

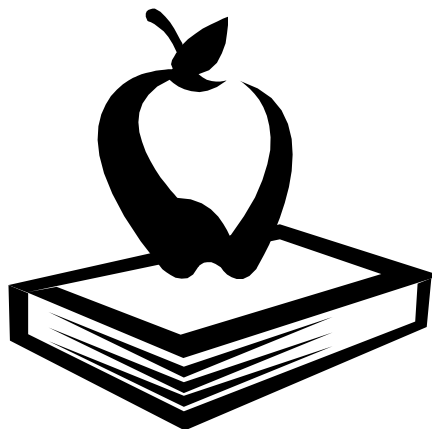
# **PREPARING FOR THE TEST AS PART OF THE APPLICATION PROCESS**

**Richard Montgomery High School**  
International Baccalaureate Diploma Program

**Montgomery Blair High School**  
Science, Mathematics, Computer Science  
Magnet Program

**Poolesville High School**  
A Whole School Magnet

- Global Ecology • Humanities
- Science, Mathematics,  
Computer Science





Inside this packet you will find information to help you answer the following questions about the magnet test:



Why should I take the test?



What's on the test?



How can I best prepare for the test?



What do the test questions look like?



How can I practice?





## Why should I take the test?

Taking the test is part of the application process for entry into three Montgomery County Public Schools countywide high school special programs that are among the best in the world. At Montgomery Blair High School the Science, Mathematics, Computer Science Magnet Program offers accelerated, interdisciplinary courses in science, mathematics, and computer science. At Richard Montgomery High School the International Baccalaureate Diploma Program is an international program that includes honors and college-level work in English, science, math, foreign language, social studies, and a sixth subject of your choice. And Poolesville High School, A Whole School Magnet, offers students rigorous programs in three areas: global ecology; the humanities; and science, mathematics, and computer science.

The test enables the selection committee to identify your strengths as a thinker and problem-solver, as well as assessing your verbal and mathematical skills. The test results are not the only information considered when the programs' selection committees meet to select students for the incoming freshman class in each school. They also look at your middle school grades, your teachers' recommendations, your application form, and an essay written at the time of testing. They want to understand what special qualities or strengths as a learner have enabled you to succeed in middle school.



## What's on the test?

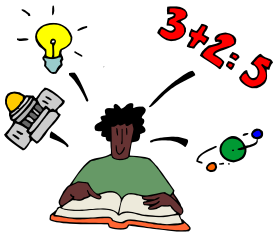
On the testing date you will take a two-hour test designed specifically for the Montgomery County Public Schools by a national testing service. In addition, you will write a one-page essay in response to a writing prompt that you will receive at the testing site. The essay will help the committee get to know you as a person and will enable them to assess your written communication skills.

The test contains two sections: a verbal section and a math section. The verbal section consists of vocabulary, logical reasoning, and reading comprehension items. The math section consists of mathematical problems and quantitative comparison items. Samples of these types of questions appear later in this booklet.

You have the choice to start with the math or verbal section. If you finish the first section before one hour elapses, you may continue to the second section. The test proctor will tell you when one hour has passed and will alert you to begin the second section. If you have time, you **WILL** be able to return to the first section and review answers or complete unfinished items.

Each item on the test has only one correct answer. Your score will be based on the number of correct answers, and **points will not be deducted for wrong answers.** Therefore, it is in your best interest to try to answer every question.

After the test is finished, you will have a short break before you begin the essay. Then you will have thirty minutes to write your essay.



## How can I best prepare for the test?

You have already done the most important preparation by studying hard at school, reading regularly, and stretching yourself to do challenging work. The skills in reading, reasoning, mathematics, and writing that you have developed over the past eight years will help you on test day.

Here are some tips to increase the likelihood that you will do your best on the test.

