IBA Regular Batch

ANALYTICAL ABILITY: DATA SUFFICIENCY

Lecture-4+5

OVERVIEW

1. Types
2. Steps
3. Strategies
4. Practice

Name:

Batch:

CAPSTONE EDUCATION

152/2/A-2 GREEN ROAD, PANTHAPATH SIGNAL,
ROWSHAN TOWER, 4TH FLOOR, DHAKA-1205
01972-277866, 016-30313031

Introduction to Data Sufficiency

Data sufficiency questions consist of a question followed by two statements. Your job is to decide whether the information in the statements (taken singly or together) is sufficient to answer the question.

These questions require much less calculation than standard problem solving: evaluate rather than calculate.

Here are those five answer choices.

1. Statement 1 alone is sufficient but statement 2 alone is not sufficient to answer the question asked.
2. Statement 2 alone is sufficient but statement 1 alone is not sufficient to answer the question asked.
3. Both statements 1 and 2 together are sufficient to answer the question but neither statement is sufficient alone.
4. Each statement alone is sufficient to answer the question.
5. Statements 1 and 2 are not sufficient to answer the question asked and additional data is needed to answer the statements.

Data Sufficiency and the Managerial Mindset

Why does the IBA ask Data Sufficiency questions? First of all, Data Sufficiency tests your ability to gauge relevance – if I want to know A, is it relevant to know B? It certainly conceivable that, in the real business world, if you want to know the price or cost or value of one thing, it will be important to be able to figure out whether knowing the price or cost or value of another thing would be relevant.

At a deeper level, think of the difference of these two questions: (1) what is the actual answer to problem X? vs. (2) do we have enough information to answer problem X? The first question may involve specific expertise, depending on the nature of the problem, and may well be delegated to, for example, an engineer. The second question is more quintessentially the manager's question, the manager who sees that the problem can be solved and delegates it appropriately.

As you are preparing for IBA, you are planning a career as a manager, which is all about delegating, about decision-making, about discerning what paths are fruitful for exploration and what paths don't merit examination. In this sense, I would argue that Data Sufficiency tests skills that are at the very heart of what it is to be a powerful and effective manager.

Types of Data Sufficiency Problems:

Value vs. Yes/No

There are two types of data sufficiency problems:

(1) **VALUE**: These questions require you to solve for one numerical value:

What is the value of $x + y$?
How old is Vera?
In what year were the most rabbits born?

The information in the statements can be considered sufficient if it allows you to find a single number to answer the question.

(2) **YES/NO**: These questions require you to give a simple yes or no answer:

Is n divisible by 177
Is $x + y$ prime?

Is $y<O?$

The information in the statements can be considered sufficient if it allows you to conclusively answer YES or NO. If the answer is MAYBE, the information is insufficient.

Steps in solving Data Sufficiency questions

1. Read the given problem.
2. Never try to reach final answer as it is not asked. You need to find whether the information provided is enough to solve the given problem or not.
3. Never make any assumption. Use only universal rules { eg. a + b = a + b - (a U b) }
4. Try to solve questions by using above strategies
5. Solve question step by step. First try to find answer using first statement then second and finally with both. Then mark the answer
6. Even if you find answer with only one statement, then try to find answer with remaining statement as sometimes there is an option that answer can be find with both statements separately.
7. Move on quickly and mark answer can't be found in case you are unable to reach any conclusion with information provided.

Directions:-

Marks A as answer if statement I alone is sufficient to answer the question
Marks B as answer if statement II alone is sufficient to answer the question
Marks C as answer if statement I and II together are sufficient to answer the question but neither statement alone is sufficient to answer the question
Marks D as answer if statement I & II are separately sufficient to answer the question
Marks E as answer if statement I & II are sufficient to answer the question

DATA SUFFICIENCY STRATEGIES

Rephrasing

Data sufficiency problems involve an element of disguise, in which the mathematical content and Information are obscured in some way. Therefore, your first task in solving a data sufficiency problem is to rephrase the question and/or the statements whenever possible. **Rephrase, both the question AND the statements, if you can.**

If P is an integer, is $\frac{P}{18}$ an integer?

(1) $\frac{5P}{18}$ is an integer

(2) $\frac{6P}{18}$ is an integer

Rephrasing the question: If $\frac{P}{18}$ is an integer, this means that p is DIVISIBLE by 18. Thus, this question is asking whether p is divisible by 18.

