Preparation Guide

FST

FIREFIGHTER SELECTION TOOL

SELECTION WORKS

Firefighter Selection Tool™

Preparation Guide

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This Preparation Guide is intended solely for use by candidates/applicants who are preparing to participate in a testing process for a municipal, county, state or federal agency that will administer the Firefighter Selection Tool™, herein referred to as the FST™, as part of its testing and selection process.

This Preparation Guide is intended for distribution ONLY to candidates/applicants as described above or to approved representatives of municipal, county, state or federal agencies in conjunction with the administration of an agency-approved testing process. Distribution to any outside parties is expressly forbidden.

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1. Preparing for a Fire Service Career

The purpose of this guide is to enable you to efficiently and effectively prepare to participate in the administration of the FST™, a state-of-the-art test to identify those individuals who will excel in fire service careers. The FST™ will be a critical hurdle in the pathway toward achieving an employment opportunity as a firefighter. This guide seeks to provide critical information about the FST™ that will allow you to prepare for the test-taking experience, hone your cognitive skills, minimize test-related anxiety and ultimately perform at your peak level.

Firefighter examinations can vary greatly in form and composition; therefore, we encourage you to be discerning about any other resources you may use to prepare for the FST™. This guide was created specifically for the FST™ by the publisher of the FST™. No other source of information will be as informative or accurate concerning the content and construction of the FST™.

2. What Does the FST Measure?

The FST™ was designed to measure numerous areas that are related to successful performance as a firefighter. Specifically, the FST™ contains questions covering two broad areas: cognitive abilities and non-cognitive traits. It is important to note that the FST™ does not measure job knowledge or any specific skills that require specialized training. You will not need any specific firefighting knowledge or skills to succeed on the FST™.

Cognitive Abilities

The cognitive section of the FST™ assesses eight distinct cognitive abilities: deductive reasoning, inductive reasoning, information ordering, mathematical reasoning, spatial orientation, visualization, written expression and written comprehension. These cognitive ability areas have been demonstrated to be essential for success in firefighter jobs based on job analytic research.

Cognitive abilities are capabilities of our brains to perceive, reason, understand, manipulate and interact with stimuli in the world around us. Cognitive abilities are honed through education, training and practice. Understanding each cognitive ability, considering your personal strengths and weaknesses and allocating time to practice cognitive abilities that you tend to be weak in is one of the best ways you can prepare for the FST™.

In order to better familiarize you with the diversity of questions you will experience in the cognitive section of the FST™, the following table will describe each cognitive ability area and the manner in which it might be demonstrated on the job.

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Cognitive Ability	Description
Deductive Reasoning	Deductive reasoning is the ability to apply rules and principles to make decisions about what to expect from a specific situation. During training, firefighters learn about basic principles of physics and chemistry. They often apply these principles on the job.
Inductive Reasoning	Inductive reasoning is the ability to combine specific pieces of information to arrive at a conclusion about what the causal relationship is between those pieces of information and the resulting outcome. Firefighters frequently exercise this ability when they take in multiple pieces of information and then make decisions about how to react to a scenario based on that information.
Information Ordering	Information ordering is the ability to identify the best or proper order of given actions or steps. This ability is fundamental to understanding the proper order of steps in performing a specific task safely. Firefighters are trained to perform complex tasks that require properly ordering steps. Raising ladders, deploying hoseline, ventilating roofs and responding to hazardous materials are examples of some of the tasks that require the firefighter to properly follow a set sequence of steps.
Mathematical Reasoning	Mathematical reasoning is a combination of the ability to perform basic arithmetic and the ability to choose the proper arithmetic formulas based on a specific situation. Firefighters use mathematical reasoning to estimate how many hose sections are required to span a distance and estimate proper ladder lengths, among other things.
Spatial Orientation	Spatial orientation is the ability to understand how to navigate within spaces or how to get from one point to another. Firefighters require this ability to travel from the fire station to the emergency scene, but also to navigate in and out of a building that is obscured by smoke and fire.
Visualization	Visualization is the ability to imagine how one object will impact another or how something will look after it is manipulated or rearranged. In order to understand how a fire engine's pump operates, how to use tools effectively or how complex firefighting equipment is used to achieve its objective, visualization skills are required. Visualization is not to be confused with mechanical reasoning. While related, mechanical reasoning requires a knowledge of how machines and tools operate; including an understanding of principles such as leverage, inertia, weight, torsion, etc.
Written Comprehension	Written comprehension is simply the ability to read the English language and understand what is being communicated. This involves an understanding of vocabulary, grammatical structure, punctuation and literary style. Firefighters are required to read and understand a vast amount of training materials and are confronted with on-going professional training throughout their career that is presented in a written format. Firefighters also have to read and understand policies, directives and tactical plans.
Written Expression	Written expression is the ability to communicate intended thoughts using the English language. This ability requires an understanding of vocabulary, grammatical structure, punctuation and syntax. Firefighters are responsible for writing incident reports and communicating information through logs and records; therefore, firefighters must be able to communicate intelligently and professionally via the written word. It is necessary to understand how to spell common words, properly use and pair parts of language (e.g., nouns, verbs, articles, etc.), punctuate sentences properly, and compose meaningful sentences.

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Your performance on the cognitive section can be dramatically improved by practicing these specific cognitive abilities. Often, when individuals fail to answer a question correctly, they do so because they are unable to determine the method by which the problem should be solved. This preparation guide will review the proper methods of solving each type of question found on the FST™. Later in this guide, sample cognitive ability questions will be presented that will allow you to practice these methods, assess your abilities and address your areas of weakness.

Non-Cognitive Traits

In addition to cognitive ability, the FST™ measures a wide array of non-cognitive dimensions. These fall into two main categories: work styles (personality) and biographical data. Your predisposition to respond to people and situations in a given way is your style or personality. These traits have been developed in you over a long period of time and are considered to be very stable. Your biographical experiences are those experiences in your life that result from your abilities, interests and personality.

Work styles and biographical data help to predict your suitability for a firefighter job and your likelihood of succeeding in this career. There are many different patterns of styles and biographical experiences that lead to success. For this reason, it is important that you respond candidly to questions in this section.

3. How is the FST Scored?

A score will be calculated for each cognitive ability and these sub-scores will be combined into a cognitive section score. Likewise, sub-scores will be combined into section scores for each of the non-cognitive areas. Finally, each section score will be combined into a single composite score on a 100-point scale. Each part of the FST™ will contribute to your final test score.

4. Rules Governing the Testing Process

The FST™ testing process is governed by many rules. Please familiarize yourself with these rules and closely adhere to them so that you are not disqualified from the testing process. If at any time during the test administration you have a question about the rules of the test, you are strongly encouraged to raise your hand and ask that question. It is better to ask a question than to be disqualified for breaking a rule.

Test Security

The administration of the FST™ is a highly secure process. By participating in the testing process, you agree that you will maintain the security and confidentiality of the test content with which you come in contact. This means that you will not share information about the questions or answer options with anyone either during or after the testing process. If you are found to have shared secure test content, you will be barred from future participation in a FST™ testing process, and could be subject to legal action. You are prohibited from copying

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down test content, removing test materials from the testing environment or in any way reproducing or distributing test content.

You will not be allowed to have access to photographic devices (e.g., cameras, video equipment, cellular phones, scanners, imaging devices, etc.), mobile phones, or any electronic device that is capable of capturing or removing images or content related to the FST™.

Aids

The FST™ is designed to be taken without the assistance of any type of reference materials or electronic aids. You are not allowed to bring the following devices into the testing environment or to use them in the course of taking the test: electronic spelling aids, dictionaries, web-enabled devices, calculators or any devices that assist you in answering the questions contained in the FST™.

Sign-in

You will be required to sign-in to the testing site. You will be required to have a valid government-issued photo identification in order to be allowed into the testing process.

Cheating

Test proctors will be present to instruct test takers and to monitor the security and fairness of the testing process. If any candidate is determined to have in any way violated test rules or engaged in dishonest behavior, that individual will be removed from the testing process by test proctors and will be disqualified. Any behavior that demonstrates a willful violation of the test rules or dishonest behavior (e.g., viewing another test-taker's answer sheet, answering questions after time expires, sharing answers with other parties) will result in disqualification. You should seek to avoid the appearance of any wrong-doing throughout the test-taking process. Keep your eyes on your testing materials and do not engage in conversation with other test-takers during the test.

Using the Answer Sheet

You will record your answers on a computer-read answer sheet. This type of sheet, sometimes referred to as a Scantron form, is highly sensitive. Be careful not to make errant marks on the answer sheet or use the answer sheet as scratch paper. Fill in all answer spaces according to the instructions provided prior to the administration of the test. Ensure that your answers are legible and are clearly and darkly marked. Also, frequently check to make sure that the number of the question that you are answering corresponds to the number on the answer sheet.

Responding to Questions

No additional points are deducted for marking incorrect responses; therefore, it is in your best interest to answer all questions contained in the FST™. Your failure to answer all questions could have a detrimental effect on your test score. It is advisable to make an educated guess on a test question rather than leaving the question blank.

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There are four answer options for each FST™ cognitive ability question, thus random guessing affords you a 25 percent chance of correctly responding to any given question (as compared to zero percent if you leave a question blank). If you are uncertain about the correct answer, eliminate options that you feel are clearly incorrect and then guess the correct answer from the remaining answer options. By using this method, you will increase your probability of correctly responding to questions when guessing. The table below demonstrates how the probability of success increases when you are able to eliminate incorrect answer options. As you can see, using a process of elimination and making your best educated guess is the best strategy for the FST™ .

Possible Answer Choices	1	2	3	4
Probability when Guessing	100%	50%	33%	25%

If you are having trouble identifying the correct answer for a question, it may be beneficial to skip the question and come back to it as time allows. This will keep you from wasting valuable time on questions that you are less likely to respond to accurately.

Time Management

The FST™ contains 120 non-cognitive test questions in Section I and 80 cognitive questions in Section II. You will be allowed 30 minutes to answer the questions in Section I. Once time is called, you will immediately be read the instructions for Section II. After instructions are read, you will be allowed two (2) hours to complete Section II. Once Section II begins, you will not be allowed to make any changes to Section I. The time allowed to complete each test section should be sufficient to answer all questions. It is your responsibility to manage your time effectively so that you can complete the test, in its entirety, in the allotted time period. You may find it helpful to bring a wrist watch with you so that you can track your time.

Test Etiquette

It is important that you be respectful to other test takers seated around you. Do not make loud noises or engage in distracting behavior during the course of the test administration. If you use the washroom or exit the test facility, do so quietly and with as little distraction as possible. If you complete a test section and must wait prior to the beginning of the next section, please sit quietly. You may wish to review your answers.

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5. Test Preparation

Ideally, you have weeks or months remaining before the administration of the FST™. We recommend that you use this time to systematically prepare for the test. Your preparation should involve four simple steps:

1. Review the test dimensions and rules outlined in this Preparation Guide.
2. Review the cognitive example and practice questions and attempt to answer them correctly.
3. Identify your developmental needs by noting the types of questions for which you struggle to provide answers.
4. Practice responding to questions in your weak areas until you are better able to arrive at the correct answers.

This guide was developed to assist you in identifying your developmental needs. Improving your weak cognitive areas is the single best way to increase your performance on the test.

