NEGATION TEST SERIES

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INTRODUCTION

A lot of students are scared of **Assumption questions in the Critical Reasoning Section of the GMAT**, simply because they are never really sure of the answer they are marking. The reason they face this problem is that they do not know how to **exploit a key feature of any assumption**. Needless to say that this lack in their understanding can cost them gravely since Assumption, together with related questions categories (such as Evaluate, Strengthen, Weaken etc.), accounts for more than **70% of the CR questions served in the exam**.

Before we go any further, why don't you try an Official Assumption argument to have a firsthand experience of this question category:

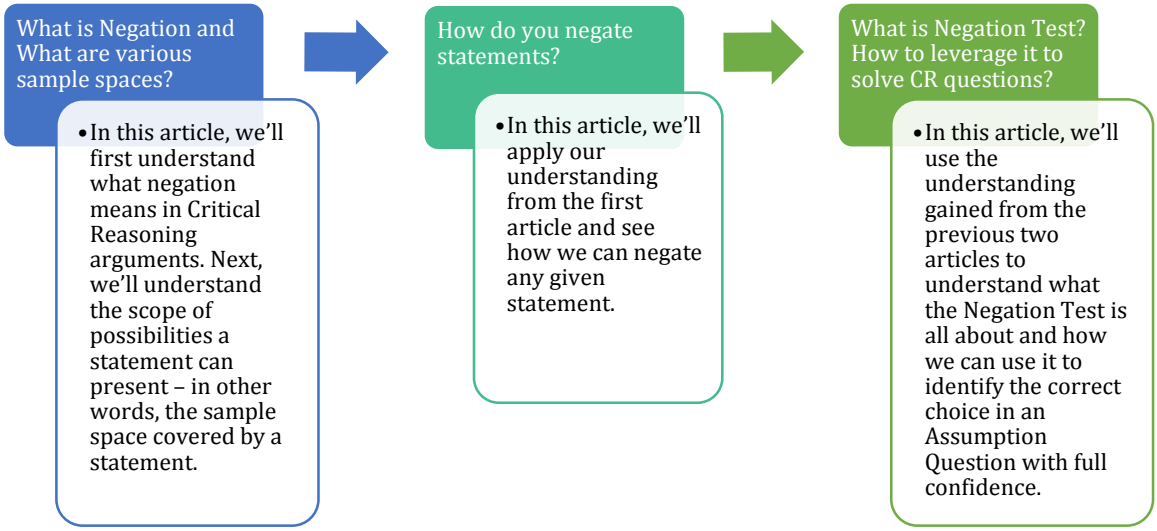
Argument: *Although parapsychology is often considered a pseudoscience, it is in fact a genuine scientific enterprise, for it uses scientific methods such as controlled experiments and statistical tests of clearly stated hypotheses to examine the questions it raises.*

The conclusion above is properly drawn if which of the following is assumed?

(A) If a field of study can conclusively answer the questions it raises, then it is a genuine science.
(B) Since parapsychology uses scientific methods, it will produce credible results.
(C) Any enterprise that does not use controlled experiments and statistical tests is not genuine science.
(D) Any field of study that employs scientific methods is a genuine scientific enterprise.
(E) Since parapsychology raises clearly statable questions, they can be tested in controlled experiments.

What was your experience of the above question? Were you too unsure while marking the answer since you were confused between two answer choices? Did you have to re-read the passage while evaluating the answer choices, even though you did spend appropriate amount of time understanding the argument? If yes, then that means that you too are missing out on leveraging the **Negation Test** that exploits a **central feature of an assumption - that it has to be true for the argument to hold true!**

To make you understand and master the concept of Negation test, we have designed this e-book. Through a step-by-step approach, we shall demonstrate how the Negation test can help you mark the correct answer to an assumption within less than 2 minutes and that too with a 100% surety. Accordingly, this e-book is divided into the following parts:



Alright, so let's get started!

ARTICLE #1 WHAT IS NEGATION AND WHAT ARE VARIOUS SAMPLE SPACES?

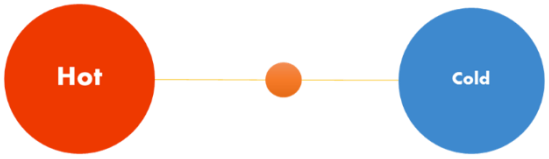
INTRODUCTION

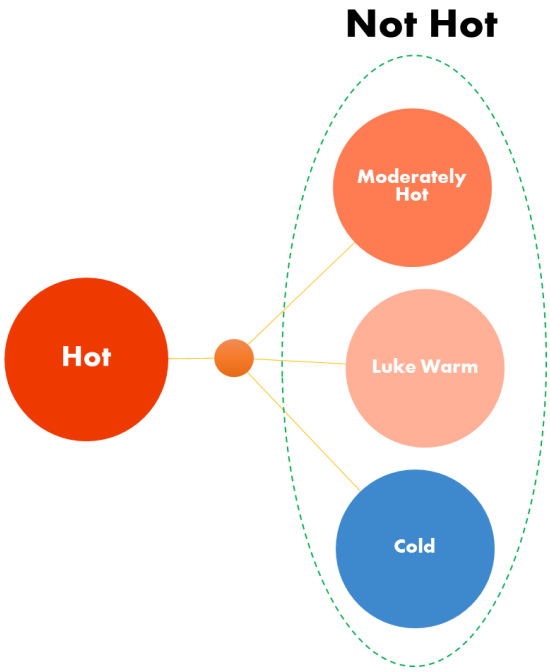
The first step in understanding the Negation Test is to understand what negation means in the GMAT world. This is what we'll cover first in this article. We'll then understand how certain words play an important role in determining the scope of the sample space covered by the statement.

POLAR OPPOSITE VS LOGICAL OPPOSITE

Negation in the GMAT world is based on the concept of Logical Opposites. To understand what it means, let's contrast it with Polar Opposite.

Polar Opposite: The polar opposite of a given word/phrase/statement is the extreme opposite of it; for instance *cold* is the polar opposite of *hot*.





Logical Opposite: The logical opposite range of a word/phrase/statement covers the spectrum of the possibilities that lie outside the arena of the negated word; for instance the logical opposite range that we get by negating the word "hot" would include possibilities such as *moderately warm*, *lukewarm*, *cold* etc.

In all, this range includes anything and everything that is NOT hot. Hence, the logical opposite of "hot" is "not hot".

Below is a table that gives a few more examples to illustrate the difference between polar and logical opposites of a word.

Word	Logical Opposites	Polar Opposite
Bitter	Not bitter: *sour, sweet* etc.	*sweet*
Summer	Not summer: *spring, winter, autumn* etc.	*winter*

WHAT IS NEGATION IN CR?

Now that you have understood the concept of Logical Opposite, let's see how we use the same to negate statements in CR. Let us take a couple of examples:

Statement: The soup is hot.

Negation: The soup is NOT hot.

Meaning of the negated statement: We don't know whether the soup is cold, moderately warm or lukewarm. All that we know is that it is definitely not hot.

Statement: Michael plays basketball

Negation: Michael does NOT play basketball.

Meaning of the negated statement: We don't know whether Michael plays any other game. All that we know is that he definitely doesn't play basketball.

Easy, isn't it? Let's now look at another example.

Statement: Isabelle's hair is black.

What will be the negation of the above statement?

a. Isabelle's hair is white.
b. Isabelle's hair is not black.