The prime factorization of 18 is 3 x 3 x 2. In order for the integer p to be divisible by 18, it must be divisible by two 3's and a 2.
We can rephrase the question as follows:

Does P contain two 3's and a 2?

Now, we can rephrase each statement.

Statement (1) can be restated as $5p$ is divisible by 18, or by two 3's and a 2.

The coefficient of 5 does not provide ANY of the necessary primes to be divisible by 18 (in other words, it does not have any 3's or *2's* as factors). Therefore, in order for *5p* to be divisible by 18, *P* must be divisible by two *3's* and a 2.
Thus, statement (1) can be rephrased:

There are (at least) two 3's and a 2 in *p*.

This is sufficient to answer the question.

Statement (2) can be restated as *6p* is divisible by 18 or by two 3's and a 2.

The coefficient of 6 provides two of the necessary primes to be divisible by 18 (6 has a factor 3 and a factor of 2). Therefore, in order for *6p* to be divisible by 18, *P* must be divisible by one 3. While there may be additional primes in the prime box of p, statement (2) only *guarantees* one 3 in *p's* prime box. Thus, statement (2) can be rephrased:

There is at least one 3 in P

This is not sufficient to answer the question.
Thus, the answer to this data sufficiency problem is (A): Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient.

Always factor algebraic expressions when you can. This is a great way to "un-disguise" information in data sufficiency problems.

Determining Sufficiency Does Not Require Solving

One common mistake individuals make on data sufficiency questions is solving equations completely instead of simply determining whether sufficient data exist to answer the question. Remember that data sufficiency questions do not require you to find a value--they require you to determine definitively whether sufficient data exist to answer the question. In order to answer a data sufficiency question, you do not need to determine the solution to each equation (e.g., $x = 7$ and $y = 6$). Rather, you need to have a definitive answer (e.g., x is a single value). Consider the following example:

E.X: If a, b, and c are positive integers, what is the value of $a^9 + b^8 + c^6$?

1. $a^3 = 8$, $b = 18$, and $c = 28989$
2. $a = 2$, $b^8 = 11{,}019{,}960{,}576$

Explanation:

1. In evaluating Statement (1), we know definitive values for a, b, and c. Consequently, we have sufficient information to find a definitive value for $a^9 + b^8 + c^6$.
2. Note that we do not need to determine what the exact value of $a^9 + b^8 + c^6$ is. We simply need to know definitively that one-and-only-one value for the expression $a^9 + b^8 + c^6$ can exist given the information in Statement 1. Statement (1) is SUFFICIENT.
3. In evaluating Statement (1), we can perform the following algebraic substitutions:
   $= (a)^9 + b^8 + c^6$
   $= (2)^9 + 11{,}019{,}960{,}576 + c^6$

4. Since we cannot definitively determine that there will only be one value for c^6, we cannot definitively determine that there will be only one value for the entire expression $a^9 + b^8 + c^6$. (Note that we do not need to determine what the exact value is.) Statement (2) is NOT SUFFICIENT.

Correct Answer: **A**

Statements (1) and (2) Do Not Contradict

Statements (1) and (2) will NEVER contradict each other. Consequently, if you are simplifying or solving statements and the result is a situation where Statements (1) and (2) contradict each other, you made an error. For example, if after simplifying the information in the statements, you are left with Statement (1) $x = 10$ and Statement (2) $x = 19$, you must go back and re-do your calculations as you made an error.

In A Time Crunch, Evaluate the Easier Statement and Guess

If you are in a time crunch, look at the statements and see which one is easier to evaluate and act accordingly. By evaluating one statement, you improve your odds of guessing the correct answer significantly.

If x is an integer, is $x^3 > 0$?