6. Example Cognitive Ability Questions

In this section you will be presented with one sample test question for each of the eight cognitive ability areas. For each cognitive ability area you will be presented with:

- A sample question that is highly similar to the questions contained in the related FST™ section
- A discussion regarding the ability area that the test question is measuring
- A recommendation regarding how you should go about answering the question
- An explanation of the correctness/incorrectness of each of the answer options
- An analysis of common mistakes that can be made in answering that particular type of question

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Example Question 1: Deductive Reasoning

Following is an example of a deductive reasoning question that might be contained in the FST™.

Please use the following table to answer question 1.

Tool Name	Description	Primary Purpose
Pick-Head Axe	Good for cutting through wood, shingles and other natural and lightweight materials. The pick end can be used make a starting point for cutting or to pierce materials.	Cutting
Flat-Head Axe	Capable of chopping various natural materials. Can be used as a striking tool in forcible entry.	Cutting
Halligan-Type Bar	Provides leverage for opening doors, locks or windows. Generally has a duckbill and pick at one end and a prying claw at the other end.	Prying
Standard Pike Pole	Can be used to break a window, keeping firefighters out of way of falling glass. May be used to remove shards of glass and the window frame from a safe distance.	Pushing/pulling
Dry-wall Hook	Has a top blade and scoop that can be driven through a wall/ceiling and rotated around in order to pull down wall or ceiling material.	Pushing/pulling
Battering Ram	Used to force open doors or breach brick/concrete walls.	Striking

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1. A fire has broken out in an abandoned building. All of the metal exterior doors and windows are locked with heavy padlocks. Firefighters will have to force their way inside one of the doors in order to control the blaze. Which of the following tools would be most appropriate to use?

    a. Battering Ram and Standard Pike Pole
    b. Halligan-Type Bar and Battering Ram
    c. Dry-wall Hook and Battering Ram
    d. Pick-Head Axe and Halligan-Type Bar

Take a moment to review this question and attempt to determine the correct answer.

This question measures deductive reasoning, or your ability to apply general guidelines regarding the use of various firefighter tools to determine what tools could be used to achieve a desired outcome in a specific situation.

Before you read the information in the table, read the question carefully. This question is asking you to identify the tools that would be most appropriate to gain entry into a building that is locked up using heavy padlocks. Knowing that you are trying to identify a tool for this specific job, you can read the information contained in the table with this in mind. It is also helpful to highlight key words and descriptions that are in-line with what you feel would be appropriate for the scenario described in the question.

Now, let's review each of the tools listed in the table to determine which ones would be appropriate to deal with the building described in the question. The pick-head axe is used to cut or pierce lightweight materials. The question does not describe any lightweight materials that need to be breached, but rather, identifies the doors as metal with both doors and windows having heavy padlocks. Since the firefighters will have to either break a padlock or compromise a metal door, a tool designed for use with wood or lightweight materials will not be effective. The flat-head axe is described as a cutting tool for natural materials. Since this is not designed for metal materials, the flat-head axe will also not be helpful. The Halligan-Type Bar is used for prying doors, locks and windows. This description fits the situation. We have heavy locks and metal doors. Prying these items open is likely a reasonable way to gain entry. The Halligan-Type Bar would be a good choice. The Standard Pike Pole is described as being effective for breaking glass. While there are windows described in this question, the firefighters have chosen to enter through the door. This means that the Standard Pike Pole is not going to be an effective choice. The dry-wall hook is used to pull down walls and ceilings made of plaster or drywall. This tool will also not be effective for breaching an exterior door. The battering ram is designed to force open doors. This also seems like an effective choice as the firefighters specifically need to gain access through a locked door. So, the Halligan Bar and battering ram are the best choices from the available options. Option "b" is the correct answer.

A common mistake made by candidates when responding to deductive reasoning questions is to attempt to answer the question without carefully considering the information in the table. Often candidates will assume that they are familiar with the information in the table and will

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use their own knowledge to answer the question. In this case, candidates might think they know what each firefighter tool would ideally be used for and will select an answer to the question without referring to the table. Remember, the information that is contained in the table is all that is necessary to answer the question. If you do not use the information in the table, there is a chance that you will answer the question incorrectly.

The FST™ will contain questions like this one or questions that references charts or graphs. In each case, the information that is provided in the chart, graph or table is essential for answering the question. All such questions should be approached in the manner described here.

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Example Question 2: Inductive Reasoning

Following is an example of an inductive reasoning question that might be contained in the FST™.

Please refer to the following information to answer the question below.

Firefighters are at the scene of a traffic accident at the intersection of two major two-way streets. The driver and passenger of one of the vehicles involved in the accident were seriously injured and have been transported to the hospital. While several firefighters work to clear the accident scene, another department member talks to witnesses to try and determine the cause of the accident. The witnesses gave the following accounts:

Witness 1: "I was driving west on Highland Ave. and I was right behind a white sedan. As we were proceeding through the intersection, a black sports car collided with the car in front of me. As there was only one westbound lane on Highland Ave., I was unable to continue past the accident."
Witness 2: "I was driving south on Route 9 and I came to a red light. As I waited, I saw a black sports car in front of me that was waiting to make a left turn from Highland Ave. onto Route 9. It looked like he misjudged the distance between his car and a white sedan driving west on Highland Ave. because he turned right into it."
Witness 3: "I was waiting on Highland Ave. to proceed through the intersection because a black sports car in front of me was waiting to turn left onto Route 9. I think he thought he had time to make the turn, but he ended up slamming into a white car that was headed west on Highland Ave. The airbags went off and everything. It was pretty bad."
Witness 4: "I was driving north on Route 9 and was stopped at a red light. There were several cars in front of me. I heard horns honking and a loud collision, but I couldn't see what happened from where I was."

2. According to the witness accounts, traffic heading _____ on Route 9 was _____.

a. west; proceeding through the intersection
b. east; stopped at a red light
c. north; stopped at a red light
d. north; proceeding through the intersection

Take a moment to review this question and attempt to determine the correct answer.

This question measures inductive reasoning, or your ability to combine information to arrive at a conclusion about what happened. In this case, you need to consider the unique perspectives of four different individuals and use them to weave together one cohesive picture.

In order to answer this question, you have to build a diagram, either mentally or on paper, to reconstruct the traffic accident that took place. Based on the account of Witness 1, you know

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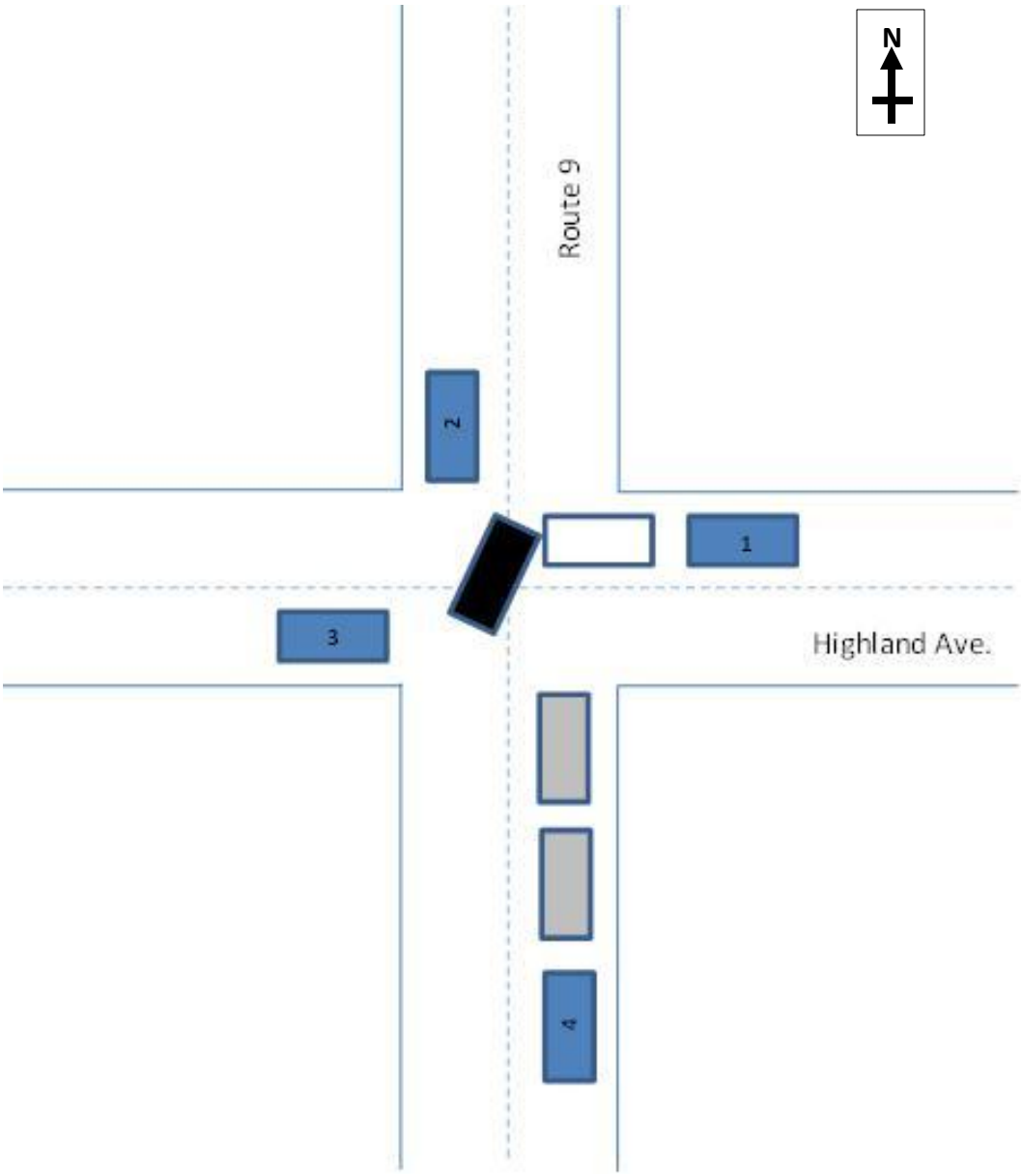
that Highland Ave. is an east-west street with one lane in either direction. Based on the account of Witness 2, you know that Route 9 runs north-south. With this information you can construct the intersection in which the accident took place. By reading each account carefully, you should be able to construct an accurate diagram that includes all the witnesses and the vehicles that collided. The following diagram was constructed solely from the information contained in the four witness accounts.



The best way to answer this question is to build a similar diagram in your test booklet. By referring to this diagram, it should be relatively easy to answer the question. In viewing our diagram we can immediately eliminate answer options “a” and “b” as Route 9 runs north-south rather than east-west. We know from our diagram that a white car headed west on Highland

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Ave. and a black car that was headed east on Highland Ave., and was in the process of turning left, collided in the intersection. Therefore, east-west traffic was moving and north-south traffic was stopped at a red light. Because north-bound traffic was stopped, “c” must be the right answer to the question.

Given the volume of information that you must synthesize, it is necessary to make some form of notes or diagram to generate a reasonable understanding of the situation that is described. Commonly, candidates will error on these types of questions because they are rushing and fail to generate a clear picture of the situation.

All the questions on the FST™ that assess inductive reasoning will involve the synthesis of witness or bystander accounts of various situations.

Example Question 3: Information Ordering

Following is an example of an information ordering question that might be contained in the FST™.

Below are the steps involved in removing the windshield from a vehicle. The steps are not in order.

Statement	Process
1	Using the proper tool, cut down either side of the windshield, starting at the openings at the corners.
2	After the windshield has been removed, place it under the vehicle or remove it from the vicinity to avoid injury.
3	After all cuts have been made, gently pull the windshield outward and upward.
4	To prepare for windshield removal, create an opening in both top corners of the windshield.
5	Make a cut across the bottom of the windshield between the two vertical cuts.
6	Begin to fold the windshield over the roof of the vehicle.

