

INDEX OF THORNY QUESTIONS

Addition

Why does $a + b + c$ equal $b + a + c$ equal $c + b + a$ and so on? Sections 2, 6, 10
Why does the traditional long addition algorithm work? Section 32

Bases

Why do we use base 10? Section 30
Why don't we say onety, twoty, threety, fourty, fivety? Section 31

Decimals

Does $0.999999 \dots$ equal 1 or does it not? Section 54, (70)
Why does multiplying a decimal number by 10 shift the decimal point?
(Does it really?) Section 56

Division

Why are the three different ways to think of division the same? Section 17
What is the value of $8 \div 2(2 + 2)$? Section 17, 46
Why does the long division algorithm work? Section 35
Can a division problem give a remainder larger than what you are dividing by? Section 17
Does division really exist? Section 53
Do we always need to check for extraneous solutions? Section 80

Fractions

Are $a \div b$ and $\frac{a}{b}$ the same number? Sections 37, 38, 40, 52
Why do we "Keep Change Flip" to divide fractions? Sections 37, 41, 46
Does "of" mean multiply? Sections 37, 45
Does "of" mean division? Section 46
Why can't the denominator of a fraction be zero? Sections 38, 52,
Is every number a fraction? Sections 51, 58, 59
Why is $\sqrt{2}$ irrational? Section 59
Does $\sqrt{2}$ exist? Sections 59, 79



Inequality

Why do we flip the direction of the inequality sign when we multiply through by a negative number? Section 78

Infinity

Does the list of numbers stop? Section 1

Negative Numbers

Why can there be negative numbers in the **area model** for multiplication? Section 24

Why is negative times negative positive? Section 25

Can negative numbers be even or odd? Section 27

Patterns

Do patterns need to be true? Sections 18, 19, 65, 103, 104

Prime Numbers

Is 1 a prime number? Section 18

Multiplication

What is multiplication? Sections 3, 5, 23, 41, 45

Why do we do multiplications before additions? Sections 8, 9

Why does multiplying by zero give zero? Section 3

Why do you “add a zero” to multiply a number by ten? Section 33

Why does the long multiplication algorithm work? Section 11

Why does $a \times b \times c$ equal $b \times a \times c$ equal $c \times b \times a$ and so on? Sections 3, 5, 7, 10

FOIL: You won’t find it in this book. Why? Section 11

Why is x^2 called x **squared** and x^3 called x **cubed**?
(And why isn’t there a geometry word for x^4 ?) Section 11

Slope

What do we use the letter m for slope? Sections 81, 82

Does a vertical line have slope? Sections 81, 82



Square roots

Must we rationalize the denominator? (The answer is no!)

Section 97

Is $\sqrt{9} = \pm 3$?

Section 79

Subtraction

Why does the long subtraction algorithm work?

Section 34

Does subtraction really exist?

Section 20

Universality

Is math universal?

Sections 0, 66

Is math a language?

Section 72

Has all of math been solved?

Sections 18, 65, 71

Zero

Is zero a number?

Section 1

What is 0×0 , “no groups of nothing”?

Section 3

Is zero even or odd?

Section 16

Why can't you divide by zero?

Section 17

Is -0 the same as 0 ?

Sections 20, 23

Is a^0 equal to 1?

Section 60