Observe that (a) is the polar opposite of the given statement. With (a), you miss out on a lot of other possibilities; for instance, her hair could be neither black nor white - it could be red or brown. These possibilities are accounted for in the Logical Opposite of the statement, which in this case is: Isabelle's hair is not black. (It is not necessary to specify the actual color.☺)

Meaning of the negated statement: We don't know whether Isabelle's hair is white or red or brown or some other color. All that we know for sure is that Isabelle's hair is NOT black.

In each of the given examples, we're talking about only one person. So it is very easy for us to write down the negated statement. Let's now increase the difficulty level a bit.

Consider the following statement.

Statement: All tall boys have black hair.

Which of the following statements is/are the correct negation(s) for the above statement?

a. Some tall boys have black hair.
b. Not all tall boys have black hair.
c. None of the tall boys have black hair.
d. No boy has black hair.
e. Most of the tall boys have black hair.

Only choice (b) is the correct negation of the given statement. To understand why that is the case, we need to understand the concept of **Sample Spaces**. Let's move to the same. ☺

UNDERSTANDING SAMPLE SPACES

The next step in understanding the concept of negation in Critical Reasoning is to understand exactly who/what the statement is talking about, i.e. the segment the statement talks about, and how this segment is affected by the sample space covered by the statement. This sample space is usually defined by various group markers such as: all, most, some, none etc.

Let's take a deeper look at these two aspects:

Understanding the Segment:

In the above example, the statement talks about a particular **segment** of population – All **tall boys** have black hair. So we need to consider the possibilities pertinent only to tall boys. We are not concerned with all boys, a group that includes short boys as well, or girls. **ONLY tall boys are within the scope of the statement**. This is the segment the statement talks about. Other segments are outside the scope of the argument and hence statements related to them are most likely not the correct assumptions.

Understanding the Sample Space:

Once you understand the segment being talked about, understand the sample space covered by the statement. Group-markers such as *all, none, some, most*, etc. define this sample space for the statement.

Let's say there are 100 tall boys (100 being a placeholder for "All" the elements in the segment). With this supposition, here is the sample space each group-marker covers:

Possibilities for 100 tall boys		
S No.	**Term**	**Possibilities it covers**
a	No/None	0 tall boys out of 100 have black hair. (Only one possibility)
b	Less than 50%	0 to 49 tall boys have black hair.
c	Up to 50%	0 to 50 tall boys have black hair.
d	Half (50%)	50 tall boys out of 100 have black hair. (Only one possibility)
e	Most	51 to 100 tall boys have black hair.

f	Some	1 to 100 tall boys has black hair. (including both 1 and 100). Note that "some" does **NOT** include 0
g	Not All	0 to 99 tall boys have black hair. (Notice how *Not All* is different from *Some*)
h	All	All the 100 tall boys have black hair. (Only one possibility)

It is helpful to think of these sample spaces in terms of the possibilities they represent. These possibilities can be represented on a straight line that denotes all the possibilities in the identified segment - we call this line the **Possibility Line**.

Now, in the current example, we are concerned with the segment of tall boys. This segment consists of 100 tall boys. Since the Possibility Line will denote each and every possibility in this segment, we can diagrammatically represent the above group markers on it in the following ways:

Diagram#1 shows the possibilities related to group markers *none, some, not all, half,* and *all.*

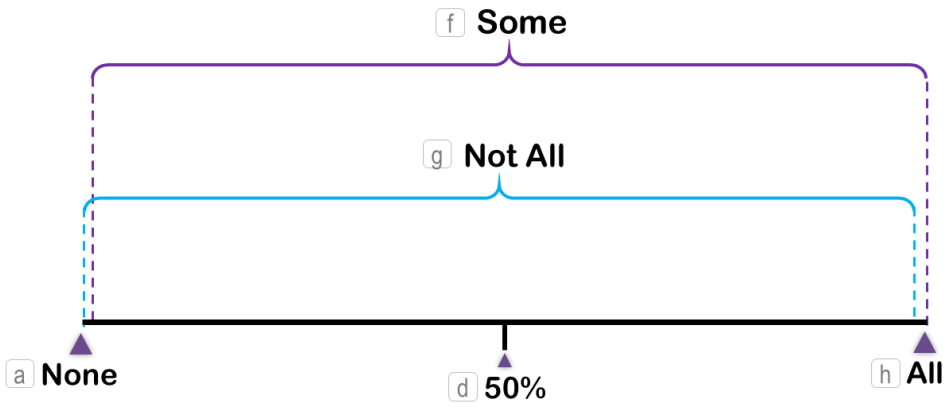


Diagram #1

Diagram#2 shows the possibilities related to group markers *none, less than half, up to half, half, most,* and *all.*

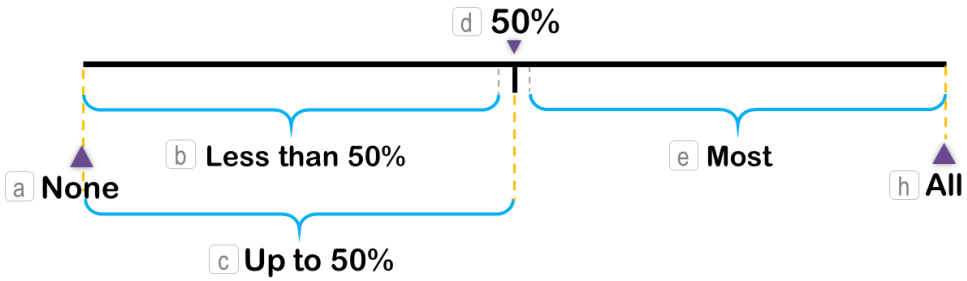


Diagram #2

Note: For the sake of clear understanding, the above group markers have been represented on two different Possibility Lines - you can represent them on a single Possibility Line as well.

As you can see in the above diagrams, the statement *All tall boys have black hair* covers only one possibility point - not 99, not 98, not 14, but a point denoting the possibility that all 100 of them have black hair. Therefore, its logical negation should account for anything and everything that is NOT 100/ALL (0-99 tall boys).

We will explore the concept of negating a statement in more detail in the next article, but before we move on to that, try your hand at solving the exercise questions given in this article.

Good Luck! ☺

EXERCISE QUESTIONS

I. Assume that you're dealing with a segment of 100 people. Following are the number of people from this set who do a particular job, job X. For each statement below, determine which all groups can it fall under; for instance, the statement 0 people do X falls under Group A. None = 0, Group C. Not more than half = 0-50, and Group E. Not all = 0-99.

i. Only 1 person does X.

ii. Only 50 people do X.

iii. Only 70 people do X.

iv. 100 people do X.

A. None
B. Some
C. Not more than half
D. Most
E. Not all
F. All

II. In the following table, map the elements of the first column to their exact matches in the second column

Group marker	Complete possibility range
Some	0 - 99
Up to half	0- 49
Most	50 - 100
Not all	1- 99

III. For each of the given statements, choose the correct negation form(s) from the option statements.

1. Given statement: The room is dark.
    a. The room is bright.
    b. The room is not bright.
    c. The room is anything but bright.
    d. The room is anything but dark.
    e. The room is not dark.

