

# THE **FCTC** WRITTEN TEST

*The FCTC Written Test was developed by the California Firefighter Joint Apprenticeship Committee (Cal-JAC).*



## PREPARING FOR THE WRITTEN TEST

The FCTC Written Test is an entry-level, general knowledge test with questions and examples tailored to the job of a firefighter. It is designed to assess your ability to process information and think critically. The goal of the test is to measure your knowledge in reading comprehension, ability to recall detailed visual and verbal information, basic mathematics, and mechanical reasoning (ability to understand and apply mechanical concepts and principles).

The testing process starts with a 30-minute period in which candidates are given essays to read and study. After the reading period, the essays are collected, and the exam begins immediately. Candidates then have two hours to complete 100 multiple-choice questions.

## WRITTEN TEST OVERVIEW

The FCTC Written Test will cover subject matter within the following sections:

### **Recall and Comprehend Verbal and Visual Information (20 Questions)**

This section requires candidates to watch two short videos and answer questions based on the scenarios presented.

### **Apply Mechanical Reasoning (25 Questions)**

This section presents problems to evaluate a candidate's ability to use reason to identify details within specific mechanical examples. The topics may include, but are not limited to: Fluid dynamics, levers, belt and pulley systems, rope and pulley systems, gears, and interpreting diagrams.

### **Solve Mathematical Problems (20 Questions)**

The math section covers areas such as addition, subtraction, multiplication, division, angles, area, volume, algebra, and the use of decimals, fractions, percentages, and ratios.

### **Recall and Comprehend Technical Information from Written Materials (35 Questions from essay packet and test booklet)**

This section assesses a candidate's ability to recall detailed information and demonstrate comprehension. Some essays are provided during the first 30 minutes of the exam period and some are included in the test booklet. The essays to be read at the beginning of the exam process cannot be referred to during the test. Answers must be based on recall of material studied during the 30 minutes allotted.

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## TESTING TIPS AND STRATEGIES

- 1. Listen carefully to all directions.** Ask questions if there is something you don't understand.
- 2. Read the entire question fully and carefully.** Be sure that you know what the question is asking and what the choices are. People often choose wrong answers simply because they failed to read the question in its entirety or the provided answers carefully, or because they chose an answer before reading all options.
- 3. Choose the answer that is GENERALLY best.** Answer according to what is generally or usually true, not by what would be true in some particular case. Sometimes there is no answer that is complete, or exactly correct, or always correct. The best answer is the one that is right under ordinary conditions. Here is an example:

The number of days in a year is:

- A. 365
- B. 366
- C. 367
- D. 368

The right answer is the one that was true for most years, not the one that was true for leap years.

**4. Understand that these exams aren't designed to trick you.** The goal of the exam is to measure your basic knowledge in reading comprehension, ability to recall detailed information, mathematics, and mechanical reasoning.

**5. Use your time efficiently.** The FCTC Written Test is not a speed test but it is timed. Candidates are given 30 minutes to read and review the essays at the beginning, and two hours for the remaining test. Move along at a pace that will allow you to go back and check your answers. Begin the actual test with the subject you excel at the most.

**6. Don't change answers too much.** When in doubt, your first answer is often correct. Answers that are changed too many times may result in the wrong answer. Eliminate choices you know are wrong. When you have trouble deciding on the best answer but have decided one or two answers are definitely not best, avoid further consideration of those and concentrate on the answers you think might be correct.

**7. Be mindful of questions with absolutes.** Suspect that something may be wrong if any of the answers provided contain broad statements or words like absolutely, always, completely, forever, infinite, never, only, sole, undeniable, or wholly.

**8. If an item is in the form of an incomplete statement, it sometimes helps to try to complete the statement looking at suggested answers.** See if the way you have completed the statement corresponds with any of the answers provided. If one is found, it is likely to be the correct one.

**9. Set aside time daily to prepare for the test.** Study with a friend or a group occasionally; the exchange of ideas will help all involved. Look up new words in the dictionary. Avoid serious study in a position or location that is too comfortable.

**10. Test day.** Familiarize yourself with the test location. Also check emails; FCTC will send all details regarding parking and building instructions. Candidates are advised to arrive well within the registration period, well rested, and prepared.

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## STUDY MATERIALS

### RECALL AND COMPREHEND TECHNICAL INFORMATION FROM WRITTEN MATERIALS

#### Essay Packets

Firefighters must read and comprehend volumes of technical materials. Nearly every working day includes some training or education classes, drills or assignments. The subjects cover a broad range of topics that include fire behavior, hazardous materials, chemistry, emergency medicine, building construction, response considerations, apparatus and equipment use, maintenance and troubleshooting, just to name a few.

An essay packet is provided during the first 30 minutes of the exam period. The number of essays can range from one to four. The essays are to be read at the beginning of the exam process, notes can be written on the essays, including underlines, asterisks, even rewriting of certain parts to help you remember the information. Once the 30 minutes are up all essays are collected. The essays cannot be referred to during

the remainder of the test. All note taking must be done on the essay packet and NOT and not on any other testing materials. Answers to the questions from the essay packet must be based on recall of material contained in the essays and not on any prior knowledge, schooling, academies or classes.

There can be anywhere between 15-20 questions from these essays and these questions will be contained in the test booklet. The length of the essays is based on the ability to read at an average of 200 words per minute. Candidates are given a five-minute warning before their 30-minute reading time is up.

### **Instructions for Sample Essay**

Set a timer for 10 minutes. Read the essay, "Grooming Standards", study it, make notes on it, and underline items you think are important. Use the entire 10 minutes to study the essay. Once the time is up, put away the essay and DO NOT refer to the essay when completing the questions later in this study guide.

Remember to only answer the corresponding questions after the rest of the study guide has been completed. The goal is to test your ability to read material, comprehend the material and then be able to recall the material later in the testing process.

## **GROOMING STANDARDS**

All personnel shall conform to this standard and present a professional appearance at all times when on duty, while representing the Department, and/or while wearing Department uniform apparel. Given the dynamic and ever-changing nature of contemporary community standards, and the ever-fluid grooming styles of contemporary pop culture, it is impossible to address precisely every potential grooming and appearance issue that may arise. Therefore, when a situation arises that is not specifically addressed within the text of this procedure, the Deputy Fire Chief is expected and empowered to exercise their best judgment and discretion in the enforcement of the spirit and intent of this procedure.

