



Petroleum Inspector Certification Programme

Test Questions

International Version
English Language Fourth Edition November 2012

Part of the International Certification Programme run in
conjunction with the Energy Institute



BLANK PAGE
(BACK OF COVER)

Petroleum Inspector Certification Programme

Test Questions

International Version
English Language Fourth Edition November 2012

Copyright © 2012 The International Federation of Inspection Agencies

All rights reserved

No part of this document may be reproduced by any means, or transmitted or translated into a machine language without the written permission of the International Federation of Inspection Agencies

Disclaimers

This document is designed to be used as part of the IFIA Petroleum Inspector Certification Programme. IFIA makes no warranty, express or implied, that it is fit for any purpose whatsoever or to the absolute sufficiency of the material presented. It cannot be assumed that every procedure is covered.

IFIA assumes no responsibility for any inaccuracies in reproduction or errors in interpretation of any authority. IFIA reserves the right to modify or amend this document without prior notification but assumes no responsibility to update or issue corrections.

Reference is made in this document to the American Petroleum Institute's Manual of Petroleum Measurement Standards (API MPMS), to International Standards Organisation (ISO) documents and to the Energy Institute's Hydrocarbon Management (HM) documents (previously Institute of Petroleum Measurement Manual, IP PMM). These are copyright publications and questions or requests for information regarding these standards should be addressed to the respective organisation.

UK First Edition published February 2003

International First Edition published October 2004 (fully compatible)

International Second Edition published January 2008

International Third Edition published March 2009 (questions fully compatible)

International Fourth Edition published November 2012

Introduction

This document has been produced by the IFIA Petroleum and Petrochemical Committee to represent a basic body of knowledge which is expected of a petroleum inspector. A sub-set of 100 of these questions will be used to form the examination which must be passed as part of the qualification “Certified Inspector of Petroleum”. The pass level is 75%.

Candidates must have completed a minimum of 6 months working as a petroleum inspector and a specified programme of field training. This is detailed in the IFIA Petroleum Inspector Training Requirements List and must be fully documented in the employer’s internal training records.

The Petroleum Inspector Certification Programme is an international programme and although details will vary between regions the qualification is international and transferable.

The guidelines governing the Petroleum Inspector Certification Programme outside the Americas are determined by the IFIA Petroleum and Petrochemical Committee together with a Technical Advisory Board, which includes representatives from the Energy Institute and a number of major oil companies.

To obtain a copy of the guidelines or for any other enquiries concerning the programme please visit the website at www.ifia-federation.org. Further contact details are available there.

A similar system applies in the Americas, however a different set of test questions is used to reflect differences in practice and the use of customary units. Again, details and copies of the Americas test questions can be obtained from the IFIA website.

BLANK PAGE

Contents

Section 1	Calculations
Section 2	Definitions
Section 3	Loss Control
Section 4	Marine Measurement
Section 5	Safety
Section 6	Sampling
Section 7	Tank Gauging
Section 8	Temperature Determination
Section 9	Metering
Section 10	Ethics

SECTION 1 - CALCULATIONS

1.01 As the density of a material increases, what happens to the API Gravity?

- a. It becomes higher
- b.* It becomes lower
- c. It does not change
- d. Answers a., b. and c. are all wrong

1.02 Density of any substance is the ratio of its mass to its volume, usually at a specified temperature. *Relative Density* is the ratio of the density of a substance at a specified temperature to the density of what other substance?

- a. Pure ethanol at the specified temperature
- b. Acetone at the specified temperature
- c.* Pure water at the specified temperature
- d. Vegetable oil at a specified temperature

1.03 When a capacity table indicates a reference API Gravity and an API Gravity correction per barrel variance for a shore tank, what data must be available to calculate a floating roof correction?

- a. Weight of the roof only
- b. API Gravity of the contents at 60 °F ; API Gravity for which the capacity table was calculated; correction in barrels for each degree of difference in API Gravity
- c. Observed API Gravity of the contents; Weight of the roof; correction in barrels for each degree of difference in API Gravity
- d.* Observed API Gravity of the contents; API Gravity for which the capacity table was calculated; correction in barrels for each degree of difference in API Gravity

1.04 When calculating the Gross Standard Volume (GSV) in a shore tank at a pressure of 1 atmosphere, the term 'Ctpl' means the same as which other factor?

- a. Vessel Experience Factor (VEF)
- b.* Volume Correction Factor (VCF)
- c. Weight Correction Factor (WCF)
- d. Voyage Analysis Report (VAR)

- 1.05 If a cargo does not contain S&W, the Gross Standard Volume and the Net Standard Volume are the same.**
- a.* True
 - b. False
- 1.06 For a crude oil cargo, what information does the formula $GOV \times VCF$ give?**
- a.* GSV (Gross Standard Volume)
 - b. NSV (Net Standard Volume)
 - c. TCV (Total Calculated Volume)
 - d. VCF (Volume Correction Factor)
- 1.07 The Total Calculated Volume is equal to the Gross Standard Volume plus what?**
- a.* Free water
 - b. S&W
 - c. Roof Correction
 - d. Free Water and S&W
- 1.08 For a trim correction to apply, which of the following conditions must exist?**
- a. Vessel must be down by the stern
 - b. Liquid may not contact the forward bulkhead
 - c.* Liquid must touch all four bulkheads
 - d. Conditions a., b. and c. must all exist
- 1.09 What is the equation used to calculate a vessel's 'trim factor'?**
- a.* Trim divided by the length between perpendiculars
 - b. Trim divided by the vessel's width
 - c. Trim divided by the tank length
 - d. Tank length divided by the length between perpendiculars
- 1.10 What must roof corrections be based on?**
- a.* The density at the temperature of the oil in the tank
 - b. The density at standard temperature of the oil in the tank
 - c. The barrels per inch calculated from the tank capacity table
 - d. The critical zone

1.11 What is the 'trim factor' of a vessel?

- a. The amount the vessel is trimmed
- b.* The slope per linear foot (or metre) of the vessel
- c. The slope per square foot (or metre) of the vessel
- d. The length between perpendiculars times the trim

1.12 Tanks on barges or other small vessels do not require trim corrections because they are too small for a correction to make a significant difference.