3. What is the correct order of the steps listed above?

a. 4, 5, 1, 3, 6, 2
b. 4, 1, 5, 3, 6, 2
c. 1, 5, 2, 6, 3, 4
d. 1, 5, 3, 4, 6, 2

Take a moment to review this question and attempt to determine the correct answer.

This question measures information ordering, or your ability to place the steps involved in removing a windshield from a vehicle in a logical and meaningful order. This involves determining what step must precede another step to allow the latter step to take place.

In order to answer this question, you must first read through all six statements. When reading through them, you may wish to make notes by each step indicating that it comes earlier or later in the process. If you identify the three steps that come earlier and the three steps that come later, you can then go back and rank-order these statements in smaller groups. This takes a complex task and breaks it into more manageable pieces.

After reviewing the six statements from the question above, you will note some important words that indicate the placement of a couple of the statements. Statement 2 begins, "After the windshield has been removed…." It is reasonable to conclude that this statement must be the last, or near to the last step in the process because this procedure involves the removal of a windshield. Therefore, you should note next to statement 2 that it comes at or near the end.

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Statement 4 begins with, “To prepare for windshield removal….” This statement indicates that it is one of the initial steps that must be taken towards removing the windshield. You should note next to this statement that it comes first or near the beginning of the procedure. Both statements 1 and 5 reference cuts that are made in the windshield. Considering that statement 4 discusses the openings that needed to be made to facilitate these cuts, it would be reasonable to assume that statements 1 and 5 must both come near the beginning of the procedure and after statement 4. Statement 3 begins by saying, “After all cuts have been made,” which is an indication that it must come after statements 1 and 5. Therefore, you should note next to statement 3 that it is in the latter portion of the procedure, directly following statements 1 and 5. The only statement that remains is statement 6. This statement tells us that we need to fold the windshield over the roof. The only way the windshield can be folded like this is if the proper cuts have been made to free it; statement 3 allowed the windshield to be pulled outward so that it could be folded. So, statement 6 also comes in the latter portion of the procedure.

Now, all that remains is to order statements 1, 4 and 5 as the initial steps and statements 2, 3 and 6 as the latter steps. As indicated earlier, statement 4 must come first as it deals with preparation. Statement 1 must come next because it requires that the firefighter start cutting at the openings made in statement 4. That means that statement 5 comes third. This makes sense because statement 5 continues to make cuts that were started in statement 1 (the vertical cuts). So, the first three steps in order are 4, 1 and 5. Now we can order the last three steps. Statements 1 and 5 deal with cuts made in the windshield. Since no other statements require the firefighter to make cuts, statement 3, which provides instructions for what to do after all cuts have been made, is the next logical step. Statement 6 can only occur after statement 3, so statement 6 must be the fifth step. As indicated earlier, statement 2 discusses the removal of the windshield and must come last in this sequence. Therefore, the proper order of the last three steps is 3, 6 and 2. The final sequence of steps from start to finish is 4, 1, 5, 3, 6 and 2.

Once you have determined the proper sequence, read the statements through in order and make sure that the sequence makes logical sense. If so, you have found the appropriate solution.

Regarding the selection of the right answer to this question, once you identify statement 4 as the first step, you can immediately eliminate answer options “c” and “d.” In reviewing answer options “a” and “b” you will notice that there is only one distinction between them; the order of the second and third statements. Because you know that statement 1 comes second, you should chose “b” as the correct response.

The most common mistake that is made in information ordering questions is failing to read all the steps before beginning the organization process. You cannot determine the order of statements, or even categorize them effectively, until you have considered all the choices. Another common mistake is failing to review the steps in order after you have drawn a conclusion regarding their order. This last check ensures that the sequence is logical. Often

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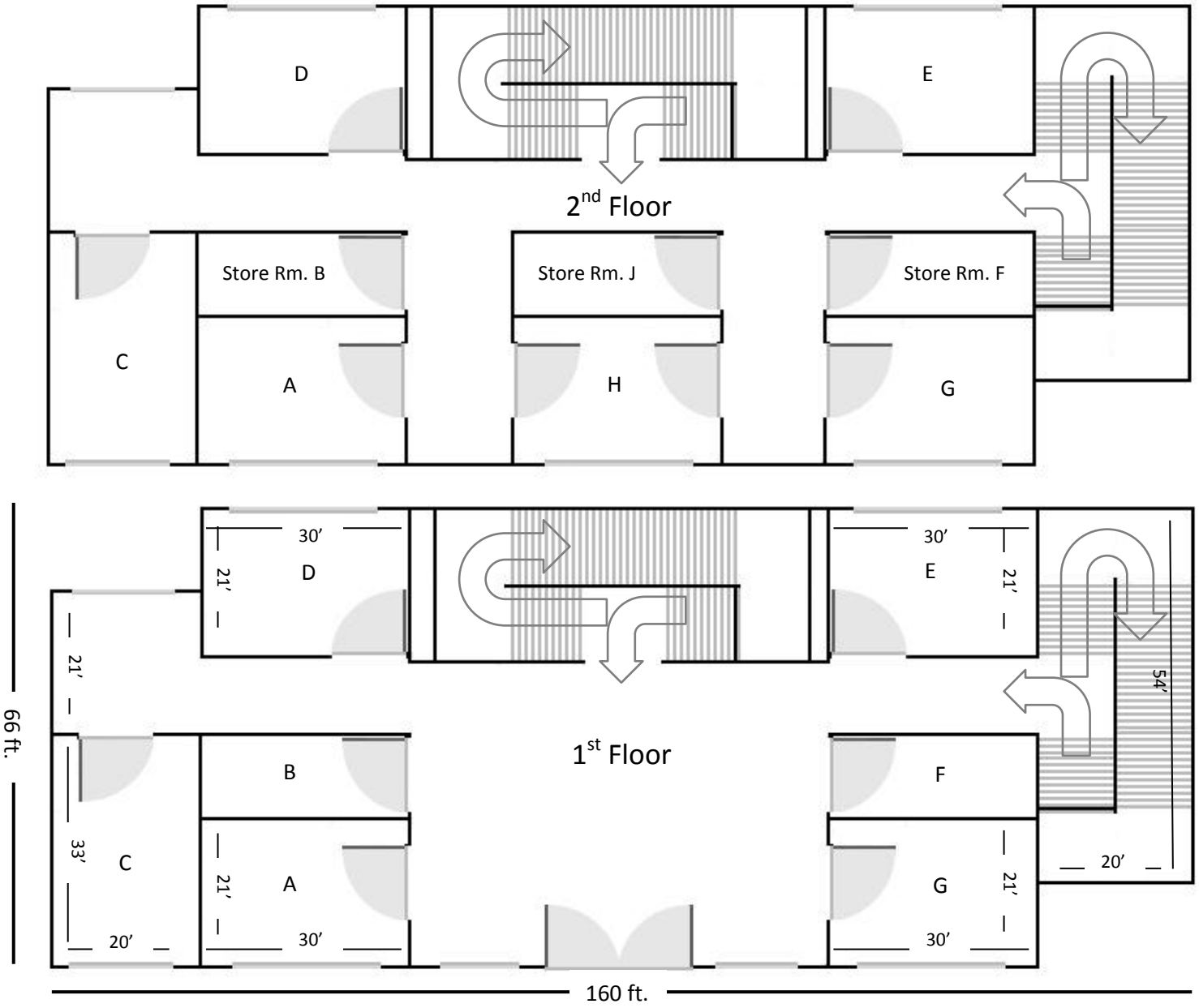
you will find that it makes sense to switch one or two of the steps around to allow the sequence to flow better.

All the questions that assess information ordering in the FST™ will be very similar to this question. Some may only ask you to identify the first few or the last few steps, rather than the sequence of all the steps. Other questions will ask you to identify the placement of one statement in terms of what other statement it precedes or succeeds. Regardless, all the questions will require that you properly order the statements from first to last. If you always work out the full order of the statements, you will be able to easily answer any question that will be asked about those statements.

Example Question 4: Mathematical Reasoning

Following is an example of a mathematical reasoning question that might be contained in the FST™.



4. Assuming it takes a firefighter ½ a second to search a square foot, how long would it take 2 firefighters to search the entire building shown above?
    a. 84 minutes
    b. 88 minutes
    c. 168 minutes
    d. 336 minutes

Take a moment to review this question and attempt to determine the correct answer.

This question measures mathematical reasoning, or your ability to determine the how long it will take to search the building depicted in the schematic by determining the area of the building (through the use of multiplication, addition and subtraction) and the amount of time it takes to search the building based on seconds per square foot.

In order to answer this question, you must first determine the total square footage of the building. This process will involve:

- Computing the square footage of each of the three rectangular sections of the first floor using the formula for determining area: length x width
- Add the square footage of each of the three sections together to determine the total square footage of the floor
- Multiply the total square footage of the first floor by two to account for the total square footage of the building (because the floors are identical in size and shape)

First, let's identify the three rectangular spaces that make up the first floor. These are the area of Suite C combined with the area just above Suite C, the stairwell on the far right side of the image, and the total space between these two areas. Let's refer to these spaces as Area 1, Area 2 and Area 3, respectively. A diagram has been provided below for clarification. The area of Area 1 is determined by multiplying the total length by the total width. The width is noted as 20 feet and the length is the combination of 33 feet and 21 feet, or 54 feet. So, the total area of Area 1 is 20x54 or 1,080 square feet. Area 2 is also 20 feet by 54 feet, so its area is also 1,080 square feet. The area of Area 3 is determined by multiplying its width, identified as 66 feet, by the length. The length is determined by subtracting the width of Area 1 (20 feet) and Area 2 (20 feet) from the total building length of 160 feet. The length of Area 3 is, therefore, 120 feet. So the area of Area 3 is 66x120, or 7,920 square feet.

Diagram of Areas 1, 2 and 3

Now we can add the square footage of the three sections to determine the total square footage of the first floor. 7,920 + 1,080 +1,080 = 10,080 square feet. If we multiple this value by two (for the two floors), we arrive at the total square footage of the building. 10,080 x 2 = 20,160 square feet.

We are told that it takes a single firefighter .5 seconds to search a square foot. The question asks how long it will take two firefighters to search the entire building. Because two firefighters will search a square foot faster than one, we can determine how long it takes two firefighters to search a square foot by dividing .5 by 2, yielding a value of .25 second. Because there are 20,160 total square feet, we can set up the following equation to solve the problem:

20,160 sq. ft. x .25 secs. per sq. ft. = total seconds required

20,160 sq. ft. x .25 secs. per sq. ft. = 5,040 seconds

In order to convert seconds into minutes we need to divide 5,040 by 60 because there are 60 seconds in one minute. When we divide 5,040 by 60, we get a value of 84 minutes. Therefore the correct answer to this question is "a."

Errors in computation are the most likely mistakes you will make in this type of question. There is also the possibility that you will set up the math equations inappropriately. Following are the most likely sources of error for this question:

- Not recognizing that two firefighters are searching
- Determining the rate that firefighters will search by multiplying .5 seconds by 2 instead of dividing by 2
- Failing to calculate the total square feet of the building by multiplying 10,080 by 2
- Improperly computing 20,160 x .25
- Failing to convert seconds to minutes

The mathematical reasoning questions on the FST™ with be very similar to this question. You will be expected to add, subtract, multiply and divide simple numbers and to set up simple computational formulas. Remember, you will not be allowed to use a calculator so be sure that you are comfortable with adding, subtracting, multiplying and dividing by hand.