2. Given statement: The per-minute charge of a call made from a landline is higher than the per-minute call charge made from a cell phone.
    a. The per-minute charge of a call made from a landline is lower than the per-minute call charge made from a cell phone.
    b. The per-minute charge of a call made from a landline is low.
    c. The per-minute charge of a call made from a landline is higher than the per-minute call charge made from a cell phone.
    d. The per-minute charge of a call not made from a landline is higher than the per-minute call charge made from a cell phone.
    e. The per-minute charge of a call made from a cell phone is high.
    f. The per-minute charge of a call made from a landline is not higher than the per-minute call charge made from a cell phone.

3. Given statement: The buildings in Oakville are stronger than the buildings in Cottonville.
    a. The buildings in Oakville are as weak as the buildings in Cottonville.
    b. The buildings not in Oakville are not stronger than the buildings in Cottonville.
    c. The buildings in Oakville are weaker than the buildings in Cottonville.
    d. The buildings in Oakville are not as strong as the buildings in Cottonville.
    e. The buildings in Oakville are not stronger than the buildings in Cottonville.
    f. The buildings not in Oakville are not as strong as the buildings in Cottonville.
    g. The buildings in Oakville are as strong as or weaker than the buildings in Cottonville.

ANSWER KEY

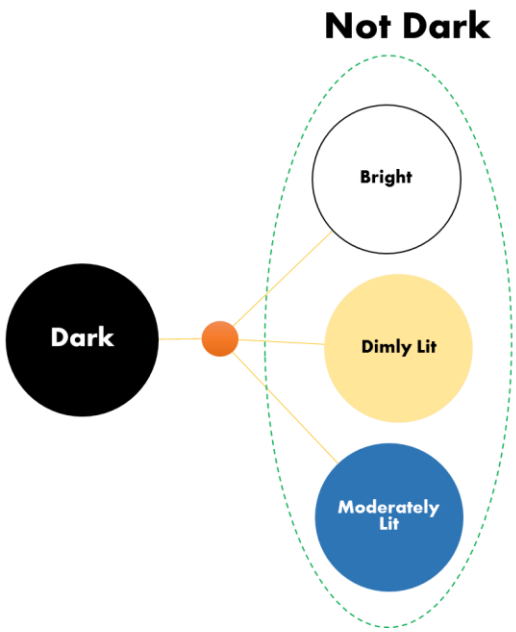
Question I.

i. *Only 1 person does X* falls under the Groups B, C, E
ii. *Only 50 people do X* falls under the Groups B, C, E
iii. *Only 70 people do X* falls under the Groups B, D, E
iv. *100 people do X* falls under the Groups B, D, F

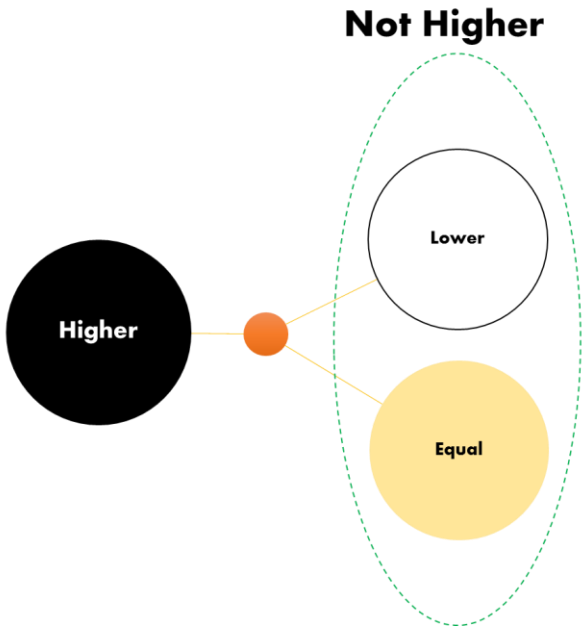
Question II – Not All: 0 to 99

Question III:

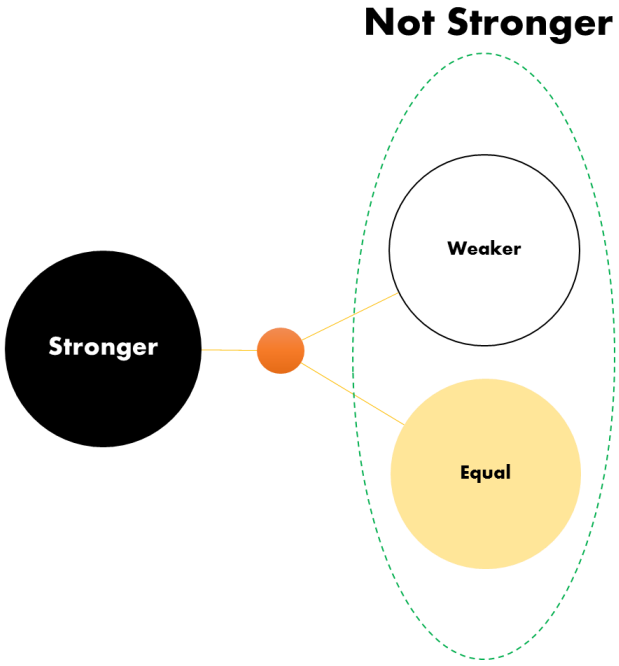
1. d, e



2. f



3. e, g



ARTICLE #2 HOW DO YOU NEGATE STATEMENTS?

INTRODUCTION

In order to negate any statement in CR, you should be familiar with the concept of logical negation and representing sample spaces on the Possibility Line. We cover all of this in our first article in the **Negation Test Series**: **What is Negation and What are Various Sample Spaces**. In this article, we will apply that understanding to master the negation of any given statement. Right then…Let's get started!

HOW TO NEGATE STATEMENTS

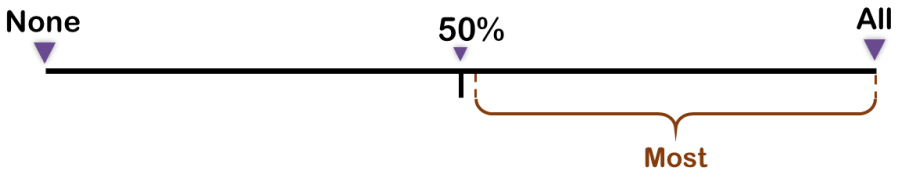
By this time, you should be somewhat comfortable with the concept of Possibility Line and representing various sample spaces on it. Let's follow a step-by-step approach to see how this understanding can help you negate statements easily.

STEP 1: UNDERSTANDING THE SEGMENT

The first step in negating a statement is understanding the **segment** the statement talks about. How do we do that? We simply understand about whom/what is the information given; for instance, if the statement says *Most basket-ball players are more than six feet tall*, then our segment is just basketball players and **not** any other kind of players - the statement gives information ONLY about basket-ball players.

