

3

logic games basics

When we first begin preparing for the LSAT, we are, in general, far better prepared to tackle the Logical Reasoning or Reading Comprehension sections than we are the Logic Games section. In large part, that is because the things that we have to do and the thoughts we have to have for Logical Reasoning and Reading Comprehension questions don't seem as foreign to us.

Logic games are unique to the LSAT, and they are the most abstract aspect of the exam. They are abstract in that they have very little to do with real life, and playing them well is about handling a series of arbitrary rules. They really are *games*.

The Logic Games section is also commonly the most learnable of all sections. Countless people have started out absolutely lost as to how to solve Logic Games and ended up becoming Logic Games masters. In large part, this is because there is great commonality to all games, and all games questions follow fairly predictable design patterns. The games you see on your exam will be just like the games you see in your practice, if you know what to look for. When you think of most games from real life—Monopoly, Sudoku, poker, and such—you know that you can get better at them by learning and utilizing effective strategies, and by getting experience playing them. That's also absolutely true about Logic Games.

But when you start out, it sure can be tough to believe that you will ever conquer the Logic Games section.

You can do it. This book is going to help.

By the time we are through, there will be nothing about a game that surprises you, and you will have systems to handle every possible situation that can arise.

But we're getting ahead of ourselves. Try your hand at the game that appears on the next page before moving further.

Try This

This is a logic game and full set of questions that appeared on a previously administered LSAT. Do your best to answer the questions per the scenario and the rules given. Try to push the pace, but don't worry about timing for now. If you'd like to try the game again later, make sure to do your work on a separate page.

A messenger will deliver exactly seven packages—L, M, N, O, P, S, and T—one at a time, not necessarily in that order. The seven deliveries must be made according to the following conditions:

P is delivered either first or seventh.

The messenger delivers N at some time after delivering L.

The messenger delivers T at some time after delivering M.

The messenger delivers exactly one package between delivering L and delivering O, whether or not L is delivered before O.

The messenger delivers exactly one package between delivering M and delivering P, whether or not M is delivered before P.

1. Which one of the following is an order in which the messenger could make the deliveries, from first to seventh?

- (A) L, N, S, O, M, T, P
- (B) M, T, P, S, L, N, O
- (C) O, S, L, N, M, T, P
- (D) P, N, M, S, O, T, L
- (E) P, T, M, S, L, N, O

4. If T is delivered fourth, the seventh package delivered must be

- (A) L
- (B) N
- (C) O
- (D) P
- (E) S

2. Which one of the following could be true?

- (A) N is delivered first.
- (B) T is delivered first.
- (C) T is delivered second.
- (D) M is delivered fourth.
- (E) S is delivered seventh.

5. If the messenger delivers M at some time after delivering O, the fifth package delivered could be any one of the following EXCEPT:

- (A) L
- (B) M
- (C) N
- (D) S
- (E) T

3. If N is delivered fourth, which one of the following could be true?

- (A) L is delivered first.
- (B) L is delivered second.
- (C) M is delivered third.
- (D) O is delivered fifth.
- (E) S is delivered first.

If that game felt easy for you, then fantastic. You've got a head start on just about everyone else. For most people, Logic Games don't feel as comfortable at first.

As we've mentioned before, the good news is that for most test takers, the Logic Games section is the most learnable of all of the sections. If you do the right type of work, you will get better. If you think you can improve at Monopoly or Sudoku with some practice, there is no reason for you to think you can't get better at Logic Games. *But...*

Of course the truth is that a tough Logic Game is harder than your typical Sudoku game, and of course the stakes are higher, and the competition fierce. To get really good—to feel like you have mastery—it takes hard, consistent, careful work.

In this lesson, we'll discuss the basics of the Logic Games section, the common challenges many test takers face, and the skills that top scorers have. Then we'll lay out a road map for how we're going to ensure that you go into the test ready for any Logic Game that can come your way.