- a. True
- b.* False

1.13 When an automatic in-line sampler is used correctly during the discharge of a crude oil vessel, what will the resulting sample include?

- a. Oil and S&W
- b. Oil, S&W and sludge
- c.* Oil, S&W & Free Water
- d. S&W and Free Water only

1.14 A tank has a measured gauge height of 15.000 m and is filled to a 10.000 m innage with no free water. To take a middle spot sample, to what point in the tank must you lower the sampler?

- a. 5.000 m below the reference gauge point
- b. 7.500 m below the reference gauge point
- c.* 10.000 m below the reference gauge point
- d. 7.500 m from the tank bottom

1.15 A tank has a measured gauge height of 15.000 m and is filled to a 9.000 m innage with no free water. To take a lower spot sample, to what point in the tank must you lower the sampler?

- a. 3.000 m below the reference gauge point
- b. 5.000 m above the tank bottom
- c. 12.000 m below the reference gauge point
- d.* 13.500 m below the reference gauge point

- 1.16 A tank has a measured gauge height of 15.000 m and is filled to a 9.000 m innage with no free water. To take an upper spot sample, to what point in the tank must you lower the sampler?**
- a. 6.000 m above the tank bottom
 - b.* 7.500 m below the reference gauge point
 - c. 9.500 m below the reference gauge point
 - d. 6.000 m above the tank bottom
- 1.17 A tank has a measured gauge height of 15.000 m and is filled to a 12.000 m innage with no free water. To take a top spot sample to what point in the tank must you lower the sampler?**
- a. 5.000 m below the reference gauge point
 - b.* 3.150 m below the reference gauge point
 - c. 9.000 m below the reference gauge point
 - d. 0.150 m below the reference gauge point
- 1.18 What is generally accepted as the density of pure water at 15°C?**
- a. 60 kg/m³
 - b.* 1000 kg/m³
 - c. 14.5 kg/m³
 - d. 1.0 kg/m³
- 1.19 The term *specific gravity* has been replaced by what term?**
- a. API gravity
 - b. Density in vacuum
 - c.* Relative density
 - d. Density in air
- 1.20 When a vessel's capacity tables are graduated to greater than 1/8", 0.01', or 3 mm, you should interpolate to calculate the volume at the gauged level in the tank.**
- a.* True
 - b. False
- 1.21 When the density at observed temperature of a crude oil is known, what table would you use to find the density at 15°C?**
- a.* Table 53A
 - b. Table 53B
 - c. Table 24A
 - d. Table 24B

1.22 In what units is a metric tape graduated?

- a.* Millimeters
- b. Millilitres
- c. Hundredths of a foot
- d. Percentages

1.23 How many centimeters equal one inch?

- a. 3.16
- b. 2.75
- c.* 2.54
- d. Answers a., b. and c. are all wrong

1.24 What is another name for relative density?

- a. Density in vacuum
- b. Density in air
- c.* Specific Gravity
- d. Gravity by pyknometer

1.25 What is the formula to calculate API Gravity at 60°F when Relative Density is known?

- a. $(141.5 \div \text{Relative Density @ Observed Temperature}) - 131.5$
- b. $(141.5 + \text{Relative Density @ 60/60F}) - 131.5$
- c. $(131.5 \div \text{Relative Density @ 60/60F}) - 141.5$
- d.* $(141.5 \div \text{Relative Density @ 60/60F}) - 131.5$

1.26 What is the equivalent of 0 degrees Celsius on the Fahrenheit scale?

- a. 0 °F
- b. 12 °F
- c. 50 °F
- d.* 32 °F

1.27 Is the density used in the measurement tables (Table 54A, B, C, D) density in air or vacuum?

- a. Air
- b.* Vacuum

- 1.28 A product has API gravity at 60°F of 21.3. What table would be used to find the equivalent density at 15 degrees Celsius?**
- a. Table 8
 - b. Table 11
 - c.* Table 3
 - d. Table 6B
- 1.29 What table should be used to convert m³ at 15 °C to metric tons in air?**
- a. Table 53A
 - b.* Table 56
 - c. Table 54B
 - d. Table 13
- 1.30 A list correction is most similar to which of the following calculations?**
- a. A wedge formula
 - b. A vessel experience factor
 - c. A voyage ratio
 - d.* A trim correction
- 1.31 The correction for the effect of temperature on the shell of a shore tank does not need to be calculated if the contents of the tank are at 15 °C.**
- a. True
 - b.* False
- 1.32 It is necessary to know the Vessel Experience Factor of a ship before you can accurately determine whether there has been a loss or gain of cargo in transit.**
- a. True
 - b.* False
- 1.33 Which Energy Institute HM document contains guidelines on Calculation of Oil Quantities?**
- a. HM10 – HM20
 - b. HM28
 - c. This topic is not covered by the EI HM documents
 - d.* HM1

1.34 What table should be used to convert barrels at 60 °F to cubic metres at 15 °C?

- a. Table 11
- b.* Table 52
- c. Table 6A
- d. Table 13

1.35 Who decides whether to apply a line displacement differential to a shore figure?

- a. Terminal procedures
- b. Inspection company personnel
- c. The Buyer and Seller
- d.* Either a. or c. can decide

SECTION 2 - DEFINITIONS

2.01 What does the API Gravity scale indicate?

- a.* Relative Density
- b. Volume
- c. Thickness
- d. Ratio of weight to density

2.02 What is a hydrometer?

- a. A device to measure viscosity
- b. A device to measure hydration
- c.* A device to measure density
- d. A device to measure water flow

2.03 What is ballast?

- a. Water in the tanks of a vessel used for laundry and other sanitation purposes
- b. Any water on board a vessel in any tank
- c. Water that is used to clean cargo tanks
- d.* Water that allows the vessel to maintain stability and to control stress and trim

2.04 What is a permanent ballast tank?

- a. A tank that permanently contains ballast at all times
- b.* A tank that is designated to contain only ballast
- c. A tank that is used only to maintain a permanent list condition
- d. Answers a., b. and c. are all wrong