STEP 2: UNDERSTANDING THE SAMPLE SPACE

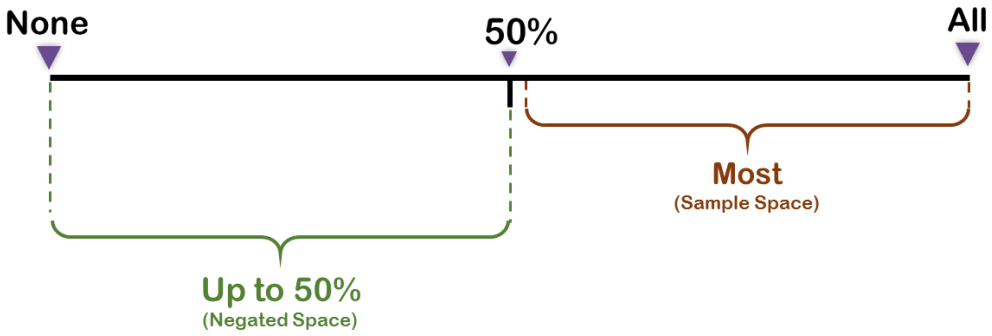
The second step in negating a statement is understanding the **sample space** the statement gives information about. Now, you know that typically group-markers such as *some, most, none* etc. determine the sample space for the statement. Accordingly, in the current example, the sample space would be the range covered by the group marker "Most" = >50%. This sample space is basically the point/range of possibilities covered by the statement on the Possibility Line. Accordingly, let's represent it on the Possibility Line:



STEP 3: UNDERSTAND THE POSSIBILITIES OUTSIDE THE IDENTIFIED SAMPLE-SPACE

This is the third and the final step in negating a statement. On the Possibility Line, determine the area that is NOT covered by the sample space/range of possibilities covered by the given statement.

So, in the current example, the area that lies outside the possibilities covered by *Most* is *Up to 50%*. This is it! This is the negated space, using which we'll create the negated statement.



*Negated space = possibilities not covered by the original sample space

So far so good. But how do you write this down in the form of the negated statement? It is very simple. To derive the negated statement, you just need to **replace the original group marker** in the original statement, "Most" in this case, **by the negated space**. Let's do this together.

Original Statement: *Most basket-ball player are more than six feet tall.*

Negated Statement: *Up to 50% of basket-ball players are more than six feet tall.*

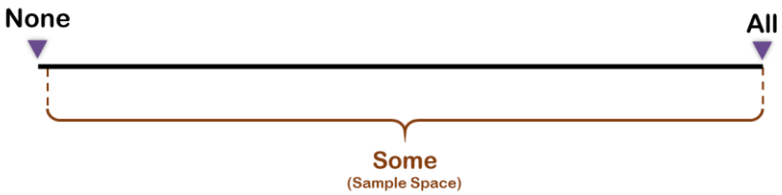
Simple, wasn't it? Let's apply the process to some more example statements.

EXAMPLE A

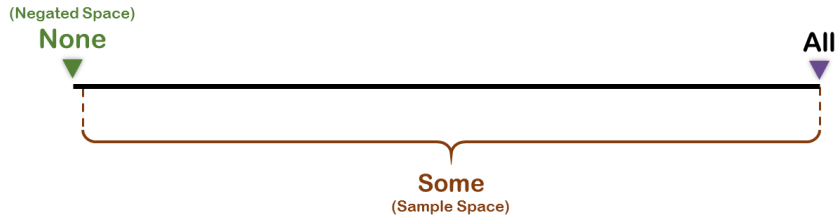
Original Statement: *Some farmers who live in India have adopted modern techniques in farming*.

Step 1 Understanding the Segment: The statement talks about a category of farmers: farmers WHO live in India. Therefore, this is our segment.

Step 2 Understanding the Sample-Space: The group marker present in the statement is some. Therefore, the range of possibilities this statement talks about is 1- 100. Let's represent it on the Possibility Line:



Step 3 Understand the possibilities OUTSIDE the sample space: As you can see in the above section, the sample space covered by *some* is 1-100. Therefore, we are left with only one possibility on the Possibility Line that is OUTSIDE this space – the possibility of *none/no* or 0 farmers who live in India. This is indeed the negated space. Let's see it on the Possibility Line:



Let's now deduce the negated statement by replacing the original group-marker by the negated space:

Original Statement: *Some farmers who live in India have adopted modern techniques in farming*.

Negated Statement: *None of the farmers who live in India have adopted modern techniques in farming.*

EXAMPLE B

Let's take another example, and this time we'll evaluate some given statements to see which one fits the bill of the negated statement.

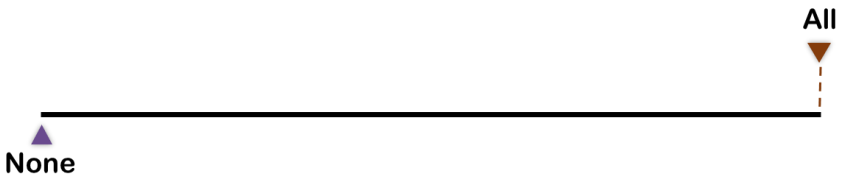
Original Statement: Every individual who has taken a loan will say that EMIs are a headache.

Options for negated statements:

A. Not every individual who hasn't taken a loan will say that EMIs are a headache.
B. Only some individuals who have taken a loan will say that EMIs are a headache.
C. No individual who has taken a loan will say that EMIs are a headache.
D. At least one individual who has taken a loan will say that EMIs are a headache.
E. Not every individual who has taken a loan will say that EMIs are a headache.

Step 1 Understanding the Segment: The statement talks about a category of individuals: individuals WHO have taken some loan or the other.

Step 2 Understanding the Sample-Space: The group marker present in the given statement is *Every*. Now *every individual* means the same as *all individuals*. Accordingly, let's represent it on the Possibility Line:



Step 3 Understand the possibilities OUTSIDE the sample space: As you can see in the above section, ***all* represents a single possibility point** where each and every individual who has taken a loan will say that EMIs are a headache. So, if this segment contains 100 such individuals, then *all* represents the point at which all 100 will say that EMIs are a headache. Accordingly, anything that is outside this possibility point falls under the negated space. Now what is this negated space? Think about it. If we start from 0, then up till what point we do not reach all or 100? It is 99, right? So the negated space will cover the range 0-99. We can represent this on the Possibility Line in the following way:

Let's now deduce the negated statement by replacing the original group-marker by the negated space:

Original Statement: *Every individual who has taken a loan will say that EMIs are a headache.*

Negated Statement: *Not all individuals who have taken a loan will say that EMIs are a headache.*

Now that we know what the negated statement is, evaluating the given options should be a cakewalk. So, let's get cracking!

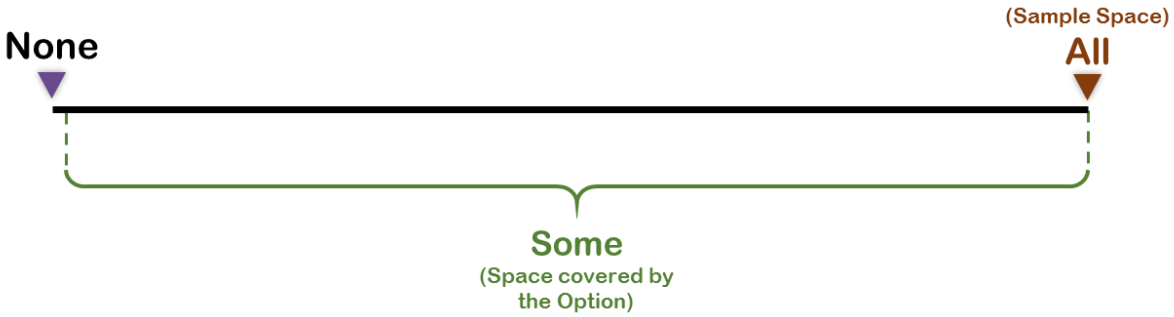
Answer Choice Explanation

A. Not every individual who hasn't taken a loan will say that EMIs are a headache.

Incorrect – Wrong Segment

This choice talks about individuals who have NOT taken a loan. We don't need to consider it any further.