**In this lesson,
we will discuss the
common challenges
that Logic Games
present, the skills
that top scorers
have, and our plan
for mastery**

details, details

basic facts about logic games

One of your three scored sections will be a Logic Games section.

Each Logic Games section has four games, and generally twenty-three questions.

Each game will have between five and seven questions associated with it.

Every game that has appeared on the LSAT in the modern era can be thought of in terms of elements to be assigned, and positions to be filled.

For two or three games in every four-game set, the positions are organized in some sort of order.

For approximately half of all Logic Games, the positions are organized in groups.

Some games have positions organized by group *and* order. Almost no games have positions organized by neither group nor order.

Games are further complicated due to subgroups, or mismatching numbers issues.

For almost all test takers, a diagram is necessary for organizing the information given, and the ability to diagram well is a big key to success.

The purpose of a diagram is to represent what you know about a game in a clear and usable way, and to help facilitate bringing information together.

Of the twenty-three questions, all but two to four of them will come from a small bucket of basic question types. The remaining few will also come from an equally small bucket of minor question types.

For all Logic Games, there is some information that we can uncover, and some that we can't. All questions test your ability to differentiate between what is known, and what remains uncertain. A minority of questions also test your ability to consider a range of possibilities.

all games relate elements to positions

No matter what the specifics are of a particular game, all games are fundamentally about assigning elements to positions. In creating our diagrams, we will always use variables to represent elements and slots to represent positions. In general, we will begin our diagrams by writing out the elements and the slots.

F
G
H
J
K

The Challenge of Logic Games

So, why are Logic Games difficult? For people starting out, here are a few common reasons:

One: Logic Games are not, in many ways, what we think they are. As we've discussed, these games present a unique situation for our brains. When you first play, it's very easy to incorrectly associate Logic Games with other types of situations (e.g., other types of games, or other tests of reasoning ability), and it's also very easy to develop misconceptions about how these games work. Considering that these games require extremely careful and correct analysis, these misconceptions can have a big impact on your learning curve.

Two: Logic Games require a lot from us. More specifically, Logic Games require us to juggle a lot of information. Some of this information is simple to understand, but some of it is not. Some of it is easy to diagram, and some of it is not. Regardless, when it comes time to answer questions, we have to somehow bring these disparate pieces together to make inference after inference after inference. Sometimes, a question will require that we make four or five inferences before we get to the one that's relevant to the correct answer. It can feel like juggling a bowling ball, a plastic bucket, and a flaming log, all at once.

Three: You don't have Logic Games-specific skills yet. Logic Games are like the long division you did in school, in that in order to work at our best, we have to use tools outside of our brains—we have to be able to write things out to think about them properly. The first few times any of us play games, we don't have any practiced strategies or skills—that means that even if we are writing things down and whatnot, we are not totally able to utilize these “outside of brain” tools. We end up overly dependent on what we can do with no tools, and these games are not designed to be solved that way. Very few of us are any good at long division without our pencil and paper methods for writing things out. The same goes for Logic Games.

The good news is that there is a great similarity to all Logic Games that appear on the exam, and very soon you will have systems that make it much easier for you to think about all of these games correctly. In exactly the same way that learning to do division on paper—as opposed to in your head—increased the range of division issues over which you had mastery, your ability to diagram will have a drastic impact on your level of comfort and mastery here.

How Logic Games Feel for Top Scorers

Top scorers find Logic Games to be challenging, just as everyone else does. Of course, the big difference is that top scorers have the skills to meet these challenges. Here are some characteristics that define Logic Games mastery:

One: Top scorers have the ability to comprehend and lay out a basic setup for any Logic Games scenario.

