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. How do you recognize an equation in a word problem?

2. What words mean "equals"?

3. What is our approach to word problems?

4. How often is information you are given in a problem on the GMAT not necessary for solving the problem?

5. In Data Sufficiency, what's the first thing you look for to determine if a statement is sufficient?

6. Whenever you create a new variable, what should you do?

7. How is the answer to number 6 different for problems involving age?

8. When do you pick numbers?

9. When picking numbers, what numbers should you pick?

Answers to End of Section Quiz

1. Any sentence which compares two or more values is an equation. For example, "Fred is 10 inches shorter than Bob." This is a comparison between Fred's height and Bob's height, so is an equation.

2. Conjugations of "to be": is, are, was, will be, would be, etc. "Is" (and it's conjugations) generally mean "is identical to" which is also what "equals" means.

3. Read one sentence at a time, write anything down that you are told, do any work that you can do (generally meaning solve or simplify equations if you can).

4. Never. Everything that you are told will be needed to answer the question. That's why writing things down and doing the appropriate work is never a waste of time – you'll need to do it sooner or later, so you might as well do it now, before you clutter your mind with other facts.

5. Count the distinct variables and the different equations (make sure that you include any equations that you are given to start with); if they are equal, it's sufficient. If not, do the math (solve and substitute) and see if you can make it work.

6. Write down what it stands for. Remember, variables always stand for number values, so writing "b = Bob" is wrong; b must be Bob's height, or weight, or *some* number associated with Bob.

7. When labeling variables in age problems, you'll write down "now". E.g. "m = Mary's age now." This is because ages change, so you want to know what value the variable started at.

8. Pick numbers when the question doesn't give you any numbers to start with (all variables).

9. Any you want, as long as they are easy and don't contradict what you are told.

Algebra Word Problems 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. The contents of a box weigh a certain amount. If you remove fifteen pounds from the box its contents will weigh five pounds more than if you had halved their weight. How much did the box's contents originally weigh?

    A. 20
    B. 25
    C. 40
    D. 45
    E. 50

2. Three monkeys and two giraffes eat a combined 45 kilograms of food in a week. A single giraffe eats two kilograms less than twice what a monkey eats each week. How much does a single monkey eat in a week?

    A. 21
    B. 15
    C. 12
    D. 9
    E. 7

3. Who is taller, Mike or Carl?

    1) Mike is 3" taller than Betty.
    2) Twice Carl's height would be 4" less than twice Mike's height.

    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.

4. If the girls in the class were split into three equal groups, the size of each group would be the same as if 18 girls had left the class. How many girls are in the class?

A. 33
B. 30
C. 27
D. 21
E. 18

5. Missy is now 1/3 Jeremy's age. In 5 years, Jeremy will be twice as old as Missy. What is the current difference between their two ages?

A. 5
B. 10
C. 15
D. 20
E. 25

Take a short break: deep breaths, rotate your shoulders, shake out your hands. Wait until you feel ready to start again. Another deep breath, feel good, go ahead!

6. Andy is 10 and Barbara is 12. How many years ago was Andy 1/2 of Barbara's age?

A. 2
B. 4
C. 5
D. 6
E. 8

7. If the youngest of three brothers is half the middle brother's age, and the oldest is three times the youngest brother's age, in how many years will the youngest be half the oldest's age? **BAD QUESTION!!!! CAN I FIX IT?**

A. 2
B. 3
C. 4
D. 5
E. 6

8. Isadora has two large jugs of milk and some small cartons of milk. All the large cartons are of the same size, and all the small cartons are of the same size. How many small cartons does she have?

1) Large cartons contain twice the milk as small cartons, and she has 8 gallons of milk in total.
2) She has a total of six containers of milk.

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.

9. For every cup of sugar used, a certain recipe requires E eggs. Eggs cost D dollars and sugar costs F dollars. If John starts with X dollars, follows this recipe, and uses C cups of sugar, how much money does he have left after buying all the ingredients?

A. $X - C(DE + F)$
B. $X - CF + CE$
C. $CEF - FX + D$
D. $D(CE + F) - X$
E. $CE - CF - DX$

10. A sandwich maker is making tuna sandwiches. The sandwiches have only tuna and mayonnaise on them. Every spoonful of mayo has 50 calories and every spoonful of tuna has 120 calories. Including the bread, which has 100 calories, the sandwiches has 560 calories, and there are 5 spoonfuls of stuff on it. How many spoonfuls of tuna are on the sandwich? **too easy, use different numbers**

A. 2
B. 3
C. 4
D. 5
E. 6

11. Half of the musicians in the orchestra play woodwinds. Half of those who don't play woodwinds play strings. Half of those who play neither strings nor woodwinds play percussion. The remaining five play triangles. How many musicians, total, are in the orchestra?