B. Only some individuals who have taken a loan will say that EMIs are a headache.



Incorrect: The space covered by the option overlaps with the sample space of the given statement. Therefore, this option fails to provide the right negated space. **Remember, the negated space contains only the possibilities OUTSIDE the original sample space.**

C. No individual who has taken a loan will say that EMIs are a headache.

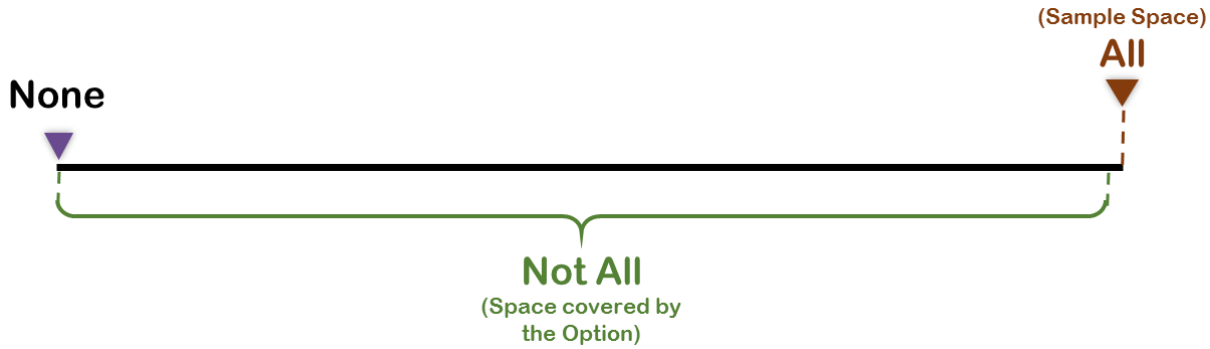
Incorrect: The space covered by the option doesn't include all the possibilities that lie outside the original sample-space. **Remember, the logical negation of a statement should account for all the possibilities lying outside the sample space of the given statement.** Therefore, this option cannot be the logical negation of the given statement.

D. At least one individual who has taken a loan will say that EMIs are a headache.

Incorrect: This is essentially the same as Option B, since saying that ***at least 1 person does X*** **means the same as saying *some people do X***. Think about it! *At least one person did X* means that we know for sure that 1 out of the given segment definitely did X – the number could be more; it could be even *all*, but we know for sure that at least one person was involved. This gives us the same sample space as *some* (1-100). Therefore, this option cannot be the logical negation of the given statement.

E. Not every individual who has taken a loan will say that EMIs are a headache.

"Not every" is same as "Not all".



*not every = not all

Correct: As you can see, the diagrammatic representation above matches the Possibility Line diagram we come up with before evaluating the options statements.

The space covered by the option covers all the possibilities outside the possibility point denoted by *all*. Therefore, option E is the logical negation of the given statement.

You are now ready to move to the **exercise questions** to check your understanding of how to negate statements.

Good luck! ☺

EXERCISE QUESTIONS

*At this stage, your focus should not be on memorizing the group-markers but rather on mastering their understanding while negating statements. Therefore, for ready reference, please find below the list of commonly used group-markers. You may need to refer to this list while answering the exercise questions.

Term	Logical Opposite
All (100)	Not All (0-99)
Some (at least one)	None (Notice that "Some" includes **everything except 0**)
Not All	All
Most	Not more than half (0-50)
None	Some (at least one)
Exactly X	Not Exactly X (Note that the sample space is both before X and after X, just not X)
Significant	Insignificant
Never	Sometimes
Always	Not Always
Everywhere	Not everywhere

Identify the correct negations for the following statements.

1. Most websites that are developed with a proper focus on SEO get a significant number of visitors.
    a. 49% of the websites that are developed without a proper focus on SEO get a significant number of visitors.
    b. All websites that are developed with a proper focus on SEO get a significant number of visitors.
    c. Some websites that are developed with a proper focus on SEO get a significant number of visitors.
    d. Up to 50% of the websites that are developed with a proper focus on SEO get a significant number of visitors.

2. Some people over 60 years of age are conservative investors.
    a. Not all people over 60 years of age are conservative investors.
    b. No person over the age of 60 is a conservative investor.
    c. Not everyone over 60 is a conservative investor.
    d. Most people are conservative investors.

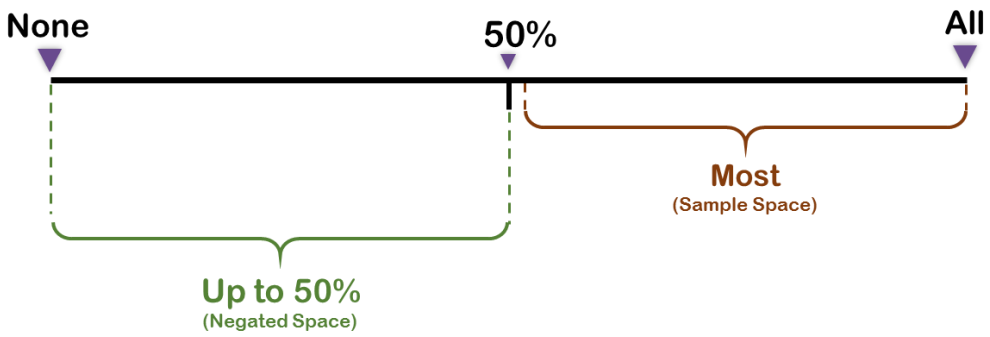
3. Up to 70% of the laptops powered by HCD processor are prone to over-heating issues.
    a. Not every laptop powered by HCD processor is prone to over-heating issues.
    b. Some laptops that are not powered by HCD processor are prone to over-heating issues.
    c. 70% or more laptops powered by HCD processor are prone to over-heating issues.
    d. More than 70% laptops powered by HCD processor are prone to over-heating issues.

4. Any GMAT taker will agree that the GMAT is a mentally gruelling exam.
    a. Only some GMAT takers will agree that the GMAT is a mentally gruelling exam.
    b. Not more than half of the GMAT takers will agree that the GMAT is a mentally gruelling exam.
    c. Not every GMAT taker will agree that the GMAT is a mentally gruelling exam.
    d. No GMAT taker will agree that the GMAT is a mentally gruelling exam.