If you take soy sauce, sugar, sesame oil, and garlic, you can come up with hundreds of different and unique flavors. Something similar happens with Logic Games, but our first experience with them is akin to the person eating the food—what we might first notice is that there seem to be hundreds of different types of Logic Games. Okay, maybe not hundreds, but other strategy guides will divide Logic Games into dozens and dozens of different types for you to master. However, if you look at games from a slightly different perspective, you can see that there is great commonality to all of these games, and actually very little variation from the norm—they are all made of just a few basic ingredients. The simplest, and most effective way to develop a sound ability to “picture” any game is to develop a usable understanding of the fundamental issues that make up the structure of all games. To carry the analogy through, the best way to understand all of the various food dishes quickly and correctly is to develop a simple and usable understanding of the basic ingredients—soy sauce, sugar, sesame oil, and garlic.

Top scorers have a simple and usable understanding of the fundamental issues that underlie all games. This allows them to easily picture the basics of any game situation.

a note of caution

When thinking about improving at Logic Games, it’s helpful to have a long-term perspective.

As we’ve mentioned, it’s very natural for people to get better at Logic Games, and it’s almost expected that you will make some significant improvement fairly quickly. For a lot of people, just becoming familiar with a few basic tools for diagramming is all it takes to make the first jump. (This is different from Logical Reasoning and Reading Comprehension, where score improvement commonly comes a bit later in the study process.)

However, it’s important to note here that the manner in which a person improves and thinks about his or her initial improvement can have a significant, often unseen, impact on how much the person can improve. Simply put, this has to do with the development of habits—you can develop sound fundamental habits that are easier to build upon, or you can develop “pretty good” patchwork habits that serve as a poor foundation for adding further

knowledge, and fall apart under the stress of the exam. An analogy can be made here to tennis or golf: You can get “pretty good” while developing bad habits in your form, “trick shots,” and “shortcuts,” but these bad habits can eventually prevent you from becoming awesome.

What are you meant to get out of this warning? Pay attention to your fundamentals—don’t be eager to get to the “hard stuff.” I promise that if you understand the fundamentals really well, the hard stuff is actually not going to seem that hard at all. And don’t let yourself off the hook when you don’t understand something or feel uncomfortable with a strategy, especially in the earlier lessons. You may survive one game not knowing how to do something or not understanding the difference between two very similar rules, but you don’t want to go into the test hoping you’re going to see the games you feel comfortable with. You want to go into the exam confident that you can handle any game and any issue they can throw your way.

Being able to start a game with a clear, organized understanding of the game situation makes everything else you have to do far easier.

Two: Top scorers have the ability to understand all rules in a specific and usable way.

Imagine that you have a game for which you are splitting eight students into two different teams, A and B. Here are two different rules you could get for this game:

“Mary and Jon will be assigned to different teams.”

“If Mary is assigned to team A, then Jon will be assigned to team B.”

Do you notice the difference in meaning between these two rules? We won’t go into too much detail here, but notice that per the first rule, Mary and Jon have to be on separate teams. Per the second rule, they do not.¹

1. Notice, per the second rule, that if Mary is on team A, Jon will be on Team B. Also, if Jon is on team A, we know Mary can’t be, so Mary must be on team B. However, there is nothing preventing both Mary and Jon from being on team B.

Most of the rules that accompany Logic Games are not too difficult to understand. But when we think about the difference between the two rules above, you can see how...

A. It’s a challenge to understand each and every rule exactly.

B. It’s a challenge to notate the rules in such a way that you don’t confuse the meaning with your notation.

C. It’s a challenge to bring together your exact and usable understanding of various rules.

Again, the good news is that the same issues show up again and again in the games, and with practice you can develop the skills necessary to handle all subtleties effectively.

Three: Top scorers have the ability to recognize the keys to a game.

For every game, there is certain information, whether it be particular rules or particular inferences, that is most useful for thinking about the game easily and solving questions quickly. Often, prioritizing this information can mean the difference between a game and questions taking six minutes, or a game and questions taking ten minutes.

Even the best game players are not able to come up with this key thought or inference every single time, but many top scorers are able to do so very frequently, and what this means is that they may be able to get through two or three of the games in a section very quickly. This leaves them a lot more time to get through the other games.

Four: Top scorers rarely make diagramming mistakes, and they are able to recover when they do.

