

# GMAT Word Problems: Fundamentals (Excerpt)

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## Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>Difficulty Levels</b>	<b>3</b>
<b>3</b>	<b>Problem Solving</b>	<b>4</b>
<b>4</b>	<b>Data Sufficiency</b>	<b>6</b>
<b>5</b>	<b>Answer Key</b>	<b>8</b>
<b>6</b>	<b>Explanations</b>	<b>9</b>

## 1 Introduction

This document contains nothing but GMAT Word Problems questions—100 of them, to be exact. There's nothing inherently difficult about a word problem, but very few GMAT word problems are very easy. The biggest challenge most students face is translating the word problem to an algebra problem (or whatever content area it is). The math may not be hard, but getting to the point where you can do the math takes practice.

As in all of my GMAT preparation resources, you'll find these questions indexed by difficulty.

For further, more specific practice, I have produced several other resources that may help you. There are many word problems in nearly all of my practice sets, but you'll find the most in "Rates, Ratios, and Percents," and "Problem Solving: Fundamentals." There are also many tricky ones in "Algebra: Fundamentals," in particular several that have variables in the answer choices.

Also, The GMAT Math Bible has several chapters (along with focused practice) on just about every type of word problem, including individual chapters on ratios, rates, averages, weighted averages, overlapping sets, probability, permutations, combinations, and much more. If you find you are struggling with the mechanics of these problems, your time is probably better spent with the GMAT Math Bible than in doing dozens and dozens of practice problems, hoping to pick up those skills along the way.

As far as strategy is concerned, there are dozens of articles at GMAT HACKS to help you with your strategic approach to Arithmetic questions. Most importantly, you should make sure you understand every practice problem you do. It doesn't matter if you get it right the first time—what matters is whether you'll get it right the next time you see it, because the next time you see it could be on the GMAT.

With that in mind, carefully analyze the explanations. Redo questions that took you too long the first time around. Review questions over multiple sessions, rather than cramming for eight hours straight each Saturday. These basic study skills may not feel like the key to GMAT preparation, but they are the difference between those people who reach their score goals and those who never do.

Enough talking; there are 100 Word Problems questions waiting inside. Get to work!

## 2 Difficulty Levels

In general, the level 5 questions in this guide are 500- to 560-level questions. The level 4 questions represent a broad range of difficulty from about 380 to 500, while the level 3 questions are lower.

### **Easy (3)**

PS

9, 12, 30

DS

47, 50, 55, 59, 63, 74, 76, 82, 84, 96

### **Moderately Easy (4)**

PS

3, 4, 7, 8, 11, 18, 22, 23, 27, 28, 32, 33, 34, 36, 38, 40, 42, 43

DS

46, 48, 49, 53, 54, 56, 57, 58, 60, 61, 62, 64, 65, 66, 75, 77, 78, 79, 83, 85, 91, 92, 94, 95, 97, 98, 99, 100

### **Moderate (5)**

PS

1, 2, 5, 6, 10, 13, 14, 15, 16, 17, 19, 20, 21, 24, 25, 26, 29, 31, 35, 37, 39, 41, 44, 45

DS

51, 52, 67, 68, 69, 70, 71, 72, 73, 80, 81, 86, 87, 88, 89, 90, 93

### 3 Problem Solving

Note: this guide contains both an answer key (so you can quickly check your answers) and full explanations.

41. Country X taxes each of its citizens an amount equal to 12 percent of the first \$40,000 of income, plus 20 percent of all income in excess of \$40,000. If a citizen of Country X is taxed a total of \$8,000, what is her income?
- (A) \$40,000
  - (B) \$56,000
  - (C) \$64,000
  - (D) \$66,667
  - (E) \$80,000
42. The manager of a concert venue noted that for every 100 admission tickets sold, the venue sells 12 compact discs at \$15.00 each, 8 t-shirts at \$20.00 each, and 5 concert posters at \$12.00 each. What is the average (arithmetic mean) of these merchandise sales per ticket sold?
- (A) \$3.00
  - (B) \$3.76
  - (C) \$3.81
  - (D) \$4.00
  - (E) \$4.40
- \$10, \$11, \$11, \$12, \$12, \$14, \$16, \$17, \$21, \$22
43. The various prices that a certain product were sold for at retailers in City X is shown above. How many prices were greater than the median price but less than the mean price?
- (A) None
  - (B) One
  - (C) Two
  - (D) Three
  - (E) Four