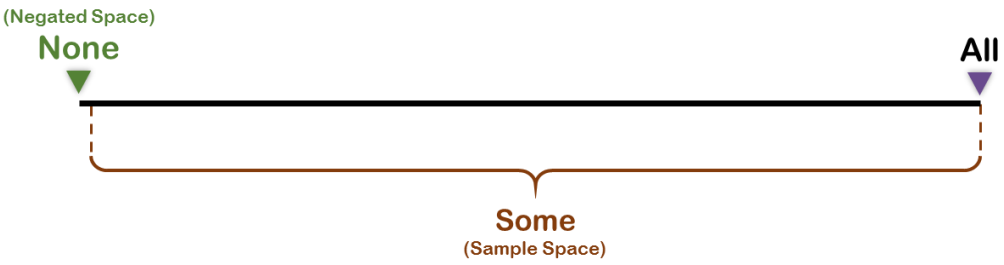
ANSWER KEY

Correct Answers:

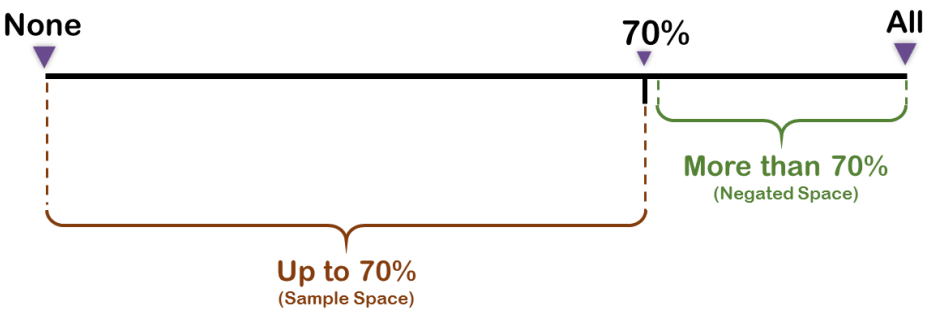
1. d



2. b



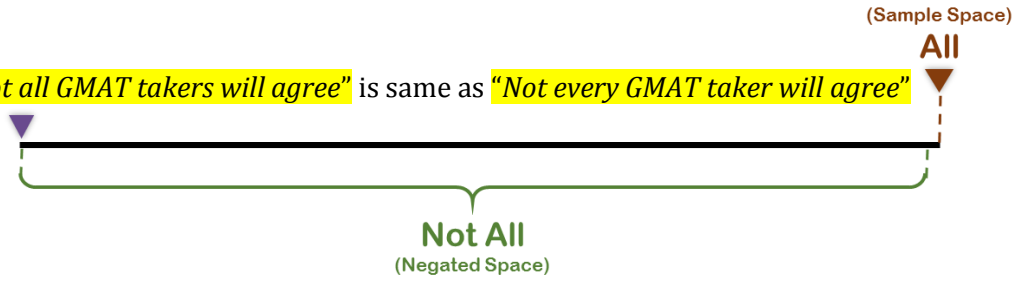
3. d



4. c

"Any GMAT taker will agree" is same as *"All GMAT takers will agree"*.

"Not all GMAT takers will agree" is same as *"Not every GMAT taker will agree"*



ARTICLE #3 WHAT IS NEGATION TEST AND HOW TO USE IT

INTRODUCTION

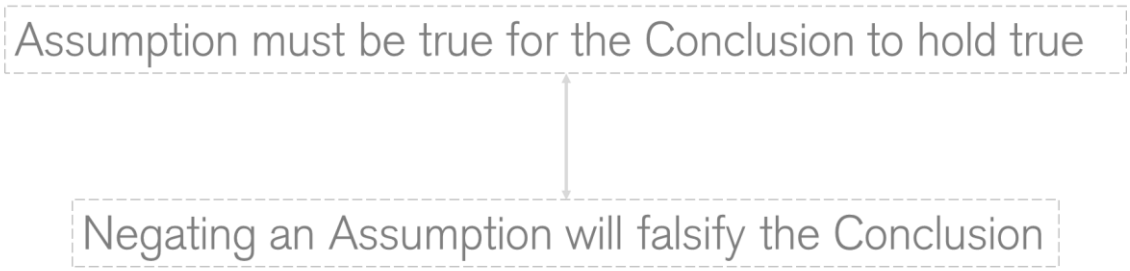
This is the third and the final article in the series of Negation Test Articles. In the first article you learnt about the concept of logical negation and sample spaces. You also learnt how to represent various sample spaces on the Possibility Line. In the second article you applied this understanding to negate various statements. In this article, we'll go one-step further and logically negate option choice statements through the **Negation Test to figure out the correct answer to an Assumption Question with a 100% surety.**

All set to master the Negation Test? Let's get rolling!

WHAT IS THE NEGATION TEST?

The Negation Test is a tool that we use to determine with full confidence as to whether a given answer choice in an Assumption question is the correct answer. How do we do that? We simply **take an answer choice and logically negate the information given in it**. If by negating the information, **the conclusion is falsified**, the answer choice at hand is indeed an assumption made by the author, and is, hence, the **correct answer**. You can mark it and move on to the next question. As simple as that!

Of course **if negating** the information given in the answer choice under consideration **does not falsify the conclusion**, you need to evaluate other contenders, since this one's NOT the correct answer – it is **not the assumption**; it is not vital for the argument.



WHY DOES THE NEGATION TEST WORK

Now you may ask as to why is that – why does negating the assumption falsify the conclusion?

The Negation Test exploits a key feature of any assumption – that the assumption has to be true for the conclusion to hold valid. Let's understand this quality a bit more.

By definition**,** an **assumption is a vital piece of information** that is never actually given to us in the argument but is supposed/**assumed by the author while drawing the conclusion.** What does this mean? This means that **if we take away the assumed piece of information**, the author will

not be able to draw the given conclusion and **the argument falls apart**. This is the feature that the Negation Test utilizes.

Now that you know in principle why the Negation test works, let's see it in action. But before that, you need to understand when exactly to use the test.

WHEN TO USE THE NEGATION TEST

To use the Negation test successfully, you need to understand **when** exactly to use it. The reasons for the same are simple:

1. **The Negation Test is not meant as a first line of defence**: The purpose of the test is to help you figure out the correct answer when you are stuck between two answer choices (ideally) that are close as per your understanding. This means that you will have done some analysis before using the test – we will show you what kind of analysis we mean.
2. **Using the test on each and every choice means wastage of precious prep/exam time**: The test is meant to clear your doubt and help you save time while making a decision between answer choices that you think are close; however, if you apply it to each and every choice, then you are not only wasting your time but also missing a key gap in your understanding. The fact that you are confused among more than two answer choices shows that you didn't understand the argument well. Applying the Negation Test will not work here since your understanding of the argument is not clear to begin with.

Now that you are clear about when to apply the Negation Test, **let's address the analysis you should do leading up to its application**.

Let's say after you read an argument, you spend a little time on thinking about the argument, but, despite your best effort, the assumption doesn't jump right at you. You, therefore, get confused when you go in to the answer-choice evaluation.

Now here's how you should approach the question from this point on:

1. **Discard all the answer choices that do not provide new information**: As discussed earlier, an assumption is something that is supposed/assumed but not stated by the author while making the conclusion. Therefore, it cannot be a repetition of what's already given to us.
2. **Discard answer choices that do not support the conclusion:** As e-GMATers know, an assumption must always support the conclusion. The logic is the same. Assumption provides a piece of information that the author has taken in to account while drawing the conclusion – even though he/she doesn't state it in the passage. So, basically, the assumption facilitates the author in drawing the conclusion.
3. **Apply the Negation Test:** After following the above two steps, you will be left with 2 (maybe 3 in the beginning when you are stilling learning concepts) answer choices. Now, without wasting any more time, get the Negation Test rolling.

Let's see the above process in action.

NEGATION TEST IN ACTION: EXAMPLE 1

QUESTION

Argument: Investments that are not subject to market risk are categorised as conservative investment options. These options are generally safe to invest in but generate a lower than average market-yield. Therefore, some people over 60 are likely to get returns that are lower than the market average.

Which of the following is an assumption made by the author?

A. Most people over 60 are likely to invest in conservative investment options.
B. At least one person over 60 is likely to invest in conservative investment options.
C. Some investors over 60 are likely to invest in options other than the ones generally considered conservative.

Before we apply the Negation Test to the two choices under consideration, let's first understand the argument.

