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QUESTION NO: 1

In considering the rating of audible appliances, in wide-open spaces, how many decibels does the sound pressure level (SPL) decrease every time the distance from the source is doubled?

A. 4 dB

B. 6 dB

C. 10 dB

D. 16 dB

ANSWER: B

Explanation:

6 dB is correct. In a wide-open space that approximates a free field, sound from a point source spreads over an increasingly large spherical area as distance increases. The sound intensity therefore follows the inverse-square relationship: doubling the distance reduces intensity to one-quarter of its former value. Sound pressure level is logarithmic, and this quartering of intensity corresponds to a reduction of approximately 6 dB. Equivalently, sound pressure itself is inversely proportional to distance, so doubling the distance halves the pressure amplitude; $20 \times \log_{10}(1/2)$ is approximately −6.02 dB. Thus, if an appliance produces 100 dB at 1 m, its level is approximately 94 dB at 2 m and 88 dB at 4 m, assuming no significant reflections, absorption, obstructions, or competing ambient noise. This propagation principle is important when evaluating audible notification appliance coverage and determining whether the required alarm signal level will be achieved at listener locations. NFPA 72 addresses audible public-mode notification requirements, including the relationship of alarm signals to ambient sound levels; the free-field distance calculation provides the fundamental acoustical basis for estimating the level delivered by a source. See the NFPA 72 standard information page and the NIST overview of sound level and decibels.

QUESTION NO: 2

What type of property classifications experience the majority of fire deaths in the United States?

A. Business

B. Educational

C. Public Assembly

D. One- and two-family dwellings

ANSWER: D

Explanation:

One- and two-family dwellings experience the majority of civilian fire deaths in the United States. NFPA fire-loss analyses consistently show that fatal fires are concentrated in residential settings, with one- and two-family homes—including manufactured homes—representing the largest share of civilian fire deaths among property-use categories. This finding is important in fire protection practice because a dwelling fire commonly begins when occupants are present, often during evening or sleeping hours, so detection, notification, evacuation, and early suppression directly affect life safety outcomes.

The classification refers to detached homes, duplexes, and similar dwelling arrangements used by one or two families. It is a property-use classification for fire-statistics reporting; it should not be confused with a statement that every such dwelling has identical hazards or protection features. For CFPS purposes, the key point is the national loss pattern: residential occupancies, and particularly one- and two-family dwellings, account for the predominant portion of fatal-fire outcomes. NFPA's national fire-loss reporting provides the supporting trend data and definitions used to identify where civilian fire deaths occur. See NFPA's Fire Loss in the United States reports and its Home Structure Fires research.

QUESTION NO: 3

The duration of required fire flow in public supply systems ranges from

A. 1-4 hours.

B. 1-6 hours.

C. 2-10 hours.

D. 3-8 hours.

ANSWER: A

Explanation:

1-4 hours. is correct. Under NFPA 1's public water-supply fire-flow provisions, the required duration is established from the calculated fire-flow demand and is expressed in hour increments that range from 1 hour to 4 hours. This duration represents the period for which the water system must be capable of delivering the required fire flow, in addition to applicable domestic demand, so that firefighting operations have an adequate and sustained water supply. The required flow and duration are determined using the building's characteristics and fire-protection features addressed by the code's fire-flow methodology; therefore, a larger or more demanding fire-flow condition can require a longer duration within this range. The duration is a design and planning criterion for the available public water supply, including its source, storage, distribution network, and hydrant arrangement. NFPA 1 addresses these requirements in its fire-flow provisions and associated table for required fire-flow duration. The authoritative edition adopted by the enforcing jurisdiction should always be consulted because local amendments and edition-specific requirements can apply. See the NFPA 1 free-access publication portal at NFPA 1, Fire Code and NFPA's overview of fire codes and standards at NFPA Codes and Standards.

QUESTION NO: 4

The primary design approach to mitigate the effect of wind on smoke movement in high-rise buildings is based on

A. outside temperature.

B. height of the building.

C. tightness of the building.

D. fire department access.

ANSWER: C

Explanation:

tightness of the building. is correct because wind produces pressure differences across a high-rise building's exterior envelope. Those pressures can drive smoke through cracks, gaps, doors, shafts, and other leakage paths, potentially overcoming intended smoke-control pressure relationships. A tight building envelope reduces uncontrolled air leakage, making pressure differentials more predictable and allowing stairwell pressurization, zoned smoke control, and other mechanical smoke-control systems to maintain their design performance under wind exposure. In practical design, envelope leakage characteristics are therefore fundamental inputs to evaluating the airflow and fan capacity needed to control smoke movement. Building tightness also supports compartmentation by limiting the pathways through which smoke can be transported between floors or from the fire area into egress routes. This is consistent with the engineering basis for smoke-control system design: establish and maintain a pressure difference or airflow criterion despite adverse environmental effects, including wind. NFPA 92 addresses pressure differences, leakage, and the design analysis of smoke-control systems, while NIST research discusses the significant role of wind-driven pressures and building leakage in smoke spread. See NFPA 92, Standard for Smoke Control Systems and NIST: Wind Effects on Smoke Movement in High-Rise Buildings.