There are many concepts in math, not all of which can be covered in this study guide. In order to be successful you will need to know which mathematical operation is appropriate to solving the problem, given the problem at hand. Following are some common formulas you must know in order to be successful on the FST™.

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Commonly Used Math Formulas in the Fire Service

- Area of a rectangle = Length x Width
    - Note: Odd shapes may be broken down into multiple rectangles.
- Volume of a cube = Length x Width x Height
- Perimeter of a rectangle = 2 * Length + Width
- Average = Sum of all values / Total number of values
    - E.g., (2 + 3 + 4)/ 3 = 3
- Time Rate Conversions
    - Minutes to Seconds = Minutes * 60
    - Seconds to Minutes = Seconds / 60
    - Minutes to Hours = Minutes / 60
    - Hours to Minutes = Hours * 60
- Fractions, Decimals and Percentages
    - Common Fractions and their Decimals
        - 1/2 = .5
        - 1/3 = .33
        - 1/4 = .25
        - 1/5 = .2
        - 1/6 = .167
        - 1/7 = .143
        - 1/8 = .125
        - 1/9 = .11
        - 1/10 = .1
    - Fraction to Percentage Conversion
        - Move decimal two places to the right for percentage out of 100.
        - .5 = 50%
        - .33 = 33.33%
        - .25 = 25%
        - .2 = 20%
        - .167 = 16.67%
        - .143 = 14.28%
        - .125 = 12.5%
        - .11 = 11.11%
        - .1 = 10%

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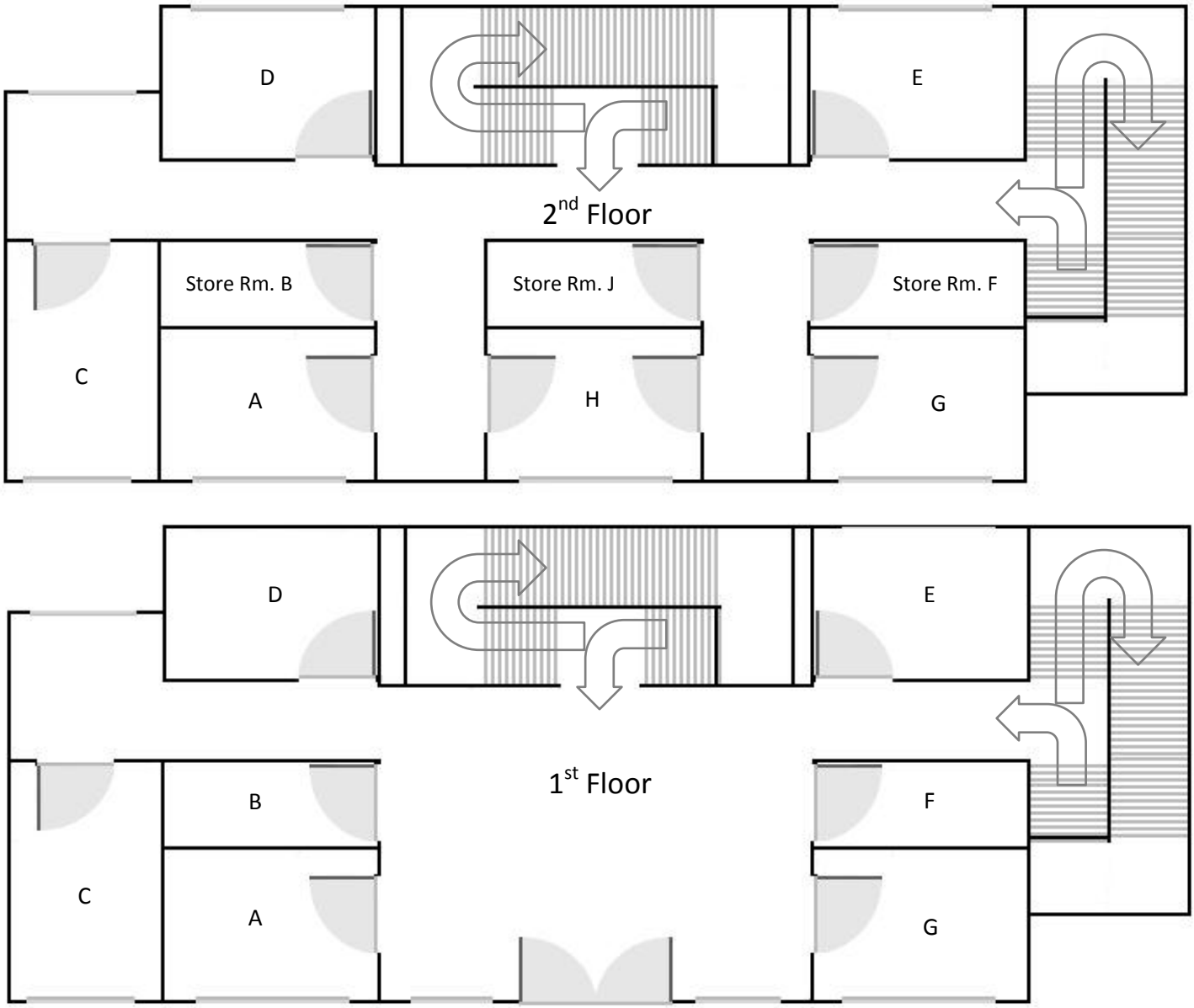
Example Question 5: Spatial Orientation

Following is an example of a spatial orientation question that might be contained in the FST™.



5. An ambulance has been called to an office building for an employee complaining of chest pain. The employee works on the second floor in Suite A. If the paramedics enter the building through the main doors on the north side of the building, what is the fastest way to get to Suite A?

    a. Ascend the north stairwell and turn left out of the stairwell. Walk down the hallway and take the first right. The door to Suite A is the second on the right.
    b. Ascend the south stairwell and turn right out of the stairwell. Walk down the hallway and take the first left. The door to Suite A is the second on the right.
    c. Ascend the east stairwell and turn left out of the stairwell. Walk down the hallway and take the second left. The door to Suite A is the second on the left.
    d. Ascend the west stairwell and turn right out of the stairwell. Walk down the hallway and take the second left. The door to Suite A is the second on the right.

Take a moment to review this question and attempt to determine the correct answer.

This question measures spatial orientation, or your ability to understand how you would maneuver through the two story building depicted in the schematic. This ability involves imagining yourself inside of the structure and orientating yourself to the direction you would move if you were at any given point in the structure.

In order to answer this question, you will need to familiarize yourself with the building schematic. Notice that there is a first floor and a second floor. In three dimensional space, the second floor would be directly on top of the first floor. Note that the entrance to the first floor is at the bottom of the schematic and note that there is a stair case directly across from the entry door. There is also a stair case on the right side of the drawing. Also, note that Suite A on the second floor is adjacent to Suite C and Store Room B. The question asks you to determine the fastest way to Suite A if you enter through the main doors (Note that the main doors are said to be on the north side of the building. It is important to point out that the manner in which a building is laid out in a schematic may not always correspond to a compass where north is at the top of the page. In this case, north is the bottom end of the page and south is the top end). In order to answer the question, you should draw what you believe is the shortest distance from the front doors to Suite A. In this case, that would take you from the door directly across to the staircase, up the staircase to the second floor, down the hall towards Store Room B, and then down the hallway that separates Suites A and H.

In reviewing the answer options, you will note that north, south, east and west stairwells are referenced. If the main doors are on the north side of the building then the staircase directly across from those doors is the south stairwell. Based on this orientation, the stairwell on the right side of the page is west. So, answer options “a” and “c” are not possible responses because the stairwells that are referenced in these options do not exist. By reviewing the remaining options, you will note that option “b” corresponds to the pathway that you selected as being the shortest. Note that answer option “b” requires the paramedics to turn right then left. Remember that you have to consider that when you arrive on the second floor you are

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facing the north side of the building; therefore a right hand turn will move you down the hallway towards Suites A, C and D. Answer “b” is the correct response.

The most common mistakes on spatial orientation questions have to do with improperly orienting yourself. First, you must understand where north, south, east and west are based on the building schematic or map you are viewing. You also need to be sure that you consider the perspective of an individual who is “inside” the map or building. This will allow you to make correct judgments about whether a turn is left or right, east or west, or north or south. Remember to carefully review the map or building diagram before reading the questions as this will help you better relate to the question.

The spatial orientation questions in the FST™ will either be building schematics, as was the case in this question, or maps of cities and geographical areas.

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Example Question 6: Visualization

Following is an example of a visualization question that might be contained in the FST™.

Please use the following images of a gear assembly to answer the questions below.

Figure 1

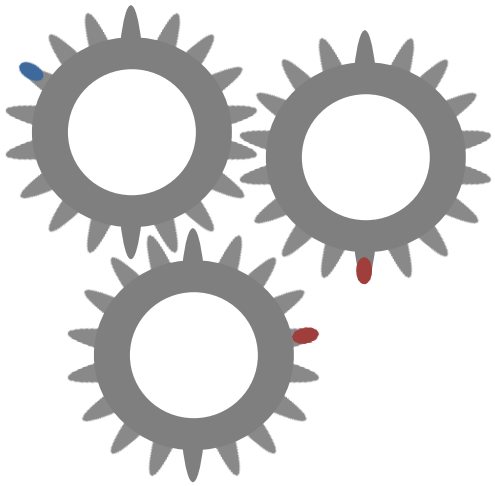
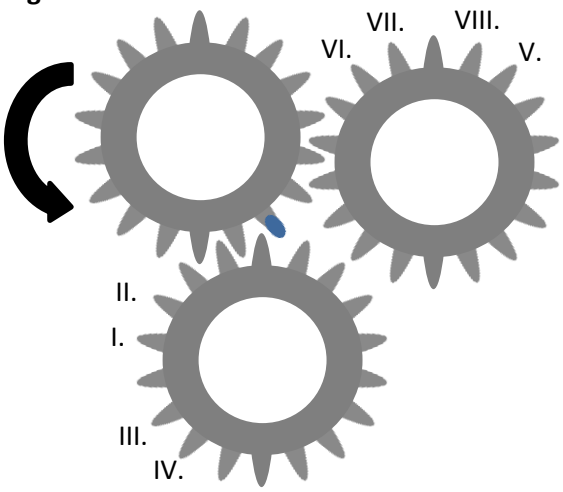


Figure 2



6. Figure 1 shows the starting state of a gear mechanism; Figure 2 shows the end state of that same gear mechanism after it has been rotated in the direction indicated by the black arrow. Please identify where the red dots should be placed in Figure 2.

    a. I. and VI.
    b. III. and VIII.
    c. III. and VII.
    d. II. and VII.

Take a moment to review this question and attempt to determine the correct answer.

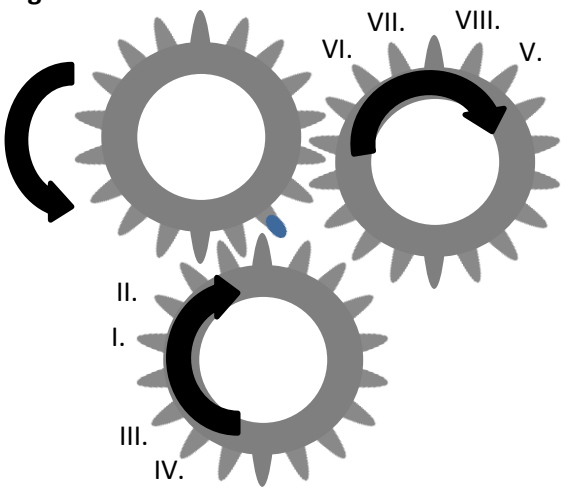
This question measures visualization, or your ability to understand how one gear's movement impacts the movement of another gear and what the impacted gear will look like in its final state. In essence, this question requires you to "move" the gears in your mind and determine how each gear impacts the next.