Supervisors who determine that a subordinate's hair, jewelry, uniform, or other appearance is not in compliance with either the letter or the spirit and intent of this procedure, shall refer the case through the Chain of Command to the Deputy Fire Chief. The Deputy Fire Chief is authorized to exercise their judgment and discretion to decide the matter. They are empowered to direct the employee to make the necessary modifications which, in the judgment of the Deputy Fire Chief, are necessary to bring the employee into compliance. Employees disagreeing with the Deputy Fire Chief's decision may appeal that decision, in writing, to the Fire Chief. After considering all of the facts of each specific case, the Fire Chief shall render a decision. The Fire Chief's decision in the matter shall be considered final.

### **UNIFORMS**

The appropriate uniform, as noted below, shall be worn by all members of the Fire Department when on duty. All Fire department members are responsible for obtaining and maintaining the uniform items required for their assignment. All uniform items shall be maintained in presentable condition. Faded, worn, or damaged clothing is not acceptable; this includes faded lettering or markings on uniform items requiring such markings. All uniform shirts shall display the member's name in plain view. Civilian clothes are optional for members assigned to staff and special assignments as authorized by the Fire Chief.

### **GENERAL INSTRUCTIONS**

All members of an Operations Fire Company, while engaged in public contact duties, shall wear the same type of uniform at the same time (i.e., all members wearing the regulation dress shirt and appropriate trousers, not just the company officer). Company Officers will assure that all members are appropriately dressed for the specific activity. Paramedics shall wear the paramedic patch on the right sleeve of the uniform jackets, and the silkscreened replica on the right sleeve of fatigue shirts. Personnel appearing for a trial or hearing representing the Fire Department shall wear the dress uniform. Personnel attending funerals or assigned to funeral detail shall wear the dress uniform with a navy blue necktie and badge shroud. Pallbearers may wear

white gloves.

## HAIR

Hair should be clean, neat, well groomed, and safe. Hair shall also be of a natural hair color with the color distributed evenly through the hair in a natural manner that avoids calling undue attention to it. Hair styles and/or colors that are extreme and/or unnatural are contrary to the intent and purpose of this procedure and are, therefore, disallowed. Hairstyles that preclude the proper wearing of self-contained breathing apparatus are not permitted. Hair shall be worn so that it does not extend below the bottom of the uniform shirt collar while standing in an erect position. Longer hair is not encouraged and shall only be acceptable if it is pinned up in a neat manner and does not interfere with the wearing of department issued headgear. No ribbons or ornaments shall be worn in the hair except for neat, inconspicuous bobby pins or conservative barrettes that blend with the hair color. No hair can show under the front brim of department issued headgear.

## FACIAL HAIR

Facial hair shall be trimmed, well groomed, and must not interfere with self-contained breathing apparatus. Extreme styles of eye brows/eye lashes, sideburns, and mustaches shall not be allowed. Extreme styles would be any that are not in harmony with the contemporary community standards for facial hair on a mature adult in a responsible position, or any that call undue attention to the individual. Facial hair which lies below the lower lip and above the chin is allowed but shall not be more than one inch in length, nor more than one inch in width. This facial hair shall not interfere with the seal of all Department-issued fitted safety masks. Other than eyebrows/eye lashes, mustaches, side burns, and hair below the lip as described above, no other facial hair, including beards, is allowed.

## JEWELRY

Members are discouraged from wearing rings or other jewelry on the fire or training ground. Jewelry that is determined by the supervisor to be a safety hazard shall be removed while on duty or involved in any potentially hazardous operation. While on duty, members may wear one stud earring per ear not to exceed 2 mm. No facial jewelry or body piercing which is visible to the public shall be worn while on duty, while representing the Department, or while wearing department uniform apparel. Further, members are discouraged from wearing jewelry which may catch on clothing and/or equipment and cause injury to the employee, whether or not it is visible to the public.

## UPDATES

This policy will be updated on an annual basis in May of each year. Any changes prior to May will be recorded in the Personnel Section.

## **RECALL AND COMPREHEND VERBAL AND VISUAL INFORMATION**

The ability to quickly and accurately determine and remember details at an emergency scene is a critical skill for firefighters. All crew members are responsible for contributing to the overall scene size-up, that is they each must see and hear detailed information and communicate that information to the rest of the crew. The scene size-up will determine the response necessary to save lives and avoid injuries.

It is equally important to be able to listen when instructions are given, or tasks are assigned. The success of the crew depends on each member doing their assigned task correctly and expediently.

In this section, candidates are required to watch two short videos and answer questions based on the scenarios presented. NO note taking is allowed and all pencils must be down on the desk while the videos are playing. After each video, a series of 7-10 questions will follow and answers must be based on material contained in the video. Questions will be based not only on what is heard but what is seen in the videos.

Videos and questions will only be played once.

### Practice your verbal and visual recall skills

The video segment and questions are a sample of how information will be presented during the test. See how many of the questions you can answer after viewing the video. Remember, you will only see a segment once during the test.

**Directions:** Watch the video and answer the questions at the end. NO note taking is allowed.



SAMPLE SCENARIO

### APPLY MECHANICAL REASONING

Firefighter training and job skills require learning methods and procedures for fighting fires and performing rescues. Learning how and when to use hand tools, power tools, firefighting apparatus and equipment is essential for success. Much of the training for these tasks is accomplished using pictures, drawings and diagrams of three-dimensional objects. For instance, a firefighter needs to acquire skills in reading equipment diagrams, instruction manuals, blueprints, and maps. Firefighters must be able to develop a mental image of a three-dimensional object, such as a house or a power saw, by looking at a two-dimensional picture of the object.

This section is designed to test your skill to visualize and reason how objects work, operate or interact. The concepts covered in the test may include (but are not limited to): fluid dynamics, levers, belt and pulley systems, gears, interpreting diagrams, and rope and pulley systems.

This portion of the test contains 25 questions. You may write in your test booklet, but DO NOT circle or indicate your answers in your test booklet, only on your optical scan form.

**Directions:** Review the mechanical reasoning concepts below. Next, test your knowledge on the sample questions pertaining to these concepts.

