Zillions of Practice Problems for Beginning Algebra

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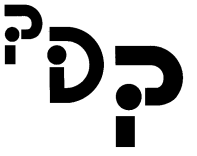

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What This Book Is All About

In the *Life of Fred: Beginning Algebra Expanded Edition* book, there are *Your Turn to Play* sections after each topic is presented. And each *Your Turn to Play* offers complete solutions to each question.

At the end of each chapter are three problem sets, each named after a city. Each of the problems in these cities is also completely worked out in the book.

I thought that all those problems would be enough.
I still think all those problems are enough.
As they say in German: *Genug ist genug.*[*]

Some of my readers have written to me, "Enough is not enough. We want more. We want tons of problems along with completely worked out solutions. We need the drill-and-kill approach. My kids are not crying when they read Fred—how could they be learning math without crying?"

If you are a part of those *some readers*, then this *Zillions of Practice Problems* was written for you.

HOW THIS BOOK IS ORGANIZED

Life of Fred: Beginning Algebra Expanded Edition is in twelve chapters. This book also has twelve chapters.

As you work through each chapter in *Life of Fred: Beginning Algebra Expanded Edition*, you can do as many of the problems as you like in the corresponding chapter in this book.

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[*] "Enough is enough." I learned this nifty phrase when I studied German in high school.

CHAPTERS IN THIS BOOK

Each chapter in this book is divided into two parts.

✯ The first part takes each topic and offers a zillion problems.

✯ The second part is called the Mixed Bag. It consists of a variety of problems from the chapter and review problems from the beginning of the book up to that point.

COMPLETE SOLUTIONS

Every problem (gasp!) will receive a detailed solution—not just the answer.

ELIMINATING TEMPTATION

The solutions and answers are all given in the back half of the book. The first question in this book is numbered "45." The second one is "888." In most ordinary practice books, they are numbered, "1, 2, 3 . . ." which is really silly when you think about it. In those books, when you look up the answer to "1" you might accidentally see the answer to "2" and that would spoil all the fun.

Contents

Mixture Problems

6179. Joe wants to make 30 pounds of chili seasoning that contains 30% cayenne pepper. He has one sack of mild chili seasoning that is 10% cayenne and one sack of hot chili seasoning that is 40% cayenne.

How much of each sack should he use?

6704. Darlene has some pancake mix that contains 2% sugar. She calls that her bitter mix. She has some that contains 5% sugar. She calls that her too-sweet mix.

She wants to make 60 pounds of pancake mix that has 3% sugar. How much of each mix should she use?

8975. You are a veterinarian and you need to give a marten a shot to ease its pain. You need to give it 9 cc that contains 6% morphine. You have some 4% and some 10%. How much of each should you mix together?

(Side note: It is often nice in medical work to get the mathematics right. Too little pain killer and the marten remains in pain. Too much morphine and the martin will look like:

dead marten

201. We need to ship 600 cars to Freedonia, and the order specifies that 28% of those cars should have tape players.

40% of the older cars have tape players, and 15% of the newer cars do. How many older cars should we ship?

1850. Darlene has weak dishwashing liquid that contains 17% soap. She also has strong dishwashing liquid that contains 37% soap.

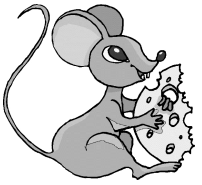
Darlene just purchased a dishwashing robot. When she read the directions, she found out that the robot would only work if you gave it 444 ounces of dishwashing liquid that contained 22% soap.

How much of each dishwashing liquid should Darlene use?

(Joe never washes his dishes because he only uses paper plates.)

Second part: the Mixed Bag: a variety of problems from this chapter and previous material

2226. Joe likes his cereal with exactly 8% flour in it. (The rest is sugar and artificial flavorings.) He asked Darlene take his two boxes of cereal—Captain Mousebait (7% flour) and Sergeant Sugar (11% flour)—and mix them together to get 300 ounces.



How much of each cereal should Darlene use?

1928. Haydn wrote the "Sun" quartets five times as long ago as Robert Frost wrote "In the Clearing."

Sixteen years from now, the "Sun" quartets will be four times as old as "In the Clearing."

How old is "In the Clearing" today?

2258. Joe decided one night to read "In the Clearing." He first read the poem at the rate of 40 words/minute. Then he decided to read it backwards. Reading backwards slowed his reading rate down to 5 words/minute.