As you become more familiar with Logic Games, they will feel less and less like challenges of intelligence or cleverness, and more and more like challenges of consistency and mental discipline.

Most top scorers make very few diagramming errors, and if you are going to invest time in Logic Games training, you should expect that your diagramming process will, in general, be error free.

But games are hard, and errors do happen. There will be moments when you misread a rule, or misunderstand a secondary ramification of a rule, or mis-diagram in some way. Again, you shouldn't expect for this to happen, but you've got to expect that it can.

The good news is that with the right experience and perspective, you should be able to quickly recognize when you've made a mistake, in large part because the process of solving questions won't "flow" in the way that you expect it to, and you should be able to recover in time to still get the questions correct.

Five: Top scorers have specific habits for solving specific types of questions.

The truth is that every single person who takes the LSAT wastes time thinking about issues that are ultimately unrelated to arriving at the correct answers. When you first start out, this is true for pretty much every single LSAT question you try—even when you review a question you got right, you can find things you spent your time thinking about that ultimately didn't matter.

This inefficiency arguably hurts us the most in Logic Games relative to other sections because for most people, Logic Games is the section for which the time pressure is most significant. Top scorers are consistently able to think about the right things at the right time.

Six: Top scorers have confidence.

This is another statement from the "cheesy but true" category. Top scorers have confidence. Confidence is not enough to ensure a top score, but...

A lack of confidence almost always results in underperformance. This is because the games section requires us to make a lot of decisions—a lot of decisions that balance on top of other decisions—and all of us are worse at making decisions when we lack confidence in what we are doing. Students go into the games section lacking confidence if they don't have a simple and clear understanding of what can happen in the section and if they don't trust their skill set. Top scorers have confidence in their skills.

**The games section
requires us to make
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when we lack
confidence**

characteristics of mastery

Let's take a look at how the characteristics we've just discussed relate to the game that you played earlier. Diagrams corresponding to the points below are on the opposite page.

1. The ability to comprehend and lay out a basic setup for any games scenario

All games involve placing elements into positions, and about two thirds of all LSAT games require us to think about these positions in some sort of order. For this game, the seven elements that we must place are L, M, N, O, P, S, and T. The positions represent the order in which these elements are delivered, and we will work under the assumption that order goes from left to right.

2. The ability to understand all rules in a specific and usable way

If each game that appeared on the LSAT was unique, and if you had to consistently come up with ways to notate constraints, diagramming would be a far more difficult endeavor. However, this is not the case. There is great consistency to how games are designed.

Notice that the first rule is about which position a certain element can go in: P can go in first or seventh position. The rest of the rules are all rules that give us more information about the ordering of events. These are all very common types of rules, and we will get plenty of practice with them in the lessons to come. To the side are some effective (though not the only effective) ways to diagram the given rules.

3. The ability to recognize the keys to a game

For an ordering game, the most significant information to know about a game generally has to do with a large grouping of elements. For example, imagine a simpler game with six positions, and you happen to know the relationship between four of the elements that go in those positions. Your understanding of this relationship would certainly be central to your understanding of the game as a whole.

We don't have any such significant rule here, but we do have information about "clusters" of elements, and we can gather this information by bringing various rules together. We'll lay out an effective way to do so on the next page, but before you look, go ahead and think about which rules seem to go together, and think about the significance of the information these clusters give us.

4. The habits necessary to rarely make diagramming mistakes

...And we won't be making any mistakes in this example. We'll discuss ways to recover from such mistakes, if and when they do happen, in later lessons.

5. Specific methods for solving specific types of questions

One of the best ways to combat the significant time pressure that you will face on the exam is to have effective and specific strategies for each type of question. Just like there are no unique rules, there are no unique questions—each question that appears is of a common variety that has appeared on countless exams, and you can habitualize strategies that are most effective for each type of question. On the side are some basic tips on how to handle a sampling of the questions that we saw.