# GEARS



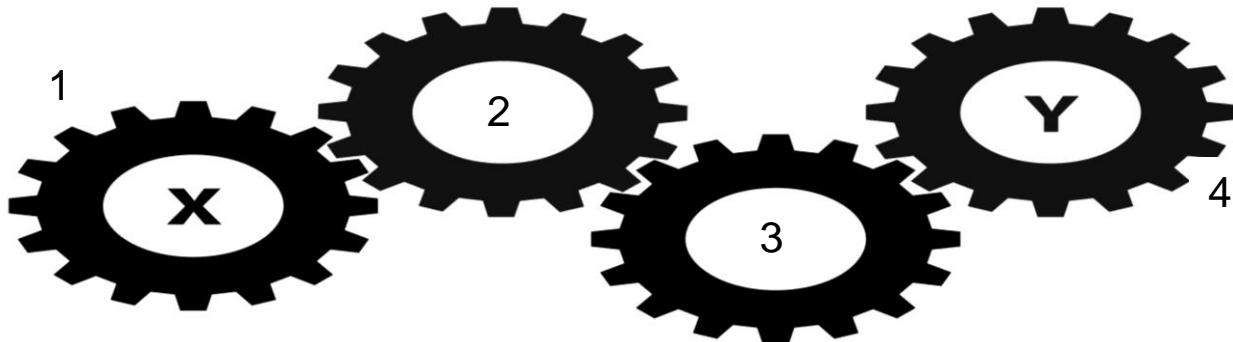
A gear or cogwheel is a rotating machine part having cut teeth, or cogs, which mesh with another toothed part to transmit torque, in most cases with teeth on the one gear being of identical shape and often also with that shape on the other gear. Two or more gears working in a sequence (train) are called a gear train or, in many cases, a transmission; such gear arrangements can produce a mechanical advantage through a gear ratio and thus may be considered a simple machine.

If the gears are touching (meshed) then the adjacent gears move in opposite directions. When there are an odd number of meshed gears then the last gear will always turn in the same direction as the first gear.

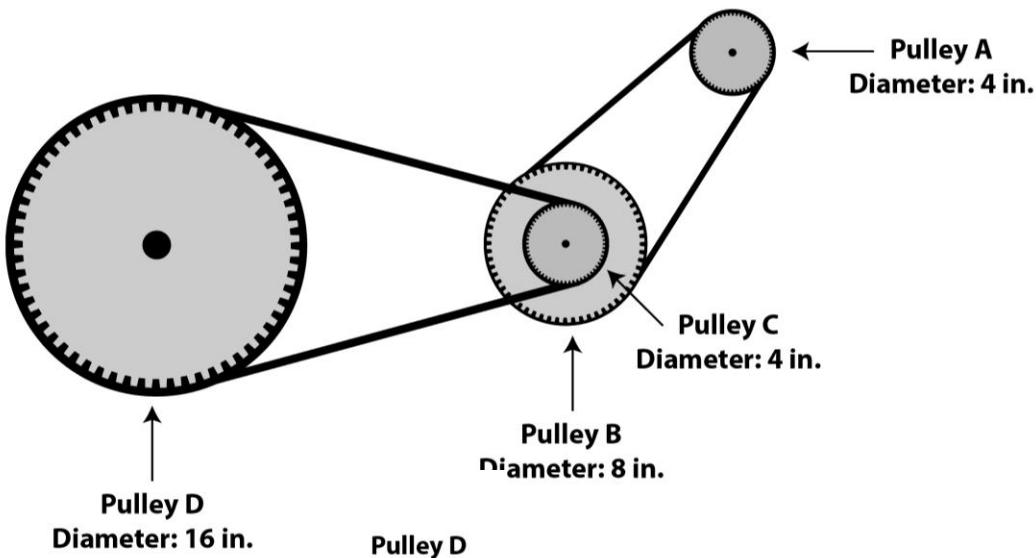
Geared devices can change the speed, torque, and direction of a power source. The most common situation is for a gear to mesh with another gear; however, a gear can also mesh with a non-rotating toothed part, called a rack, thereby producing translation instead of rotation.

When two gears mesh, and one gear is bigger than the other (even though the size of the teeth must match), a mechanical advantage is produced, with the rotational speeds and the torques of the two gears differing in an inverse relationship.

**Spur gear:** Spur gears or straight-cut gears are the simplest type of gear. They consist of a cylinder or disk with the teeth projecting radically, and although they are not straight-sided in form (they are usually of special form to achieve constant drive ratio, mainly involute), the edge of each tooth is straight and aligned parallel to the axis of rotation. These gears can be meshed together correctly only if they are fitted to parallel shafts.



## BELT & PULLEY SYSTEM



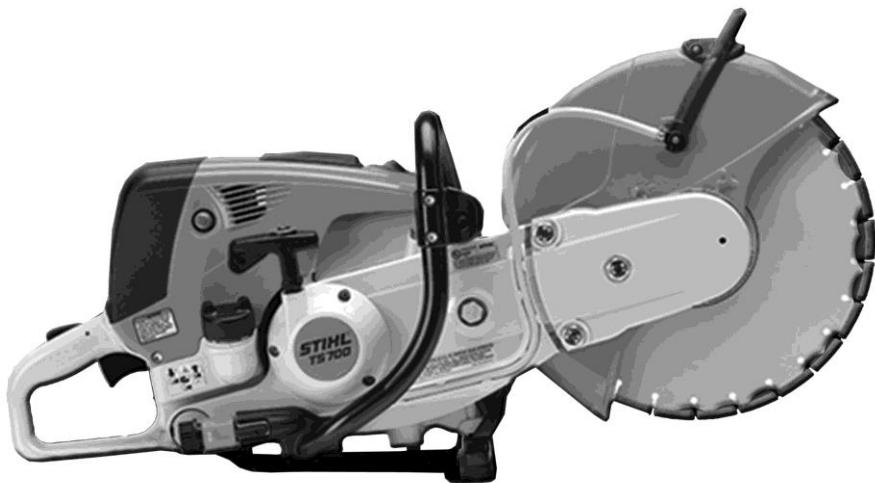
A belt and pulley system is characterized by two or more pulleys in common to a belt. This allows for mechanical power, torque, and speed to be transmitted across axles. If the pulleys are of differing diameters, a mechanical advantage is realized.

In this system, assume that the linked pulleys (B and C in the example) run at the same rpm, since they are attached to the same shaft.

Break the problem down into parts, and calculate them in order:

- Diameter of pulley A/diameter of pulley B =  $4/8$ , so pulley B will run  $1/2$  as fast as pulley A.  $400/2 = 200$  rpm
- You already know that pulley C runs at the same speed as pulley B
- Diameter of pulley C/diameter of pulley D =  $4/16 = 1/4$ , so pulley D will run  $1/4$  as fast as pulley C
- $200/4 = 50$  rpm

## BELT & PULLEY SYSTEM



A belt and pulley system is characterized by two or more pulleys in common to a belt. This allows for mechanical power, torque, and speed to be transmitted across axles. If the pulleys are of differing diameters, a mechanical advantage is realized.

