End of Section Quiz

Write your answers to each question down; this will force you to think them through, and won't allow you to cheat (by cutting yourself slack) when you look at the answers. If your answer doesn't mean the same thing as the first sentence of my answer, you got it wrong (you don't have to include all the related stuff in your answers that I have after the first sentence of mine).

If you miss one or more questions, read through the answers, think about them, take a break, and then re-do the *entire* quiz. Do this until you get a perfect score.

1. What is an equation?

2. What does "solve for x in terms of y" mean?

3. Why, when changing one side of an equation, do you have to do the exact same thing to the other side?

4. What is substitution? Why does it work?

5. Should you ever skip steps (meaning not write them down) when doing algebra? Why or why not?

6. In doing Data Sufficiency questions, what is the first question you ask yourself when trying to determine if a statement is sufficient?

7. When do you backsolve?

8. How do you backsolve?

Answers to End of Section Quiz

1. An equation is a comparison between two values. The value on the right side of the equation (gotten by doing all the math on that side) is exactly the same as the value on the left side of the equation.

2. It means that you will have x on one side of the equation (with no numbers or other variables), and everything else on the other, and that "everything else" will include y.

3. The two sides of an equation work out to exactly the same number (that is what the "=" means), so if you change one side, you have to change the other side in the same way in order to keep them exactly the same.

4. Substitution is replacing a variable with what it equals. For example, if x = 4, you can put "4" everywhere you see x. This works (meaning, it is allowed by rules of math) because "=" means "exactly the same" (see question 1). If two things are exactly the same, replacing one for the other should change nothing.

5. You should never skip steps when doing algebra – write everything down. This is important, because when you don't write things down, you have to do them in your head.

Work done in your head is harder (and slower) in the long run, and will hurt your GMAT score overall. Writing things down is easier, and thus better for your score in the long run, plus it allows you to catch any mistakes you make as you make them (because you can see them right in front of you).

6. Ask yourself, "Do I have as many different equations as I do different variables." If the answer is yes, then you can solve for any variable you want. If the answer is no, you'll have to do some math (solve and substitute).

7. Backsolve when you don't know how to do the problem any other way, or when another way of doing the problem will take you too long.

8. Backsolving means substituting each answer into the equations you are given, solving for everything, and seeing if you get false statements. If you do, the answer is wrong; if you don't, the answer is right.

Algebra Practice Questions

The following have both Problem Solving and Data Sufficiency questions mixed together, just as the actual GMAT will. You will recognize Data Sufficiency questions by the two statements (1 and 2) below each question, and by their answers.

Before you do these questions, make sure that you have compiled a long and a short list, as described in the **Study Guide**; make sure you look at your short list before doing every question here. Don't worry about time; take as long as you need, just make sure you follow all the proper steps in answering the questions. Take at least one break during practice (after question 5).

Once you've finished these questions, take a break. Then review the explanations (located at the end of the question set). See what you did right and what you did wrong; edit your short list, add to your long list, visualize again. When you are ready, there is a second set of questions **(no there isn't – should there be?)**. The point of these questions is to reinforce what you learned in the first set, and give a chance to practice any technique changes you made after reviewing the first set.

1. $t = 2q$

   $\frac{t}{6} = q - 24$

   What is the value of q?

   A. 12
   B. 15
   C. 24
   D. 27
   E. 36

2. If $a + b + c = 27$, what is the value of a?

   1) $3a + b = 36$
   2) $2b = 3c - 9$

   A. Statement (1), by itself, is sufficient to answer the question, but statement (2), by itself, is not.
   B. Statement (2), by itself, is sufficient to answer the question, but statement (1), by itself, is not.
   C. Statements (1) and (2) taken together are sufficient to answer the question, although neither statement by itself is sufficient.
   D. Either statement by itself is sufficient to answer the question.
   E. Statements (1) and (2) taken together are not sufficient to answer the question, nor are they sufficient to answer the question by themselves.