6. Confidence

On the following two pages is a full solution for this game. Note that success does not require brilliance—it does require the consistent execution of a lot of steps. A lack of confidence makes this task much more difficult.

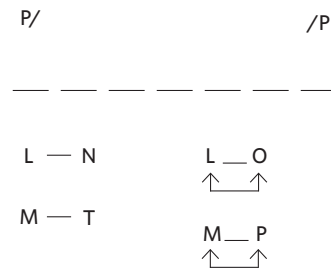
A messenger will deliver exactly seven packages—L, M, N, O, P, S, and T—one at a time, not necessarily in that order. The seven deliveries must be made according to the following conditions:

- P is delivered either first or seventh.
- The messenger delivers N at some time after delivering L.
- The messenger delivers T at some time after delivering M.
- The messenger delivers exactly one package between delivering L and delivering O, whether or not L is delivered before O.
- The messenger delivers exactly one package between delivering M and delivering P, whether or not M is delivered before P.

1.



2.



We will almost always write out ordering games with left to right order. It matters less how we list the elements.

Here are the rules, diagrammed in the order in which they were given. During real games, we will rarely diagram rules in the order given. Rather, we'll diagram them in an order that is best for us.

3.

- P is delivered either first or seventh.
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- The messenger delivers T at some time after delivering M.
- The messenger delivers exactly one package between delivering L and delivering O, whether or not L is delivered before O.
- The messenger delivers exactly one package between delivering M and delivering P, whether or not M is delivered before P.

5.

- 2. Which one of the following could be true?
- 4. If T is delivered fourth, the seventh package delivered must be

Do you notice the overlap of elements in some of the rules? Can you picture how you could draw some of these rules together?

Notice the different approaches that we want to use for these two questions.

If one answer could be true, that means four answers must be false, based on what we should already know about the game. For the first question, we should arrive at the right answer by eliminating the wrong ones.

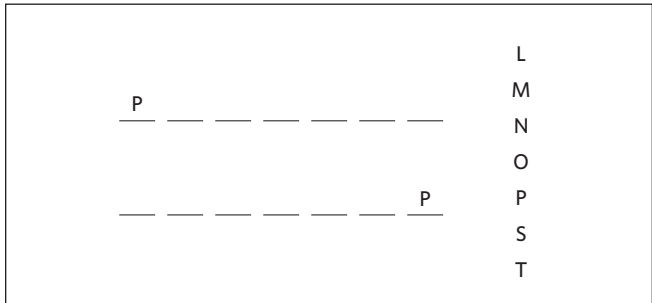
The second question is conditional, and the expectation is that putting T in fourth determines who must go in seventh. In this case, we should make sure to figure out the right answer before looking at the answer choices.

The Skillful Solution

Let's take a step-by-step look at how a top scorer might solve the game in full. Notice that this solution requires no brilliance or cleverness. It does require a full complement of skills and habits.