2.05 What does the abbreviation S&W stand for?

- a. Sand and Water
- b. Sediment and Waste
- c. Scale and Water
- d.* Sediment and Water

2.06 Which of the following are equivalent to a volume of one cubic metre?

- a. 264.172 US gallons
- b. 6.28981 US Barrels
- c. 1000 litres
- d.* Answers a., b. and c. are all correct

2.07 What is a Bill of Lading?

- a. A receipt for the cargo
- b. Evidence of the contract
- c. A document confirming ownership of cargo
- d.* Answers a., b. and c. are all correct

2.08 What is clingage?

- a. The wedge shaped volume of oil remaining in a tank after discharge
- b. The non-liquid wedge-shaped volume of oil remaining in a tank after discharge
- c.* The cargo that adheres to the internal vertical surfaces of a tank after it has been emptied.
- d. The ability of a liquid to cling to the inside surface of a container

2.09 What is a datum plate?

- a.* A level metal plate located directly under the reference gauge point to provide a fixed contact surface from which liquid depth measurement can be made.
- b. A metal plate located next to the gauging point on a tank indicating the reference gauge height.
- c. A metal plate located close to the gauging point on a tank listing all the relevant tank data
- d. A level metal plate located at the top of a gauge hatch on a tank from which the gauge height is measured.

2.10 What is deadwood?

- a. Wooden cup-case thermometer cases that are no longer fit for use
- b. Any piece of gauging equipment made of wood (i.e. wooden handles of gauge tapes, cup-case thermometer cases) that have been exposed to chemicals and have been damaged as a result
- c.* Any tank fitting or structural member inside a tank that affects the capacity of the tank
- d. Answers a., b. and c. are all wrong

2.11 What is the formula for density?

- a. Length divided by width
- b. Volume divided by temperature
- c.* Mass divided by volume
- d. Mass divided by relative density

2.12 The density of a liquid will change as its temperature changes.

- a.* True
- b. False

2.13 What is relative density?

- a.* The ratio of the mass of a given volume of liquid at a stated temperature to the mass of an equal volume of pure water at a stated temperature
- b. The relative ability of a liquid to remain in a liquid state when cooled below standard freeze point
- c. A measure of the relative viscosity of a liquid
- d. The ratio of a given mass of a liquid when compared with its mass at 60 °F

2.14 What is an emulsion?

- a. A heavy viscous liquid
- b. A heavy viscous liquid containing a large amount of entrained sediment
- c.* An oil & water mixture that does not readily separate
- d. A layer of free water located above a heavy viscous petroleum product

2.15 What is Flash Point?

- a. The minimum temperature to which a liquid must be heated for the vapours released to ignite and for the flame to propagate
- b.* The minimum temperature at which a liquid will release sufficient vapour to be ignited by the presence of an ignition source and for the flame to propagate across the liquid surface
- c. The point at which a liquid will vapourise when subject to heating
- d. The point at which a liquid will vapourise when subject to a change in ambient pressure

2.16 Reproducibility is best described as:

- a. The difference between successive test results obtained by the same operator, with the same apparatus, on nominally identical test material using the same test method
- b. The difference between successive test results, obtained by different operators, on nominally identical test material using the same test method
- c. The difference between two single results, obtained by the same operator, using the same test method and nominally identical test material
- d.* The difference between two single and independent results obtained by different operators, working in different laboratories, on nominally identical test material using the same test method

2.17 What is Total Observed Volume (TOV)?

- a.* The total measured volume of all petroleum liquids, sediment and water, and free water at observed temperature
- b. The total measured volume of all petroleum liquids, sediment and water but excluding free water, at observed temperature
- c. The total volume of all petroleum liquids and sediment and water, corrected to a standard temperature by the appropriate volume correction factor for the observed temperature and density
- d. The total measured volume of all petroleum liquids excluding water and sediment, at observed temperature

2.18 What is Gross Observed Volume (GOV)?

- a. The total measured volume of all petroleum liquids, sediment and water, and free water at observed temperature
- b.* The total volume of all petroleum liquids and sediment and water, excluding free water, at observed temperature
- c. The total volume of all petroleum liquids excluding sediment and water and free water, at observed temperature
- d. The total volume of all petroleum liquids and sediment and water, excluding free water, corrected to a standard temperature by the appropriate volume correction factor for the observed temperature and density

2.19 What is Gross Standard Volume (GSV)?

- a. The total volume of all petroleum liquids excluding free water, water and sediment, corrected to a standard temperature by the appropriate volume correction factor for the observed temperature and density
- b. The total volume of all petroleum liquids including free water, water and sediment, corrected to a standard temperature by the appropriate volume correction factor for the observed temperature and density
- c.* The total volume of all petroleum liquids and sediment and water, excluding free water, corrected to a standard temperature by the appropriate volume correction factor for the observed temperature and density
- d. The total volume of all petroleum liquids including free water but excluding sediment and water, corrected to a standard temperature by the appropriate volume correction factor for the observed temperature and density

2.20 What is Net Standard Volume (NSV)?

- a.* The total volume of all petroleum liquids, excluding sediment and water and free water, corrected to a standard temperature by the appropriate volume correction factor for the observed temperature and density
- b. The total volume of all petroleum liquids, excluding sediment and water, but including free water, corrected to a standard temperature by the appropriate volume correction factor for the observed temperature and density
- c. The total volume of all petroleum liquids and free water, excluding sediment and water, corrected to a standard temperature by the appropriate volume correction factor for the observed temperature and density
- d. The total volume of all petroleum liquids and sediment and water and free water, corrected to a standard temperature by the appropriate volume correction factor for the observed temperature and density

2.21 What is Total Calculated Volume (TCV)?

- a.* GSV plus free water
- b. NSV plus free water
- c. GSV less sediment and water
- d. NSV plus sediment and water

2.22 How is an all levels sample obtained?

- a. By submerging an unstoppered sample can or bottle to a point near the tank draw-off outlet (suction) level and then raising it, all at a uniform rate, so that it is no more than 80% full on emerging from the liquid.
- b. By Blending upper, middle and lower samples from the same tank.
- c.* By submerging a stoppered sample can or bottle to a point as near as possible to the draw-off outlet (suction) level, then opening the container and raising it at a rate such that it is no more than 80% full as it emerges from the liquid.
- d. By submerging a stoppered sample can or bottle to the mid point of the product in a tank, then opening the sampler and raising and lowering it at a uniform rate until the sampler is full.

