

KAPLAN RESEARCH SERIES

GMAT Integrated Reasoning

I. What Changed to the GMAT in 2012

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TEST PREP

I. What Changed to the GMAT in 2012

The GMAT and the New Section: Integrated Reasoning

The GMAT changed in June 2012: it gained a new section, Integrated Reasoning, and Integrated Reasoning will yield its own score, separate from the Total Score of 200-800 calculated from performance on the Quantitative and Verbal sections.

The test maker, GMAC, dubbed the new incarnation of the test the “Next Generation GMAT.” That moniker, aside from evoking Star Trek, hinted at comprehensive changes to the test, but in fact the Quantitative and Verbal sections of the test did *not* change in June 2012. The substance of the change was the addition of Integrated Reasoning, so you could think of the new GMAT more as a “GMAT+.”

The amount of time that you’ll sit for the exam is the same, because the IR section (as we’ll abbreviate it) replaced the Analysis of an Issue essay, with the same time limit as that essay: 30 minutes. Note that the Analytical Writing Assessment (AWA) score has *not* been eliminated. Rather, the AWA score is determined solely by the Argument of an Essay section. GMAC has explained that one essay, rather than two, has proved sufficient to determine an AWA score, so the Issue essay is no longer required by the test makers – and it won’t be missed by the people who had to write the essay, either, although once those people see the Integrated Reasoning section, many of them will want the essay section back.

What Changed in June 2012, and What Didn’t

As we’ve already said, the overall testing time on the new GMAT is unchanged, and the change lies in the composition of the sections.

The Integrated Reasoning section requires you to use many of the same reasoning skills you’ll be using in the Quant and Verbal sections. But the new question types require some other skills as well: you will need to navigate through spreadsheets, graphs, and tabbed pages. For Table Analysis questions, for example, you will be presented with a table of data that can be sorted by using a drop-down menu. Multi-Source Reasoning questions will require you to integrate information from several different tabbed pages.

There is another new element to the Integrated Reasoning section: you will have the use of an onscreen calculator. You’ll have a calculator in the Integrated Reasoning section only. You will not be given access to the calculator for the Quantitative section, and you will not be allowed to bring your own calculator into the exam. The calculator will perform basic functions and can be accessed by clicking an icon on the screen. Use caution when accessing the

calculator; rounding and estimation are often much faster than the time-consuming process of typing in multiple large numbers.

The biggest change to the new GMAT is the time it takes to prepare competitively. The sitting time may be the same, but the time you spend actually taking the GMAT is a miniscule portion of your total relationship with the test. Consider these statistics obtained by the test maker and reported in 2010:

<i>GMAT Total Score</i>	<i>Average Hours of Practice Time (including instruction)</i>
700+	99
600-690	106
500-590	79

How Total Scores Correlate with Practice Time (Source: GMAC, 2010)

The key take-away from this chart is that success on the GMAT requires much more preparation than most test takers expect—about 100 hours, on average, or 2-3 months of some mix of instruction, coaching, practice, and review, depending on the individual. (Many people fixate on the 7-hour drop and moving from the second row of the table to the top row, but this difference, or whether there is any leveling off in hours near top performers, is inconsequential given how far these numbers exceed our expectations, and also given the fact that they are only averages anyway.) The consequence for IR is that a test that requires a lot of preparation already is about to require even more. One way to put it is to say that another table like the one above will be added into the mix—how many hours of preparation it takes to be competitive on the IR section.

Why did GMAC Add This Section?

Now that you have a sense of what the IR section is, we'll answer a frequently asked question: why was this section added?

First, a few reasons that are *not* behind the change:

- *It's NOT (primarily) to make the test harder.* Making the test difficult or grueling, in and of itself, is not a goal of the GMAC or any other test maker. Our experiences of preparing for the test may lead us to think otherwise, when we are brushing up on how to calculate the area of a trapezoid or the permutations of heads and tails of various coin flips. What the test maker wants to do is make the test accurate and useful. We'll discuss whether it *is* harder in Part III, below.
- *It's NOT (primarily) to compete with the GRE.* The GRE, administered by ETS, has emerged as a competitor to the GMAT in the business school admissions space. It's

true that neither test maker can afford to ignore the other completely. Nevertheless, any good test maker can be expected to update their test from time to time, to leverage technology developments and respond to the needs of their clientele (in this case, business schools). The advent of the GRE may have shaped the timing of the new GMAT and hence the scope of the change, to some degree, but the “other test” isn’t the sole reason behind the change.