3. Solve for x in terms of y.

   $3x - y = 2x + 2y$

   A. $x = y$
   B. $x = 3y$

C. $x = y + 1$
D. $x = 2y - 1$
E. $x = \frac{2y}{3}$

4. What is the value of a?

1) $a + 3 = \frac{3a}{2}$
2) $2a = 4a - 6b$

A. Statement (1), by itself, is sufficient to answer the question, but statement (2), by itself, is not.
B. Statement (2), by itself, is sufficient to answer the question, but statement (1), by itself, is not.
C. Statements (1) and (2) taken together are sufficient to answer the question, although neither statement by itself is sufficient.
D. Either statement by itself is sufficient to answer the question.
E. Statements (1) and (2) taken together are not sufficient to answer the question, nor are they sufficient to answer the question by themselves.

5. What is the value of x?

$\frac{x}{y + 2} = 4y - 1$

$\frac{x}{3} + y = 4y$

A. $\frac{1}{4}$
B. $\frac{1}{3}$
C. 2
D. 4
E. 9

Take a short break, about a minute. Do a little movement to get your blood flowing. OK, ready? Back to algebra!

6. $m + g - e = 4$. What is the value of m?

1) $g = e$
2) $6 + 2g = 2m$

A. Statement (1), by itself, is sufficient to answer the question, but statement (2), by itself, is not.
B. Statement (2), by itself, is sufficient to answer the question, but statement (1), by itself, is not.
C. Statements (1) and (2) taken together are sufficient to answer the question, although neither statement by itself is sufficient.
D. Either statement by itself is sufficient to answer the question.
E. Statements (1) and (2) taken together are not sufficient to answer the question, nor are they sufficient to answer the question by themselves.

7. What is the value of s?

$u - .5s = 2$
$.2u + .125s = 4$

A. 1.2
B. 1.6
C. 12
D. 15
E. 16

8. $2d + 1 = c + \frac{d}{4}$

$c - d = d - 3$

Solve for d.

A. 4
B. 8
C. 9
D. 12
E. 15

9. If $w - z = \frac{4w}{3z}$, what is the value of z?

1) $w + z = 3w - .5z$
2) $2w + 2z = 6w - z$

A. Statement (1), by itself, is sufficient to answer the question, but statement (2), by itself, is not.
B. Statement (2), by itself, is sufficient to answer the question, but statement (1), by itself, is not.
C. Statements (1) and (2) taken together are sufficient to answer the question, although neither statement by itself is sufficient.
D. Either statement by itself is sufficient to answer the question.
E. Statements (1) and (2) taken together are not sufficient to answer the question, nor are they sufficient to answer the question by themselves.

10. $\frac{x(x - 1)(x - 2)(x - 3) + x}{x} = 7$

What is the value of x?

A. 1
B. 2
C. 3
D. 4
E. 5

11. What is the value of r?

1) $r + .5t = 7$

2) $4r + 2t = 28$

A. Statement (1), by itself, is sufficient to answer the question, but statement (2), by itself, is not.
B. Statement (2), by itself, is sufficient to answer the question, but statement (1), by itself, is not.
C. Statements (1) and (2) taken together are sufficient to answer the question, although neither statement by itself is sufficient.
D. Either statement by itself is sufficient to answer the question.
E. Statements (1) and (2) taken together are not sufficient to answer the question, nor are they sufficient to answer the question by themselves.

Answer Key for Algebra Practice Questions

1. D
2. C
3. B
4. B
5. E
6. A
7. E
8. A
9. D
10. D
11. E

Explanations for Algebra Practice Questions

1. $t = 2q$

$\frac{t}{6} = q - 24$

What is the value of q?

We have two variables and two equations, so we can definitely solve. We have to solve one of the equations for one variable, and then substitute that into the other equation. But, wait, the first equations ($t = 2q$) is *already solved* for t; that makes our job very easy. Just substitute this into the 2nd equation.

$$\frac{2q}{6} = q - 24$$

When you see a fraction like 2/6 that can be reduced, reduce it (this isn't necessary to the question, but makes it easier). 2/6 is the same as 1/3, because 2 goes into both 2 and 6 (1 time into 2, 3 times into 6, thus, 1/3). 1/3 q is the same as q/3.

$$\frac{q}{3} = q - 24$$

Now get rid of that pesky 3 in the denominator by multiplying both sides by 3. (If we hadn't reduced the 2q/6, we'd be multiplying by 6 now).

$$3\left(\frac{q}{3}\right) = 3(q - 24)$$

The 3's will cancel out on the left side. On the right side, you have to multiply *everything* by 3.

$$q = 3q - 72$$

Get the q's together on one side; we subtract 3q from the right side because it is positive, and we always do the opposite operation:

$$q - 3q = 3q - 3q - 72$$

$$-2q = -72$$

$$\frac{-2q}{-2} = \frac{-72}{-2}$$

$$q = 36$$

This is answer E.