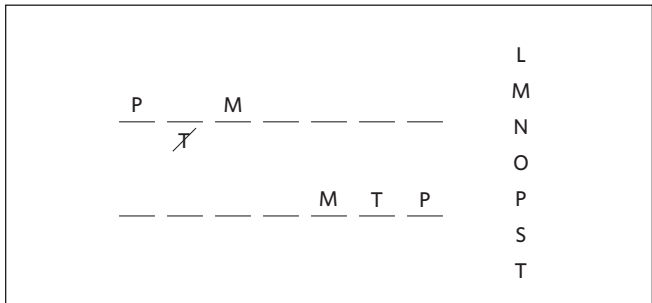
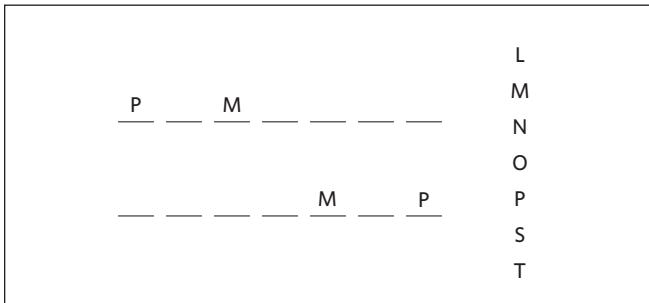
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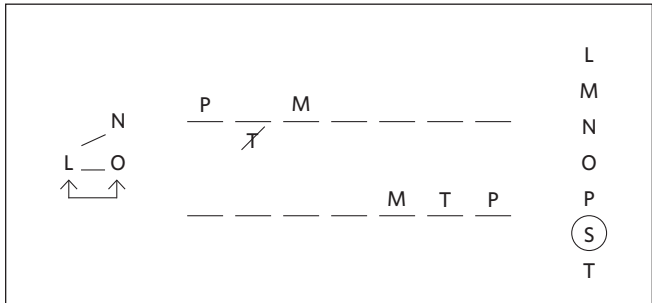
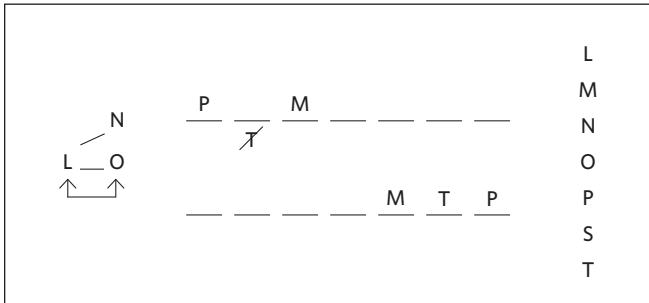
Step one: Notice that P is limited to one of two fixed positions, the last rule links M to P, and the third relates T to M. We can use this significant cluster of elements to organize the game.

Step two: Instead of using one diagram, we can branch off of the first rule and create two diagrams, one for when P is first, another for when P is seventh. This will help us better organize and keep on top of the information.



Step three: Since we've drawn P into the diagram, we can also draw in the rule about M being two spaces away from P. Notice how much better we can see the options for P and M than we would be able to if we had used just one diagram.

Step four: Now we need to incorporate the rule that T is after M. For the first diagram, that puts T in 4, 5, 6, or 7. That just means T is not in 2, and that's a clean way to notate that rule. For the second diagram, we know that T would have to go sixth.



Step five: Now we can diagram the remaining two rules. Notice that these rules also share an element in common, and so we can diagram these two rules together. After diagramming all rules, always check your picture against the rules one last time to make sure you've drawn everything clearly and correctly.

Step six: We want to take note of any elements that didn't get mentioned in the rules. These are "free agents" that can go anywhere. Lastly, we want to take a few more seconds to get very comfortable with our diagram and what it means; we'll need to use it quite a bit to answer the questions.

1. Which one of the following is an order in which the messenger could make the deliveries, from first to seventh?

- (A) L, N, S, O, M, T, P
- (B) M, T, P, S, L, N, O
- (C) O, S, L, N, M, T, P
- (D) P, N, M, S, O, T, L
- (E) P, T, M, S, L, N, O

Almost all games begin with a question that asks you to identify one possible arrangement of elements. These questions are designed to test your understanding of the rules given, and these questions are very consistent in the way that they are written. Each of the wrong answers must violate at least one rule, and the fastest, most accurate way to arrive at the correct answer is to go down the list of the rules we were given (typically the only time we will use the list of rules instead of our diagram), and to eliminate answers that violate those rules. We can use the first rule (you can see the rules listed on the opposite page) to eliminate (B). We can use the second rule to eliminate (D). We can use the third rule to eliminate (E). We can use the fourth rule to eliminate (A). That leaves us with **(C) as the correct answer.**

4. If T is delivered fourth, the seventh package delivered must be

- (A) L
- (B) N
- (C) O
- (D) P
- (E) S

 P S M T L N O

We want to start by placing T fourth, and we know that this should eventually tell us which package is in seventh. If T is fourth, we know the second diagram can't work, so we're just left with the first. With T in that fourth position, the only place for L _ O to go is 5 _ 7, and, since L needs to go before N and we need a place for N to go, that means L must be in 5, and O must be in 7. **The correct answer is (C),** and because this was a question for which we identified the answer before looking at the choices, we don't need to worry about eliminating wrong choices.