Since 1953, the GMAT has been used as predictor of first-year success in business school. As management curriculum continues to evolve, changes to the GMAT are often deemed necessary to reflect the nature of the business school student population. In preparing for the test change, GMAC polled approximately 740 management school faculty who indicated that the cognitive skills used in Integrated Reasoning are a prerequisite for management students of the future.

Similar to the Quant and Verbal section, the IR questions will not test purely on content knowledge. You will not need to be an expert on using spreadsheet software, but you will need some level of cognizance on interpreting information in a spreadsheet. In a world where visual data are more important than ever for making decisions, the IR section is designed to better reflect what a student is supposed to be equipped to do before entering business school.

Integrated Reasoning Does Not Adapt...and What That Means

The Integrated Reasoning section is not computer-adaptive; in the standardized testing world, we call non-computer-adaptive tests “linear tests.” Since the IR section is linear, you’ll see a particular set of questions that are *not* chosen on the fly and do *not* adapt to your performance. Your performance on one question will not affect the difficulty of the one that follows. Once upon a time, the Quant and Verbal sections were linear, when they were paper-based, and some linear versions of those sections still exist for practice purposes. For example, the practice test at the beginning of the *Official Guide* published by GMAC is a linear test. All of Kaplan’s online practice tests are now computer-adaptive, to mimic the actual test format; you may take one of them for free at www.kaplanGMAT.com/GMATPT.

The fact that the IR section is “linear,” or non-adaptive, allows us to make a few inferences about what the section is like. For an above-average test taker, an adaptive test consists primarily of questions of above-average difficulty. Not so for a linear test: they have the same set of questions for everyone. They are designed for the masses, you might say. For that above-average test taker, there will be more easy questions that they have to make sure to get corrected, and a few high-difficulty questions of critical importance. It will be more important to get every question correct and to be able to whip through them very quickly, unlike on the CAT sections, where strategic guesses and balanced time management pay off.

Although not adaptive, Integrated Reasoning is similar to the rest of the GMAT in one key respect: time is of the essence. As in the Quant and Verbal sections, your ability to make good

decisions about time management will be rewarded, and bad decisions will be punished. This is true of the business world too: no executive has the luxury of being able to throw unlimited resources – of money, time, or personnel – at every problem. The best executives know when to cut their losses, and how to focus limited resources where they will be most effective. The same is true of the GMAT. If you are unsure of the answer to an Integrated Reasoning problem, you will need to take your best guess and keep going.

How the IR Section Works

There will be twelve questions in your Integrated Reasoning section. They are designed to resemble the types of information management challenges that students encounter in business school and in real-world business situations. These questions will focus on test takers' ability to solve complex problems using data from multiple sources in a variety of formats. You will be asked to analyze different types of data (presented in graphs, tables, and passages, among other formats), convert data between verbal and graphical formats, and evaluate outcomes and tradeoffs. Some of the data will be in interactive formats. You may need to sort data within columns of a spreadsheet to determine the answer, or click on multiple tabbed pages to view additional information. Some questions will include multiple parts. For example, a question about a graph may require you to use multiple drop-down menus to accurately complete a sentence describing that data.

The Integrated Reasoning section will contain four question types:

- **Table Analysis** questions ask you to analyze data in a sortable table or spreadsheet.
- **Graphics Interpretation** questions test your ability to get information from graphs and images.
- **Multi-Source Reasoning** questions test your ability to synthesize data from several sources.
- **Two-Part Analysis** questions ask you to find possible values for each of two variables.

Because the questions in the Integrated Reasoning section will vary greatly in form and content, flexibility will be key to success. Fortunately, Integrated Reasoning questions draw on many of the same skills you need for the Verbal and Quantitative sections. Thorough practice with GMAT questions of all types will help you be prepared for Integrated Reasoning.