A belt drive is analogous to that of a chain drive, however a belt sheave may be smooth (devoid of discrete interlocking members as would be found on a chain sprocket, spur gear, or timing belt) so that the mechanical advantage is approximately given by the ratio of the pitch diameter of the sheaves only, not fixed exactly by the ratio of teeth as with gears and sprockets.

## ROPE & PULLEY

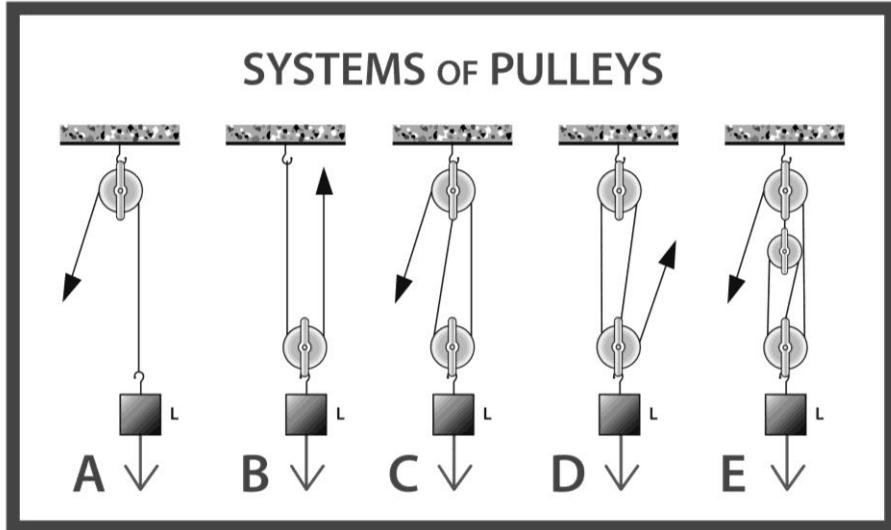


A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a cable or belt along its circumference. Pulleys are used in a variety of ways to lift loads, apply forces, and to

transmit power.

A pulley may also be called a sheave or drum and may have a groove between two flanges around its circumference. The drive element of a pulley system can be a rope, cable, belt, or chain that runs over the pulley inside the groove. Pulleys are assembled to form a block and tackle in order to provide mechanical advantage to apply large forces. Pulleys are also assembled as part of belt and chain drives in order to transmit power from one rotating shaft to another.

## ROPE & PULLEY



A rope and pulley system – that is, a block and tackle – is characterized by the use of a single continuous rope to transmit a tension force around one or more pulleys to lift or move a load – the rope may be a light line or a strong cable.

If the rope and pulley system does not dissipate or store energy, then its mechanical advantage is the number of parts of the rope that act on the load.

- If the anchor knot is at the load (examples A, D, and E) then the mechanical advantage will be odd (1:1, 3:1, 5:1 etc.).
- If the anchor knot is at the anchor (examples B and C) then the mechanical advantage will be even (2:1, 4:1, 6:1 etc.).
- To move a load a given distance, we must figure out how much rope will be needed for our haul system. If we are using a 3:1 mechanical advantage and need to move the load 20 feet, we need to pull 60 feet of rope through our system: 3 (our 3:1) X 20 feet (the distance) = 60 feet.

# LEVER



A lever is a machine consisting of a beam or rigid rod pivoted at a fixed hinge, or fulcrum. A lever amplifies an input force to provide a greater output force, which is said to provide leverage. The ratio of the output force to the input force is the mechanical advantage of the lever.

Three classes of levers: Levers are classified by the relative positions of the fulcrum and the input and output forces. It is common to call the input force the effort and the output force the load or the resistance. This allows the identification of three classes of levers by the relative locations of the fulcrum, the resistance, and the effort.

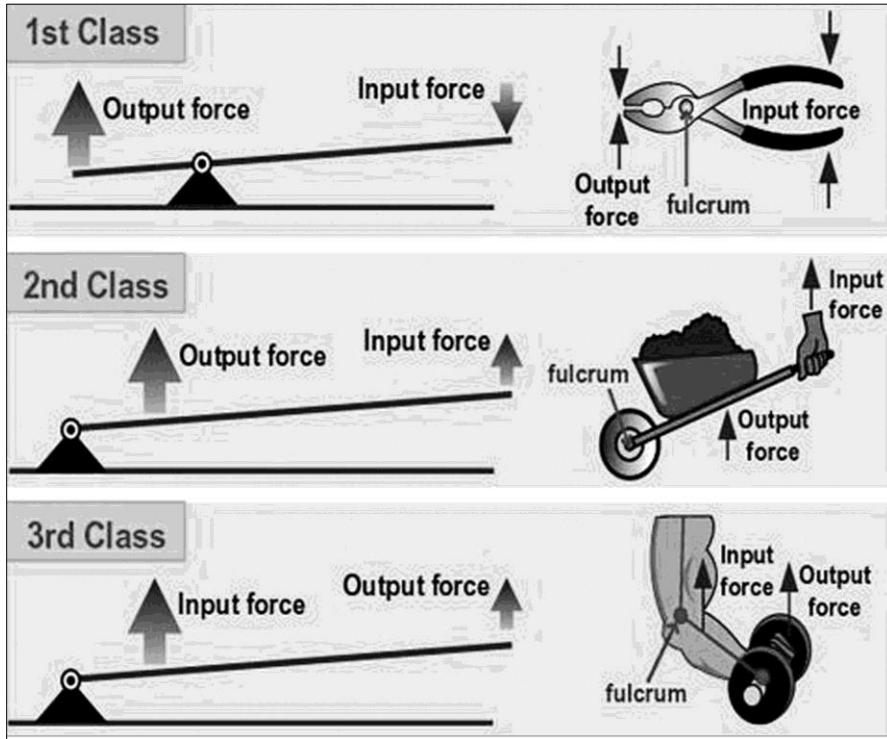
Class 1: Fulcrum in the middle: the effort is applied on one side of the fulcrum and the resistance on the other side, for example, a seesaw, a crowbar or a pair of scissors. Mechanical advantage may be greater or less than 1.

Class 2: Resistance in the middle: the effort is applied on one side of the resistance and the fulcrum is located on the other side, for example, a wheelbarrow, a nutcracker, a bottle opener or the brake pedal of a car. Mechanical advantage is always greater than 1.

Class 3: Effort in the middle: the resistance is on one side of the effort and the fulcrum is located on the other side, for example, a pair of tweezers or the human mandible. Mechanical advantage is always less than 1.