1. Review the sample items that follow. If the samples and their explanations are not clear, consult with your math or English teacher for assistance. Your teachers may want to develop similar items to practice with students in your class. Cramming or attending test preparation courses will do little to significantly improve your scores and will take time away from the important studying you need to do for your classes.
2. Rest well the night before the test; eat a good breakfast on the test day.
3. Plan to arrive before the designated time so that you will be relaxed when you enter the test room. Some nervousness is normal, but do not put so much emphasis on the test that you freeze.
4. Bring several sharpened #2 pencils and your student ID number if you are a Montgomery County Public School student.
5. Do not bring a calculator or a calculator watch. They may not be used during the test. Don't bring food, beverages, alarm watches, books, or paper.
6. Plan your time. Decide ahead if you will begin with the math or verbal section. Keep in mind how much time you have to work on a section and the number of items on that section. Look up periodically to see how much time remains. These strategies will help you maintain a reasonable testing pace.
7. Read the instructions carefully. You may underline key words on the test booklet.
8. Keep your eyes on your own paper so that proctors will not mistake wandering eyes for attempts at cheating.
9. If you finish early, go back and review your answers. Check that you have carefully filled in the correct answer on the answer sheet. Look closely for other careless mistakes, such as marking an answer next to the incorrect question number. Be sure that you

have attempted to answer every question because there is no additional penalty for incorrect answers. Your score is based on the total number of correct answers.

10. Do not become upset or distracted by difficult questions. No one is expected to get all the answers correct. After a reasonable attempt at the questions, go on to other test items and then return to work on the difficult questions at the end of the test. Make sure that you indicate items you have skipped on your test booklet. Also, when you skip an item, check that you have placed your next answer beside the correct item number.

### Here are some tips for the essay portion of the testing.

1. When you begin the essay section of the magnet test, read the prompt carefully. It will resemble the following prompt, which was used on the 2003 test:

*Mark Twain, American author and humorist, once wrote, "Work and play are words used to describe the same thing under differing circumstances." Is school work or play for you? Why? Use examples from your academic life to support your position in a coherent, meaningful, brief essay.*

2. Before writing your essay response, think and plan for about five minutes. You will have thirty minutes for this section of the test.
3. Develop your ideas fully with interesting details. A one-paragraph response with generalizations is not a fully developed, interesting response. A good response to the prompt in #1 might include vivid details about school that support your opinion of school as work, as play, or as both. An especially good response might help us understand what you are thinking as you sit in the classroom or work at home in the evening. Review the rubric on the next page to see specifically how you will be scored.
4. Make sure that the essay reflects who you are as a student and as a human being. Remember that the selection committee will use this essay to form a fuller picture of you.
5. Use language that is lively and expressive. The members of the committee want to see the skill with which you write.
6. Reread your essay to check for errors in expression or rambling organization.

# Magnet Test Essay Scoring Rubric

## Level 6

The response is a thoroughly developed essay which fulfills the writing purpose.

- Has relevant and complete support and elaboration which enhance ideas
- Uses a precise organizational strategy which enhances the purpose
- Maintains a distinctive voice and deliberate tone
- Uses precise word choice and evocative language
- Demonstrates careful attention to audience's understanding and interest
- Has no errors in usage or conventions that interfere with meaning

## Level 5

The response is a well-developed essay which attempts to fulfill the writing purpose.

- Has support and elaboration which enhance ideas, although these may not completely fulfill the purpose
- Uses an effective organizational strategy that is consistent with the purpose
- Maintains a consistent voice and tone
- Uses clear and consistent word choice
- Demonstrates attention to audience's understanding and interest
- Has no errors in usage or conventions that interfere with meaning

## Level 4

The response is an organized essay which addresses the writing purpose.

- Has support and elaboration which may be uneven or incomplete
- Uses an inconsistent or unevenly applied organizational strategy
- Employs an inconsistent voice or inappropriate tone
- Demonstrates an awareness of audience's understanding and interest
- Has few, if any, errors in usage or conventions that interfere with meaning

### **Level 3**

The response is an incomplete or oversimplified essay which attempts to address the writing purpose.

- Has incomplete or unclear elaboration and support for development of ideas
- Uses an organizational structure that is inconsistent or unclear
- Employs a flat to inappropriate tone and voice
- Demonstrates little awareness of audience's understanding and interest
- Has errors in usage or conventions, some of which may interfere with meaning

### **Level 2**

The response is a poorly written essay which attempts to address the writing purpose.

- Has support and elaboration that is inadequate
- Uses an unstructured or confusing organizational strategy
- Employs an unidentifiable tone and voice
- Demonstrates no attention to audience's understanding and interest
- Has errors in usage and conventions, some of which interfere with meaning

### **Level 1**

The response provides evidence the writer has seen the assignment and is attempting to respond to it.