2.23 How is a running sample obtained?

- a.* by lowering an unstoppered sample can or bottle from the top of the oil to the level of the outlet (Suction) and returning it to the top of the oil at a uniform rate so that the sample can or bottle is about 80% full when withdrawn from the oil.
- b. by lowering a stoppered sample can or bottle to the level of the outlet, then opening the sampler and raising it at a uniform rate so that it is about 80% full when withdrawn from the oil.
- c. by lowering a stoppered sample can to the mid point of the tank contents, then opening the sampler and raising and lowering it at a uniform rate until it is full
- d. by lowering an unstoppered sample can or bottle to the mid point of the tank contents, then raising and lowering it at a uniform rate until it is full

2.24 What is a floating roof tank?

- a. A tank that floats on its roof
- b.* A tank in which the roof floats freely on the surface of the liquid contents except at low levels when the weight of the roof is supported by its legs.
- c. A tank in which the roof, supported by guide wires, can be adjusted to the required height for safe filling of the tank.
- d. Answers a., b. and c. are all wrong.

2.25 What is the total volume of all material in a tank at the observed temperature called?

- a. Total Calculated Volume (TCV)
- b.* Total Observed Volume (TOV)
- c. On Board Quantity (OBQ)
- d. Gross Observed Volume (GOV)

2.26 What is the volume of all material in a tank at the observed temperature less the free water called?

- a. Total Observed Volume (TOV)
- b. Gross Standard Volume (GSV)
- c.* Gross Observed Volume (GOV)
- d. Remaining On Board (ROB)

2.27 What is the volume of all material in a tank, less the free water, called, when corrected by the volume correction factor?

- a.* Gross Standard Volume (GSV)
- b. Gross Observed Volume (GOV)
- c. Total Calculated Volume (TCV)
- d. Net Standard Volume (NSV)

2.28 The Net Standard Volume (NSV) is the Gross Standard Volume (GSV) less?

- a. Total Calculated Volume (TCV)
- b. Total Observed Volume (TOV)
- c. Gross Standard Volume (GSV)
- d.* Sediment and Water (S&W)

2.29 What is the Reference Gauge Height of a tank?

- a. The distance from the tank top to the tank bottom
- b. The distance from the ullage hatch to the datum plate
- c.* The distance from reference gauge point to the tank bottom or datum plate
- d. The distance from tank bottom to the ullage hatch

2.30 What term describes a vessel with the forward draft greater than the aft draft?

- a. Down by the stern
- b.* Trimmed by the head
- c. Up at the bow
- d. Listing dangerously

2.31 What does an innage, sounding or dip measure?

- a. The depth of the empty space above the liquid in a tank
- b. The depth of the sediment in a tank
- c. The length of an innage tape
- d.* The depth of the liquid in a tank

2.32 What does an ullage gauge measure?

- a.* The depth of the empty space above the liquid in a tank
- b. The height of the free water in a tank
- c. The length of an ullage tape
- d. The depth of the liquid in a tank

2.33 What is the term for the amount to be paid by the Charterer if a vessel is delayed beyond the terms allowed in the Charter Party?

- a. Dispatch money
- b.* Demurrage
- c. Disbursement
- d. Penalty money

2.34 What is the name of the document which is given as an official receipt for the cargo on board a vessel?

- a. Certificate of Quality
- b. Custom declaration
- c.* Bill of Lading
- d. Charter party

- 2.35 What is the name given to the factor calculated from the ratios of historical Total Calculated Volumes (TCV) of a vessel (less OBQ/ROB) with the corresponding historical Total Calculated Volumes (TCV) of shore delivered/received volumes?**
- a. Voyage Analysis Factor
 - b. Tank Correction Factor
 - c.* Vessel Experience Factor
 - d. Ullage Correction Factor
- 2.36 What is the name given to the mixture of oil, tank washings, water and sediment collected in a designated ship's tank?**
- a. Polluted oil
 - b. Merchantable oil
 - c.* Slops
 - d. Hazardous waste
- 2.37 What is the Total Observed Volume (TOV) defined as?**
- a. The volume read from the strapping table
 - b.* The total measured volume of all petroleum liquids, sediment and water, and free water at observed temperature and pressure
 - c. The volume read from the strapping table corrected for roof displacement
 - d. The volume used to calculate a Vessel Experience Factor (VEF)
- 2.38 How is Gross Observed Volume (GOV) is defined?**
- a. The volume read from the strapping table
 - b.* The total volume of all petroleum liquids and sediment and water, excluding free water, at observed temperature and pressure
 - c. The volume read from the strapping table corrected for roof displacement
 - d. The volume used to calculate vessel ratios

2.39 How is 'draft' defined?

- a.* The distance from the surface of the water to the keel of the ship
- b. The distance from the deck of the ship to the surface of the water
- c. The distance from the Plimsoll mark to the bottom of the ship
- d. The distance from the Plimsoll mark to the deck

2.40 How is 'trim' defined?

- a. The same as the draft
- b.* The difference between the forward and aft draft
- c. The average of the forward draft, the amidships draft, and the aft draft
- d. The leaning of the vessel to one side

2.41 How is 'list' defined?

- a. The difference between the starboard draft and the port freeboard
- b.* The leaning or inclination of a vessel expressed in degrees to port or starboard
- c. The average of the starboard draft and the port draft expressed in degrees port or starboard
- d. The difference between the forward and aft draft

2.42 How is 'free water' defined?

- a.* The layer of water present in the tank that is not suspended in the oil
- b. Any water found on the bob with water paste
- c. Any water found using the tank gauging equipment
- d. Any water that is trim corrected