A. 40
B. 36
C. 32
D. 24
E. 20

12. A sphere contains *m* molecules of oxygen evenly distributed throughout it. If it were divided into 4 equal sections, each section would contain enough oxygen for 4 breaths. If a sphere with 800 molecules of oxygen has enough oxygen for eight breaths, what is the value of *m*?

A. 800
B. 1000
C. 1200
D. 1600
E. 2400

13. An encryption scheme arrives at the code number for a word by multiplying the place of each later in the alphabet (A is 1, B is 2, etc.) by the sum of the key number and the position of the letter in the word (1^{st}, 2^{nd}, etc.). If the code number for ACE is 121, what is the key number?

A. 3
B. 5
C. 11
D. 13
E. 33

14. A couple is celebrating their anniversary today. They have been married for one half of his life, and since she was 30 years old. In five years they will have been married for one half of her life. How many years have they been married?

A. 24
B. 25
C. 30
D. 40
E. 50

15. Monkey ball teams have *m* people on them. With 48 people, *x* teams can be formed. What is the value of *m*?

1) Super monkey ball teams have 2 more people on them than monkey ball.
2) 4 fewer super monkey ball teams can be formed from 48 people than monkey ball teams.

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. If half the contents of the smaller of two full pitchers of water were poured out it would contain one third of the contents of the larger; however, two of the smaller pitchers, if full, would contain five fluid ounces more than one of the larger. How much water would it take to fill both the smaller and larger pitchers, if empty?

A. 12
B. 15
C. 24
D. 25
E. 30

explanations for last few questions

Answer Key for Algebra Practice Questions

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

Explanations for Algebra Practice Questions

1. The contents of a box weigh a certain amount. If you remove fifteen pounds from the box its contents will weigh five pounds more than if you had halved their weight. How much did the box's contents originally weigh?

We'll go through this sentence by sentence, the way we are supposed to. The first sentence doesn't tell us much, just that we have a box, and it has contents, and that we are going to be interested in the weight of those contents. The test wouldn't be telling us about these contents if we didn't need to know about them, but, since we aren't told how much they weigh, we can't write down the weight. However, since the weight is unknown, we will assign it a variable.

b = weight of contents of box

I wrote down that b is the weight of the *contents* of the box, because it is possible that we will also have to think about the weight of the box itself (i.e., the cardboard, or wood, or whatever the box is made out of).

The next sentence is an equation, because it compares the weight of the contents in two different situations. Going through it word by word: "remove" means "subtract", "from the box" refers to the weight of the box's contents (b), "will weigh" means "equals", "more" means "add", and "halved" means "divide by 2 (or multiply by 1/2)". We get the following equation:

$$b - 15 = 5 + \frac{b}{2}$$

At this point, before reading the next sentence, we should solve (we know we can because we have one variable and one equation). The easiest way to do so is to first multiply both sides by 2, to get rid of the fraction, although you can subtract b/2 from both sides as well (that requires getting a common denominator for b and b/2, which will be 2).

$$(2)\,(b - 15) = (5 + \tfrac{b}{2})(2)$$

$$2b - 30 = 10 + b$$

$$\begin{array}{l} 2b - 30 = 10 + b \\ -b \qquad\quad\; - b \\ \hline b - 30 \;\; = 10 \end{array}$$

$$\begin{array}{l} b - 30 = 10 \\ \;\; +30 \;\; +30 \\ \hline b \qquad = \;\; 40 \end{array}$$

Now we read the last sentence. It asks us for the weight of the box's contents, which is what "b" refers to; we've already solved for it, so we're done.

2. Three monkeys and two giraffes eat a combined 45 kilograms of food in a week. A single giraffe eats two kilograms less than twice what a monkey eats each week. How much does a single monkey eat in a week?

The first sentence here is an equation; it's telling you that the amount the monkeys and giraffes eat *is* a certain amount. Remember to label your variables.

m = amount eaten by a monkey in a week
b = amount eaten by a giraffe in a week

$$3m + 2g = 45$$

Since we have two variables but only one equation we can't solve. On to the next sentence.