- Has no elaboration or support, or the development does not support the writing purpose
- Uses little or no organizational structure
- Demonstrates no attention to voice
- Demonstrates no awareness of audience
- Has errors in usage and conventions which interfere with meaning

### **Level 0**

The response is completely incorrect or irrelevant, or there is no response.



## What do the test questions look like?

The following are descriptions of the different subtests. Actual sample items and explanations follow.

### *A. Vocabulary*

The vocabulary section of the test relies on your having a broad range of experiences with words and word study. These experiences come from reading high quality texts that are complex both in content and structure, and from studying word origins. The sentences you must complete sometimes lack clear contexts so you must have a large vocabulary on which to draw.

### *B. Logical Reasoning*

This section of the test requires you to use skills to organize ideas and draw logical conclusions. In some cases, you must be able to determine the difference between information that you can assume is part of the situation versus information that, although reasonable in a larger sense, is not implied by the situation described in the problem. The prompt “based on the information above” is crucial to solving these problems because you can immediately eliminate responses that are not based on the given information. In other cases, you might have to consider unfamiliar content or terms, or you might need to use alternative strategies such as drawing a picture, working backwards, and making lists.

### *C. Reading Comprehension*

All of the texts will be expository, meaning you will be reading for information, rather than for literary experience. Some of the items can be answered by thinking about the text as it is written. However, many of the questions require you to read between the lines and think about the information in a different way. You have to be careful not to impose your own feelings when choosing a response. All responses are based on the text, but sometimes the answers have the information worded slightly differently than what is in the actual text.

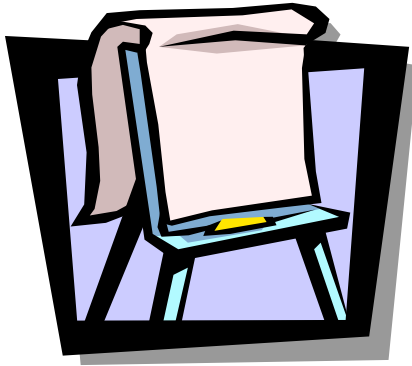
### *D. Mathematical Problems*

In some cases, you can either solve the problem using simply computation, or you can use logical reasoning to determine which answer makes sense. Many of the items require you to be able to reason through a problem and use a multi-step process to determine the solution.

### *E. Quantitative Comparison*

In this section of the test, you compare two quantities and must determine if one is larger than the other, if they are equal, or if an answer cannot be determined. In some cases, you can just use computation to select the correct response. In other cases, you need to apply your knowledge of numbers to abstract situations involving unknowns and variables.





## How can I practice?

Please review the following sample items carefully. The samples are presented to you so that you can understand the format of the test. The questions do not reflect the exact content of the test. The preparation you receive by completing the practice items and reviewing the explanations of the answers ensures that, on the day of the test, the committee is getting an accurate picture of the concepts you understand and the skills you have, instead of simply seeing how well you understand directions. At the top of each page of questions, you will find a table of helpful hints. Use these ideas to understand better how to answer those specific types of questions.



## Sample Vocabulary Questions

Read the entire sentence.	Know your vocabulary.	Small words make a big difference.	Watch out for negatives.	Try answering the question without looking at the choices.
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- **A judgment made before all the facts are known must be called \_\_\_\_\_.**
  - a) Harsh
  - b) Deliberate
  - c) Sensible
  - d) Premature
  - e) Fair
  
- **The research is so \_\_\_\_\_ that it leaves no part of the issue unexamined.**
  - a) Comprehensive
  - b) Rewarding
  - c) Sporadic
  - d) Economical
  - e) Problematical
  
- **Because her explanation was so clear and well understood by everyone, I told her that any more details would be \_\_\_\_\_.**
  - a) Subjective
  - b) Eloquent
  - c) Superfluous
  - d) Incontrovertible
  - e) Impervious

## Sample Vocabulary Questions: Understanding the Answers

- A judgment made before all the facts are known must be called **premature**.

Response D is the correct answer for this item. Think about what you know about the word “judgment.” Think to yourself: “I know I need all of the facts before I can make a good judgment about something, so the word I’m looking for must mean something about making an *uninformed* judgment.” *Premature* is a better response than *harsh* because *harsh* implies something bad or wrong while *premature* implies something was done too early. Reading the entire sentence is also important because the phrase “before all the facts are known” is a big clue. The word *premature* has the prefix “pre” meaning “before.”