2.43 What has the same meaning as the term 'innage'?

- a. Ullage
- b.* Sounding
- c. Outage
- d. Answers a., b. and c. are all wrong

2.44 What is 'load on top'?

- a. The shipboard practice of collecting water and water and oil mixtures resulting from ballasting and tank cleaning operations (usually in a slop tank) and subsequently loading cargo on top of it and pumping the mixture ashore at the discharge port.
- b. The act of commingling existing onboard quantity with cargo being loaded
- c.* Answers a. and b. are correct
- d. Answers a., b. and c. are all wrong

2.45 What is a 'wall wash test'?

- a.* The activity of rinsing the wall of a tank with a solvent and obtaining a sample of the previous product(s) to determine compatibility with the product to be loaded.
- b. The activity of rinsing a tank with clean, fresh water following tank cleaning to ensure that the product to be loaded will not be contaminated.
- c. The activity of washing the walls of a tank to remove all traces of the product previously contained in the tank
- d. Answers a., b. and c. are all wrong

SECTION 3 - LOSS CONTROL

3.01 Which API MPMS chapter provides guidelines for identifying the source of free water?

- a. Chapter 8.3
- b. Chapter 15
- c. Chapter 17.2A
- d.* Chapter 17.3

3.02 For the purposes of voyage analysis, what is a 'simple voyage'?

- a.* A voyage from one load port to one discharge port with one cargo
- b. A voyage from one load port to one discharge port with any number of cargoes
- c. A voyage where all measurements were taken with automatic equipment only
- d. A voyage that relied on carefully proved meters at both the load port and the discharge port

3.03 A volumetric loss is usually determined by comparing the discharge port outturn quantity to the load port Bill of Lading quantity. On a crude oil cargo, which volume is compared?

- a.* TCV (Total Calculated Volume)
- b. TOV (Total Observed Volume)
- c. GOV (Gross Observed Volume)
- d. Answers a., b. and c. are all wrong

3.04 After deducting the OBQ or ROB, which volume is used to calculate a vessel experience factor (VEF)?

- a.* TCV (Total Calculated Volume)
- b. TOV (Total Observed Volume)
- c. GSV (Gross Standard Volume)
- d. GOV (Gross Observed Volume)

3.05 What is the primary function of a Voyage Analysis Report (VAR)?

- a. Providing a method for adjusting vessel figures for the Vessel Experience Factor (VEF)
- b.* Systematically placing all data required for voyage analysis on one page
- c. Convincing shippers that the Bill of Lading is overstated
- d. Convincing receivers that there was a problem in the terminal that caused part of the cargo to be incorrectly measured

3.06 Which of the following steps is not included in the basic voyage analysis process?

- a. Comparing Bill of Lading figures to outturn figures
- b. Comparing vessel sailing figures to vessel arrival figures
- c. Comparing ROB to OBQ
- d.* Comparing line fill at load port to line fill at discharge port

3.07 For what purpose is a Letter of Protest issued to a terminal or vessel?

- a. To inform them that you did not think they ran their operation correctly
- b. To allow the terminal or vessel to respond to a complaint
- c.* To formally note that a situation has occurred which may require intervention from the client(s)
- d. To give the terminal and vessel time to improve their operations before the next cargo movement

3.08 The difference between shore quantity and vessel quantity corrected by the VEF can indicate the likelihood of an inaccurate shore or vessel quantity.

- a.* True
- b. False

- 3.09 What will a comparison of a vessel's departure Total Calculated Volume (TCV) and its arrival Total Calculated Volume (TCV) give an indication of?**
- a. Discharge performance
 - b. VEF accuracy
 - c.* Transit cargo variation
 - d. Condition of dirty ballast
- 3.10 Volumetric shrinkage occurs when crude oils of different densities are mixed. Which API MPMS chapter covers the subject of volumetric shrinkage?**
- a. Chapter 9.3
 - b. Chapter 12.1
 - c. Chapter 12.2
 - d.* Chapter 12.3
- 3.11 A shore pipeline is partially full before discharge and completely full after discharge. What will this result in?**
- a. An apparent gain of product as measured in the shore tank
 - b.* An apparent loss of product as measured in the shore tank
 - c. A apparent loss of product as measured on the vessel
 - d. It will have no impact on the outturn
- 3.12 Volumetric shrinkage is least when there is a large density difference between the two crude oils that are mixed.**
- a. True
 - b.* False
- 3.13 Which factors contribute to high evaporative losses?**
- a. High vapour pressure of the cargo
 - b. Excessive agitation of cargo during voyage
 - c. Gauge hatches left open
 - d.* Answers a., b. and c. are all correct
- 3.14 Metered quantities are always more accurate than those obtained from static shore tank measurements.**
- a. True
 - b.* False

3.15 Whether a shoreline is full, partly full or empty can affect accurate measurement of transferred volumes. Which documents provide guidelines for determining the fullness of pipelines between vessels and shore tanks?

- a.* ISO 11563 / API MPMS Chapter 17.6
- b. EI HM21
- c. EI HM28
- d. ISO 3171 / API MPMS Chapter 8.2

3.16 What is a 'transit' difference?

- a.* The difference between the vessel-measured volume at the load port and the vessel-measured volume at the discharge port
- b. The difference between the vessel-measured volume at the load port and the shore-measured volume at the load port
- c. The difference between the vessel-measured volume at the load port and the shore-measured volume at the discharge port
- d. The difference between the shore line agreed tolerance at the load port and the shore line agreed tolerance at the discharge port

SECTION 4 - MARINE MEASUREMENT

4.01 If the vessel incurs a transit loss of product and a transit gain in water, what should you do?

- a. Obtain samples of the free water
- b. Check the vessel's bunkers and bunker consumption during the voyage
- c. Verify the condition of seals on the sea suction and overboard discharge valves
- d.* Answers a., b. and c. are all correct

4.02 If the vessel has independently certified wedge tables, they may be used instead of calculating the wedge volume yourself.

- a.* True
- b. False

4.03 According to published standards is it permissible to apply the wedge formula to non-liquid ROB or OBQ?

- a. Yes
- b. No
- c.* Yes, but only if the trim of the vessel was confirmed by the Inspector at the time the material solidified
- d. Yes, but only if a sample can be obtained

4.04 If a vessel is on even keel and product in a tank is touching all four bulkheads, should you use the wedge formula to calculate the volume?