3. *PROBLEM SOLVING*

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44. Tara drove at an average speed of 50 miles per hour for the first 50 miles of her trip and then at an average speed of 75 miles per hour for the remaining 50 miles of her trip. If she made no stops during the trip, what was Tara's average speed, in miles per hour, for the entire trip?
- (A) 50  
(B) 55  
(C) 60  
(D) 65  
(E) 70
45. Running at the same constant rate,  $a$  identical machines can produce a total of 120 bolts per minute. At this rate, how many bolts could 4 such machines produce in 5 minutes?
- (A)  $\frac{a}{6}$   
(B)  $\frac{a}{600}$   
(C)  $\frac{150}{a}$   
(D)  $\frac{480}{a}$   
(E)  $\frac{2,400}{a}$

## 4 Data Sufficiency

For all Data Sufficiency questions, the answer choices are as follows:

- (A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.
  - (B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient.
  - (C) BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
  - (D) EACH statement ALONE is sufficient.
  - (E) Statements (1) and (2) TOGETHER are NOT sufficient.
46. If  $x$  equally priced shares of a certain stock were valued at \$25,000 on Monday, what was the value per share of the stock on Friday?
- (1) The value of each share increased by 3% between Monday and Friday.
  - (2) The value of each share increased by \$1.50 between Monday and Friday.
47. Steve and Carl each received an increase in salary. Which one received the larger percent increase?
- (1) Steve's salary increased by \$1,000 per month.
  - (2) Carl's salary increased by \$1,200 per month
48. A sporting goods store that sells tennis balls sells each of its packages of Brand X balls for a certain price and each of its packages of Brand Y balls for a certain price. If Oscar, Rennie, and Thom bought tennis balls in this store, how much did Rennie pay for 2 packages of Brand X balls and 2 packages of Brand Y balls?
- (1) Oscar bought 2 packages of Brand X balls and 1 package of Brand Y balls for \$9.49.
  - (2) Thom bought 1 package of Brand X balls and 1 package of Brand Y balls for \$6.49.
49. If an item is purchased for  $x$  percent less than its retail price, and then sold for  $y$  percent less than its retail price, what was the retail price of the item?
- (1)  $x - y = 10$
  - (2)  $y = 5$

4. *DATA SUFFICIENCY*

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50. Board member A wants to schedule a 30-minute meeting on Tuesday with himself and three other board members, B, C, and D. Is there a 30-minute period on Tuesday that is open for all four members?
- (1) On Tuesday A and C have an open period from 9:30 a.m. to 11:00 a.m.
  - (2) On Tuesday D has an open period from 10:30 a.m. to 1:00 p.m. and B has an open period from 8:00 a.m. to 12:00 p.m.

## 5 Answer Key

For full explanations, see the next section.

- 41. B
- 42. D
- 43. B
- 44. C
- 45. E
- 46. C
- 47. E
- 48. B
- 49. E
- 50. C

## 6 Explanations

For a quick-reference answer key, see the previous section.

41. B

Explanation: 12 percent of the first \$40,000 in income is:

$$0.12(40,000) = 12(400) = 4800$$

That's less than \$8,000, so the citizen's income must be more than \$40,000.

If the citizen was taxed \$4,800 on the first \$40,000 in income, that leaves \$8,000 - \$4,800 = \$3,200 in tax on the remaining income.

The tax rate on additional income is 20%. If we call the additional income  $a$ , we can set 20% of  $a$  equal to \$3,200:

$$3200 = 0.2a$$

$$a = 3200(5) = 16,000$$

If the citizen earns \$16,000 after the first \$40,000, that's a total of \$56,000, choice (B).

42. D

Explanation: First, find the total merchandise sales per 100 admission tickets:

$$12 \text{ compact discs at } \$15 \text{ each is: } 12(15) = \$180$$

$$8 \text{ t-shirts at } \$20 \text{ each is: } 8(20) = \$160$$

$$5 \text{ posters at } \$12 \text{ each is } 5(12) = \$60$$

$$\text{The total is } \$180 + \$160 + \$60 = \$400$$

$$\$400 \text{ per } 100 \text{ is } \$4 \text{ per ticket, choice (D).}$$

43. B

Explanation: To find the median, first arrange the terms in ascending order. (That's already done for you.) Since there are an even number of terms in the set, the median is the average of the two middle terms, \$12 and \$14, for a median of \$13.