- The research is so **comprehensive** that it leaves no part of the issue unexamined.

Response A is the correct answer for this item. Think about what the sentence states about the research. The phrase “leaves no part...unexamined” means that the correct response will say something positive about the research. While *rewarding* and *economical* might both imply something positive, *comprehensive* implies taking everything into account. The word *comprehensive* is related to the word “comprehend,” meaning “understand.” You can infer from the sentence that the research helped people understand all parts of the issue.

- Because her explanation was so clear and well understood by everyone, I told her that any more details would be **superfluous**.

Response C is the correct answer for this item. In this case, it’s really important to have a big vocabulary. From the sentence, you can infer that the correct response will say something about “additional details” not being needed or taking away from the story. The word *superfluous* has the stem “super” meaning “extra” or “above and beyond.” Knowing the origins of words will help you make the connection between what the sentence means and the possible correct responses.

## Sample Logical Reasoning Questions

Problems like these focus on your ability to think clearly when you are given many pieces of information.	Draw a figure to represent items in a line. Follow the directions carefully.	Rely only on the information provided in the problem. Do not use your own personal experience to draw conclusions.	Don't worry about the subject of the problem. Focus on key word like "all," "some," "none," etc.	Draw pictures, make lists, or otherwise try to organize the information in the problem.
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- **Several people are standing in a straight line. Starting at one end of the line Latoya is counted as the 5<sup>th</sup> person, and starting at the other end she is counted as the 12<sup>th</sup> person. How many people are in the line?**
  - a) 15
  - b) 16
  - c) 17
  - d) 18
  - e) 19
- **Juan is younger than Tammy, and he is older and shorter than Lee. Tammy is taller and younger than Carmen, yet Carmen is taller than Lee. Which answer represents these people in order from youngest to oldest?**
  - a) Juan, Carmen, Lee, Tammy
  - b) Lee, Juan, Tammy, Carmen
  - c) Lee, Tammy, Juan, Carmen
  - d) Tammy, Lee, Carmen, Juan
  - e) Carmen, Tammy, Juan, Lee
- **The members of the Liars Club never tell the truth. After the school's spelling bee, in which there were no ties, one of them said, "Katie finished first. Alex beat Katie. Maria beat Jaron, and Alex came in last." Which one of the following statements is a valid conclusion based on the information in this problem?**
  - a) The Liars Club cheated on the spelling bee.
  - b) Katie won the spelling bee.
  - c) Members of The Liars Club should not be allowed to compete in the spelling bee.
  - d) Jaron beat Maria.
  - e) Alex won the spelling bee.

## **Sample Logical Reasoning Questions: Understanding the Answers**

- Several people are standing in a straight line. Starting at one end of the line Latoya is counted as the 5<sup>th</sup> person, and starting at the other end she is counted as the 12<sup>th</sup> person. How many people are in the line? **The correct answer is B, 16.**

You can answer this question by careful reasoning, or you can draw it out and count. Either way, be careful that you don't leave Latoya out or count her twice. If Latoya is the 5<sup>th</sup> person from one end of the line, there are 4 people (not counting Latoya) between her and that end of the line. If Latoya is the 12<sup>th</sup> person from the other end of the line, there are 11 people (not counting Latoya) between her and that end of the line. Four people between Latoya and one end and 11 people between Latoya and the other end add up to 15 people. Add in Latoya and you have a total of 16 people.

- Juan is younger than Tammy, and he is older and shorter than Lee. Tammy is taller and younger than Carmen, yet Carmen is taller than Lee. Which answer represents these people in order from youngest to oldest? **The correct answer is B, Lee, Juan, Tammy, Carmen.**

This item may seem confusing because it contains extra information you don't need to find the correct answer. You can immediately ignore any information about height since the question is about age. The information you then get is: Juan is younger than Tammy. Juan is older than Lee. Tammy is younger than Carmen. Since no one is younger than Lee, he must be the youngest. Since no one is older than Carmen, she must be the oldest. That leaves just 2 answer choices. Since Juan is younger than Tammy, he must be closest to Lee while Tammy is closest to Carmen.