2. If a + b + c = 27, what is the value of a?

   1) 3a + b = 36
   2) 2b = 3c – 9

Here's a Data Sufficiency question. We are given one equation to start with, which has three variables in it. We, most likely, need two more equations to be able to solve.

Statement 1 gives us a 2nd equation. Our rule is to first count the variables and equations; if they are equal, the statement is sufficient. Here we have 3 variables but only 2 equations. That means that we have to do some math. Solve for b and substitute into the 1st equation:

Statement 1) $3a - 3a + b = 36 - 3a$

$$b = 36 - 3a$$

Substitute:

$$a + 36 - 3a + c = 27$$

We still have a c in the equation, so we can't get a value for a. Insufficient.

Statement 2 is the same; we still only have 2 equations – the original one and the one given in statement 2; we ignore statement 1 for the time being (look at the statements by themselves, only combine if they are both insufficient). Solve for b:

Statement 2) $\frac{2b}{} = \frac{3c - 9}{}$

$$2 \qquad 2$$

$$b = \frac{3c - 9}{2}$$

I can see that when I substitute this into the original equation, I'll still have c's left (nothing will cancel out), so this is going to be insufficient.

Since they are both insufficient, we look at the two statements together. They give us three equations (including the original one, a + b + c = 27) and three variables (a, b, and c). None of the equations is a multiple of the others (there is no number you can multiply any equation to make the others; for example, statement 1 has 3a, but only one b, so we can't multiply the original equation by 3 to make it). Thus, we can solve for any variable, and the statements are sufficient together. This is answer C.

3. Solve for x in terms of y.

$$3x - y = 2x + 2y$$

We have to move all the x's to one side and everything else to the other. I'll move the y's first (it doesn't matter what order I do things in, remember).

$$3x - y + y = 2x + 2y + y$$

$$3x = 2x + 3y$$

Now I have to move the x's to the left side.

$$3x - 2x = 2x - 2xy + 3y$$

$$x = 3y$$

This is answer B.

4. What is the value of a?

1) $a + 3 = \frac{3a}{2}$
2) $2a = 4a - 6b$

Another Data Sufficiency question. Almost half of these questions are Data Sufficiency, which is a higher percentage than you'll see on the actual GMAT, but I want to get you used to Data Sufficiency now, so that when they start to get more difficult you have a good foundation to build on. Anyway, we want to find a number value for a here.

Statement 1 gives us a single equation, with only one variable. Our first rule is to compare the number of equations and variables; since they are equal here, we can definitely solve for a. This is sufficient.

Statement 2 gives us a single equation with two variables, a and b. We won't be able to solve this and get a number value for a. You are welcome to do the math, but by this time you should realize, from experience, that an equation like this will never generate a number

value. Not doing the math here is not skipping steps, because you know the answer already, just as if I asked you for 10 + 5 it would be OK not to write the problem down.

Since 1 is sufficient but 2 isn't, the answer is A.

5. What is the value of x?

$$\frac{x}{y+2} = 4y - 1$$

$$\frac{x}{3} + y = 4y$$

Solve the 2nd equation for y, because that is pretty easy (all we have to do is move the y from the left to the right side, and then divide).

$$\frac{x}{3} + y - y = 4y - y$$

$$\frac{x}{3} = 3y$$

To get rid of the 3y, we divide by 3. This is the same as multiplying by 1/3 (remember, the fraction line means divide, so something time 1/3 means "multiply by 1, divide by 3"). Multiplying by 1/3 makes the left side easier to deal with than it would be if you have divided by 3 (although the result is the same).

$$\left(\frac{1}{3}\right)\frac{x}{3} = 3y\left(\frac{1}{3}\right)$$

$$\frac{x}{9} = y$$

Now substitute this into the 1st equation wherever you see y.

$$\frac{x}{\frac{x}{9}+2} = 4\left(\frac{x}{9}\right) - 1$$

Now, the only way to get rid of the denominator on the left side is to multiply both sides by (x/9 + 2), and you can see that that will have weird results on the right side (since we'll be multiplying x by x). At this point the problem should be looking a little too complicated to do in the time we have. What should we do?