# LEVER

## The 3 Classes of Levers



These classes are described by the mnemonic “fre 123” where the fulcrum is in the middle for the 1<sup>st</sup> class lever, the resistance is in the middle for the 2<sup>nd</sup> class lever, and the effort is in the middle for the 3<sup>rd</sup>.

## FLUID DYNAMICS



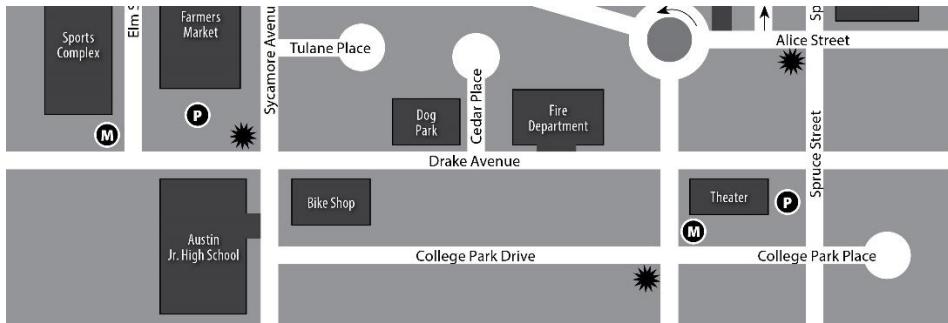
Remember that head is the pressure created by the force of gravity and is a function of the difference in elevation between intake and the output. Normally, head pressure is measured in pounds per square inch. Fortunately for us Newton realized that the force of gravity is a constant and therefore it is possible to exactly calculate the pressure that gravity will create a given vertical drop.

The formula for determining head pressure is really simple:

1 vertical foot = 0.433 pounds per square inch

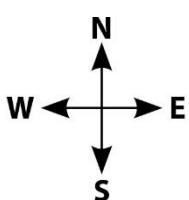
1 psi = 2.31 vertical feet

# INTERPRETING DIAGRAMS



The ability to correctly interpret diagrams is an important skill used in the fire service. This concept encompasses maps and document reading: buildings, blueprints, interior and exterior building diagrams, and floor plans to name a few. There are many types of maps that are used in the fire service: streets, city, interstates and highways, physical, vegetation, and topographical maps. Understanding how to read a map and the ability to correctly get from point A to point B is a vital skill. General map reading components include: the map or diagram, a compass, and a legend.

A map can be a picture of a geographical location, like the United States or a city with its buildings and streets identified. A map will usually label all major streets or highways and depending on how detailed of a map, smaller streets can be labeled as well. A map of the world will have continents while a city map will have details of all the streets within the city limits.



A compass is one or more arrows showing the principal directions printed on a map or diagram. The four major compass points are North, South, East and West. Using the state of California, if we are at the Capitol, Sacramento, north of us is Oregon, south of us is Baja Mexico, to our east is Nevada and to our west would be the Pacific Ocean. Once you know one direction on a map, you will be able to figure out all the other compass points.

A legend consists of a set of symbols followed by a brief description. Not all maps will have a legend but when present it is important to take note of the provided information. Always read all information on map pages. Here is an example of a legend:

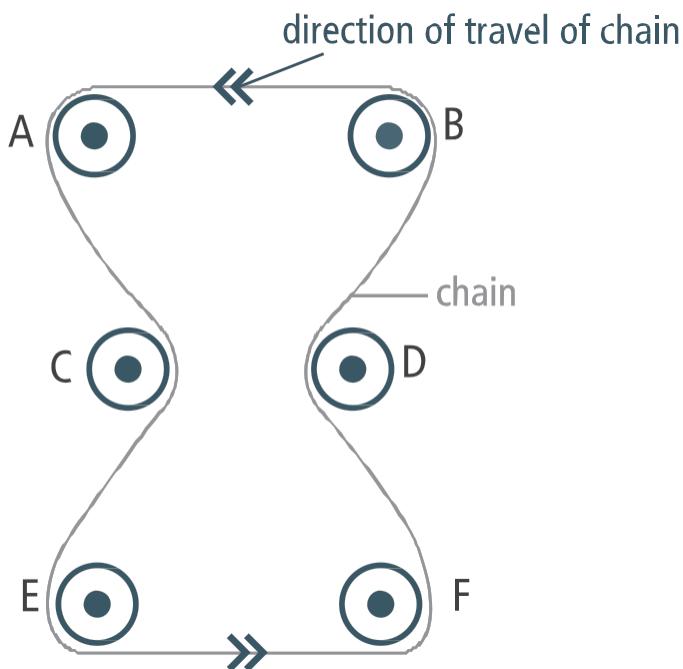


## SAMPLE QUESTIONS

### Belt and Pulley System

1. In the diagram shown, which gears are turning clockwise?

- A. A, C and F
- B. B, D and F
- C. C and D
- D. E and F



2.

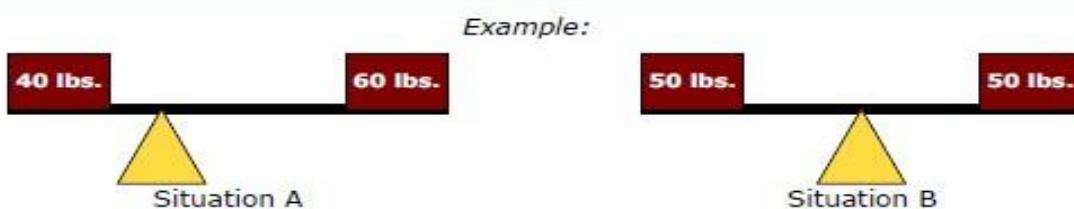
*Example:*

Which of the pulleys will complete the most revolutions per minute?

- A. Pulley A
- B. Pulley B
- C. Pulley C
- D. The pulleys will make an equal number of revolutions per minute.

## SINGLE LEVER

3.

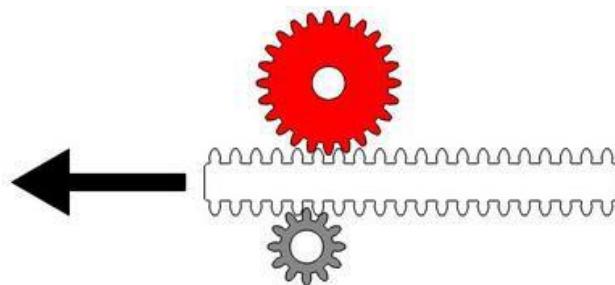


Of the two situations depicted above,

- A. only A is physically possible.
- B. only B is physically possible.
- C. both A and B are physically possible.
- D. it is impossible to tell which of the two is possible.