Integrated Reasoning is scored on a 1-8 scale, in 1-point increments. When the new section launched in June, the percentiles fluctuated somewhat wildly from month to month. Now with the benefit of months of test-taker data, IR percentiles have stabilized. As is typical with most standardized tests, these percentiles will be updated on a regular basis, but you can treat the chart as a reliable barometer of how your IR score and percentile will match.



How Total Scores Correlate with Practice Time (Source: mba.com, April 2013)

II. The Four New Question Types

The Question Types

In reviewing the four question types, what's common across all of the new question formats is that the questions test important cognitive skills that are not prevalent on the other sections of the GMAT. In particular, a few themes jump out across all types:

- You need to interpret data and confirm specific conclusions from that data.
- You need to convert quantitative data across both verbal and visual formats.

Table Analysis

Sort By
Select...

Household Size: Occupied Housing Units by State, 2010 Census								
	1-person households	2-person households	3-person households	4-person households	5-person households	6-person households	7-or-more-person households	Total households
Connecticut	373,648	443,095	226,658	197,116	84,916	29,348	16,306	1,371,087
Maine	159,538	213,695	84,340	64,010	23,840	7,854	3,947	557,219
Massachusetts	732,263	813,166	417,216	353,676	150,842	51,409	28,503	2,547,075
New Hampshire	133,057	188,923	85,046	70,835	27,365	9,286	4,461	518,973
Vermont	72,238	96,889	39,695	31,210	11,107	3,480	1,828	256,442

SOURCE: U.S. Census Bureau, 2010 Census. 2010 Census Summary File 1 NOTE: For information on confidentiality protection, nonsampling error, and definitions, see <http://www.census.gov/prod/cen2010/doc/sf1.pdf>.

The above data is drawn from 2010 census data for New England (excluding Rhode Island, whose data is not available). The table provides the total number of households in each state and the distribution of households of various sizes within each state.

Each column of the table can be sorted in ascending order by clicking on the word "Select" above the table and choosing, from the drop-down menu, the heading of the column on which you want the table to be sorted.

Consider the following statements about these states. For each statement evaluate whether that statement is true or false, according to the information in the table.

	True	False	
<input type="radio"/>	<input type="radio"/>		New Hampshire has the largest percent difference between the number of two-person households and the number of three-person households.
<input type="radio"/>	<input type="radio"/>		The median household size of all households in the five states combined is two people.
<input type="radio"/>	<input type="radio"/>		Of the seven categories of household size, Maine has the median number of households in exactly three.
<input type="radio"/>	<input type="radio"/>		In each of the seven categories of household size, Massachusetts has more households than the next highest two states combined.

Figure 1: Sample Table Analysis question

Table Analysis questions measure your ability to interpret and analyze information presented in a sortable table, similar to a spreadsheet. You will likely see a table, a paragraph of text that describes it, and several statements, which are presented in a true-false answer format. Figure 1 gives an example of a sample Table Analysis question, in which you're asked if each statement is true or false, based on your interpretation of the data. Directly above the table, you will see a Sort button that, when clicked, opens a drop-down menu of options that correspond to the column headers in the table: in this case, the different categories of households. When you select a category from the drop-down menu, the entire chart will be sorted based on the category you select. If the information in that column is numerical, it will be sorted from lowest to highest. If the information in that column is text, it will be sorted in alphabetical order. Questions often asked for the greatest, least, or median values in various categories, so expect strategic use of the Sort button to pay off on Test Day.

As with all Integrated Reasoning problems, Table Analysis isn't as straightforward as reading numbers off a chart. Don't ignore any accompanying text, as it may help you to decode the mass of information in the spreadsheet.