We should backsolve. I would start with answer E. Why? Because we have all of those x's over 9, and if x were 9, that would make the math much, much easier. If you start with A, that's OK, too, as long as you can quickly see that each answer won't work. Let's try 9 real quick and see why it works.

$$\frac{9}{\frac{9}{9}+2} = 4\left(\frac{9}{9}\right) - 1$$

9 over 9 is one. 4 times 1 is 4.

$$\frac{9}{1+2} = 4 - 1$$

$$\frac{9}{3} = 3$$

This is true, so the answer is E.

Real quickly, I'll do answer A, so you can get a feeling for how to recognize when an answer is wrong.

$$\frac{\frac{1}{4}}{\frac{1}{4}+2} = 4\left(\frac{1}{\frac{4}{9}}\right) - 1$$

Now, 1 over 4 over 9 is the same as 1 ÷ 4/9 (because the fraction line means divide). This is the same as 1(9/4) (which is just 9/4, because anything times 1 is the same), because when you divide by a fraction, you flip the fraction over and multiply. So, 1/4/9 is 9/4. If you aren't comfortable with the process by now, review it several times; it *will* come up on the GMAT, and you don't want to have to figure it out on the test, you want to just know how to do it.

$$\frac{\frac{1}{9}}{\frac{9}{4}+2} = 4\left(\frac{1}{4}\right) - 1$$

This is clearly wrong. Why? Because 1 over whatever that is is going to be smaller than 1 (the denominator is greater than 1, right? and when you divide by numbers greater than 1, the result is smaller than what you started with; here, that means the left will be smaller than 1). The right side is larger than 1; 4 times 9/4 is going to be 36/4, and even subtracting that 1 won't make it smaller than 1. Thus, the two sides *can't* be equal, and I don't need to figure out exactly what they are. This answer has to be wrong, because the equation I have is false.

6. m + g – e = 4. What is the value of m?

1) g = e
2) 6 + 2g = 2m

Another Data Sufficiency question; here we start with three variables and one equation. let's look at Statement 1 first.

Our first step is always to count variables and equations. Statement 1, combined with the original equation, gives us two equations and three variables. That means we have to do a little math. Since Statement 1 is already solved for g, substitute into the original equation.

$$m + e - e = 4$$

$$m = 4$$

We have a value for m, so this statement is sufficient. Remember to always make a note (writing either S or I) when you finish a statement, so that later you know if it was sufficient or not, even if you forget halfway through the next statement.

Statement 2 also gives us an additional equation; we have two equations and three variables. We don't have to do the math, either. You can see that if you solve this and substitute into the original equation, we can't cancel out e, because there is no e in this equation. Statement 2, then, is insufficient, because substituting it into the original equation leaves us with two variables. The answer is A.

7. What is the value of s?

$u - .5s = 2$
$.2u + .125s = 4$

Solve the first equation for u (because it's easier) and substitute that into the second equation.

$$u - .5s + .5s = 2 + .5s$$

$$u = 2 + .5s$$

Substitute:

$$.2(2 + .5s) + .125s = 4$$

Remember, you have to multiply .2 times everything in the parenthesis (because each part was a part of u).

$$.4 + .1s + .125s = 4$$

How'd we get .1s? .2 times .5 is .1, because 2 times 5 is 10, and we have two decimal places (see the **Arithmetic** appendix for more on multiplying decimals).

$$.4 + .225s = 4$$

$$.4 - .4 + .225s = 4 - .4$$

$$.225s = 3.6$$

Don't be afraid of a little long division, go ahead and divide .225 into 3.6. Remember, because you are dividing by a decimal, you have to move the decimal point over in both numbers three times (because you move the decimal point three times to make .225 a non-decimal). That means you are dividing 225 into 3600. It goes in 16 times, which is answer E.