- The members of the Liars Club never tell the truth. After the school's spelling bee, one of them said, "Katie finished first. Alex beat Katie. Maria beat Jaron, and Alex came in last." Which one of the following statements is a valid conclusion based on the information in this problem? **The correct answer is D, Jaron beat Maria.**

For this type of item, review all of the responses first. Answers A and C can be eliminated immediately because they are not based on information in the problem. Instead, they are based on your own opinion of the situation. That leaves B, D, and E. Instead of trying to put the students in order from first to last, try evaluating the reasonableness of each answer. Response B is incorrect because the statement in the problem is that "Katie finished first." Since that is a lie, we know B cannot be correct. Response E is not the best choice because the statement in the problem is that "Alex came in last." While that is a lie, we don't know if he came in first, only that he didn't come in last; therefore, response E is not necessarily correct. We need to check response D. Response D is the best choice because the statement in the problem is that "Maria beat Jaron." Since this is a lie, Maria did not beat Jaron. Because there were no ties, we can logically conclude then that Jaron did beat Maria, and response D is the best choice.

The students finished the spelling bee in this order: 1-Jaron, 2-Katie, 3-Alex, 4-Maria.

## Sample Reading Comprehension Questions

The answers come from the passage – not your own personal experience.	Every word counts.	Mark the passage or make short notes.	Read the questions and answers carefully.	An answer can be true and still be the wrong answer for that particular question.
The passage must support your answer.	Try eliminating choices you know are false.	Double-check the other choices.	Pace yourself.	Go back to any questions you skipped.

Read the passage entitled “Solar Energy” on the back of this page. Use the information to answer the questions below. Base your answers only on what you have read in the passage.

- **Which of the following best tells what this passage is about?**
  - a) which solar energy design is most economical
  - b) the problems associated with collecting solar energy
  - c) why solar energy is the best form of energy
  - d) two ways to collect solar energy
  - e) a history of solar energy
- **Which of the following is the most likely reason an active design would be chosen over a passive design?**
  - a) An active design is less expensive.
  - b) A structure does not have windows that can face the sun.
  - c) An active design works more efficiently.
  - d) It is too difficult to install stone and ceramic tiles for a passive design.
  - e) A passive design is too unreliable.
- **The electric pump and hose system (lines 26-27) allows**
  - a) liquid to run through the building to heat the rooms.
  - b) liquid to cool the flat-plate collector.
  - c) the active design to be more efficient.
  - d) warm air to circulate through the building.
  - e) cool air to circulate through the building.
- **In what sequence do the following events occur to collect solar energy in a passive design?**
  - I. Sunlight heats the walls and floors.
  - II. The building is positioned to face the sun.
  - III. Heat is released at night.
  - a) I, II, III
  - b) I, III, II
  - c) III, I, II
  - d) II, III, I
  - e) II, I, III

## Solar Energy

Solar energy is the direct use of the Sun's energy to heat living spaces. People have used this type of energy for thousands of years. In the last fifty years scientists have renewed their investigation into the use of solar energy as an alternative energy source. They have developed several designs that are able to collect the sun's energy and convert it to heat for use in homes and commercial buildings.

A passive solar energy design uses the building's shape, materials, and its orientation to the sun to collect and store the sun's energy. The building is positioned with large windows facing the sun so that it can receive and store heat from the sun during the winter. During the summer, the windows are designed to close or block the sun's energy. On cool, sunny days, sunlight passes through the south facing windows and heats the wall and floors. Stone and ceramic tiles are used as flooring to absorb and retain the sun's heat. At night the walls and floors slowly release the heat. Heat may also be stored by placing liquid inside containers placed in the rooms, the walls, or the floor to absorb the sun's energy by day and release it by night.

An active design is used where windows cannot face the sun. This design uses a flat-plate collector to capture and store the sun's heat. The collector consists of an insulated box which is placed on the roof or somewhere else where it can be warmed by the sun's energy. Inside the box is a long, curved tube filled with liquid. The tube is connected to an electric pump and hose system that runs into the building. As the liquid is heated, it is pumped through the system. The liquid gives up its heat as it passes through the cooler rooms, warming them. Then the cooled liquid returns to the flat-plate collector where it is heated once again by the sun's energy.

## **Sample Reading Comprehension Questions: Understanding the Answers**

- **Which of the following best tells what this passage is about? The correct response is D, two ways to collect solar energy.**

Start by reviewing each of the responses. A, B, and C all contain ideas not brought up in the reading selection. There is no mention of money, problems with the designs, or a discussion of advantages and disadvantages. That leaves D and E. It is tempting to choose E because the first paragraph does describe some of the background to solar energy collection. However, the focus of the reading is on the two different designs. Therefore, D is the best answer. This is one of those situations where you must select the best answer, even though more than one answer might seem correct.