- a. Yes
- b.* No

4.05 Can a free water volume be calculated using a wedge formula, if the water does not touch the forward bulkhead.

- a.* Yes
- b. No

4.06 The preferred device for taking temperatures in a marine custody transfer is?

- a. A mercury-in-glass thermometer in a cup-case assembly
- b. An in-line temperature probe
- c. An on-board radar system
- d.* A portable electronic thermometer

4.07 What is the first thing you must do when you board a marine vessel?

- a.* Report to the person in charge
- b. Have the tanks open, ready to gauge and sample
- c. Always take samples first
- d. Always take gauges first

4.08 The vessel's master states that he will load 15,000 MT of a product. Your instructions state that a maximum of 13,000 MT should be loaded. What will be your course of action?

- a. Assume the vessel's master has more up to date information
- b.* Contact your principal for instructions.
- c. Help to calculate the stop gauge to be certain the ship is not overloaded.
- d. Leave the decision to the terminal.

4.09 EI HM28 states that the preferred method for taking cargo measurements on board ships is?

- a. By automatic gauging systems as long as the sensor is mounted at the center of each cargo tank/compartment
- b. Only with electronic gauging tapes (portable measurement units/PMU's)
- c. By an independent inspector
- d.* Using manual measurement methods whenever possible

4.10 When you are on board a marine vessel, the overall responsibility for the use of proper safety procedures, appropriate measurement equipment and the correct sampling equipment rests with?

- a.* The inspector
- b. The inspection company that the inspector works for
- c. The vessel
- d. The inspection company's principal

- 4.11 The term 'simultaneous ballasting or deballasting' means?**
- a. The vessel is transferring ballast from one ballast tank to another
 - b. The vessel is taking on or pumping off ballast in more than one tank at a time
 - c.* The vessel is transferring ballast while cargo is being pumped
 - d. The Chief Officer has been authorized to pump ballast ashore
- 4.12 Once sea valves are sealed by an independent inspector, the vessel staff may not operate those valves during custody transfer for any reason without consulting with the inspector.**
- a. True
 - b.* False
- 4.13 Why is measurement of free water on board marine vessels important?**
- a. To enable net cargo reconciliation
 - b. As a check against water quantities received at the shore terminal
 - c. As an indication of possible cargo theft
 - d.* Answers a., b. and c. are all correct
- 4.14 What does EI HM 28 deal with?**
- a. Line displacements
 - b. LPG sampling
 - c.* Crude oil cargo measurements
 - d. Answers a., b. and c. are all wrong
- 4.15 When you board a vessel, what is the first thing you do?**
- a. Start sampling
 - b. Check to see if the inert gas system is on
 - c.* Report to the person in charge on the vessel
 - d. Start taking temperatures

4.16 What is the purpose of ballast?

- a. To keep the cargo warm
- b. To segregate cargoes
- c. To reduce the ship's fuel consumption
- d.* To maintaining the vessel's stability, trim, and to control vessel stress

4.17 When should a bunker inspection be performed?

- a. Only with fuel oil cargoes
- b. With every product except gasoline
- c. When requested by the vessel
- d.* As appropriate or on the request of the principal

4.18 It is important when measuring ROB and OBQ to remember that?

- a. Liquid material is usually ullaged.
- b. Non-liquid material must be innaged.
- c.* Vessel trim can have an effect
- d. Answers a., b. and c. are all correct

4.19 When is an OBQ inspection performed?

- a. Before loading a clean product
- b.* Before any cargo is loaded
- c. Before any chemical is loaded
- d. Before loading a clean product after a dirty one

4.20 You have determined that ROB material is non-liquid, but you were only able to measure it from one gauge point. In order to calculate the volume of ROB, you should assume that it is lying evenly across the bottom of the tank.

- a.* True
- b. False

4.21 Why may multipoint gauging be required when performing an OBQ/ROB survey?

- a. To help determine if a wedge condition exists
- b. To help determine the nature (liquid or non-liquid) and quantity of the OBQ/ROB
- c. Because the vessel is on even keel.
- d.* Answers a. and b. are correct

- 4.22 If the ROB is non-liquid in nature what is the preferred measurement method?**
- a. A single innage/dip
 - b.* An average of multiple innages
 - c. By ullage
 - d. Using trim corrections
- 4.23 If a series of innage measurements indicates that the ROB/OBQ lies evenly across the bottom, how should you determine the volume?**
- a. By use of trim corrections
 - b. By applying the wedge formula
 - c.* By using an average of the innage measurements.
 - d. By using the innage at the official gauge point
- 4.24 Is it correct to apply a wedge calculation to an OBQ/ROB volume if the material is touching all four tank bulkheads ?**
- a.* No
 - b. Yes
- 4.25 If you are only able to gauge the vessel's tanks from one location and the ROB is non-liquid, what should you use to obtain a volume?**
- a. A wedge table or formula
 - b. A trim corrected innage
 - c.* An uncorrected innage
 - d. A trim corrected ullage
- 4.26 The On Board Quantity (OBQ) measured at a loading port will usually be greater than the remaining on board (ROB) measured at the previous discharge port.**
- a.* True
 - b. False
- 4.27 In what case will non-liquid ROB be considered not to be evenly distributed across the tank bottom?**
- a. When the vessel is listing
 - b. When the cargo was heated
 - c.* When multiple gauges in the tank prove otherwise
 - d. When ROB is more than 10cm deep

4.28 What components may be included in OBQ?

- a. Free water
- b. A layer of non-liquid material
- c. Liquid material
- d.* Any combination of the above

4.29 What is cargo that adheres to the vertical bulkheads of a tank called?

- a. Slops
- b.* Clingage
- c. Coatage
- d. Klingons

4.30 What is the amount of material found in a tank prior to loading called?

- a. Slops
- b.* On Board Quantity (OBQ)
- c. Bunkers
- d. Remaining On Board (ROB)

4.31 What is the amount of material found in a tank after discharge called?

- a. Slops
- b. On Board Quantity (OBQ)
- c. Bunkers
- d.* Remaining On Board (ROB)

4.32 If you are instructed to take manual vessel measurements but the Captain refuses to allow this, what course of action should you take?