It took him a total of 27 minutes to read the poem in both directions. How long did it take Joe to read the poem in the normal direction?

2280. Joe liked to eat jelly beans while he watched television every evening. He bought red jelly beans at a cost of $5/lb. He bought green jelly beans at $6/lb. He spent a total of $488. He bought 8 more pounds of the green than of the red. How many pounds of red jelly beans did he buy?

4507. This particular cat likes some bones in his fish. (It's a good source of calcium.) This cat prefers a fish mixture with 7% bones.

How many pounds of 5% bones should he mix with 8% bones to obtain 36 pounds of fish with 7% bones?

Chapter Five

First part: Problems on Each Topic

Solving Two Equations, Two Unknowns by Elimination

1891. Solve $\begin{cases} 7x + 3y = 43 \\ 4x - 3y = 1 \end{cases}$

2292. Solve $\begin{cases} 5x + 3y = 18 \\ -5x - 10y = 10 \end{cases}$

2904. Solve $\begin{cases} 10x + 6y = 62 \\ 8x - 2y = 2 \end{cases}$

4010. Solve $\begin{cases} 4x + 3y = 3 \\ 12x - 7y = -71 \end{cases}$

4505. Solve $\begin{cases} 6x + 6y = -18 \\ 7x + 8y = -25 \end{cases}$

4519. Solve $\begin{cases} 6x + 3y = 6 \\ 9x + 10y = 42 \end{cases}$

Union of Sets

3328. What is the union of {3, 4, 5} and {4, ♡, w}?

4280. $\{8\} \cup \{1, 2\} = ?$

4500. $\{x \mid x \text{ is an integer and } x > 4\} \cup \{y \mid y \text{ is a whole number and } y < 6\}$

600. $\{1, 2, 3\} \cup \{3, 2, 1\}$

800. $\{\ \} \cup \{$☮$\}$

924. For any set A, it is always true that $A \cup \{\ \} = A$.

For any number x, it is always true that x times 1 equals x.

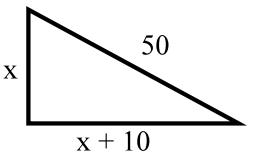
{ } is called the identity element for union.

1 is called the identity element for multiplication.

What is the identity element for addition?

1893. $\{ y \mid y \text{ is an integer and } y < -4\} \cup \{ z \mid z \text{ is a natural number}\}$

6019. In a right triangle the shortest leg is 10 meters shorter than the other leg. The hypotenuse is 50 meters long. How long is the shorter leg?



We almost always begin a word problem by letting the variable equal the thing we are trying to find out.
Let x = the length of the shorter leg.
Then x + 10 = the length of the longer leg.

By the Pythagorean theorem, $x^2 + (x + 10)^2 = 50^2$

$$x^2 + x^2 + 20x + 100 = 2500$$

$$2x^2 + 20x - 2400 = 0$$

Divide everything by 2 $\quad x^2 + 10x - 1200 = 0$

Find two numbers that multiply to –1200 and add to 10. $\quad$ +40 and –30 $\quad (x + 40)(x - 30) = 0$

Set each factor equal to zero $\quad x + 40 = 0$ OR $x - 30 = 0$

$$x = 30 \text{ meters}$$

(x = – 40 meters doesn't make any sense for the length of a leg.)

6021. $\dfrac{5}{y - 12} + \dfrac{17 - y}{12 - y}$

The least common multiple is not (y – 12)(12 – y). That's too large. We can make the denominators alike by multiplying the second fraction on the top and bottom by –1.

$$\frac{5}{y - 12} + \frac{17 - y}{12 - y} = \frac{5}{y - 12} + \frac{(17 - y)\mathbf{(-1)}}{(12 - y)\mathbf{(-1)}}$$

$$= \frac{5 + (17 - y)(-1)}{y - 12}$$

$$= \frac{5 - 17 + y}{y - 12}$$

$$= \frac{y - 12}{y - 12} = 1$$

6025. {x | x = *a*/*b* where *a* and *b* are integers and $b \neq 0$} is the set of **rational numbers**. All of these are rational numbers: 7/3, –5/8, 200, 4.3238, $\sqrt{144}$, and 0, because each of these can be written as an integer divided by a non-zero integer. 200 = 200/1, 4.3238 = 43238/10000, $\sqrt{144}$ = 12/1, and 0 = 0/83.

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