## GEARS

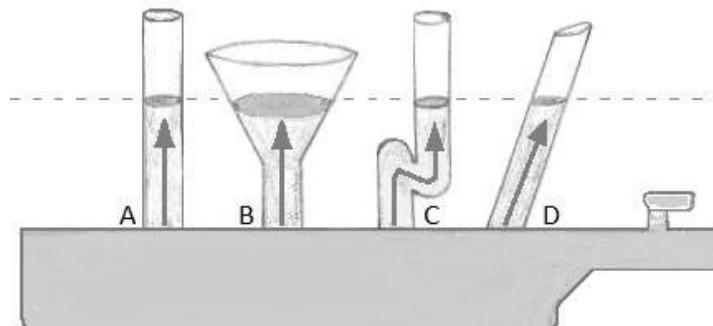
4. The diagram shows two fixed cogwheels which can only rotate around their own axis. A rack is inserted between the two cogwheels and is moved in the direction shown by the arrow. What are the directions of movement and velocities of the cogwheels?



- A. Same direction, same velocities
- B. Same direction, different velocities
- C. Different directions, same velocities
- D. Different directions, different velocities

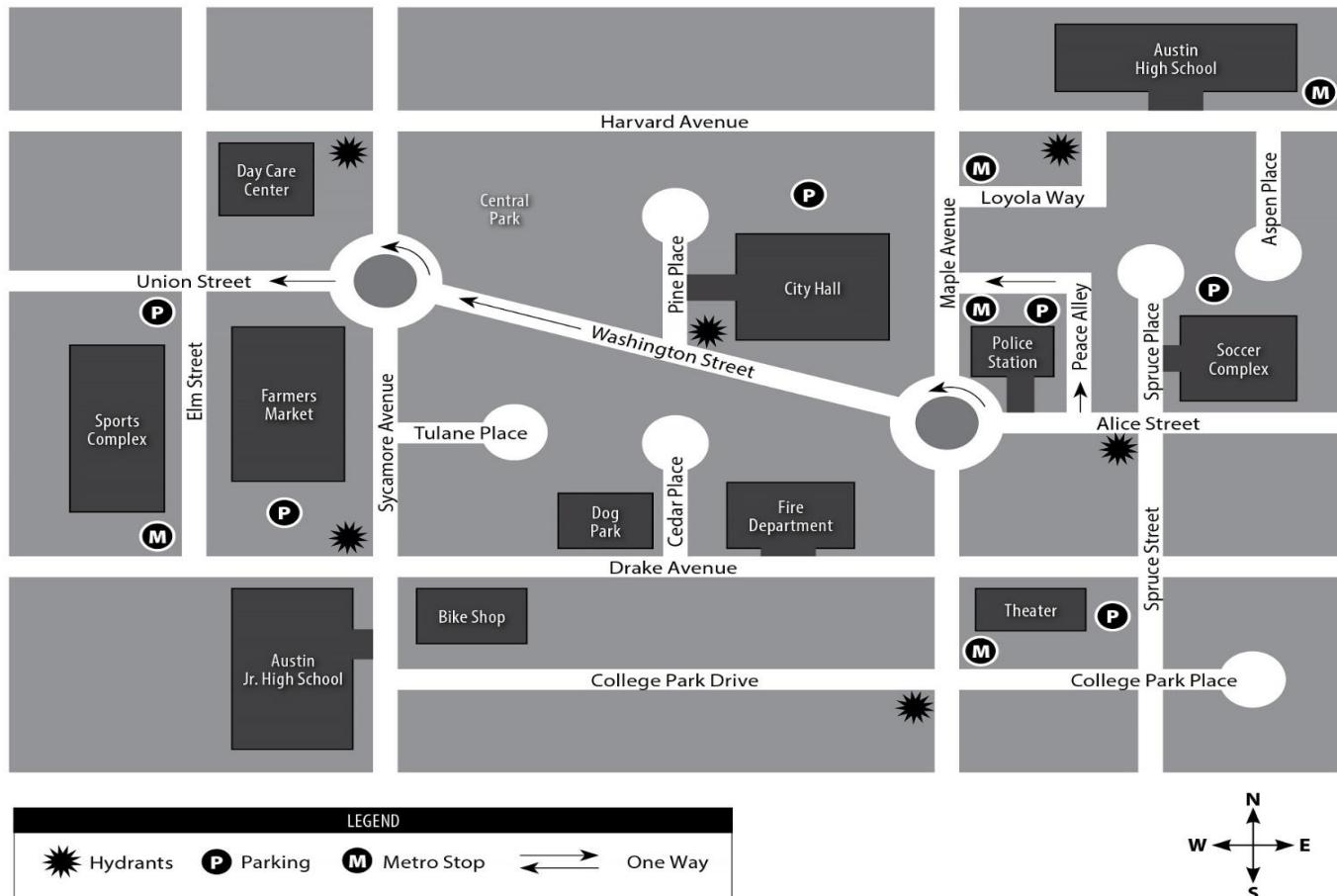
## FLUID DYNAMICS

5. When the supply hose is turned on and the bottom container is filled with water, in which tube will the water level rise the highest?



- A. Both A & B  
 B.  
 C. Both C & D  
 D. They will all fill equally

## MAP READING



**Directions:** Refer to the above map to answer questions 1-4.

- Where is the Day Care Center in relation to the Dog Park?
  - South
  - East
  - South-east
  - North-west
- You are at the Austin Junior High School. You exit onto Sycamore Avenue. You turn left and walk to the corner. You then turn left and walk one block, turn right and walk two blocks and finally, turn right and walk one block. Where are you?
  - Elm Street and Harvard Avenue
  - Union Street and Sycamore Avenue
  - Harvard Avenue and Sycamore Avenue
  - Elm Street and Union Street

3. Which streets run perpendicular to College Park Drive?

- A. Tulane Place and Cedar Place
- B. Pine Place and Cedar Place
- C. Loyola Way and Union Street
- D. Washington Street and Spruce Street

4. How many hydrants are west of Central Park?

- A. Two
- B. Three
- C. Four
- D. Five

## SOLVE MATHEMATICAL PROBLEMS

This section of the written test measures your mathematical skills. Firefighters perform a wide variety of duties. Often, the tasks that must be completed require using basic math. Formulas needed for specific tasks, such as hydraulics, are taught on-the-job. However, those formulas and many routine tasks require understanding and application of basic mathematical concepts. The math functions covered in this exam include:

- Addition/Subtraction
- Multiplication/Division
- Fractions/Decimals
- Percentages
- Angles
- Area
- Volume
- Ratios

There are numerous sources of materials and information for basic math (websites, colleges, libraries, etc.). Choose the books, materials and methods that best suit your learning style to brush up on your math skills.