- **Which of the following is the most likely reason an active design would be chosen over a passive design? The correct response is B, a structure does not have windows that can face the sun.**

In this case, you need to be sure to base your response on the information in the reading. You might know a lot about solar energy collection and so you might be tempted to choose one of the other responses. However, the only response that is based on the reading is B. Line 21 specifically states, “An active design is used where windows cannot face the sun.”

- **The electric pump and hose system (lines 26-27) allows The correct answer is A, liquid to run through the building to heat the rooms.**

In this case, you are directed back to specific lines in the reading. You should immediately look for clues in that area of the reading. There is no information in the reading about efficiency or circulating air, so you can rule out C, D, and E. This type of question can also be tricky because of the technical language involved, such as flat-plate collector. The flat plate collector is mentioned at the beginning and end of the paragraph, but there is no information about using liquid to cool it, only that the cooled liquid gets reheated by the flat-plate collector. However, in lines 28-29, it says, “The liquid gives up its heat as it passes through the cooler rooms, warming them.” From this sentence you can infer, or conclude, that it means something similar to response A.

- **In what sequence do the following events occur to collect solar energy in a passive design? The correct answer is E: II, I, III.**

A good way to approach this type of problem is NOT to look at the responses first. Instead, put them in the order you think is correct. The question directs you back to the paragraph about passive design. It is there that you can find information to help you. You don't have to rely on your memory! Just reread the text. Once you have decided on an order, look to see if your order is one of the responses. If it is, great! If it isn't, think about which part you are sure about. For example, if you were sure “II” has to be first, use that idea to eliminate responses that don't have “II” as the first item. Then you can check the remaining answers against what you read in the text.

## Sample Mathematical Multiple-Choice Questions

<p>If it seems like a lot of calculating to do, look for a shortcut. Use logical reasoning and number sense instead of relying on calculation.</p>	<p>A quick “make sense” check before you start working on a question can help you eliminate some of the answers right away.</p>	<p>When the math is simple and you understand what the question is asking, it’s okay to find the answer by checking each choice and/or eliminating choices.</p>	<p>Be careful about going with your “intuition” or “gut feeling.” Sometimes there are incorrect response choices that look correct at first glance.</p>
<p>Label diagrams and figures with the information you have. If no diagram or figure is drawn for you, draw your own. It only has to be neat enough for you to work with.</p>	<p>When checking the values of expressions, remember the order of operations. Also keep in mind special rules for working with positive and negative numbers.</p>	<p>If you are presented with a question that shows the grid lines of a graph, you may rely on the accuracy of those lines.</p>	<p>You are not scored on how you approach the problem, only on which solution you choose.</p>

- **Which of the following integers is a divisor of both 36 and 90?**
  - a) 12
  - b) 10
  - c) 8
  - d) 6
  - e) 4
- **If  $4(X-1) - 3X = 12$ , then  $X =$** 
  - a) 4
  - b) 8
  - c) 11
  - d) 13
  - e) 16
- **A car averages 20 miles per gallon in city driving and 30 miles per gallon in highway driving. At these rates, how many gallons of gas will the car use on a 300-mile trip if  $\frac{4}{5}$  of the trip is highway driving and the rest is city driving?**
  - a) 5
  - b) 11
  - c) 14
  - d) 20
  - e) 25
- **A basketball player has a mean of 22 points per game for 8 games. What is the total number of points this player must score in the next 2 games in order to have an average of 20 points per game for 10 games?**
  - a) 18
  - b) 20
  - c) 22
  - d) 24
  - e) 34

## Sample Mathematical Multiple-Choice Questions: Understanding the Answers

- Which of the following integers is a divisor of both 36 and 90? **The correct answer is D, 6.**

A divisor is a number by which another number can be divided. *If you forgot what a divisor is, think about some other clues in the item.* The word “divisor” has the word “divide” in it, so the correct response must link 36, 90, and division. Another clue is the word “both.” This implies that the correct response tells you something that 36 and 90 have in common. Do some quick mental math to figure out which number 36 and 90 have in common through division.

