## INDEX OF THORNY QUESTIONS

## Addition

Why does $a+b+c$ equal $b+a+c$ equal $c+b+a$ and so on?
Why does the traditional long addition algorithm work?
Bases
Why do we use base 10 ?
Why don't we say onety, twoty, threety, fourty, fivety?

## Decimals

Does $0.999999 \cdots$ equal 1 or does it not?

Why does multiplying a decimal number by 10 shift the decimal point?
(Does it really?)

## Division

Why are the three different ways to think of division the same?

What is the value of $8 \div 2(2+2)$ ?

Why does the long division algorithm work?

Can a division problem give a remainder larger than what you are dividing by?

Does division really exist?

## Extraneous Solutions

Do we always need to check for extraneous solutions?

## Fractions

Are $a \div b$ and $\frac{a}{b}$ the same number?
Why do we "Keep Change Flip" to divide fractions?

Does "of" mean multiply?
Does "of" mean division?

Why can't the denominator of a fraction be zero?

Is every number a fraction?

Why is $\sqrt{2}$ irrational?
Does $\sqrt{2}$ exist?

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Inequality
Why do we flip the direction of the inequality sign when we multiply through by a negative number?

## Infinity

Does the list of numbers stop?

## Negative Numbers

Why can there be negative numbers in the area model for multiplication?

Why is negative times negative positive?

Can negative numbers be even or odd?

## Patterns

Do patterns need to be true?

## Prime Numbers

Is 1 a prime number?
Multiplication
What is multiplication?

Why do we do multiplications before additions?

Why does multiplying by zero give zero?
Why do you "add a zero" to multiply a number by ten?
Why does the long multiplication algorithm work?

Why does $a \times b \times c$ equal $b \times a \times c$ equal $c \times b \times a$ and so on?

FOIL: You won't find it in this book. Why?

Why is $x^{2}$ called $x$ squared and $x^{3}$ called $x$ cubed?
(And why isn't there a geometry word for $x^{4}$ ?)

## Subtraction

Why does the long subtraction algorithm work?
Does subtraction really exist?

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Universality
Is math universal?
Is math a language?
Has all of math been solved?
Zero
Is zero a number?

What is $0 \times 0$, "no groups of nothing"?

Is zero even or odd?

Why can't you divide by zero?

Is -0 the same as 0 ?

Is $a^{0}$ equal to 1 ?

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