There are twenty (20) mathematical word problems to solve on the test. The questions are at a high school education level, and calculators are NOT allowed. All questions are designed to test your knowledge and not to trick you. Work may be completed under each math question or on the blank page opposite the questions in your test booklet. DO NOT circle or indicate your answers in your test booklet, only on your optical scan form.

**Directions:** Complete the following examples as they represent the questions that appear on the exam.

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## SAMPLE QUESTIONS

1. If a tank with a 12' diameter holds 670 gallons per foot of depth, how many gallons will a tank with a 12' diameter hold if it is 4' deep?

- A. 2,280
- B. 2,430

- C. 3,040
  - D. 2,680
2. During a preplan process of a building, you must obtain the square footage. You have a strip mall with two occupancies. One occupancy measures 96' x 52' and the other measures 114' x 52'. What is the approximate square footage for this building?
- A. 13,000
  - B. 11,000
  - C. 12,000
  - D. 10,000
3. If the sales tax is 18% and a new pair of fire gloves cost \$35.25, then what is your total cost for the gloves?
- A. \$42.59
  - B. \$43.59
  - C. \$42.60
  - D. \$41.60
4. Station 3's coffee fund is \$12; the total amount in station 3's expense fund is \$48. What percent of the total fund goes towards coffee?
- A. .40
  - B. 40%
  - C. 25%
  - D. .25
5. Plastic fire helmets cost \$500 per gross in 2014. In 2016, the cost per gross dropped to \$100. What is the percent of decrease in cost per gross?
- A. .8
  - B. 8%
  - C. 80%
  - D. -80%
6. In the fire academy, we had a ratio of 7 to 5 passing grades to failing. How many of the 36 students failed?
- A. 21
  - B. 15
  - C. 7
  - D. 5
7. How many square feet are in a circle with a radius of 5 feet?
- A. 78.50
  - B. 73.50
  - C. 75.80
  - D. 75.30
8. What is the total volume of a cube that is 7' tall, 3' wide and 5' long?
- A. 115 cubic feet
  - B. 105 square feet
  - C. 115 square feet

- D. 105 cubic feet
9. What is the total volume of a cylinder that is 7' high with a 3' radius?
- A. 188.52 square feet
  - B. 197.82 cubic feet
  - C. 188.52 cubic feet
  - D. 197.82 square feet

## RECALL AND COMPREHEND TECHNICAL INFORMATION FROM WRITTEN MATERIALS

### IN-TEST ESSAYS

Firefighters must read and comprehend volumes of technical materials. Nearly every working day includes some training or education classes, drills or assignments. The subjects cover a broad range of topics that include fire behavior, hazardous materials, chemistry, fire prevention codes, building construction and codes, apparatus and equipment including maintenance and troubleshooting. Generally, this section will assess a candidate's ability to recall detailed information and demonstrate comprehension of critical and exact information.

In addition to the essays provided in the essay packet at the beginning of the exam, there are also essays included in the test booklet and are therefore available to refer back to when answering corresponding questions. Do not base any answers on prior knowledge, classes or training, only on information contained in the essays. You may make notes on the essays in your test booklet but DO NOT circle or indicate your answers in your test booklet, only on your optical scan form.

**Directions:** Read the following sample essay and answer the questions. You may refer back to this essay to search for the correct answer.

## SCBA USE AND HAZARDOUS CONDITIONS

There are numerous types of Self-Contained Breathing Apparatus (SCBA) found within the fire service. They can range from low pressure systems to high pressure. There are numerous components to an SCBA, including the first stage pressure regulator, second stage regulator, high pressure air tank, harness, mask, headsup display device, voice amp, low air alarm and personal alarm safety device (PASS).

PASS devices are mandatory on all SCBAs and can be actuated by air or battery. The PASS device is an audible warning system designed to let the firefighter know when they are low on air. PASS devices usually sound at 500 psi and let off an audible warning for 15-30 seconds. The PASS device cannot be turned off and can only be disarmed by turning off the SCBA unit or via refill of the tank above 500 psi. It should be a fundamental rule in firefighting that no one be permitted to enter any potentially toxic atmosphere, such as an interior or exterior fire attack, below-grade rescue, or hazardous materials emergency, unless equipped with a protective breathing apparatus. SCBAs vary in weight and can be as heavy as 50 pounds or as light as 32 pounds.

The lungs and respiratory tract are more vulnerable to injury than any other body part. The gases encountered in fires are dangerous in one way or another. Smoke can carry numerous dangerous particles; some of those particles can include carbon, tar, and dust floating in a combination of heated gases. Some of the suspended particles in smoke are merely irritating, but others may be lethal. The size of the particle determines how deeply into the unprotected lungs it will be inhaled.

There are four common hazardous atmospheres associated with fires or other emergencies. These atmospheres include the following: oxygen deficiency, elevated temperatures, smoke and toxic atmospheres with fire. An example of a toxic atmosphere would be the buildup of carbon monoxide. This colorless, odorless gas is caused by incomplete combustion and is the number one cause of fire related deaths.

The combustion process consumes oxygen while producing toxic gases. When oxygen concentrations are below 18 percent, the human body responds by increasing its respiratory rate. Oxygen deficiency can also occur in below-grade locations, chemical storage tanks, grain bins, silos, and other confined spaces.

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## SAMPLE QUESTIONS

1. There are numerous components to an SCBA including:

- A. A harness
- B. A low air alarm
- C. A second stage regulator
- D. All of the above

2. The PASS device is a/an \_\_\_\_\_ warning system designed to let the firefighter know when they are low on air.

- A. Respiratory
- B. Pressure
- C. Regulator
- D. Audible

3. The PASS device cannot be turned off and can only be disarmed by turning off the SCBA unit or via:

- A. Refill of the tank above 300 psi
- B. Refill of the tank above 450 psi
- C. Refill of the tank above 500 psi
- D. Refill of the tank above 550 psi

4. Unless equipped with a protective breathing apparatus, it should be a fundamental rule in firefighting that no one be permitted to enter any potentially toxic atmosphere, including a/an:

- A. High angle emergency
- B. Above-grade emergency
- C. Low angle emergency
- D. Hazardous materials emergency

5. The \_\_\_\_\_ are more vulnerable to injury than any other body part.

- A. Lungs and respiratory tract
- B. Heart and liver
- C. Brain and kidney
- D. Eyes and ears

6. There are \_\_\_\_\_ common hazardous atmospheres associated with fires or other emergencies.

- A. 2
- B. 3
- C. 4
- D. 5

7. The hazardous atmospheres associated with fires or other emergencies include the following:

- A. Oxygen Deficiency
- B. Elevated Temperatures
- C. Smoke and Toxic Atmospheres
- D. All of the above

8. When oxygen concentrations are below \_\_\_\_\_ percent, the human body responds by increasing its respiratory rate.

- A. 18
- B. 20
- C. 22
- D. 24

9. \_\_\_\_\_ is the number one cause of fire-related deaths.