This is also an equation, because it's comparing the amount eaten by monkeys and giraffes. Let's go through it word by word, because it's a little bit tricky. "A single giraffe" means we have one "g"; "2 kilograms" is easy; "less than" means we are subtracting the two kilograms from what comes *next*, not from what came before. So it's going to be "2m – 2", not "g – 2" (2m because it says "twice what a monkey eats" and "twice" means "times two). Notice that we don't have any "equals" words here; we know that we are comparing monkeys and giraffes, so the stuff about the giraffe will be on one side of the equals and the stuff about the monkey will be on the other side.

$$g = 2m - 2$$

Now we have two equations, so we can solve. Since the second equation is already solved for g, we can just substitute that into the first equation.

$$3m + 2(2m - 2) = 45$$

$$3m + 4m - 4 = 45$$

$$7m - 4 = 45$$

$$\begin{array}{l} 7m - 4 = 45 \\ \quad\; + 4 \;\; + 4 \end{array}$$

$$7m = 49$$

$$\frac{7m}{7} = \frac{49}{7}$$

$$m = 7$$

(Please note that what I have written here is slightly redundant; I rewrote the same equation before adding 4 to both sides, and before dividing by 7; this isn't necessary on the GMAT, but I do it here to make the steps clearer).

We read the next sentence and discover that we have already answered the question.

3. Who is taller, Mike or Carl?

    1) Mike is 3" taller than Betty.
    2) Twice Carl's height would be 4" less than twice Mike's height.

Before we look at the statements, we need to notice something a little different about this question. We aren't being asked to find either Mike or Carl's height. Rather, we only need to know which is taller. This may make things easier.

Statement 1 can be made into an equation:

m = Mike's height
b = Betty's height

$$m = 3 + b$$

However, it doesn't tell us anything about Carl. If we don't know anything about Carl we won't know if he is taller than Mike or not. This is insufficient.

Statement 2 is also an equation. "Twice" means "times two"; "would be" means "equals", "less than" means "subtract 4 from what comes next". We get:

$$2c = 2m - 4$$

The first thing to look at in Data Sufficiency is how many variables and equations we have. We have two variables but only one equation. If the number of variables and equations is not the same, we have to do some math. The first thing we always do in algebra is solve an equation. We can easily solve for c by dividing both sides by 2.

$$\frac{2c}{2} = \frac{2m - 4}{2}$$

We can divide every distinct number in the numerator by 2, so we can cancel out the 2 on the right side.

$$c = m - 2$$

We still don't know how tall Mike or Carl is. But we do know that Carl is shorter than Mike, because we have to subtract 2 from Mike's height to get Carl's. So this answers our

question, and is sufficient.[1] Since Statement 1 is insufficient but Statement 2 is sufficient, the answer is B.

4. If the girls in the class were split into three equal groups, the size of each group would be the same as if 18 girls had left the class. How many girls are in the class?

Again, the first sentence is an equation (the words "would be" tell you, as well as the fact that we are comparing the number of girls in the class in two different situations). The sentence talks about splitting the class; splitting is the same as dividing. Splitting the class into three groups is the same as doing what? Dividing it by 3, so each group is 1/3 of the whole class.

g = number of girls in class

$$\frac{g}{3} = g - 18$$

One variable, one equation, we can solve. You can either subtract g/3 from both sides (which means you have to get a common denominator) or you can multiply both sides by 3, which I find easier.

$$(3)\ \frac{g}{3} = (g - 18)\ 3$$

$$g = 3g - 54$$

$$\begin{array}{r} g = 3g - 54 \\ -3g \quad -3g \\ \hline -g = \quad -54 \end{array}$$

$$g = 54$$

The question (which we haven't read yet) asks for the number of girls in the class, so we are done.

5. Missy is now 1/3 Jeremy's age. In 5 years, Jeremy will be twice as old as Missy. What is the current difference between their two ages?

An age problem, so don't forget to put "now" when you label your variables. The first sentence compares Missy and Jeremy's ages, so it is an equation. Remember, "is" means equals, and "Missy" refers to Missy's age.

m = Missy's age now
j = Jeremy's age now

$$m = \frac{j}{3}$$

We have two variables, one equation, so we can't solve. Let's move on to the next sentence. It is also an equation; notice, however, that it talks about their ages in 5 years.

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[1] By the way, if you had this backwards and thought the equation meant that Carl is *taller*, the statement is still sufficient: you can answer the question (even though you are thinking of the right answer).