1. $x^5 + x^3 + x + 15 = 298$
2. $x^5 + 10 > 15$

Explanation:

1. When you raise an integer to an odd number, it does not change the sign of the expression. In other words, if x is negative, x^3 will be negative. Likewise, if x is positive, x^3 will be positive.
2. The question can be simplified to: "is x positive?"
3. If time is short and Statement (1) looks complicated, move on and evaluate Statement (2) first and rule out clearly wrong answers.
4. Evaluating Statement (2):
   $x^5 + 10 > 15$
   $x^5 > 5$
   x must be positive. Statement (2) is SUFFICIENT.
5. Since Statement (2) is sufficient, you can quickly rule out answer choices A, C, and E. You have now quickly improved your chances of choosing the correct answer from 20% to 50% (i.e., you are now choosing from 2 answer choices instead of from 5).
6. In evaluating Statement (1), begin by simplifying:
   $x^5 + x^3 + x + 15 = 298$
   $x^5 + x^3 + x = 283$
7. Since raising a number to an odd exponent does not change the sign of the number, the sign of every term in Statement (1) must be the same (i.e., x^5, x^3, and x all have the same sign.)
8. Logically, x must be positive since it is impossible to add together only negative numbers and arrive at a sum that is a positive number. In other words, if you add any two negative numbers, you will have a negative number with a larger absolute value. Since $x^5 + x^3 + x$ adds up to a positive number (i.e., 283), it is impossible for x to be negative (otherwise, $x^5 + x^3 + x$ would be negative). x is positive and Statement (1) is SUFFICIENT.
9. It turns out that $x = 3.0227$, meaning Statement (1) is SUFFICIENT because the information in it produces one-and-only-one value for the expression above.
10. Note, however, that the test would never ask you to solve an equation such as the one in Statement (1). This complicated equation is used simply to elucidate the technique.

Correct Answer: **D**

Symmetry amongst Statements (1) and (2) --> D or E

Parallelism or symmetry in the two statements means that D or E is the correct answer. In other words, if you rephrase the statements and you discover they are saying the same thing, you can immediately rule out A, B, and C. This is best illustrated by an example:

What is the value of $x + 15$?

1. $x^3 = 27$
2. $x^5 = 243$

Explanation:

1. Evaluate Statement (1).
   $x^3 = 27$
   $x = 3$
2. Evaluate Statement (2).
   $x^5 = 243$
   $x = 3$
3. Since Statements (1) and (2) provide the same information, answer choices A, B, and C cannot be correct. Consequently, answer choices D or E must be true.
4. Statements (1) and (2) are each SUFFICIENT alone because $x + 15$ will always be 18.

Correct Answer: **D**

Avoid Unwarranted Assumptions

In intermediate to difficult questions, the examiner tries to trap test-takers by getting them to make unwarranted assumptions. Consider the following examples of unwarranted assumptions:

- A jar contains 10 marbles. If there are 4 red marbles in the jar, how many blue marbles are in the jar? **Unwarranted Assumption: There are 6 blue marbles in the jar.** There could be 5 blue marbles and 1 yellow marble. Do not assume that there are only two colors of marbles in the jar.
- If $x > 10$ and $x < 12$, what is the value of x? **Unwarranted Assumption: x is 11.** You cannot assume that x is an integer. Nothing in the given information said that x must be an integer. Consequently, x could be 10.5 or 11.5.
- If Ms. Watson's 4^{th} grade class has 20 students and 50% of these students have blonde hair, how many girls in Mrs. Watson's class have blonde hair? **Unwarranted Assumption: There are 10 students with blonde hair so 50% of these must be girls. Consequently, 5 girls have blonde hair.** You cannot assume that the ratio of the number of boys to girls is 1:1, or 50%.

Beware of Even Exponents

- Whenever dealing with even exponents, you must be cognizant that an even exponent hides the sign of the base. In other words, if $x^2 = 4$, $x = 2$ AND -2. Consider the following example where forgetting this would take you to the wrong answer.

E.X.: What is the value of $x + 1$?

1. $x^2 = 16$
2. $x^3 = 64$

Explanation:

1. In evaluating Statement (1), many beginning and intermediate-level test-takers automatically assume that since x = 4, Statement (1) is sufficient because 4 + 1 is always 5.
2. However, Statement (1) is NOT SUFFICIENT because x also equals -4 since $(-4)^2 = 16$. Consequently, x + 1 also equals (-4) + 1 = -3
3. In evaluating Statement (2), we find that Statement (2) is SUFFICIENT because there is only one possible value for x, 4. Negative four is not a possible value given the information in Statement (2) since $(-4)^3$ is not 64 but -64. Therefore, there is only one possible value for x + 1, 5.
4. Since Statement (1) alone is NOT SUFFICIENT and Statement (2) alone is SUFFICIENT, answer B is correct.