- A. Carbon monoxide
- B. Carbon dioxide
- C. Nitrogen dioxide
- D. Hydrogen chloride

10. Which colorless odorless, gas is caused by incomplete combustion?

- A. Carbon monoxide
- B. Carbon dioxide
- C. Nitrogen dioxide
- D. Hydrogen chloride

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## SAMPLE QUESTIONS

### PRETEST ESSAY PACKET: GROOMING STANDARDS DO NOT REFER BACK TO THE ESSAY, MEMORY ONLY

1. What optional item may Pallbearers wear?

- A. Badge Shroud
- B. Navy Neck Tie
- C. White Gloves

- D. None of the above
2. Where is the paramedic patch to be worn on the uniform jacket?
- A. Front of jacket, over heart
  - B. Right Sleeve
  - C. Left Sleeve
  - D. Both Sleeves
3. This policy shall be updated on an annual basis during which month?
- A. January
  - B. May
  - C. September
  - D. December
4. What is the maximum size earring allowed to be worn?
- A. 1 mm
  - B. 2 mm
  - C. 3 mm
  - D. 4 mm
5. When are rings prohibited from being worn?
- A. On the fire ground
  - B. On the training ground
  - C. All of the above
  - D. None of the above
6. How can an employee that disagrees with a decision made by the Deputy Fire Chief appeal the decision?
- A. Union representative
  - B. Shop steward
  - C. Direct supervisor
  - D. In writing
7. Civilian clothes are optional for members assigned to staff, who authorizes this decision?
- A. Human Resource Department
  - B. Union Representative
  - C. Deputy Fire Chief
  - D. Fire Chief
8. There are several factors that facial hair must meet in order to be approved per the policy, which one does not fall within the policy guideline?
- A. Nothing below the upper lip.
  - B. Trimmed
  - C. Well groomed
  - D. Does not interfere with breathing apparatus
9. Which of the following hair styles are not permitted?
- A. Safe

- B. Long hair
  - C. Extreme hair colors
  - D. Well groomed
10. What must be displayed in plain view on the uniform shirt?
- A. Department Logo
  - B. Members Name
  - C. Paramedic Patch
  - D. Department Badge
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## Answer Key

### RECALL AND COMPREHEND VERBAL AND VISUAL INFORMATION

1. D            2. B            3. B

### APPLY MECHANICAL REASONING

1. C

Gears C and D. At least one gear in each of the other answers is turning counterclockwise. It helps to follow the direction of the chain, which is connected to all the gears.

2. A

Notice that pulley A is the smallest of the three pulleys in the group. Because of its size, it has a shorter distance to travel to complete one revolution. Another way to phrase the question would be to ask which pulley is moving the fastest, in which case, the same thought process is used.

3. B

In Situation B, the length of the lever on both sides of the fulcrum is equal, as is the weight supported on each side. This represents a “balanced” situation. It is physically impossible for the lever to remain balanced in Situation A because there is more weight on the right side. Even if the weights of the load were equal, the lever would still not balance because the right side of the lever is longer than the left side.

4. D

The red cogwheel will turn clockwise at a slower velocity than the grey cogwheel, which will turn counterclockwise. The smaller the wheel, the higher the velocity.

5. D

As liquid fills the bottom container, pressure causes the liquid to rise in each tube equally. The liquid reaches the same level in all of the tubes without regard to the shape or angle of the tube.

### MAP READING

1. D            2. C            3. B            4. A

## SOLVE MATHEMATICAL PROBLEMS

- |      |      |      |
|------|------|------|
| 1. D | 4. C | 7. A |
| 2. B | 5. C | 8. D |
| 3. D | 6. B | 9. B |

## RECALL AND COMPREHEND TECHNICAL INFORMATION FROM WRITTEN MATERIAL

### IN-TEST ESSAYS: SCBA USE AND HAZARDOUS CONDITIONS

- |      |      |      |       |
|------|------|------|-------|
| 1. D | 4. D | 7. D | 10. A |
| 2. D | 5. A | 8. A |       |
| 3. C | 6. C | 9. A |       |

### PRETEST ESSAY PACKET: GROOMING STANDARDS

- |      |      |      |       |
|------|------|------|-------|
| 1. C | 4. B | 7. D | 10. B |
| 2. B | 5. C | 8. A |       |
| 3. B | 6. D | 9. C |       |
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## Final Thoughts

**Know your learning style.** Everyone learns differently so be mindful of your own style of learning new materials and work with it.

**Be mindful of your strengths.** When you are told to open your test booklet and begin, start in the section that you are the strongest. This will give you confidence as your progress through the test. You may complete the sections in the test booklet in any order but always remember to check your number on your optical scan form with the corresponding question number.

**We are testing your knowledge and ability to learn.** The purpose of the test is to test your knowledge and ability to learn, comprehend and then recall that information. We are NOT trying to trick you with our questions. Take the questions at face value. Do not “read” into the question.

**Proctors will not help you understand any question.** Test proctors will not rephrase test questions; explain the meaning of any words contained in the question, directions or answer choices. Proctors will advise you to do the best you can with the information you have.

**Reasons a candidate may be dismissed from a test and receive a failing score.** Cheating of any kind, including looking at another candidate’s testing materials, concealed notes or electronic devices, taking pictures of any testing materials, or using any aids such as a calculator will result in an automatic failure. Talking to other candidates once testing has begun is also not allowed. NO CELL PHONES. If you bring your cell phone into the testing room and the test has started, you will be dismissed.

**Remember:** You will not be permitted to take the written test if you arrive after the testing doors have been closed, so be sure to allow yourself plenty of time to travel to the testing venue. Doors are closed 15 minutes prior to the start of the test and will NOT be opened for ANY reason.

**Know how to follow directions.** Your Lead Test Administrator will read a series of instructions that you must follow. It is important to follow all directions given. This is a vital skill in the fire service!