75 cents!