Correct Answer: **B**

Statements Producing Two Values Are Not Automatically Insufficient

Just because a statement, when simplified, yields two values does not mean the statement is automatically insufficient. Those two values could produce the same value for the question, in which case the statement is sufficient. Consider the following example:

E.X.: If x is an integer, what is the value of $x^2 + x - 12$?

1. x = 3
2. x = 3, x = -4

Explanation

1. Since Statement (1) gives a single definitive value that can be plugged in to $x^2 + x - 12$, Statement (1) is SUFFICIENT since we will be able to determine for sure the value of the expression.
2. To see this more clearly, plug in x = 3 and see that it produces one definitive answer to the question:
   $x^2 + x - 12$
   $3^2 + 3 - 12 = 9 + 3 - 12 = 0$
3. Evaluate Statement (2). At this point, some are tempted to say that since Statement (2) provides two values for x, Statement (2) is not sufficient because two different values of x (i.e., 3 and -4) will produce two separate values of the equation in the question. However, this is not always true. Two separate values of x can produce the same value.
   Evaluate x = 3
   $x^2 + x - 12$
   $3^2 + 3 - 12 = 9 + 3 - 12 = 0$
   Evaluate x = -4
   $x^2 + x - 12$
   $(-4)^2 -4 - 12 = 16 -4 - 12 = 0$
4. Since the information in Statement (2) provides one definitive value for the expression in the question (i.e., 0), Statement (2) is SUFFICIENT.
5. Since Statement (1) alone is SUFFICIENT and Statement (2) alone is SUFFICIENT, answer D is correct.

Two Equations with Two Variables Does Not Necessarily Mean Sufficiency

In high school math, most students learned that if two equations have two separate variables, then a definitive solution exists. Although this is technically true, IBA plays upon this and seeks to trick test-takers by providing two equations that look different but are actually the same. The examiner hopes that test-takers will assume that a solution exists for the equations. However, there is only one unique equation with two variables, so a solution does not need to exist. Consider the following example:

If x and y are integers, is $x > 0$ and $y < 0$?

1. $4x + y = 8$
2. $x - 2 = -y/4$

Explanation:

1. Most test-takers realize that Statement (1) alone and Statement (2) alone are NOT SUFFICIENT.
2. However, the tests' authors hope that test-takers, when evaluating answer choice C, will assume that there are two unique equations with two variables and, as a result, there is a unique solution for x and y and the question can be definitively answered.
3. But, the above assumption does not hold in this question because there are not two unique equations. The equation in Statement (2) is the same as the equation in Statement (1).
   Start with: $4x + y = 8$
   Subtract 8 from each side: $4x - 8 + y = 0$
   Subtract y from each side: $4x - 8 = -y$
   Divide each side by 4: $x - 2 = -y/4$
   So, there is only one unique equation with two variables. Consequently, it is impossible to solve for the value of x and y. Both Statements (1) and (2), even when taken together, are NOT SUFFICIENT.

Correct Answer: **E**

How are Answers Chosen in Data Sufficiency?

To understand *sufficiency* and *insufficiency,* let's familiarize ourselves first with *yes/no* data sufficiency questions. Here are five examples, each representing one of answer choices A through E:

Yes/No Data Sufficiency Question:

Qs.1) Is x an even number?

(1) x is a prime number less than 3.

(2) x is an integer greater than 1.

Statement (1). Knowing that x is a prime number less than 3, tells us that x is 2. After all, 2 is the only prime number less than 3. We can answer this question with an unequivocal "yes"— X is an even number. This statement is sufficient.

Statement (2). Knowing merely that x is greater than 1 does not tell us whether x is even or odd. This statement, by itself, is insufficient.

Choice A is correct. To remember this combination, pronounce each letter: *"S—I—A."*

Qs.2) Is x an even number?

(1) x is an integer less than 3.

(2) x is the product of two even integers.

Statement (1). Knowing merely that x is less than 3 does not tell us whether x is even (e.g., 2, 0, −2, −4) or odd (e.g., 1, −1, −3). Because x could equally be even or odd, this statement is

Statement (2). Knowing that x is the product of two even integers guarantees that x is an even integer.

Choice B is correct. To remember this combination, pronounce each letter: *"I—S—B."*

Qs.3) Is x an even number?

(1) x is an integer greater than 1.

(2) x is an integer less than 3.