QUESTION NO: 5

The travel distance limit for a new unsprinklered educational occupancy is

A. 150 ft. (45 m).

B. 175 ft. (53 m).

C. 200 ft. (61 m).

D. 250 ft. (76 m).

ANSWER: A

Explanation:

NFPA 101, *Life Safety Code*, establishes a maximum exit-access travel distance of 150 ft (45 m) for a new educational occupancy that is not protected throughout by an approved automatic sprinkler system. This requirement appears in the new educational occupancies provisions in Section 14.2.6.1 of the 2018 edition. Travel distance is measured along the natural path of travel from the most remote point in a room or space to an exit, exit access door, or other permitted point of egress as applicable under the Code. The limit is intended to ensure that students, staff, and visitors can reach a protected means of egress before untenable fire conditions are likely to develop. Educational occupancies require particular attention to egress because occupants can include children who may need direction or assistance during evacuation. The 150 ft (45 m) limit is therefore the applicable baseline for a new unsprinklered educational building. NFPA 101 provides increased travel-distance allowances where the occupancy is protected throughout by an approved automatic sprinkler system, but that condition is not part of this question. See NFPA's NFPA 101 code information page and the NFPA 101, 2018 edition, on NFPA LiNK.

QUESTION NO: 6

Potassium bicarbonate is a dry chemical agent considered to be twice as effective as

A. Asodium bicarbonate.

B. monoammonium phosphate.

C. sodium chloride.

D. potassium sulfide.

ANSWER: A

Explanation:

Sodium bicarbonate is the correct comparison. Potassium bicarbonate is the principal active ingredient in Purple-K dry chemical and is widely recognized in fire-protection practice as having approximately twice the extinguishing effectiveness of sodium bicarbonate for flammable-liquid and flammable-gas fires. This enhanced performance is associated with the chemical's ability to interrupt the flame's combustion-chain reactions efficiently when its finely divided particles enter the flame zone. The result is a higher fire-suppression capability per unit mass, which is especially valuable for Class B hazards where rapid knockdown of a liquid-fuel fire is essential. NFPA 10 addresses the selection, rating, inspection, maintenance, and use of portable fire extinguishers, including dry-chemical extinguishing agents and their application to the appropriate fire hazards. The distinction between potassium-bicarbonate and sodium-bicarbonate agents is therefore important when evaluating extinguisher effectiveness, agent quantity, and expected Class B performance. See NFPA's portable fire extinguisher guidance and the U.S. Fire Administration's fire-extinguisher overview for authoritative context on extinguisher selection and use.

QUESTION NO: 7

At what temperature do cellulose nitrate products begin to decompose?

A. 581° F (305° C)

B. 425° F (218° C)

C. 350° F (177° C)

D. 300° F(150°C)

ANSWER: D

Explanation:

300° F(150°C) is the appropriate answer. Cellulose nitrate (also called nitrocellulose) is a nitrate ester material that can undergo self-accelerating thermal decomposition when heated. At approximately 300 °F (150 °C), decomposition becomes a significant fire-protection concern because heat and decomposition gases are generated, and the process may accelerate if heat is retained. The exact onset can vary with the product's nitrogen content, age, stabilizer content, contamination, physical form, confinement, and test method. For CFPS purposes, however, 300 °F (150 °C) is the recognized approximate beginning-of-decomposition value for cellulose nitrate products. This characteristic supports the stringent storage, handling, separation, ventilation, temperature-control, and housekeeping precautions associated with nitrocellulose materials. NFPA 40 addresses storage and handling safeguards for cellulose nitrate film and emphasizes controlling conditions that can promote decomposition and fire. The U.S. National Archives also identifies cellulose nitrate film as inherently unstable and susceptible to degradation, reinforcing the need to manage heat exposure and deterioration. See NFPA 40, Standard for the Storage and Handling of Cellulose Nitrate Film and the U.S. National Archives guidance on nitrate film.

QUESTION NO: 8

For wet-pipe automatic sprinkler systems, the only proper way to test the operation of a vane-type water flow alarm initiating device is to open the

A. main (2 in. diameter) drain.

B. valve at the inspector's test connection.

C. alarm test by-pass valve at the system's main riser.

D. check valve from the city connection.

ANSWER: B

Explanation:

The correct completion is "valve at the inspector's test connection." An inspector's test connection is specifically arranged to create a controlled water flow that represents the discharge from one operating sprinkler. When its valve is opened, water moves through the sprinkler-system piping at the remote test point and operates the vane-type waterflow detector. The detector's change of state is then transmitted to the fire alarm control unit, permitting verification of the waterflow alarm initiating function and its associated alarm indication. This test method evaluates the device under conditions that closely represent an actual sprinkler operation while avoiding an unnecessary system impairment or discharge volume. NFPA 25 establishes the inspection, testing, and maintenance requirements for water-based fire protection systems, including periodic functional testing of waterflow alarm devices. The inspector's test connection is a fundamental feature of wet-pipe sprinkler arrangements because it provides the intended means to conduct that functional test and to confirm that an alarm signal is received within the required time. See NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems and NFPA's fire sprinkler safety resources for system background and maintenance information.