2. Which one of the following could be true?

- (A) N is delivered first.
- (B) T is delivered first.
- (C) T is delivered second.
- (D) M is delivered fourth.
- (E) S is delivered seventh.

We know, per the way the question is asked, that one answer is something that could be true based on what we know of the game, and four answers are ones that must be false. In this situation, it's generally faster and more accurate to eliminate the four answers that must be false than it is to test out all answers to see which one could be true. We can see that in either of our two diagrams, neither (A), (B), (C), nor (D) can be true. Therefore, **(E) is correct.** To confirm, we can come up with a way that works with S seventh: P, L, M, O, N, T, S.

3. If N is delivered fourth, which one of the following could be true?

- (A) L is delivered first.
- (B) L is delivered second.
- (C) M is delivered third.
- (D) O is delivered fifth.
- (E) S is delivered first.

 L/O S L/O N M T P

This question is also asking what could be true, but it also comes with a condition: N is delivered fourth. When we are given a condition, invariably there will be additional information we can figure out from this condition, and this additional information will always be what is key to answering the question. If N is delivered fourth, we know that the first diagram is not an option (no place for L _ O / O _ L). In the second diagram, if N is fourth, L and O can go in 1 and 3 (in either order) and that leaves S for the second spot. In this case, since we've figured out so much, it's easy to jump to the right answer: **(A) is correct.** It's also very easy to eliminate all the wrong ones, and we can do so to confirm our work.

5. If the messenger delivers M at some time after delivering O, the fifth package delivered could be any one of the following EXCEPT:

- (A) L
- (B) M
- (C) N
- (D) S
- (E) T

 P O M L N, S, T
 M T P

M can be delivered after O in either of our diagrams. In the first diagram, M can be delivered after O if O is delivered second. That puts L into the fourth spot. That leaves us with N, S, and T for the remaining three spots, and there are no more rules that restrict where these three elements can now go. So, N, S, and T are all possibilities for the fifth package. In the second of our diagrams, M can be delivered after O in any number of ways, but, of course, in all these different options, M must be the fifth item delivered. That leaves us with N, S, T, and M as the possible options for the fifth delivery. Since we are looking for the one answer that can't be our fifth delivery, **(A) is correct.**

The Road Map to Mastery

Our path to Logic Games mastery is going to take us through three main phases:

One: We will work to develop simple and effective diagramming strategies.

The key to Logic Games success is your ability to comprehend and accurately diagram the situations presented. If you are consistently able to do these two things, your outcome will mostly be a matter of execution.

As we've discussed, all games are constructed according to a few fundamental principles. Become comfortable with these principles, and get practiced at utilizing a simple diagramming system that intuitively ties in to your understanding of the game, and you are going to be well on your way to success.

In this first phase, we will work to develop a simple and usable understanding of all the major issues that can arise in Logic Games. We will also lay out basic diagramming strategies for these various issues and begin to get practice at incorporating these strategies into real-time solutions.

Two: We'll work to develop question-specific strategies.

As mentioned before, there are just a few different types of questions that appear in the games section. However, each type of question requires a somewhat unique thought process. Immersing ourselves more and more into full and actual LSAT games, we'll work to develop a simple and correct understanding of the tasks that each question stem presents, and we'll work through exercises that will further help incorporate our understanding and strategies into how we solve questions in real time.

Three: We'll fine-tune our skills and firm up our habits.

Of course, we'll be playing games throughout the learning process, but in this phase the playing of games will take center stage. We'll use these games to finalize and fine-tune our strategies, and to complete the process of making our strategies as intuitive as possible. We'll also use various systems to analyze and isolate any final weaknesses and work to knead out those final issues.