In order to answer this question, you need to familiarize yourself with the two gear assemblies. As the instructions indicate, the assembly on the left is the starting state of the gears and the assembly on the left is the end state. You will note that the gear in the upper left is the gear that is being moved as indicated by the arrow showing the direction of movement. When this

gear is moved, it affects the movement of the other two gears that it comes in contact with. Gears rotate on a central axis and whatever other gears the "teeth" of the primary gear come in contact with will be moved. Because the gears in these images are the same size, they also have the same number of teeth. This means that each gear in this gear assembly will move at the same distance and speed as the primary gear. If one gear were larger or smaller, you could determine the proportional difference in movement and speed based on the proportion of teeth between the two gears. Questions on the FST™ will not require that you understand any mechanical reasoning, like a mechanical advantage gained through different size gears. All gears in an assembly will be identical such that speed and the number of rotations of each gear will always be a constant.

A good initial step in answering these visualization questions is to mark the movement of each of the gears in Figure 2. Since we know the movement of the primary gear is counter-clockwise, we can picture this gear spinning in that direction in our head. As it spins, it will push the teeth of the bottom gear to the right such that the bottom gear spins clockwise. Mark an arrow alongside this gear to indicate a clockwise rotation (a diagram has been provided to show you the proper rotation arrow). As the primary gear continues to spin counter-clockwise, it also pushes the teeth of the right-side gear such that the teeth of the gear are moving in a clockwise rotation. Again, mark this rotation using an arrow next to the right-side gear (the proper rotation arrow can again be found in the diagram). Based on this example, we learn that any gear that is moving counter-clockwise that comes in contact with another gear will rotate that other gear in a clockwise direction. Now that we know the direction that each gear is traveling, we can begin to answer the question.

Figure 2



Notice that Figure 2 indicates that the primary gear is moving in a counter-clockwise direction. Based on Figure 1 and the direction of movement indicated in Figure 2, we know that the blue dot has moved counter-clockwise by eight positions (or eight teeth). We can determine this by starting at the blue dot in Figure 1 and counting counter-clockwise to where the blue dot is in Figure 2. So, the primary gear has been rotated eight positions. In order to answer the question, we simply need to count eight spaces from the red dots in the direction that those respective gears are traveling. To do this, start with Figure 1 and place your finger on the red dot on the bottom gear and count eight teeth in a clockwise direction. You should end up on the tooth that is the same tooth as the one labeled III in Figure 2. Now, do the same thing for the red dot on the right-side gear. Place your finger on the red dot on the right hand gear and count eight teeth in a clockwise direction. You should end up on the tooth that is the same

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tooth as the one labeled VII in Figure 2. The correct answer is “c” that indicates the III and VII positions.

The two likely mistakes you could make in responding this this question are to misjudge the movement of the gears or to miscount the spaces that a dot is moving. Check and double-check the gear rotation direction by thinking it through carefully. Also double-check your counts to make sure they are accurate, as even being off by one tooth will cause you to select the wrong answer.

The questions that you will encounter in the FST™ that assess visualization will all be highly similar to this question.

Example Question 7: Written Comprehension

Following is an example of a written comprehension question that might be contained in the FST™.

Please refer to the following passage to answer the question below.

If you have ever watched a substance burn, for example a piece of paper, you've probably observed that as the substance burns its mass seems to diminish. The piece of paper, for instance, rapidly burns for a moment, but eventually the flame is exhausted and disappears. During the burning process, the paper is quickly converted into char and ash; the paper is almost completely consumed by the flame, leaving little left after the burning process. What then has happened to the piece of paper? Where did it go?

One of the most fundamental concepts in modern physics can help to answer the question of the disappearing piece of paper. The *Law of Conservation of Mass-Energy* (more often known as the *Law of Conservation of Mass*) states that, "Mass and energy may be converted from one to another, but there is never any net loss of mass-energy." In essence, this law states that neither mass nor energy can be created or destroyed, only changed. In modern physics, we speak of "mass-energy" ever since Albert Einstein's *Special Theory of Relativity* showed that mass has an equivalent energy and energy has an equivalent mass in the now famed equation, $E = MC^2$.

The *Law of Conservation of Mass-Energy* explains to us that the paper's mass did not disappear, nor was it destroyed. Burning is a process that converts mass into energy. In the case of the piece of paper, the mass of the paper was converted into energy in the form of heat and light.

The consequences of the Law of Conservation of Mass-Energy are very relevant to the fire sciences. Since there is a known relationship between the conversion of mass to energy, the Law allows for researchers to calculate the heat release rates of various materials though determining mass loss and temperature gain when a substance is burned. Thus, a material's fire retardance can be estimated. Also, firefighters can use this principle in a fire size-up to estimate how much potential material is available to burn, and thus estimate how long the fire could last and how much heat energy may be released. The more energy that is released, the more extinguishing material will be required (water, chemical agents, etc.), and the longer the fire burns, the more resources (men, equipment, etc.) will be required to combat the fire.

7. What is the main theme from this passage?

    a. When a piece of paper is burned, its mass is neither created nor destroyed.
    b. Albert Einstein's *Special Theory of Relativity* defines the relationship between mass and energy.
    c. The *Law of Conservation of Mass-Energy* is foundational to the fire sciences as it describes the relationship between mass and energy.
    d. The *Law of Conservation of Mass-Energy* describes what occurs to a piece of paper when it burns.

Take a moment to review this question and attempt to determine the correct answer.

This question measures written comprehension, or your ability to read a lengthy passage and synthesize the theme of that passage into a single summary statement. In order to do this, you have to identify what the author sought to communicate and select the answer option that best summarizes that thought.

The best strategy to use in responding to reading comprehension questions, or any question that requires you to read a lot of information, is to first review the question. Knowing what you are trying to answer will allow you to read the passage with a keen eye. After you review the question, carefully read through the passage and keep in mind the question that you are trying to answer. Take your time reading the passage. Rushing or skipping over sections will only make it difficult to arrive at the correct answer. Worse, you will probably end up having to read the passage again. So, slow down and read for understanding the first time.

As you read each paragraph it is helpful to either underline key sentences that help summarize the paragraph or make short notes in the margins to summarize the theme of each paragraph. Following are sample notes you might keep to summarize each paragraph:

- Paragraph 1: burning paper seems to disappear
- Paragraph 2: mass and energy are not created or destroyed, only changed
- Paragraph 3: paper is converted to heat and light
- Paragraph 4: this law helps to determine how long a fire will burn or how much water is needed to extinguish

Using your summary notes, you will be able to answer the question. The question asks you to summarize the theme of the passage. Option "a" cannot be correct because it only summarizes the theme of paragraph 2. Option "b" cannot be correct because it also focuses solely on information presented in paragraph 2. Option "d" is also incorrect, because while true, it only summarizes the information contained in paragraph 3. Option "c" is the best choice as it explains that the information discussed in the first three paragraphs serves an important role in the fire service, as described in the fourth paragraph. Option "c" is the most succinct yet comprehensive description of the reading passage.

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The most common error you are likely to make in reading a written comprehension question is to select an answer option that is far too narrow in scope. This is indicated by answer options "a," "b," and "d." Make sure that the answer option you select summarizes the most information in the passage and helps you better understand the author's intention. In this passage, the author clearly sought to link Einstein's theory to the fire service. Option "c" is the only answer option that communicated this critical point.

All written comprehension questions in the FST™ will contain a focal passage and questions that are highly similar to the question you see here.

Example Question 8: Written Expression

Following is an example of a written expression question that might be contained in the FST™.

For the following question, please choose the line that contains the misspelled word, grammatical error or punctuation error. Only one of the lines will contain an error.

8. I. When a local girl was badly burned in a house fire,
II. the Middletown Fire Department hosted a fundraiser
III. to raise money for burn victims. The girls family members
IV. were present to accept a donation of $10,000.00.

a. Line I.
b. Line II.
c. Line III.
d. Line IV.

Take a moment to review this question and attempt to determine the correct answer.

This question measures written expression, specifically the ability to identify improper grammar, spelling or punctuation. To the extent that you understand how to use grammar/syntax, spelling and punctuation appropriately, you should be able to recognize when a mistake is made.

In order to answer this question, you should first read it through and see if any error noticeably stands out to you. If so, carefully verify that the error is indeed an error. Make sure you can come up with a grammar, punctuation or spelling rule that is clearly broken in this instance. If there is not an error that immediately stands out, dissect the reading passage line by line. Go through line I and see if there are any grammar, punctuation or spelling errors. Move through each line doing the same thing.

In Example Question 8, the only error occurs in line III. The sentence that starts, "The girls family…," is attempting to communicate that the family belongs to the girl. In this case, "girls" needs to assume the possessive form. This can be achieved by adding an apostrophe between the "l" and the "s." Because "local girl" as found in line I is a singular noun, it would not be appropriate to place the apostrophe after the "s" in girls.

There are many rules that govern the use of the English language. It would be wise to consult a text that teaches grammar and style rules or a writer's style manual. Please note that the FST™ will only ask questions about conventional and commonly accepted practices. Style manuals often disagree on lesser grammar and style rules. Also, any misspelled words for which questions are asked will be commonly used words that the majority of individuals should be capable of spelling.

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In addition to the example question noted previously, you will also see questions that ask you to fill in a word that properly completes the sentence. Often, this will require you to identify the proper tense or number of a verb, the proper number of a noun, the proper pronoun or the proper form of a commonly misused word. Another question type will contain a brief paragraph that must be summarized in a single sentence. The sentence you choose must be the most accurate and succinct summation of the information in the paragraph. This type of question will assess your ability to use language economically and accurately.

Following is a brief summary of common and important grammar and syntax rules. This list is not intended to be exhaustive, but rather to communicate common rules and errors with which you should be familiar.

Use of Apostrophes and Quotation Marks

- If you are trying to communicate the possessive form of a singular noun, generally you add " 's" to the word.
- If the noun is plural, generally, you add the apostrophe after the "s."
- The possessive form of "it" does not contain an apostrophe (the apostrophe is reserved for the contraction of "it is").
- Possessive pronouns do not use apostrophes (e.g., hers, yours).
- When contracting words, the apostrophe is intended to take the place of the missing letter(s) (e.g., "it's" for "it is," "couldn't" for "could not").
- Generally, a quote contained within a sentence is proceeded by a comma outside the quotation marks and/or is followed by a comma inside the quotation marks (e.g., He said, "I want to go." "I want to go," he said.)

Subject-Verb Agreement and Verb Tense Agreement

- The number (singular or plural) of the subject dictates the number of the verb (e.g., The girls **run** to school. The girl **runs** to school.)
- When the subject is a pronoun, the pronoun number and verb number must agree.
- He/she/his/her coincide with singular nouns and they/their coincides with plural nouns.
- The verb tense (present, past, future) should remain consistent within a summary or description.

Commonly Misused Words

- Numerous words are commonly confused are misused including, among/between, either/neither, or/nor, can/may, whether/weather, affect/effect, farther/further, then/than, that/which, their/there/they're and to/too.

Punctuation

- Commas are used to separate items in a series, to separate a dependent clause from an independent clause, after certain adverbs (like "therefore") and before a conjunction leading into an independent clause.
- Semi-colons are used between independent clauses linked with a conjunctive adverb, between closely related independent clauses where a conjunction is not used and in a series that contains internal commas.