QUESTION NO: 9

The removal of flammable vapors by displacement for cleaning a storage tank can be accomplished by displacement with air, inert gas and

A. sodium bicarbonate

B. water

C. earth

D. absorbant

ANSWER: B

Explanation:

water is correct because filling a storage tank with water is an established vapor-displacement method when the stored material and the tank's construction are compatible with water. As the water level rises, it physically displaces the tank's vapor space and forces the flammable vapor mixture out through an appropriately controlled vent or vapor-recovery arrangement. This can reduce the quantity of flammable vapor remaining before subsequent tank-cleaning activities, while also helping remove residual product from tank surfaces. The process must be planned for the specific product: personnel need to account for compatibility, tank capacity, drainage, treatment or disposal of contaminated water, static-electricity controls, and safe handling of vapors expelled during filling. Water displacement is therefore a recognized complement to displacement using air or inert gas, rather than simply a washing step. Tank-cleaning work also requires confined-space hazard evaluation, atmospheric testing, ventilation as necessary, and controls appropriate to the flammable-liquid hazard. OSHA's guidance on permit-required confined spaces addresses evaluation and control of hazardous atmospheres before and during entry: 29 CFR 1910.146. NFPA's flammable-liquids code provides the broader fire-safety framework for handling and managing flammable and combustible liquids: NFPA 30.

QUESTION NO: 10

The ratio of the weight of a solid or a liquid substance to the weight of an equal volume of water is referred to as

A. specific density.

B. relative humidity.

C. specific gravity.

D. relative density.

ANSWER: C

Explanation:

specific gravity. is the correct term for the ratio of the weight of a given volume of a solid or liquid to the weight of an equal volume of water. Because equal volumes are compared under the same gravitational conditions, the ratio of weights is equivalent to the ratio of densities. Specific gravity is therefore dimensionless: it does not have units such as kilograms per cubic meter or pounds per cubic foot. Water is ordinarily the reference material for solids and liquids, commonly at a stated reference temperature because density varies slightly with temperature. This property is particularly useful in fire protection because it indicates whether an immiscible liquid will tend to float on water or settle below it. A liquid with a specific gravity less than 1.0 is lighter than water, while one with a specific gravity greater than 1.0 is heavier than water. Fire protection personnel use this information when evaluating flammable-liquid behavior, spill control, and the likely effectiveness of water-based tactics. The definition is consistent with standard scientific usage; see the Encyclopaedia Britannica definition of specific gravity and the IUPAC Gold Book entry for relative density.

QUESTION NO: 11

What gas is liberated when magnesium shavings or chips come in contact with water?

A. Oxygen

B. Chlorine

C. Acetylene

D. Hydrogen

ANSWER: D

Explanation:

Hydrogen is liberated when magnesium reacts with water. The reaction produces magnesium hydroxide and hydrogen gas: $Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$. Although a solid surface layer can make the reaction of bulk magnesium with cold water relatively slow, shavings and chips have substantially greater exposed surface area. This increased area can permit a more noticeable reaction and release of hydrogen, particularly if the water is warm or conditions disrupt the protective surface film. Hydrogen is an extremely flammable gas and forms ignitable or explosive mixtures with air over a broad concentration range. Consequently, an incident involving magnesium and water must be managed with attention to potential hydrogen evolution, ignition sources, and the special hazards associated with combustible metals. NFPA 484 addresses combustible-metal hazards and provides guidance for managing fires and incidents involving metals such as magnesium. The chemical behavior of magnesium with water is also summarized by Chemistry LibreTexts in its discussion of Group 2 metal reactions. NFPA 484: Standard for Combustible Metals and Chemistry LibreTexts: Reactions of Group 2 Elements with Water.

QUESTION NO: 12

The ignition test method that exposes the specimen to a known heat flux from a tungsten-quartz heater is referred to as a

A. fire propagation apparatus.

B. lateral ignition apparatus.

C. cone calorimeter.

D. intermediate-scale calorimeter.

ANSWER: C

Explanation:

The correct answer is **cone calorimeter.** The cone calorimeter is a bench-scale fire-test instrument designed to expose a specimen to a controlled, known external radiant heat flux. Its conically shaped electric radiant heater is typically a tungsten-quartz element, which provides a uniform, adjustable irradiance at the specimen surface. The test method is standardized in ASTM E1354 and ISO 5660-1, and it is based on the oxygen-consumption principle of calorimetry: the heat released by combustion can be determined from the amount of oxygen consumed. In addition to time to ignition, a cone calorimeter can measure heat-release rate, mass-loss rate, effective heat of combustion, smoke production, and combustion-gas yields. These measurements make it an important tool for characterizing the fire behavior of materials under a specified thermal exposure and for comparing material performance in fire-protection engineering assessments. The test setup, radiant heater, and measurement principles are described by ASTM E1354, Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter and summarized by the National Institute of Standards and Technology’s cone-calorimeter publication.