Graphics Interpretation

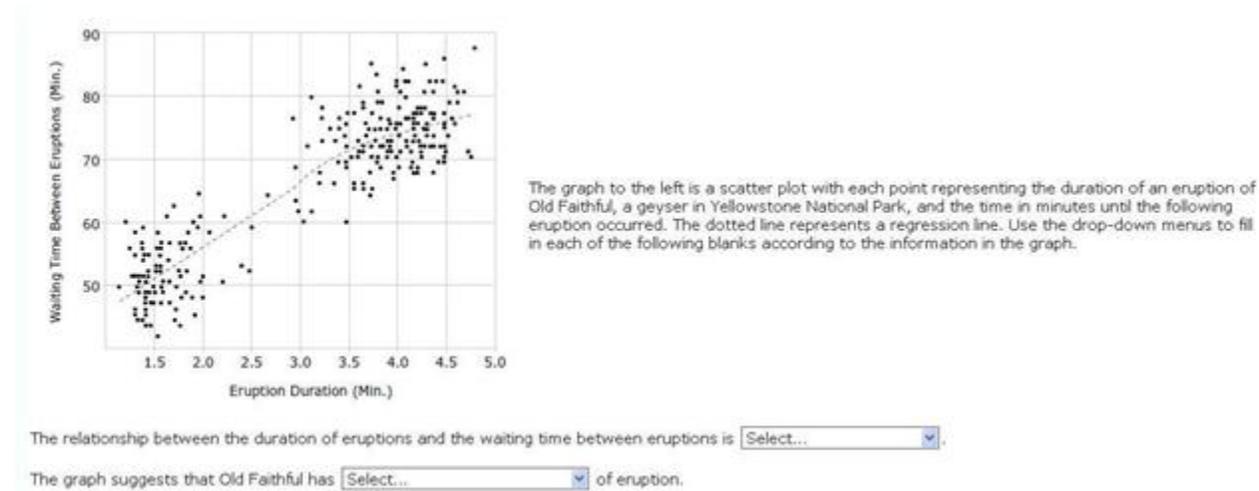


Figure 2: Sample Graphics Interpretation question

Graphics Interpretation questions test your ability to interpret and analyze data presented visually in graphs or images. For each question, you will see an image, most likely a graph (usually accompanied by a few lines of descriptive text), and two associated questions.

As with a Reading Comprehension passage, you do not need to absorb every bit of information on the graph to answer the questions. In fact, doing so would be counterproductive. What you must do is get the gist of the graph and what it contains so that you can efficiently find information when you need it. You will then read the question stem, view the answer choices, and use the information in the graph to select the correct answer.

Figure 2 is an example of how a graphical interpretation question might look on Test Day. The first question asks about the relationship between the duration of eruptions and the waiting time between the eruptions. But if you know what a regression line represents, then really the question is asking you about the nature, in particular the slope, of the regression line. The answer choices in the drop-down menu offer options of the slope of the regression line.

The GMAC has stated that their graphics interpretations will include all kinds of graphs, including bar graphs and pie-charts. The testmaker also suggested that some questions would involve images other than graphs. The sample questions all feature answer choices presented in the form of a drop-down menu. From the menu, test takers must select the number, word, or phrase that accurately completes a statement based on the information in the graph.

Multi-Source Reasoning

Email 1	Email 2	Email 3
<p>Email from project manager to financial officer</p> <p>August 3, 9:43 a.m.</p> <p>Did all three bids arrive on time last night? We need to minimize delays on construction, so if the contractors have submitted their estimates and our research team has compiled reports on the contractors' histories, we should make a decision on which firm to hire by the end of the day.</p>		<p>Consider each of the following statements. Does the information in the three emails support the inferences as stated? Choose <i>Yes</i> if the statement can be accurately inferred; otherwise choose <i>No</i>.</p> <p>Yes No</p> <p><input type="radio"/> <input type="radio"/> The total budget for the project is between \$1.4 million and \$1.5 million.</p> <p><input type="radio"/> <input type="radio"/> The project manager and the financial officer agree in their evaluation of Apaloosa's bid.</p> <p><input type="radio"/> <input type="radio"/> In making their decision, the administrator and the project coordinator considered how much time the contractors would spend on construction.</p> <p><input type="radio"/> <input type="radio"/> The project manager and the financial officer disagree about the best choice of contractors for completing the project.</p> <p><input type="radio"/> <input type="radio"/> The project manager is willing to wait a few days before deciding on Campolina's bid.</p>

Figure 3: Sample Multi-Source Reasoning question

As its name suggests, Multi-Source Reasoning tests your ability to take information from multiple sources and combine it to answer questions. This information will be presented on multiple tabs. You will have to click through the tabs to find the information you need. The data can be in the form of text, charts, tables, or a combination thereof. The testmaker has stated that part of the goal of this section is to test the ability to act “decisively” on information that appears “ambiguous,” so expect more than simple graphs, and be ready to make your best guess when you aren’t 100% positive of your answer.