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7. Diagnostic Cognitive Ability Questions

In this section you will be presented with practice items for each of the eight cognitive ability areas (a total of 17 questions). These questions are presented so that you can practice each of the cognitive ability areas and diagnose your strengths and weaknesses. The correct answers for these questions are contained in an answer key on the last page of this guide.

Diagnostic Questions 1-2: Deductive Reasoning

Tool Name	Description	Primary Purpose
Pick-Head Axe	Good for cutting through wood, shingles and other natural and lightweight materials. The pick end can be used make a starting point for cutting or to pierce materials.	Cutting
Flat-Head Axe	Capable of chopping various natural materials. Can be used as a striking tool in forcible entry.	Cutting
Halligan-Type Bar	Provides leverage for opening doors, locks or windows. Generally has a duckbill and pick at one end and a prying claw at the other end.	Prying
Standard Pike Pole	Can be used to break a window, keeping firefighters out of way of falling glass. May be used to remove shards of glass and the window frame from a safe distance.	Pushing/pulling
Dry-Wall Hook	Has a top blade and scoop that can be driven through a wall/ceiling and rotated around in order to pull down wall or ceiling material.	Pushing/pulling
Battering Ram	Used to force open doors or breach brick/concrete walls.	Striking

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1. A major fire destroyed a residential home and firefighters are performing overhaul procedures. As a firefighter working at the scene, you are responsible for making sure any flames remaining in the walls or ceilings are extinguished. In order to perform this task, which tool would be most appropriate to use?

    a. Halligan-Type Tool
    b. Flat-Head Axe
    c. Dry-wall Hook
    d. Battering Ram

2. In order to ventilate a burning building, firefighters prepare to open a hole in the roof. Which of the following tools would be most appropriate to use?

    a. Dry-wall Hook and Flat-Head Axe
    b. Pick-Head Axe and Standard Pike Pole
    c. Halligan-Type Bar and Flat-Head Axe
    d. Pick-Head Axe and Flat-Head Axe

Deductive Reasoning Answer Sheet

1. Ⓐ Ⓑ Ⓒ Ⓓ
2. Ⓐ Ⓑ Ⓒ Ⓓ

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Diagnostic Questions 3-4: Inductive Reasoning

Firefighters are at the scene of a traffic accident at the intersection of two major two-way streets. The driver and passenger of one of the vehicles involved in the accident were seriously injured and have been transported to the hospital. While several firefighters work to clear the accident scene, another department member talks to witnesses to try and determine the cause of the accident. The witnesses gave the following accounts:

Witness 1: "I was driving west on Highland Ave. and I was immediately behind a white sedan. As we were proceeding through the intersection, a black sports car collided with the car in front of me. As there was only one westbound lane on Highland Ave., I was unable to continue past the accident."
Witness 2: "I was driving south on Route 9 and I came to a red light. As I waited, I saw a black sports car in front of me that was waiting to make a left turn from Highland Ave. onto Route 9. It looked like he misjudged the distance between his car and a white sedan driving west on Highland Ave. because he turned right into it."
Witness 3: "I was waiting on Highland Ave. to proceed through the intersection because a black sports car in front of me was waiting to turn left onto Route 9. I think he thought he had time to make the turn, but he ended up slamming into a white car that was headed west on Highland Ave. The airbags went off and everything. It was pretty bad."
Witness 4: "I was driving north on Route 9 and was stopped at a red light. There were several cars in front of me. I heard horns honking and a loud collision, but I couldn't see what happened from where I was."

3. According to the witness accounts, the black sports car _____.

   a. had the right of way
   b. was stopped at a red light
   c. should have yielded to eastbound traffic
   d. should have yielded to westbound traffic

4. Based on the information gathered from the witnesses, what likely happened to cause the accident?

   a. The white sedan ran a red light and collided with a black sports car, which had the right of way on Highland Ave.
   b. The black sports car was waiting in the intersection to turn and head north on Route 9. He collided with a white sedan that had the right of way.
   c. The black sports car was waiting in the intersection to turn and head south on Route 9. He collided with a white sedan that was driving east on Highland Ave.
   d. The white sedan was waiting in the intersection to turn and head north on Route 9. He collided with a black sports car that had the right of way.

Inductive Reasoning Answer Sheet

3. Ⓐ Ⓑ Ⓒ Ⓓ
4. Ⓐ Ⓑ Ⓒ Ⓓ

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Diagnostic Questions 5-6: Information Ordering

Below are the steps involved in a two-firefighter low-shoulder ladder carry. The steps are not in order.

Statement	Procedure
1	The firefighter closest to the tip of the ladder will give the command to raise the ladder.
2	With the ladder flat on the ground, both firefighters kneel on the ground on the same side of the ladder (facing the tip).
3	The far beam of the ladder should be tilted up as the ladder rises off the ground.
4	When they have a firm grip on the ladder, both firefighters will stand the ladder on its edge.
5	To begin carrying the ladder, the firefighters pivot to face the ladder and place their free arm between two ladder rungs.
6	Both firefighters will stand, lifting the ladder with their leg muscles.
7	Both firefighters grasp a rung with their palm facing forward.

5. What is the correct order of the steps listed above?

a. 2, 7, 4, 1, 6, 3, 5
b. 5, 7, 6, 2, 3, 1, 4
c. 5, 2, 4, 1, 7, 6, 3
d. 2, 7, 4, 1, 3, 5, 6

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Below are the steps involved in making a donut roll with fire hose. The steps are not in order.

Statement	Procedure
1	If hose behind the roll becomes too tight, pull back on the parallel line with the female coupling.
2	After starting the roll, continue toward the end with the couplings.
3	As the roll approaches the coupling end, lay the roll flat on the ground.
4	Facing the coupling ends, start the roll along the parallel line with the male coupling.
5	Lay the hose flat, placing the male and female couplings side-by-side. The hose should lie in two parallel lines with the couplings at the same end.
6	Wrap the female coupling over the end with the male coupling to complete the donut roll.

6. What is the correct order of the steps listed above?

a. 4, 5, 2, 1, 3, 6
b. 4, 2, 5, 1, 3, 6
c. 5, 2, 4, 3, 1, 6
d. 5, 4, 2, 1, 3, 6

Information Ordering Answer Sheet

5. Ⓐ Ⓑ Ⓒ Ⓓ
6. Ⓐ Ⓑ Ⓒ Ⓓ

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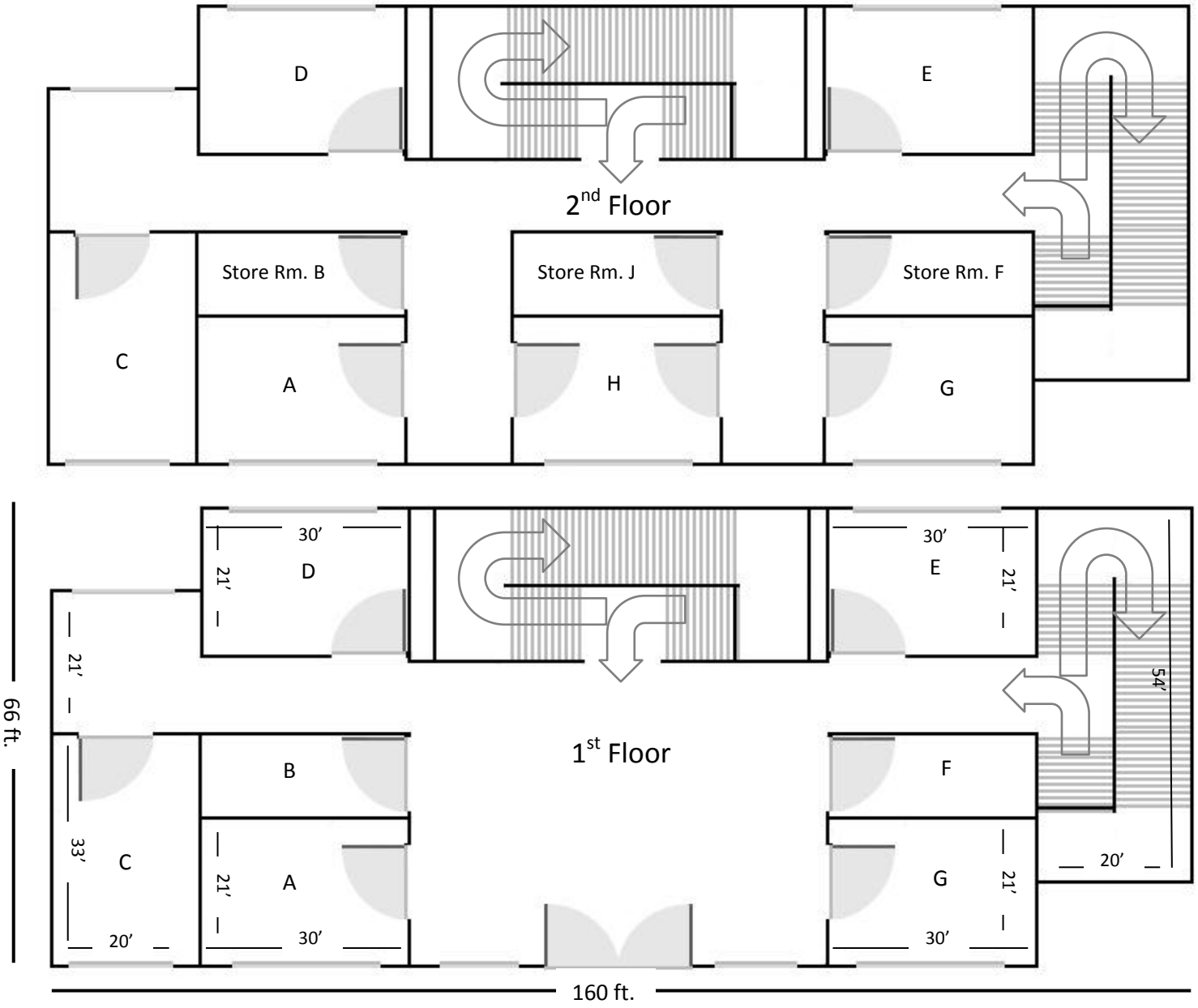
Diagnostic Questions 7-8: Mathematical Reasoning



7. Use the building schematic to estimate the number of hoseline packs you will need in order to attack a fire in Room A on the second floor. You will first have to navigate your way through the building by entering the main south facing door. The main stairwell is blocked, so you will need to use the west stairwell. Assume that you will need 300 feet of line to reach the front door, and 70 feet of hoseline is required to go from the base of the stairs to the second floor. Your fire company's hoseline packs come in lengths of 60 feet. *What is the minimum number of hoseline packs needed?*

    a. 8
    b. 9
    c. 10
    d. 11

8. A fire has broken out on the second floor in Room H and quickly spread to Storage Room J. Your commanding officer has asked you to place a water proof tarp in the main lobby area on the first floor (the area outside of room A, B, G and F) to protect it from water damage. In order to grab the correct size tarp you need to calculate the area of the main lobby. The lobby area extends from the front doors to the edge of the stairwell and from Rooms A and B to Rooms F and G. Which of the following is the correct area?