PASSAGE ANALYSIS

The argument first tells us about a kind of investment option - conservative investment option. These investments have two features – safe to invest but yield lower than the market average. On the basis of this information, the author draw a conclusion about "**some** people over 60". The author says that these people are likely to get return that are lower than the market average.

INITIAL ANSWER CHOICE EVALUATION

Now, let's say you rejected a few answer choices on some basis or the other – they did not give any new information or they did not support the conclusion, and so they were irrelevant. For instance, in the given argument, Choice C is irrelevant. Now before we tell you why that's the case, think for yourself. Does it talk about the relevant segment? NO. Does it give any information that increases our belief in the conclusion? NO- because it talks about the relevant group's likelihood to invest in options other than the one the author concludes about.

So, here we are now:

Argument: Investments that are not subject to market risk are categorised as conservative investment options. These options are generally safe to invest in but generate a lower than average market-yield. Therefore, some people over 60 are likely to get returns that are lower than the market average.

Which of the following is an assumption made by the author?

A. Most people over 60 are likely to invest in conservative investment options.

Seems like a contender as it increases my faith in the conclusion - we now know that most people make such investments so their chances of getting lower than market average returns increase.

B. At least one person over 60 is likely to invest in conservative investment options.

Seems like a contender as it talks about the same segment making the mentioned investments but isn't information about "most" above better than "at least" one here?

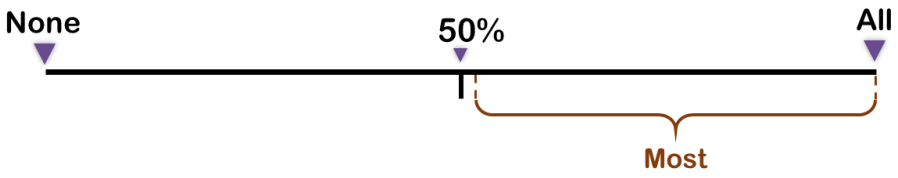
C. ~~Some investors over 60 are likely to invest in options other than the ones generally considered conservative.~~
Rejected for reasons mentioned above

Now is the time you should apply the Negation Test to choices A and B and see what impact the respective negated statements have on the conclusion. Let's start with choice A.

CHOICE A

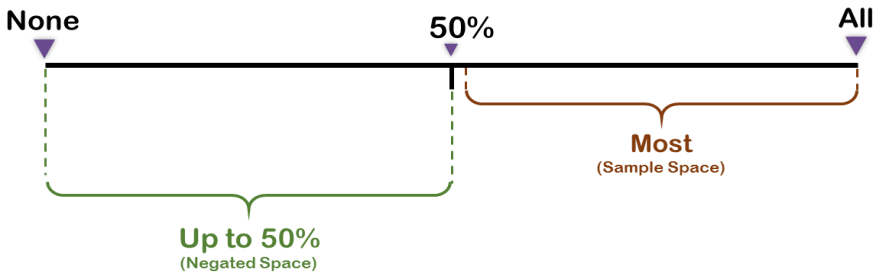
Choice A: Most people over 60 are likely to invest in conservative investment options.

Understand the Sample Space: We know that choice A talks about the relevant segment, so we can move to the step where we understand the sample space covered by choice A. Since it talks about "most" people over 60, the sample space it covers is:



Now that we know the sample space it covers, we are ready to move to determining the possibilities that lie outside this sample space.

Understand the possibilities that lie outside the sample-space: Let's see what possibilities lie outside the sample space covered by the group-marker *most*.



*Negated space = possibilities not covered by the original sample space

So, the negated statement we arrive at is:

Negated statement for choice A: *Up to 50% of people over 60 are likely to invest in conservative investment options.*

Impact of the negated statement on the Conclusion of the argument: The negated statement offers a range of possibilities. We'll consider the extreme two ones for a clear understanding. They are:

1. *No people over 60 are likely to invest in conservative investment options. – falsifies the conclusion as it negates the possibility that people over 60 are likely to invest in such options.*
2. *50% of people over 60 are likely to invest in conservative investment options. – strengthens the conclusion, as it indicates that half of the people in the segment are likely to invest in such options.*

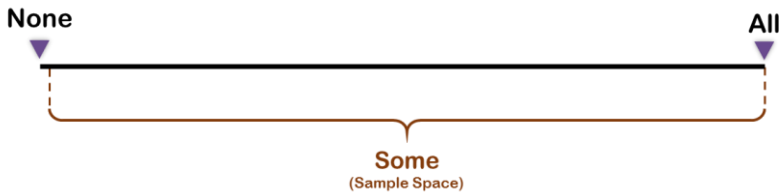
Now, **since the negated version of answer choice A does not falsify the conclusion in all possibilities under it, choice A is NOT the correct answer; it is not assumption made by the author.**

By default, we are left with only one choice now - Choice B. But let's apply the Negation Test and be a 100% sure that it is indeed the correct answer.

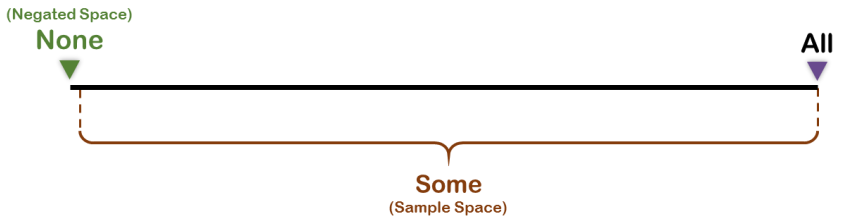
CHOICE B

Choice B: At least one person over 60 is likely to invest in conservative investment options.

Understand the sample space: Choice B says that at least one person in the segment is likely to invest in the mentioned investment options. Now, we know that logically speaking, "at least one" has the same meaning as "some" – we covered this derivation in the second article How to Negate Statements. So, we can rephrase Choice B as *: Some people over 60 are likely to invest in conservative investment options*. Let's represent the same on the Possibility Line:



<u>Understand the possibilities OUTSIDE the sample space</u>: As you can see in the above section, the sample space covered by *some* is 1-100. Therefore, we are left with only one possibility on the Possibility Line that is OUTSIDE this space – the possibility of *none/no* or 0 people in the concerned segment. This is indeed the negated space. Let's see it on the Possibility Line:



Let's now deduce the negated statement of Choice B by replacing the original group-marker by the negated space:

Choice B: *At least one person over 60 is likely to invest in conservative investment options.*

Negated version of Choice B: *None of the people over 60 are likely to invest in conservative investment options.*

Impact of the negated statement on the Conclusion of the argument: Is the conclusion falsified with the negated statement above? The answers to this question is a firm YES! The **negated statement** says that no one over 60 is likely to invest in such options. If that is indeed the case, then can the author draw the conclusion that "some" people over 60 are likely to get lower than average market-yield? Certainly not! The basis of the author's conclusion is negated.

Since the negated version of answer choice B falsifies the conclusion distinctly- without any ambiguity - answer choice B is the CORRECT answer; it is indeed an assumption made by the author.

Note that in the examples we are going in to diagrammatic representations time and again. It is to illustrate what impact logical negation has on different statements. In the actual exam, you most likely won't need to do so, as, with the right practice, you will have mastered logical negation in CR. Just in case you face a confusion then, you can use the Possibility Line to clear your doubt.

Now that you have seen how the Negation Test works in simple arguments, let's apply it to an Official Question, which we have modified slightly.