The tabs will contain a lot of information, but just like Reading Comprehension, Multi-Source Reasoning questions don’t require you to understand everything at first glance. Rather, this question type tests your ability to “process and filter” information—to understand the logical organization and connection of ideas—so you can effectively research the information you need to answer each specific problem. The testmakers also want you to “synthesize” information—that is, to draw conclusions based on multiple points of data.

The tabbed pages will be on the left side of the screen, and the questions will be on the right. There may be more than one page of questions, in which case you would click on the Next button to advance to the next page of questions (remember that you won’t be able to click back to a previous question). Figure 3 is an example of a test-taker reading the first tab of a three-tab problem, in this case one email in a series of communications. The problem the student is answering has multiple true-false statements, but counts as one problem in the section. To be able to answer all of the statements, you must click through the tabs and interpret the information provided. An immediate challenge to the test-taker is that all of the information is not present on the screen as any given point. Some test-takers may opt to jot down important notes. But since time is critical, you’ll want to be purposeful in the notes that you write, and take care in reading selectively through the information presented.

Two-Part Analysis

When car P travels at a constant speed of x miles per hour for 84 minutes, and car Q travels at an average speed of y miles per hour for 168 minutes, car P travels 21 miles more than car Q .

In the table below, select a value for x and a value for y that together are consistent with the given information. In the first column, select the row that corresponds to the value of x , and in the second column, select the row that corresponds to the value of y .

Value of x	Value of y	Possible Answers
<input type="radio"/>	<input type="radio"/>	8
<input type="radio"/>	<input type="radio"/>	14
<input type="radio"/>	<input type="radio"/>	17
<input type="radio"/>	<input type="radio"/>	29
<input type="radio"/>	<input type="radio"/>	42
<input type="radio"/>	<input type="radio"/>	49

Figure 4: Sample Two-Part Analysis question

Two-Part Analysis will involve questions that have solutions, predictably enough, in two parts. In the samples released by the testmaker, the Two-Part Analysis questions consisted of a few lines of text and instructions to select numbers from a table for two unknowns. In none of the questions could we solve for an exact value for either unknown, but we could solve for a relationship between them. For example, we could figure out that x had to be greater than y by a certain number. In every Two-Part Analysis question, only one combination of possible values would satisfy the relationship.

You'll want to begin by first reading the text and identifying the two unknowns. Then, just as in Problem Solving, you'll analyze the information to see what it tells you about the relationship between them. Then you'll figure out an approach to the problem. Perhaps you'll create an equation that relates the two variables. Perhaps you'll create a chart to work out the various relationships. Perhaps you'll use a strategy that has paid off in a Problem Solving question that had a similar set-up. Perhaps you'll plug in answer choices from the table. No matter how you solve, you'll find only one unique pair of corresponding values that satisfy the information in question.

Two-Part Analysis can be hard to visualize; take a look at Figure 4. The question in this image asks for two values that provide a solution for the word problem; note that the same numbers serve as the answer options for each number. Double check your work to make sure you didn't put the right value in the wrong column—that error will surely turn out to be a common but avoidable pitfall in the new question type.

III. Is the GMAT Harder Now?

The short answer is “yes,” though some explanation is required. The reason why, in a phrase, the new GMAT is “harder” is that there is substantially more to prepare for on the test, and quality preparation is a key component of doing well on the test.

The average number of hours of preparation (including class time, for those who take a course) that it takes to score 600+ or 700+ on the GMAT is 100 hours, according to the test maker (2010). Integrated Reasoning only adds to that number and in no way subtracts.