    a. 216 feet
    b. 360 feet
    c. 1,980 feet
    d. 2,700 feet

Mathematical Reasoning Answer Sheet

7. Ⓐ Ⓑ Ⓒ Ⓓ
8. Ⓐ Ⓑ Ⓒ Ⓓ

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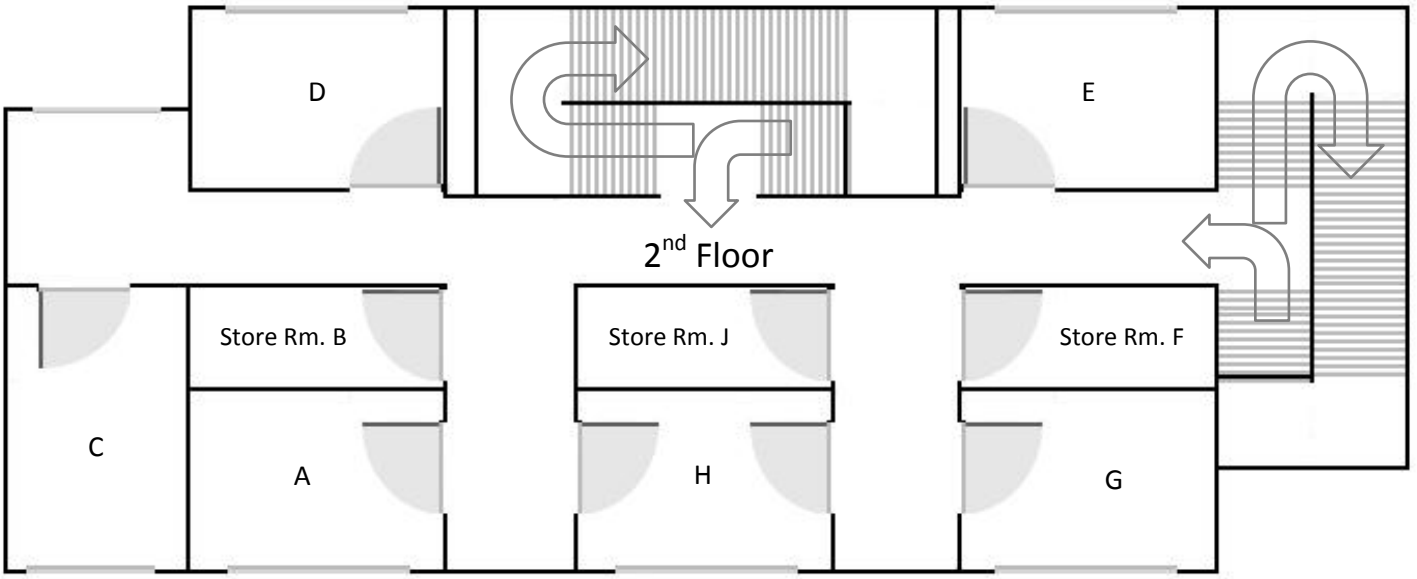
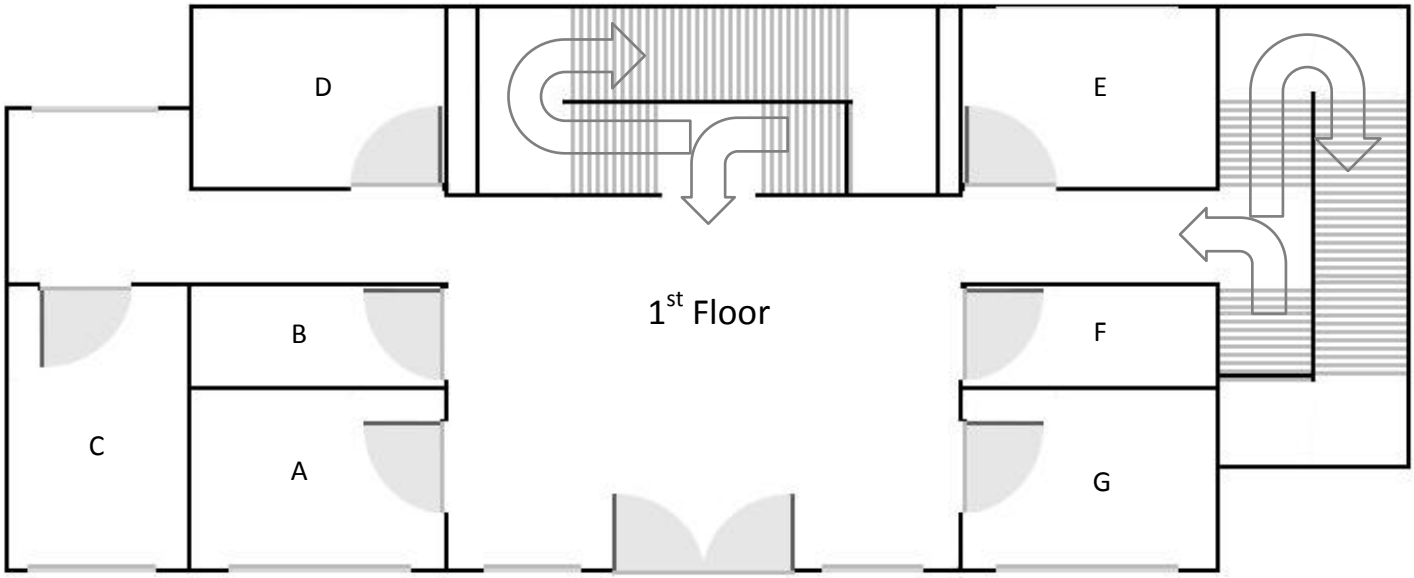
Diagnostic Questions 9-11: Spatial Orientation





9. Dispatch receives a call about a fire that has broken out in an office building. The fire is reported to be in Store Room F, but is quickly spreading. Employees who evacuated the second floor tell firefighters that the west stairwell is extremely smoky and there may be fire. When firefighters arrive and enter the north side of the building, what route should they take to attack the fire in Store Room F?

    a. Ascend the east stairwell and turn right out of the stairwell. Store Room F is located on the left side of the first hallway on the left.
    b. Ascend the north stairwell and turn left out of the stairwell. Head east down the hallway, where Store Room F will be located down the first hallway to the right.
    c. Ascend the south stairwell and turn left out of the stairwell. Head west down the hallway, where Store Room F will be located down the first hallway and to the left.
    d. Ascend the west stairwell and turn left out of the stairwell. Store Room F is located on the left side of the first hallway on the left.

10. Firefighters are currently attempting to extinguish a fire in Suite C on the second floor. One of the firefighters is notified that the roof is in danger of collapsing on them and they must exit the building as soon as possible. The second floor is very smoky, so they will have to crawl out. If the firefighters are currently in Suite C on the second floor, what is the quickest way to exit the building?

    a. Turn right out of Suite C and descend the stairs, which are through the second entryway on the left. Turn right at the bottom of the stairs to exit through the main doorway.
    b. Turn left out of Suite C and descend the stairs, which are through the second entryway on the right. Turn right at the bottom of the stairs to exit through the main doorway.
    c. Turn right out of Suite C and descend the stairs, which are through the second entryway on the left. Turn left at the bottom of the stairs to exit through the main doorway.
    d. Turn right out of Suite C and descend the stairs, which are through the first entryway on the left. Turn left at the bottom of the stairs to exit through the main doorway.

Spatial Orientation Answer Sheet

9. Ⓐ Ⓑ Ⓒ Ⓓ
10. Ⓐ Ⓑ Ⓒ Ⓓ

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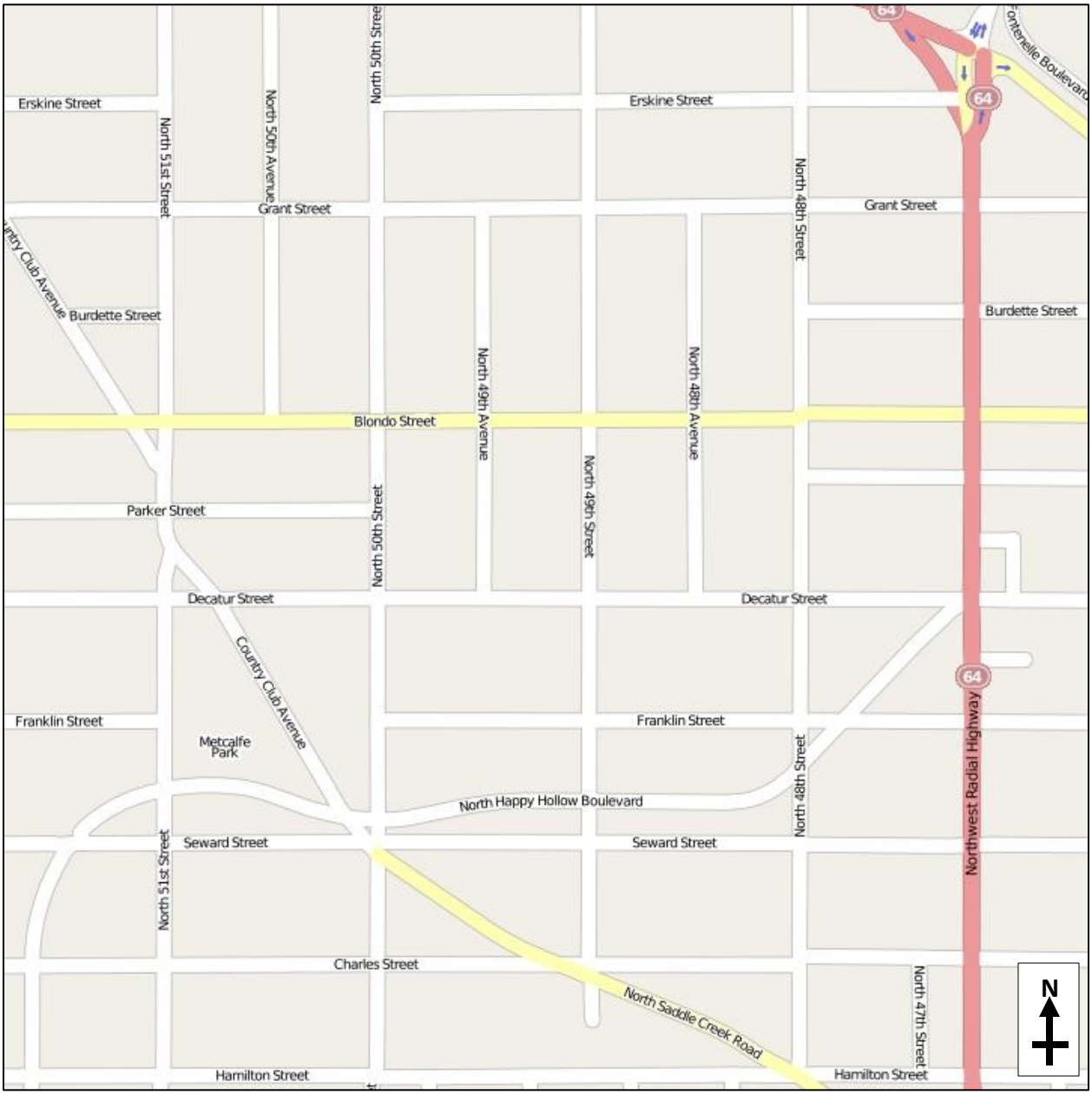


11. A traffic accident occurred at the corner of North Happy Hollow Blvd. and North 48th St. The fire station that will respond is at the corner of Erskine St. and North 51st St. What is the shortest (least distance) route to take from the fire station to the accident scene?
    a. Travel south on North 51st St., then east on Grant St., then south on North 49th Ave., then east on Blondo St., and then south on N. 48th St.
    b. Travel south on North 51st St., then west on Blondo St., and then south on N. 48th St.
    c. Travel south on North 51st St., then east on Grant St., then south on N. 50th St., then east on Decatur St., then south on N. 48th St.
    d. Travel south on North 51st St., then southeast on Country Club Ave., then east on North Happy Hollow Blvd. The accident will be at the third intersection.