NEGATION TEST IN ACTION: EXAMPLE 2 (OFFICIAL QUESTION - MODIFIED)

Argument: *Although parapsychology is often considered a pseudoscience, it is in fact a genuine scientific enterprise, for it uses scientific methods such as controlled experiments and statistical tests of clearly stated hypotheses to examine the questions it raises.*

Remember the above argument? You must have tried it while reading the first article in the Negation Test series: What is Negation and What are Various Sample Spaces. In the modified version, we have limited the answer choices to three, retained some of the original answer choices, and added some more from our end – this modification has been done to address some key gaps observed in students' understanding of this question. Have a fresh look at the question:

QUESTION

Although parapsychology is often considered a pseudoscience, it is in fact a genuine scientific enterprise, for it uses scientific methods such as controlled experiments and statistical tests of clearly stated hypotheses to examine the questions it raises.

The conclusion above is properly drawn if which of the following is assumed?

A. Every genuine scientific enterprise has to use scientific methods to examine the questions it raises.
B. Any field of study that employs scientific methods is a genuine scientific enterprise.
C. There is no other parameter, besides the use of scientific methods, that can singlehandedly determine whether a field is a genuine scientific enterprise.

Let's see how the Negation Test helps us mark the right answer in this question, with full confidence. But before we do that, we must come to a common understanding of the argument. Accordingly, let' analyse what the argument is all about.

PASSAGE ANALYSIS

Passage Statement	Analysis
Although parapsychology is often considered a pseudoscience,…	**Context:** Parapsychology is normally considered a pseudoscience (keyword: *although* indicates that the author will later state something that is not in the same direction)
…it is in fact a genuine scientific enterprise…	**Conclusion of the argument:** The author does not agree with the general opinion – says that parapsychology is a genuine scientific enterprise
…for it uses scientific methods such as controlled experiments and statistical tests of clearly stated hypotheses to examine the questions it raises.	**Premise:** The author gives a reason for the conclusion made above. (keyword: *for* provides reason) The author says that the reason parapsychology is a genuine scientific enterprise is that it uses scientific methods. The author then gives examples of these methods.

As you see, **the author's conclusion rests on the fact that parapsychology uses scientific methods to examine the questions it raises**. With this understanding in mind, let's evaluate the answer choices:

INITIAL ANSWER CHOICE EVALUATION

Argument: Although parapsychology is often considered a pseudoscience, it is in fact a genuine scientific enterprise, for it uses scientific methods such as controlled experiments and statistical tests of clearly stated hypotheses to examine the questions it raises.

A. Every genuine scientific enterprise has to use scientific methods to examine the questions it raises.
Hmmm…I am not fully sure what this means…but let me keep it for now.

B. Any field of study that employs scientific methods is a genuine scientific enterprise.
OK…this one makes the most sense, but I can't reject the others with confidence.

C. There is no other parameter, besides the use of scientific methods, that can singlehandedly determine whether a field is a genuine scientific enterprise.
Seems like a contender as it definitely increases my faith in the conclusion - we now know that no other factor can on its own determine whether a field is a genuine scientific enterprise. I am going to keep it.

Now you can apply the Negation Test. Let's negate each of the above statements to see what impact the negated versions have on the conclusion of the argument.

*Please note that we are going to put all the three answer choices under the Negation test since the purpose here is to show you how the test helps you evaluate answer choices that you might deem close. You should ideally use the test when you are stuck between two answer choices.

CHOICE A

Choice A: *Every genuine scientific enterprise has to use scientific methods to examine the questions it raises.*

First of all, this choice is not a real contender for the Negation Test. Why is that the case? This choice talks about a must condition that all genuine scientific enterprises have to fulfil. But, if you consider the argument closely, you will see that the **argument does not conclude anything about all genuine scientific enterprises**. The conclusion is regarding what can be considered as a good enough criterion for a field to be considered a genuine scientific enterprise.

Nevertheless, we will apply the Negation Test to this choice as, in our experience, many students get confused in such choices and end up marking them due to lack of proper understanding. With the application of the test, you will be able to see a 100% why it is incorrect.

Choice A: *Every genuine scientific enterprise has to use scientific methods to examine the questions it raises.*

Negated version of Choice A: *Not every genuine scientific enterprise has to use scientific methods to examine the questions it raises.*

Rephrase of the negated statement: *0 - 99 genuine scientific enterprises have to use scientific methods to examine the questions they raise.*

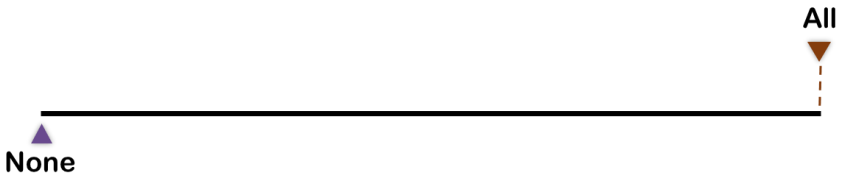
Impact of the negated statement on the conclusion: The negated statement offers a range of possibilities. We'll consider the two extreme ones for a clear understanding. They are:

3. *No genuine scientific enterprises has to use scientific methods to examine the questions it raises. – weakens the conclusion as it indicates that it is probably not a criterion worth considering.*
4. *Almost all genuine scientific enterprises have to use scientific methods to examine the questions they raise. – strengthens the conclusion, as it indicates that it is a criterion worth considering.*

As you can see, the negated version of choice A does not have a clear impact on the conclusion of the argument. Hence, choice A is not an assumption made by the author.

CHOICE B

Choice B: *Any field of study that employs scientific methods is a genuine scientific enterprise.*



Negated version of Choice B: *Not all fields of study that employ scientific methods are genuine scientific enterprises.*

Rephrase of the negated statement: *0-99 fields of study that employ scientific methods are genuine scientific enterprises.*

Meaning of the negated statement: If you see, the above statement says that out of a 100 possibilities, 0-99 employ scientific methods and are genuine scientific enterprises. This means that there is definitely one possibility that a field employs scientific methods but is still not a genuine scientific enterprise.

Impact on the conclusion: The negated version of Choice B completely destroys the basis of the author's conclusion. The reason the author said that parapsychology is a genuine scientific enterprise was that it uses scientific methods to examine the question it raises, implying that this factor is sufficient. However, **the negated version says that it is not sufficient as there is definitely 1 possibility in which even a field that uses scientific methods is not a genuine scientific enterprise. Hence, the conclusion is falsified. It is indeed the correct answer**!

Even though we have arrived at the correct answer, we will see how the Negation Test helps us reject Choice C that we did consider a strengthener in the beginning.

CHOICE C

Choice C: *There is no other parameter, besides the use of scientific methods, that can singlehandedly determine whether a field is a genuine scientific enterprise.*

Negated version of Choice C: *There are some other parameters, besides the use of scientific methods, that can singlehandedly determine whether a field is a genuine scientific enterprise.*

Meaning of the negated statement: While the use of scientific methods can determine singlehandedly, there are some other methods as well.

Impact on the conclusion: Does this choice have any negative impact on the conclusion? Nope. That's because **we still haven't negated the basis of the conclusion**. All that we know is that there are other parameters that TOO can determine what this particular parameter determines. So what? Does that take away from the fact that the use of scientific methods is enough to determine whether parapsychology is a genuine science- Nope! **The conclusion is still valid**.