SAINT JOSEPH COLLEGE
CONNECTICUT

Center for Academic Excellence

Preparing for Praxis 1- Mathematics

The Praxis 1 Computer-Based Test you are preparing for is designed to test your ability to think mathematically. It can do this with the basic mathematics topics described in the Tests at a Glance booklet. Any mathematics course you have taken will improve your skill and enhance your performance on the test. However, the questions on the test do not require a review of anything beyond elementary algebra or geometry. Good mathematical thinking can be thoroughly evaluated using only the basic mathematics usually taught in the first nine grades. The geometry is mostly practical: perimeter, area, volume, the Pythagorean Theorem. The only other geometry (that you might associate with the traditional 10^{th} grade geometry course) includes angle relationships, parallel lines, and triangles.

You may have forgotten some to the techniques and relationships you learned in the middle and upper grades but in your everyday experience you have designed your own math methods and they work! Perhaps in the fifth grade you learned to subtract a mixed number from a whole number; for example, $5 - 2\frac{1}{4}$:

$$\begin{array}{rcl} 5 & = & 4\frac{4}{4} \\ -\ 2\frac{1}{4} & = & 2\frac{1}{4} \\ \hline & & 2\frac{3}{4} \end{array}$$

As an adult, if you want to know how much will be left if you use two and a quarter yards of material from a five-yard length are you inclined to use that method or to say “5 yards minus 2 yards leaves 3 yards; now subtract the $\frac{1}{4}$ and I’m left with $2\frac{3}{4}$ yards?”

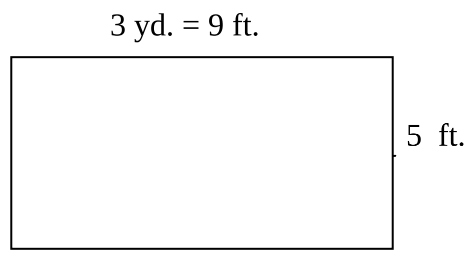
Another example: You want to figure a 15% tip for a restaurant meal that cost $28.86. In school you learned to multiply $28.86 by .15 = $4.3290 ≈ $4.33. In the restaurant that arithmetic might be a little awkward so you might say to yourself: 10% of $30 ($28.86 rounded) is $3 and 5% would be half of that: $1.50, so the appropriate tip is $3 + l.50 = $4.50. Of course, if that were a test problem for which you needed an exact answer, you would not round to $30. You might still prefer finding 10%, followed by 5% and adding the amounts: 10% of $28.86 = $2.886; 5% is still half of the 10% amount: ½ of $2.886 = $1.443 and the sum of $2.886 + $1.443 = $4.329 ≈ $4.33.

The two examples above suggest that you have figured out alternate methods to what you were taught in grade 5 or 7 and therefore you don’t have to re-memorize a lot of rules that you once knew. (Just a few!) Often all you need is a good dose of common sense and a felt need to figure something out. The important thing is to be sufficiently relaxed during the test so that these good methods will surface when you need them! Knowing that you have the self-taught alternate methods to fall back on should help you to relax!

Often the problems you are asked to solve do not lend themselves to automatic responses. Consider,

1. How many quarts of milk will fit in a 6-gallon container? Easy. How many quarts in a gallon? 4 So there are 6 × 4 quarts in a 6-gallon container. That's an automatic response—6 × 4 quarts = 24 quarts—with a pretty standard method.

2. How many 2-foot by 2-foot napkins can you cut (no seams) from a piece of fabric 3 yards long and 5 feet wide? If you needed to make those napkins you would figure out how to do it. It is not, however, a standard, automatic, arithmetic response. You have to do a little "fiddling around". Draw a sketch, notice that you'll have to waste some material, and count!



How many 2-foot wide napkins will fit across the 3 yd. (= 9 foot) length? Four will use up 8 feet and you will have 1 foot left over. Sketch them on the rectangle above. How many 2-foot napkins will fit down the 5 ft width? Two. Yes, and there will be a foot left over again. Sketch them in again. Now, how many napkins can you cut? Count them or think: I have two rows with four napkins in each. Therefore, I have 8 napkins.

The second problem gives a better indication of your ability to think mathematically than the first one. So, be ready for the non-standard problem which makes you think. Use your imagination and put yourself into the situation where you have to do the problem. You'll figure it out.

What about the problem where someone's salary is cut a certain percent and after some time she is given a raise that is the same percent of her salary as the cut. What is the temptation? To think her salary goes back to the original amount. But, this is not true. Let's look at an example. Jill receives $400 a week. After a time she gets a 10% pay cut. After a few more months she receives a 10% raise. What is her salary now?

Jill's $400 salary is cut 10%. What is 10% of $400?

____ = .1 × $400

$40 = .1 × $400

Her salary is now $400 - $40 = $360.

Months later she receives a 10% raise. What is the percent based on now? Her current salary which is $360. What is 10% of $360?

____ = .1 × $360

$36 = .1 × $360

Her salary is now \$360 +36 = \$396, not quite back to \$400!

Why did that happen? The salary that was cut was \$400; the salary that got the raise was \$360 so although the percent did not change, the base (the salary) did change. Problems like these as well as others that can fool us are mixed in the "Problems for Praxis" sets in the math hotfiles in the Academic Resources Center. Come to the ARC and help yourself.

Watch for some other "traps" in problem solving.

1. Average speed for a trip to and from a destination when you travel 60 mph going and 40 mph coming is NOT 50 mph. To find average speed for a trip you divide the total distance by the total time it took.

2. A 20% discount followed by a 30% discount is <u>not</u> equivalent to a 50% discount. Why not? Because the second discount is taken off the reduced price that results from the 20% discount. Consider a \$20 item. 20% of \$20 is \$4 so the price is now \$20 - \$4 = \$16. 30% of \$16 is \$4.80, so the price goes down from \$16 to \$16 - \$4.80 = \$11.20. What percent of \$20 have you saved? If the price you finally pay is \$11.20 you have saved \$8.80. What percent of \$20 is \$8.80?

\$8.80 = ______percent of \$20

\$8.80 = x times \$20 To isolate x, divide both sides of the equation by \$20: $x = \$8.80 \div \$20$

$x = .44 = 44\%$

Clearly the combined discounts are not as good as a 50% discount.

Helpful practices include drawing a sketch, making a table of the given information, changing "messy" numbers to simple ones and consequently doing a simpler problem to discover the correct method, estimating, using trial and error. These are all more important than memorizing lists of formulas and methods. A good memory does help but what helps the memory is lots of practice. Never study a math book without a pencil in your hand!

The best preparation for PRAXIS I Math is practice, doing problems. Just as you would not prepare for a tennis match by reading a book about tennis, you cannot prepare for a math test by reading/looking over a math book. Don't look at problems, DO them.