Imagine that two equally skilled test takers have 100 hours to spare to prepare for the GMAT. Test Taker A took the previous version of the GMAT, and Test Taker B takes the current version. Test Taker A will get a higher Total Score on the test, and since scores are valid for 5 years, Test Taker A will have an advantage.

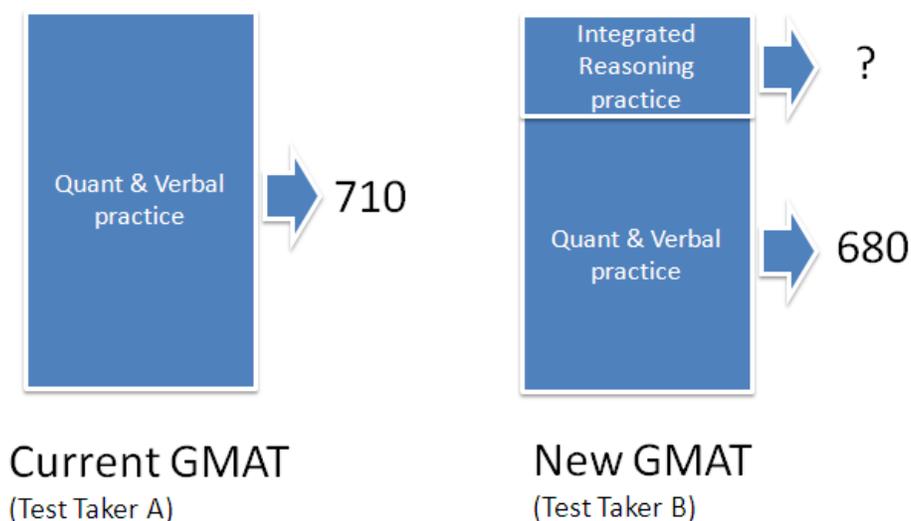


Figure 5: The GMAT test change creates an arbitrage situation

The difference between Test Taker A and Test Taker B, as illustrated in Figure 5, represents an arbitrage situation. Arbitrage, as business school teaches us, is the situation in which it’s possible to buy something in one market and sell it in another market at a higher price. The GMAT test change created an arbitrage situation: test takers could “buy” their test score before the test change and “sell” it at higher value in the post-change admissions market. Arbitrage is free money. In perfect economies, it doesn’t exist, but in the “market” of business school admissions in 2012 and beyond, the rules surrounding the GMAT have created such a free money situation for everyone who seizes it.

In the example above, Test Taker A is able to “sell” a GMAT score of 710 that he bought for the price of a 680. Test Taker B would have to “pay” more, in the form of average preparation time, to get to that 710. The exact scores aren’t important here: the pattern will hold true, on average, whenever Test Taker B spends a non-negligible amount of time preparing for Integrated Reasoning ... and if Test Taker B *doesn’t* spend a non-negligible amount of time preparing for Integrated Reasoning, Mr. or Mrs. B is taking a big risk. Notice that the height of the box, or time originally spent studying by Test Taker A, is not labeled in Figure 5. It doesn’t actually matter what the height of the box is.

Notice, also, that we haven’t spent any time in this section talking about the question types. The reality of the Integrated Reasoning section is that how difficult the questions are, in and of itself, is not the right question to ask. You may have taken a course once in which the final exam was graded on a curve; it was so difficult that even when you got 30% of the points correct, you still got the top grade in the class. Similarly, you might have taken a course that was also graded on a curve, and that course had an easy final exam; in that case, say, you got 85% of the questions right, but obtained a mediocre grade in the class because most of the students got *more* than 85% correct. The GMAT obeys a similar logic: doing well entails doing better than your competition.

People often ask whether business schools will really view scores before and after the test change equally. Might they not give an advantage to people with an Integrated Reasoning score? The truth is that business schools have no choice but to consider Total Scores before and after the test change to be of equal value. The GMAC stipulates clearly that scores are good for 5 years. Schools find it important to act in clear consistency with the rules of admissions and with everything that they state publicly about the process.

Free Practice

We offer free practice material for all of the sections of the exam. For further information, visit us at www.kaplanGMAT.com.