- a. Contact your principals immediately, via your supervisor if appropriate
- b. Issue a letter of protest to the vessel
- c. Comply with the Captain's instructions
- d.* Answers a., b. and c. are all correct

4.33 If possible, should you seal a vessel's cargo system sea-valves or any equivalent connection to the ballast system prior to loading?

- a. No
- b.* Yes

4.34 When portable electronic gauging equipment is used on board a marine vessel, which of the following considerations needs to be addressed?

- a. The equipment used must securely fit the vapour control valve.
- b. The vessel's tank capacity tables must have been adjusted to accommodate the vapour control valve location and reference height
- c. The equipment should be grounded
- d.* Answers a., b. and c. are all correct

4.35 If there is spotting of the water paste above the clear cut level what would you use to calculate the volume?

- a. The very top of the spotting
- b.* The clear cut but note the spotting volume in the remarks
- c. There is no mention of spotting in published standards
- d. Answers a., b. and c. are all wrong

4.36 If you are to gauge a vessel in a heavy swell the minimum number of dips per tank should be?

- a. One
- b. Until you get two identical readings
- c. Three and use the average
- d.* At least five, taken over the period of the motion, recorded and then averaged

4.37 If the vessel is at an exposed berth and rolling such that the cargo in the tank is moving more than 3 mm, the minimum number of gauges to be taken is?

- a. One
- b. Two
- c. Three
- d.* Five

4.38 In API MPMS Chapter 17.2 are there any guidelines for vessel inspection in adverse weather?

- a.* Yes
- b. No

4.39 API MPMS Chapter 17.4/ISO 8697 does not address the issue of pumpability.

- a.* True
- b. False

4.40 What term is used for the measurement of cargo through two or more openings in a tank?

- a. Repetitive motion gauging
- b. Duplicate gauging
- c.* Multi-point gauging
- d. Hatch survey

4.41 What is a Charter Party?

- a. A traditional event hosted by the owner of a vessel celebrating the vessel being hired
- b. A document specifying the dimensions of a vessel so it can get into the docks to load and unload its cargo
- c.* A document outlining the terms and conditions that will apply to the owner and the charterer while a vessel is on hire
- d. A statement of the demurrage to be charged to the charterer

4.42 What is the Reference Gauge Height of a vessel tank?

- a. The overall height of the expansion trunk, referred to in the drawings
- b.* The distance from the tank bottom to the reference gauge point as specified on the tank's capacity table
- c. The measured distance from the tank bottom to the reference gauge point
- d. The place inside the tank where automatic measurement floats are installed

4.43 As a minimum, how many liquid level measurements must be taken in a vessel's tanks when the vessel is in motion (rolling)?

- a. 2
- b. 3
- c. 4
- d.* 5

4.44 Is the holding of a key meeting prior to an inspection required to comply with Industry Standards

- a.* Yes
- b. No

4.45 According to EI HM28, is the petroleum inspector required to be present at a key meeting prior to an inspection?

- a.* Yes
- b. No

4.46 What is meant by the term ‘trimmed by the head’?

- a. The aft draft reading is greater than the forward draft reading.
- b.* The forward draft reading is greater than the aft draft reading.
- c. The ship has water in the forepeak tank.
- d. Trim corrections will always be added to the measured gauge

4.47 What is meant by the term ‘trimmed by the stern’?

- a.* The aft draft reading is greater than the forward draft reading
- b. The forward draft reading is greater than the aft draft reading.
- c. The ship has water in the aftpeak tank.
- d. Trim corrections will always be subtracted from the measured gauge.

4.48 When measuring cargo what is the main reason for taking draft readings on fully-loaded vessels at the loading port?

- a. To be used at the discharge port in case of a cargo variance
- b.* To enable calculation of trim or list corrections if needed
- c. To compare with draft readings at the discharge port
- d. To ensure adequate cargo drainage

4.49 What should trim corrections be applied to?

- a. Only the ROB quantity
- b. Only the OBQ quantity
- c. Any liquid material
- d.* Any liquid material that is touching all four tank bulkheads

4.50 What is the most accurate way of measuring a vessel's list?

- a. Ask the Chief Mate
- b. Reading the clinometer
- c.* By comparing the port and starboard amidships draft marks
- d. Observe the foremast while standing amidships

4.51 When a vessel is upright but not on an even keel, what should be used to correct tank dips?

- a. Volume correction tables or volume correction calculations
- b.* Trim correction tables or trim calculations
- c. Weight correction tables or weight correction calculations
- d. Draft correction tables or draft correction calculations

4.52 The trim of a vessel will have no effect on the detection of free water.

- a. True
- b.* False

4.53 In what circumstances will a wedge condition exist?

- a. If liquid covers the bottom of the tank.
- b.* If liquid does not touch all four bulkheads
- c. If liquid accumulates beneath the gauge hatch
- d. Answers a., b. and c. are all correct

4.54 When non-liquid material covers the whole bottom of a tank, trim corrections are applicable.

- a. True
- b.* False

4.55 Which of the following conditions must be present for trim corrections to apply?

- a.* Tank contents must touch all four bulkheads
- b. Tank contents must be non liquid
- c. Tank contents must not contact the forward bulkhead
- d. Answers a. and b. are correct

4.56 What is the definition of 'list'?

- a. A piece of paper showing the names of all on board personnel
- b.* The inclination or leaning of the vessel away from the upright
- c. The correction required when the vessel is not on even keel
- d. The position of the tank contents when the vessel is down by the head

4.57 When should a wedge formula calculation be used on a vessel trimmed by the stern?

- a.* When liquid material does not contact the forward bulkhead
- b. When solid material is gauged at a single gauge point
- c. When free water completely covers the tank bottom
- d. Answers a., b. and c. are all correct

4.58 Typically, four parties receive samples at the loading port when a marine tank vessel is loaded. Three of those parties are (1) the independent inspector, (2) the vessel for delivery to the discharging terminal, (3) The vessel for retain. Who is the fourth party?