Statement (1). Knowing merely that x is greater than 1 does not tell us whether x is even or odd.

Statement (2). Knowing merely that x is less than 3 does not tell us whether x is even or odd.

Choice C is correct. Say *"Double I—C."* Because this is a double "I" situation (both statements are individually insufficient), we now combine both statements and evaluate them together. Knowing that x is an integer greater than 1 but less than 3 tells us that x must be 2. This is an even number. Therefore, this question is sufficient overall. The answer to this question is "yes"— X is even.

Qs. 4 Is x an even number?

(1) x is the sum of two even integers.

(2) x is the product of an even and an odd in

Statement (1). If x is the sum of two even integers, the sum must always be

Statement (2). If x is the product ofan even and an odd integers, the result must always be an even number. E.g., $2 \times 3 = 6$; $5 \times 4 = 20$.an even number.

Choice D is correct. Say *"Double S—D."*

Qs. 5) Is x an even number?

(1) x is an integer greater than 1.

(2) x is an integer less than 4.

Statement (1). Knowing that x is greater than1 does not tell us whether x is even or odd. This statement is insufficient.

Statement (2). Knowing merely that x is less than 4 does not tell us whether x is even or odd. This statement is insufficient.

Choice E is correct. Say *"Double I—E."* Because this is a double "I" situation (both statements are individually insufficient), we now combine both statements to evaluate them together. Knowing that x is an integer greater than 1 but less than 4 tells us that x must be 2 or 3.However depending on which of these two numbers we pick, the answer will either be even or odd. Thus, we cannot answer the question entirely "yes" or entirely "no." The overall answer is insufficient.

Qs. 6) Is x an even number?

(1) x is the product of two odd integer

Statement (1). The product of two odd integers results in an odd integer. The answer to this question is "no"-is not an even integer; it's an odd integer. This statement is sufficient, not insufficient.

(2) x is the sum of an even and an odd integer

Statement (2). The sum of an even and an odd integer always results in an odd integer. The answer to this question is "no"--- x is not an even integer; it's an odd integer. This statement is also sufficient, not insufficient.

Choice D is correct. This "extra" question is included to highlight a interesting feature of *yes/no* data sufficiency questions. A definitively negative answer--- "no"---does not indicate insufficiency; it indicates sufficiency. Insufficiency occurs when the answer can be either "yes" or "no." If the answer is absolutely "yes" or absolutely "no," this is sufficiency.

Value Data Sufficiency Question:

What is the value of x?

(1) $x \geq 2$

Statement (1). Knowing that $x \geq 2$, tells us that x could be numbers like 2, 3, 4, 5, etc., not to mention numbers like 2.5, 3.3, etc. We obviously can't tell the value of x. Therefore this

(2) $x \leq 4$

Statement (2). Knowing that $x \leq 4$, tells us that x could be numbers like 4, 3, 2, 1, 0, -1, etc., not to mention non-integers (decimals). We can't tell if x is even. Therefore this statement is

The answer to the above question is choice E. Since both statements are insufficient, we put them together. Knowing that $x \geq 2$ and that $x \leq 4$ tells us that x could be 2, 3, or 4, as well as those decimals in between. We cannot find a single value for x so the answer is insufficient.

Lecture 5

1. Statement 1 alone is sufficient but statement 2 alone is not sufficient to answer the question asked.
2. Statement 2 alone is sufficient but statement 1 alone is not sufficient to answer the question asked.
3. Both statements 1 and 2 together are sufficient to answer the question but neither statement is sufficient alone.
4. Each statement alone is sufficient to answer the question.
5. Statements 1 and 2 are not sufficient to answer the question asked and additional data is needed to answer the statements

1. If x and y are positive integers, is $y(x - 3)$ even?

(1) x is an odd integer.
(2) y is an even integer.

2. If p, q, r are a series of three consecutive positive integers, is the sum of all the integers odd?

(1) Two of the three numbers p, q, r are odd numbers.

(2) $\frac{p+q+r}{3}$ is an even integer.

3. Each person in a club with 100 members voted for exactly one of 3 candidates for president: A, B, or C. Did candidate A receive the most votes?

(1) No single candidate received more than 50% of the votes.
(2) Candidate A received 32 votes.