Spatial Orientation Answer Sheet

11. Ⓐ Ⓑ Ⓒ Ⓓ

Diagnostic Questions 12-13: Visualization

Figure 1

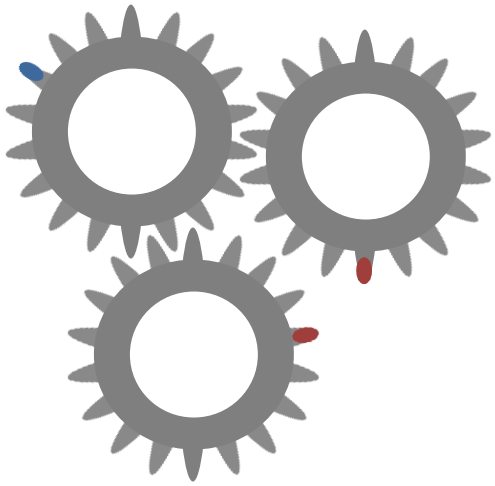


Figure 3

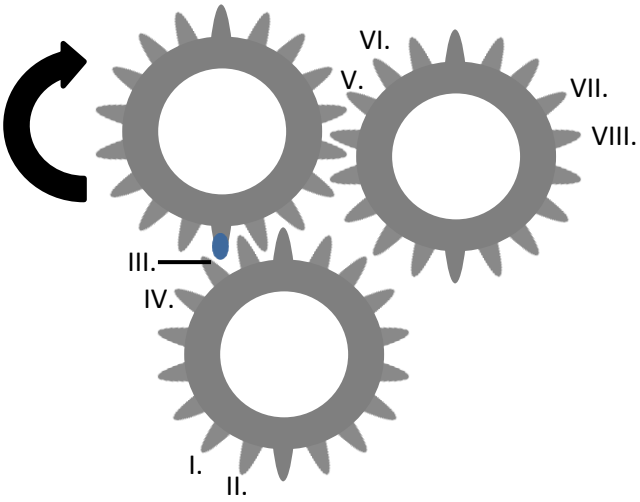
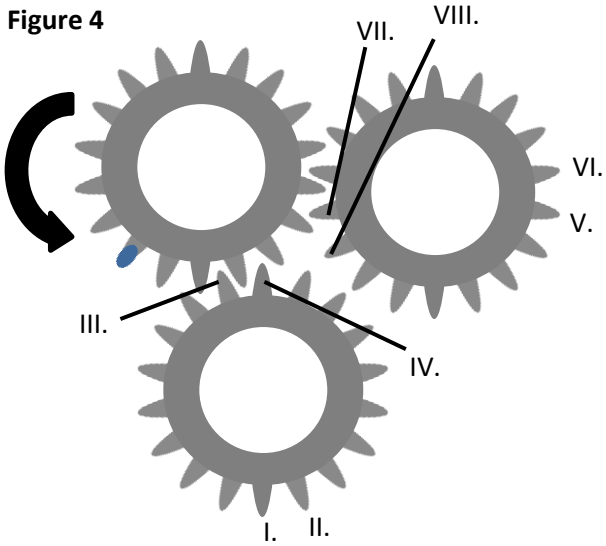


Figure 4



12. Figure 1 shows the starting state of a gear mechanism; figure 3 shows the end state of that same gear mechanism after it has been rotated in the direction indicated by the black arrow. Please identify where the red dots should be placed in figure 3.

    a. I. and VI.
    b. II. and V.
    c. III. and VII.
    d. II. and VII.

13. Figure 1 shows the starting state of a gear mechanism; figure 4 shows the end state of that same gear mechanism after it has been rotated in the direction indicated by the black arrow. Please identify where the red dots should be placed in figure 4.

    a. I. and VI.
    b. III. and VIII.
    c. III. and VII.
    d. II. and VII.

Visualization Answer Sheet

12. Ⓐ Ⓑ Ⓒ Ⓓ
13. Ⓐ Ⓑ Ⓒ Ⓓ

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Diagnostic Questions 14-15: Written Comprehension

Please refer to the following passage to answer the questions below.

If you have ever watched a substance burn, for example a piece of paper, you've probably observed that as the substance burns its mass seems to diminish. The piece of paper, for instance, rapidly burns for a moment, but eventually the flame is exhausted and disappears. During the burning process, the paper is quickly converted into char and ash; the paper is almost completely consumed by the flame, leaving little left after the burning process. What, then. has happened to the piece of paper? Where did it go?

One of the most fundamental concepts in modern physics can help to answer the question of the disappearing piece of paper. The *Law of Conservation of Mass-Energy* (more often known as the *Law of Conservation of Mass*) states that, "Mass and energy may be converted from one to another, but there is never any net loss of mass-energy." In essence, this law states that neither mass nor energy can be created or destroyed, only changed. In modern physics, we speak of "mass-energy" ever since Albert Einstein's *Special Theory of Relativity* showed that mass has an equivalent energy and energy has an equivalent mass in the now famed equation, $E = MC^2$.

The *Law of Conservation of Mass-Energy* explains to us that the paper's mass did not disappear, nor was it destroyed. Burning is a process that converts mass into energy. In the case of the piece of paper, the mass of the paper was converted into energy in the form of heat and light.

The consequences of the Law of Conservation of Mass-Energy are very relevant to the fire sciences. Since there is a known relationship between the conversion of mass to energy, the Law allows for researchers to calculate the heat release rates of various materials though determining mass loss and temperature gain when a substance is burned. Thus, a material's fire retardance can be estimated. Also, firefighters can use this principle in a fire size-up to estimate how much potential material is available to burn, and thus estimate how long the fire could last and how much heat energy may be released. The more energy that is released, the more extinguishing material will be required (water, chemical agents, etc.), and the longer the fire burns, the more resources (men, equipment, etc.) will be required to combat the fire.

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14. What is the take away from this passage regarding the relationship between mass and energy?

    a. Mass can be converted into energy (paper's mass converted into light and heat), but energy cannot be converted into mass.
    b. All mass has an equivalent energy and all energy has an equivalent mass.
    c. Mass and energy are the same substance called mass-energy.
    d. Burning is a process that transforms mass into energy by producing heat and light.

15. According to the Law of Conservation of Mass-Energy, which of the following statements best describes the relationship between mass and energy?

    a. As the mass of a given substance is destroyed through burning, there will be an increasing level of energy.
    b. Mass can be converted into energy, but it will result in the destruction of the original mass.
    c. Energy is transformed into mass given enough heat, which creates residual char and ash left by a fire.
    d. When matter burns its mass is not destroyed, but rather converted into heat and light.

Written Comprehension Answer Sheet

14. Ⓐ Ⓑ Ⓒ Ⓓ
15. Ⓐ Ⓑ Ⓒ Ⓓ

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Diagnostic Questions 16-17: Written Expression

Please select the word that best completes the sentence.

16. Battalion Chief Reynolds and his engine company _____ dispatched to the scene of a multiple-alarm fire where a storage warehouse was burning out of control.

    a. was
    b. were
    c. we're
    d. is

Please use the following scenario to answer the following question.

17. Since 1965 smoke detectors have been an affordable and reliable way to protect residential dwellings and their inhabitants from the dangers of fire. The small, battery-powered devices have been credited with saving countless lives. Because they detect smoke and not heat, residents can be warned before flames and high heat cause serious damage. Though these small and relatively inexpensive devices can save lives, many take them for granted and do not perform regular maintenance. Two-thirds of home fire deaths occurred in homes without smoke detectors or with non-operational smoke detectors. Almost 75% of smoke detector failures were due to a missing, dead or disconnected battery. Of homes that have at least one smoke detector, the detectors were not operational in one out of five homes. Fire prevention experts recommended installing smoke detectors in each bedroom, outside of sleeping areas and on each level of the residence (including basements).

    What is the main idea of the passage above?

    a. Smoke detectors, first made available in 1965, are the best way to effectively alert residents to the presence of smoke.
    b. Most homes only have one smoke detector and missing or dead batteries are the main cause of home fire deaths.
    c. Homes containing smoke detectors are not necessarily protected from fire. One in five homes does not have operational detectors.
    d. Smoke detectors, when operational and installed in the correct locations, are an effective way to reduce the risk of injury or death in the event of a fire.

Written Expression Answer Sheet

16. Ⓐ Ⓑ Ⓒ Ⓓ
17. Ⓐ Ⓑ Ⓒ Ⓓ

8. Non-Cognitive Questions

The non-cognitive section of the test will contain two types of questions: behavioral statements and multiple choice questions. Behavioral statements will present an opinion and require you to specify the degree to which you agree or disagree. You will use a 5-point scale to respond to these questions. This scale is presented below.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
A	B	C	D	E

When answering questions in this section, you should briefly consider the statement that is presented and then provide a response that corresponds with your initial reaction regarding your level of agreement or disagreement. Your first reaction is usually the most candid and accurate response. You will need to answer these questions quickly in order to complete them in the allotted time, so do not spend much time on any single question.

You should attempt to use the "neutral" response infrequently. A neutral response indicates that you do not have an opinion, which is rarely the case. If you do have an opinion, whether strong or not, it is best to respond accordingly – choose the response that most accurately reflects your sentiments.

The other question type that you will see in the non-cognitive section of the FST™ is a multiple choice question. These questions will ask you about your personal experiences or behavioral inclinations. You will be given four to five options to choose from. Select the option that best corresponds to your experience or opinion. Again, you should go with your initial reaction and avoid spending too much time on any question.

There is a candidness scale within the non-cognitive section that will assess the degree to which you respond to questions in a socially desirable manner. In other words, if you attempt to answer questions as you think they should be answered as opposed to in alignment with your opinions and experiences, your test score will be downgraded. Please answer every question honestly and candidly. All answers you provide may be verified later in the selection process during a background check and/or polygraph procedures. Dishonest or inconsistent responses could result in your disqualification.

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9. Before the Test

Your performance on the FST™, in part, depends on your physical and mental readiness. Following are some suggestions for performing optimally:

- Review the test rules contained in this Preparation Guide just prior to the test date.
- Plan to arrive to the test site on time by securing directions and leaving yourself plenty of time to get to the location (consider traffic and unforeseen occurrences).
- Get a good night's sleep the nights leading up to the test administration.
- Eat a good meal prior to the test.
- Bring appropriate sign-in materials and a wrist watch to track your time.

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10. Answer Key

Review your answers from the answer spaces on the previous pages and use the table below to indicate if your answer was correct or incorrect by marking a check in the proper column.

Number	Type	Answer	Correct	Incorrect
1	Deductive Reasoning	C		
2	Deductive Reasoning	D		
3	Inductive Reasoning	D		
4	Inductive Reasoning	B		
5	Information Ordering	A		
6	Information Ordering	D		
7	Mathematical Reasoning	C		
8	Mathematical Reasoning	D		
9	Spatial Orientation	C		
10	Spatial Orientation	A		
11	Spatial Orientation	D		
12	Visualization	B		
13	Visualization	D		
14	Written Comprehension	B		
15	Written Comprehension	D		
16	Written Expression	B		
17	Written Expression	D		

Review your right and wrong answers. If you missed one or more questions in any single cognitive ability area, you should continue practicing that ability area and review again the example question contained earlier in this preparation guide. The cognitive section of the test is your best opportunity to improve your test score – every question you get correct could substantially improve your ranking.

We wish you success in your pursuit of a fire service career!

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SELECTION WORKS

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