To find the mean price, divide the sum of the prices by the number of prices (10):

$$\frac{10+11+11+12+12+14+16+17+21+22}{10} = \frac{146}{10} = 14.6$$

To answer the question: how many terms are greater than the median price of \$13 and less than the mean price of \$14.60? The only term that fits that description is \$14, so the answer is one, choice (B).

44. C

Explanation: To find average speed, find the total distance and the total time. Total distance is straightforward: there are two 50-mile segments, for a total of 100 miles. Total time requires more effort.

If she drove at a speed of 50 miles per hour for the first 50 miles, that's a time of 1 hour.

6. EXPLANATIONS

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The next segment is 75 miles per hour for 50 miles: that requires some algebra:

$$t = \frac{d}{r} = \frac{50}{75} = \frac{2}{3}$$

Total time for the entire trip is 1 hour plus  $\frac{2}{3}$  of an hour.

Average speed is total distance divided by total time:

$$s = \frac{100}{1\frac{2}{3}} = \frac{100}{\frac{5}{3}} = 100\left(\frac{3}{5}\right) = 60, \text{ choice (C).}$$

45. E

Explanation: This is a bit challenging to get a handle on, so try choosing a value for  $a$ . If  $a = 10$  machines, then 10 identical machines can produce a total of 120 bolts per minute. That 12 bolts per minute per machine. In other words, we can find the rate per minute per machine by dividing 120 by  $a$ : algebraically, that's  $\frac{120}{a}$  bolts per minute per machine.

If you have four machines, you can multiply that rate per minute per machine by 4:

$$\frac{120}{a}(4) \text{ bolts per minute for four machines.}$$

If the machines will work for 5 minutes, multiply that rate per minute by 5:

$$\frac{120}{a}(4)(5) \text{ bolts for four machines in five minutes.}$$

Simplified, that is:

$$\frac{120(4)(5)}{a} = \frac{2,400}{a}, \text{ choice (E).}$$

46. C

Explanation: Statement (1) is insufficient: we can determine from this the total value of the shares on Friday, but that doesn't help us find the value of each individual share.

Statement (2) is also insufficient: this gives us some information about individual shares, but since we don't know the value per share on Monday, we can't determine the value per share on Friday.

Taken together, the statements are sufficient. If the total value increased by 3% from Monday to Friday, the value per share did as well. If that increase is equal to \$1.50, we can find the original price:

$$0.03x = 1.50$$

where  $x$  is the Monday price per share. Find that, add \$1.50, and you have the Friday price per share. Choice (C) is correct.

47. E

Explanation: Statements (1) and (2) are insufficient for the same reason: without knowing each person's original salary, we don't know what percent increase those dollar amounts represent.

Taken together, the statements are still insufficient. While Carl received the larger dollar amount increase, it's possible that Steve received the larger percent increase. If Carl's starting salary was much larger, a \$1,200 per month increase may not be as large of a percent increase as a \$1,000 per month increase on a smaller starting salary. Choice (E) is correct.

48. B

6. EXPLANATIONS

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Explanation: Statement (1) is insufficient: it allows us to set up an equation with two variables, but that's not enough to solve for each variable:

$$2x + y = 9.49$$

Statement (2) is sufficient. Again, we get an equation with two variables, but this time we can translate it into the answer to the question:

$$x + y = 6.49$$

Multiply both sides by 2 to get the price of 2 packages of Brand X balls and 2 packages of Brand Y balls:

$$2x + 2y = 2(6.49)$$

Choice (B) is correct.

49. E

Explanation: Many data sufficiency questions require that you have an actual number, whether it be a price, a population size, or the length of a geometric figure. This is one of them:  $x$  and  $y$  represent percents, but in order to know the retail price, you'll need to know some number—such as \$30 or \$100. It only takes a quick glance at the statements to realize that (E) must be the correct choice, as the statements are concerned with the percents, not the price. Without a price, you can't answer the question.

50. C

Explanation: Statement (1) is insufficient: it gives us no information about B or D.

Statement (2) is also insufficient: there is an overlap between B's free time and D's free time, but we don't know whether that time period overlaps with availability from A and C.

Taken together, the statements are sufficient. (2) tells us that B and D are both available from 10:30 a.m. to 12:00 p.m., and (1) tells us that A and C are available from 10:30 a.m. to 11:00 a.m. They can meet for that 30-minute period. Choice (C) is correct.