4. How many integers are greater than x, but less than y?

(1) $y = x + 5$
(2) $x = \sqrt{5}$

5. How many integers n are there such that $a > n > b$?

(1) $a - b = 4$
(2) a and b are not integers.

6. If x and y are positive integers, is $2x$ a multiple of y?

(1) x is a multiple of y.
(2) y is a multiple of x.

7. If n is an integer, is $n + 1$ a prime number?

(1) n is a prime number.
(2) $n + 2$ is not a prime number.

8. If x and y are distinct integers, is $x + y$ a prime number ?

(1) x and y are prime numbers.
(2) $x \times y$ is odd.

9. What is the value of a?
(1) $a^2 - a = 2$
(2) $a^2 + a = 6$

10. Is $x = 1$?

(1) $x^2 - x = 0$
(2) $x^3 - x = 0$

11. Is $z < 0$?
(1) $-z < z$
(2) $z^3 < z^2$

12. If x and y cannot be equal to zero, is $\frac{X}{Y} > \frac{Y}{X}$
(1) $x > y$
(2) $xy > 0$

13. If a and b cannot be equal to zero, is $0 < \frac{a}{b} < 1$
(1) $ab > 0$
(2) $a - b < 0$

14. Is $k + k < k$?

(1) $K^2 < K^3$
(2) $K^3 < K^2$

15. Is $pr > 0$?

(1) $pq > 0$
(2) $qr < 0$

16. Is $a + b > c + d$?

(1) $a > c + d$
(2) $b > c + d$

17. If $\frac{a}{b} > \frac{b}{c}$, then is a greater than c?

(1) a is positive.
(2) c is negative.

18. If $n + k = m$, what is the value of k ?

(1) $n = 10$
(2) $m + 10 = n$

19. Is x an integer?

(1) $x/2$ is an integer.
(2) $2x$ is an integer.

20. Is the integer P odd?

(1) The sum of P, $P + 4$, and $P + 11$ is even.
(2) The sum of $P - 3$, P, and $P + 11$ is odd.

21. What is the maximum number of rectangular blocks, each with dimensions 12 centimeters by 6 centimeters by 4 centimeters, that will fi t inside rectangular Box X ?

(1) When Box X is fi lled with the blocks and rests on a certain side, there are 25 blocks in the bottom layer.
(2) The inside dimensions of Box X are 60 centimeters by 30 centimeters by 20 centimeters.\

22. If sequence *S* has 200 terms, what is the 192nd term of *S*?

(1) The fi rst term of *S* is –40.
(2) Each term of *S* after the fi rst term is 3 less than the preceding term.

23. In ΔPQR, if $PQ = x$, $QR = x + 2$, and $PR = y$, which of the three angles of ΔPQR has the greatest degree measure?

(1) $y = x + 3$
(2) $x = 2$

24. What percent of the drama club members enrolled at a certain school are female students?

(1) Of the female students enrolled at the school, 40 percent are members of the drama club.
(2) Of the male students enrolled at the school, 25 percent are members of the drama club.

25. A family-size box of cereal contains more cereal and costs more than the regular-size box of cereal. What is the cost per ounce of the family-size box of cereal?

(1) The family-size box of cereal contains 10 ounces more than the regular-size box of cereal.
(2) The family-size box of cereal costs $5.40.

26. The profit from the sale of a certain appliance increases, though not proportionally, with the number of units sold. Did the profit exceed $4 million on sales of 380,000 units?

(1) The profit exceeded $2 million on sales of 200,000 units.
(2) The profit exceeded $5 million on sales of 350,000 units.

27. If *n* is an integer, is *n* even?

(1) $n2 - 1$ is an odd integer.
(2) $3n + 4$ is an even integer.

28. Carmen currently works 30 hours per week at her part-time job. If her gross hourly wage were to increase by $1.50, how many fewer hours could she work per week and still earn the same gross weekly pay as before the increase?

(1) Her gross weekly pay is currently $225.00.
(2) An increase of $1.50 would represent an increase of 20 percent of her current gross hourly wage.

29. If *r* is represented by the decimal $0.t5$, what is the digit *t*?
(1) $r < 1/3$
(2) $r < 1/10$

30. If the two floors in a certain building are 9 feet apart, how many steps are there in a set of stairs that extends from the first floor to the second floor of the building?

(1) Each step is ¾ foot high.
(2) Each step is 1 foot wide.