- If  $4(X-1) - 3X = 12$ , then  $X =$  **The correct answer is E, 16.**

To solve for  $X$ , use the distributive property and combine like-terms:

$$\begin{aligned}4(X-1) - 3X &= 12 \\4X - 4 - 3X &= 12 \\(4X - 3X) - 4 &= 12 \\X - 4 &= 12 \\X &= 16\end{aligned}$$

If you were unsure about how to simplify the expression  $4(X-1)$ , *you could also work backwards* by substituting each response for  $X$  to which value of  $X$  worked to make the equation true.

- A car averages 20 miles per gallon in city driving and 30 miles per gallon in highway driving. At these rates, how many gallons of gas will the car use on a 300-mile trip if  $\frac{4}{5}$  of the trip is highway driving and the rest is city driving? **The correct answer is B, 11.**

*This is a multi-step problem that requires proportional thinking.* First calculate how many of the 300 miles are highway miles and how many are city miles:

$$\begin{aligned}\frac{4}{5} \text{ of } 300 &\text{ is } 240 \text{ highway miles} \\ \frac{1}{5} \text{ of } 300 &\text{ is } 60 \text{ city miles}\end{aligned}$$

(If this calculation looks difficult, make it an easier problem by thinking about the relationship between 5 and 30. Since you know  $5 \times 6 = 30$ ,  $5 \times 60 = 300$ .) Then calculate how many gallons of gas to drive the 60 miles and the 240 miles:

$$\begin{aligned}60 \text{ miles at one gallon for every } 20 \text{ miles} &\text{ is } 3 \text{ gallons} \\ 240 \text{ miles at one gallon for every } 30 \text{ miles} &\text{ is } 8 \text{ gallons}\end{aligned}$$

(If this calculation looks difficult, make it an easier problem by thinking about the relationship between 6 and 2 and between 24 and 3.) Then, find the total number of gallons needed:

$$3 \text{ gallons} + 8 \text{ gallons} = 11 \text{ gallons}$$

What if you didn't even know where to start? *You could make some educated guesses by using some number sense.* Suppose the whole 300 miles was highway. That would mean you would need 10 gallons of gas (think about the relationship between 30 and 3). On the other hand, suppose the whole 300 miles was city. That would mean you would need 15 gallons of gas (think about the relationship between 30 and 2). So, the correct response must be between 10 and 15. That leaves only 2 possible responses: 11 and 14. Since more of the 300 miles was highway, which gets better gas mileage, 11 would be the more reasonable response.

- A basketball player has a mean of 22 points per game for 8 games. What is the total number of points this player must score in the next 2 games in order to have an average of 20 points per game for 10 games? **The correct answer is D, 24.**

*This is a multi-step problem in which you really have to understand the concept of mean. Start by thinking about how you calculate mean and work backwards. Over 10 games, an average of 20 points per game were scored. This means some number representing the sum of all of the scores was divided among 10 games:*

$$X / 10 = 20$$

$$X = 200$$

You know that over 8 of those 10 games, an average of 22 points per game were scored. This mean some number representing the sum of all of the scores was divided among 8 games:

$$X / 8 = 22$$

$$X = 176$$

Now you know that over 10 games the player scored 200 points and over 8 games the player scored 176 points. This means the player must score another 24 points over the last 2 games:

$$176 + X = 200$$

$$X = 24$$

If it seems difficult to try to remember the exact steps in this process, *try visualizing what is meant by the information.* You could try drawing a picture:

1	xxxxxxxxxxxxxxxxxxxxxxxx
2	xxxxxxxxxxxxxxxxxxxxxxxx
3	xxxxxxxxxxxxxxxxxxxxxxxx
4	xxxxxxxxxxxxxxxxxxxxxxxx
5	xxxxxxxxxxxxxxxxxxxxxxxx
6	xxxxxxxxxxxxxxxxxxxxxxxx
7	xxxxxxxxxxxxxxxxxxxxxxxx
8	xxxxxxxxxxxxxxxxxxxxxxxx
9	not played yet
10	not played yet
Mean score of 22 points per game for 8 games	

1	xxxxxxxxxxxxxxxxxxxxxxxx	Remove two x's from each of the first 8 games and add them to game 9. When you do this, you make the mean score for each game 20 points.
2	xxxxxxxxxxxxxxxxxxxxxxxx	
3	xxxxxxxxxxxxxxxxxxxxxxxx	
4	xxxxxxxxxxxxxxxxxxxxxxxx	
5	xxxxxxxxxxxxxxxxxxxxxxxx	
6	xxxxxxxxxxxxxxxxxxxxxxxx	
7	xxxxxxxxxxxxxxxxxxxxxxxx	
8	xxxxxxxxxxxxxxxxxxxxxxxx	
9	xxxxxxxxxxxxxxxxxxxxx_____	
10	_____	
Mean score of 20 points per game for 10 games. How many more points does the player need to score to make it 20 points per game?		