In 5 years, Jeremy will be (j + 5) years old (5 years older than he is now) and Missy will be (m + 5). "Twice as old as Missy" means twice as old as she is in five years; otherwise they would have said "twice as old as Missy is now." If they don't specify, they are talking about the age after the change.

$$j + 5 = 2(m + 5)$$

Now we have enough equations. Since the first equation is already solved for m, just substitute that into the second.

$$j + 5 = 2\left(\frac{j}{3} + 5\right)$$

Multiply both sides by 3 to get rid of the fraction.

$$3(j + 5) = 6\left(\frac{j}{3} + 5\right)$$

$$3j + 15 = 2j + 30$$

$$\begin{array}{r} 3j + 15 = 2j + 30 \\ -2j \qquad\quad -2j \\ \hline j + 15 = 30 \end{array}$$

$$\begin{array}{r} j + 15 = 30 \\ -\ 15 \ -\ 15 \\ \hline j = 15 \end{array}$$

Now read the question. It asks for the difference between their ages; difference means subtract, so we have to subtract Missy's age from Jeremy's age. That means we need to know Missy's age. Plug Jeremy's age into either equation.

$$m = \frac{15}{3}$$

$$m = 5$$

The difference between their ages is 10 years (15 – 5 = 10).

6. Andy is 10 and Barbara is 12. How many years ago was Andy 1/2 of Barbara's age?

The first sentence just gives you information, so write it down:

Andy is 10
Barbara is 12

The next sentence can be written as an equation. However, the equation is not so obvious. What should you do if you don't know how to set this up? What do you do if you don't know how to solve a problem? I wait…

That's right, you backsolve. Look at each answer and see if it works. Each answer here represents a certain number years ago. We see how old Andy and Barbara are that many years ago, and see if that agrees with what we are told – that Andy is 1/2 of Barbara's age.

A. 2
B. 4
C. 5
D. 6
E. 8

A. Two years ago Andy was 8 and Barbara 10. 8 is not 1/2 of 10, so this is wrong.

B. Four years ago Andy was 6 and Barbara 8. 6 is not 1/2 of 8, so this is wrong.

C. Five years ago Andy was 5 and Barbara 7. 5 is not 1/2 of 7, so this is wrong.

D. Six years ago Andy was 4 and Barbara 6. 4 is not 1/2 of 6, so this is wrong.

This has to be the answer, because everything else is wrong. Don't bother to check it (just to prove it to you, eight years ago Andy was 2 and Barbara 4).

I'm sure you're wondering how to do this using an equation. I really don't want you to worry about this – backsolving is a great method and you should use it. But, just to satisfy your curiosity, here goes. We are asked "how many years ago". "How many" means we don't know the number, so we use a variable.

x = number of years ago

In age problems, both people gain or lose the same number of years. x years ago, Andy was x years younger and so was Barbara. Since Andy is 10 now, x years ago he was (10 – x) years old, and Barbara was (12 – x) years old. Andy is supposed to be 1/2 of Barbara's age x years ago, and "was" means "equals", so we set up the following equation:

$$10 - x = \frac{12 - x}{2}$$

Then we solve like normal. See how much easier backsolving is? Learn how to backsolve and *when* to backsolve and your GMAT score will improve.

7. The ages of three brothers are evenly spaced apart. If the youngest is half the middle brother's age, and the oldest is three times the youngest brother's age, what is the difference in age between the oldest and the youngest?

BAD QUESTION – ANY ANSWER WORKS (IF YOU PICK THE RIGHT NUMBERS)

8. Isadora has two large jugs of milk and some small cartons of milk. All the large cartons are of the same size, and all the small cartons are of the same size. How many small cartons does she have?

    1) Large cartons contain twice the milk as small cartons, and she has 8 gallons of milk in total.
    2) She has a total of six containers of milk.

Write down what the first sentence tells you: assign a variable for the number of small cartons, because that will be important, but not for the number of large jugs – they tell you how many there are, so we don't need a variable.

s = number of small cartons

2 large jugs

The second sentence just closes any loopholes. The last sentence gives you the question:

s = ?

Statement 1 gives you some information about how much milk the containers hold. This should remind you of **Example 5** and **Example 6**: questions where you are dealing with numbers of items and some value associated with each item. The first part of the sentence talks about the value of each item. We need new variables, because we are talking about the *amount* in each container, not the number of containers.

L = amount in a large jug
c = amount in a small jug

L = 2c

The second part talks about the total amount. In **Example 5** and **6** we got the total value by multiplying the number of each thing by the value of each thing, and then adding all these amounts together. Here we will multiply the number of large jugs by the amount in each, and the number of small cartons by the amount in each, and add these together to get 8 gallons.

$$2L + sc = 8$$

We have two equations, but three variables. Try doing some math – plug the first equation into the second.

$$2(2c) + sc = 8$$

$$4c + sc = 8$$

We can't get a number for s, because we still have the variable c. This is insufficient.

Statement 2 tells us that she has a total of 6 cartons. "Total" means we add the number of each type up. We have 2 large jugs and s small jugs, so we have

$$2 + s = 6$$

This is sufficient, since we have only one variable. The answer is B.