## Sample Quantitative Comparison Questions

<p>Frequently you don't have to finish your calculations to determine an exact answer. You just have to know enough about the quantities to determine which one is greater.</p>	<p>Memorize the four answer choices for these types of questions:          A = A is bigger          B = B is bigger          C = A and B are equal          D = not enough information or more than one of the other answer choices is correct</p>	<p>If two of the answers A, B, or C can be true for a particular question, then the answer to that question is D.</p>
<p>Think of the columns as a balanced scale. Try to figure out which side is heavier – eliminate any quantities that are the same on both sides of the scale.</p>	<p>Try evaluating quantities by substituting values for variables. Remember to check the columns for any information about what the values can or cannot be.</p>	<p>When substituting values, be sure to check the special cases such as 0, 1, at least one number between 0 and 1, a number greater or numbers greater than 1, negative numbers.</p>

- **Mark A** if the quantity in **Column A** is greater;
- **Mark B** if the quantity in **Column B** is greater;
- **Mark C** if the two quantities are **equal**;
- **Mark D** if the relationship **cannot be determined** from the information given.

Column A	Column B
$\frac{1}{3} \times \frac{4}{7} \times \frac{8}{9}$	$\frac{4}{7} \times \frac{1}{3} \times \frac{5}{9}$
$\frac{1}{58} - \frac{1}{63}$	$\frac{1}{57} - \frac{1}{65}$
Distance traveled by an airplane going 200 miles per hour.	Distance traveled by an airplane going 190 miles per hour.
35% of 50	50% of 35
The number of cents in $8n$ dimes if $n > 0$	The number of cents in $3n$ quarters if $n > 0$

## **Sample Quantitative Comparison Questions: Understanding the Answers**

$\frac{1}{3} \times \frac{4}{7} \times \frac{8}{9}$	$\frac{4}{7} \times \frac{1}{3} \times \frac{5}{9}$
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**The correct response is A, the amount in Column A is larger.**

When comparing these two expressions, you should immediately notice that portions of each expression are the same. Therefore, you only really need to compare the portions that are not the same, in this case  $\frac{8}{9}$  and  $\frac{5}{9}$ . Using some number sense will save you a great deal of time instead of completing calculations.

$\frac{1}{58} - \frac{1}{63}$	$\frac{1}{57} - \frac{1}{65}$
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**The correct response is B, the amount in Column B is larger.**

Since finding a common denominator would be too time consuming to do the actual calculations, try using what you know about fractions. For the first fraction in each expression, Column B has a larger amount ( $\frac{1}{57} > \frac{1}{58}$ ). For the second fraction in each expression, Column B has a smaller amount ( $\frac{1}{65} < \frac{1}{63}$ ). Therefore, it makes sense that the amount in Column B is larger since you are subtracting the smallest amount from the largest amount.

Distance traveled by an airplane going 200 miles per hour.	Distance traveled by an airplane going 190 miles per hour.
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**The correct response is D, it cannot be determined.**

For this item, you might be tempted to select A because the plane is flying faster. However, you have not been given the amount of time each plane was traveling. Suppose the first plane only flew for one hour and the second plane flew for two hours. Since you cannot assume that each plane traveled the same amount of time, the answer cannot be determined.

35% of 50	50% of 35
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**The correct response is C, the amounts are equal.**

Before doing any computation, think about what you know from the problem. In either column you have  $35 \times 50$  involving 2 decimal points (for the %). Therefore, the expressions must be equal.

The number of cents in $8n$ dimes	The number of cents in $3n$ quarters
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**The correct response is A, the amount in Column A is larger.**

To do the calculations, consider the number of cents in each coin:  $10(8n) = 80n$  vs.  $25(3n) = 75n$ . Since  $n$  is common in both expressions, you can simply compare 80 and 75.



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