- a. The cargo owner
- b. The vessel for retain
- c. The vessel's agent
- d.* The load port terminal

4.59 What is the preferred method for preparing composite samples from vessel tanks?

- a. On board as long as every cargo tank contains the same cargo
- b. On board, using equal volumes from each tank
- c.* In a laboratory, in proportion to the volume in each tank
- d. In a laboratory when S&W and API Gravity are the only tests needed

4.60 What is 'freeboard' on a vessel?

- a.* The distance from the waterline to the vessel's deck level
- b. The distance from the waterline to the vessel's keel
- c. The time when local Customs officials permit others to board the vessel
- d. The time of day that lay time begins according to the Charter Party

-
- 4.61 Using the Imperial system of measurement; what size are draft mark numbers?**
- a. 12 inches high
 - b. 9 inches high
 - c.* 6 inches high
 - d. 3 inches high
- 4.62 Using the Imperial system of measurement; how far apart are draft mark numbers?**
- a. 12 inches
 - b. 9 inches
 - c.* 6 inches
 - d. 3 inches
- 4.63 What information is determined from draft readings?**
- a. The depth of the vessel in the water
 - b. The trim and list of the vessel
 - c. The displacement weight of the vessel
 - d.* Answers a., b. and c. are all correct
- 4.64 When the metric system is used; what size are draft numbers?**
- a. 6 inches high
 - b. 6 centimetres high
 - c. 12 centimetres high
 - d.* 10 centimetres high
- 4.65 When taking a draft reading which is in metric units; what is the distance between each number?**
- a. 6 inches
 - b. 5 centimetres
 - c. 12 centimetres
 - d.* 10 centimetres
- 4.66 Which code includes references to pre-loading inspection of vessels' tanks?**
- a. EI HM2
 - b. ISO 3070
 - c.* EI HM28, HM29
 - d. Answers a., b. and c. are all wrong
-

4.67 What is a 'wall wash test'?

- a. A procedure involving high pressure automated washing of the walls of a tank to remove any cargo residue
- b.* The activity of rinsing the wall of a tank with a solvent and obtaining a sample of the previous product(s) to determine compatibility with the product to be loaded
- c. A procedure in which a tank is washed with caustic solution to remove surface build-up
- d. Answers a., b. and c. are all wrong

4.68 What is a 'wipe test'?

- a. The procedure of wiping sample containers to ensure they are clean before being submitted to the laboratory
- b.* The procedure of physically wiping a tanks' interior surface with absorbent white rags to test for possible contamination
- c. A specialized laboratory test for the presence of water, iron, polymers and emulsion
- d. Answers a., b. and c. are all wrong

4.69 What should the number of areas in a cargo tank to be wall washed be based upon?

- a. The last cargo
- b.* The tank capacity
- c. The amount of wall wash medium you have
- d. The age of the vessel

4.70 When carrying out a wall wash test of a vessel's cargo tank you note a number of discoloured areas on the tank surface. If the discoloured areas are less than 20% of the tanks surface area, can you sample (wall wash) these areas and include it in your tank sample?

- a.* Yes
- b. No

- 4.71 When carrying out a wall wash test of a vessel's cargo tank you note some discoloured areas, tank coating breaks and exposed sections on the tank surface. These areas exceed 20% of the tank surface area. What should you do?**
- a. Wall wash these areas and include the wall washings with those from the rest of the tank
 - b. Note these areas on your inspection report and refrain from wall washing them.
 - c.* Wall wash these areas and keep the wall washings from these areas in a separate bottle
 - d. Only wall wash the area that has no coating breakdown
- 4.72 Should a wall wash be performed on a wet tank surface?**
- a. Yes
 - b.* No
- 4.73 What must be determined at a pre-loading tank inspection key meeting between vessel's personnel, shore personnel and inspection personnel?**
- a. Tank number, tank capacity, intended cargo volume
 - b. The last three cargoes and method of tank cleaning
 - c. The contents of adjacent tanks
 - d.* Information a., b. and c. must all be determined
- 4.74 A 'deck level' inspection is the most effective form of tank inspection.**
- a. True
 - b.* False
- 4.75 During a tank entry inspection, which of the following is not correct?**
- a.* Since more than one person will be entering the tank, it is not necessary to have a standby person at the hatch
 - b. All pipelines should be drained and verified empty
 - c. The tank atmosphere should be tested for safe entry
 - d. All surface areas should be checked for possible contamination, tank coating condition and loose rust

- 4.76 When wall washing a tank, which of the following is correct?**
- a. Tank bottoms (floor) normally do not require wall washing
 - b. There are two wall wash methods, blotter and funnel
 - c. Each wall wash area should be at least 3 feet by 6 feet
 - d.* Answers a., b. and c. are all correct
- 4.77 It is not necessary to prepare a blank of the wall wash liquid if it is supplied by a certified Laboratory.**
- a. True
 - b.* False
- 4.78 Pre-loading tank inspection may be limited to gauging OBQ.**
- a.* True
 - b. False
- 4.79 Who is responsible for determining that cargo on a vessel is loaded only into tanks with surfaces or coatings compatible with the cargo?**
- a. The independent Inspector
 - b. The shipper of the cargo
 - c.* Vessel's personnel
 - d. Terminal personnel
- 4.80 Which of the following is most likely to require a tank-entry inspection?**
- a.* Petrochemicals
 - b. Jet fuel
 - c. Diesel fuel
 - d. Heavy fuel oil
- 4.81 Why should you never break blisters in a tank coating and never disturb piles of debris on a tank floor when performing a tank entry inspection?**
- a. The tank atmosphere may be adversely affected
 - b. The Inspector may come into contact with potentially dangerous, unknown material
 - c. It is the responsibility of vessels' personnel to remove debris and prepare the tank surface before the tank is loaded
 - d.* Answers a., b. and c. are all correct

4.82 When reading the draft marks on a barge or vessel, which part of the number indicates the actual zero point (start) of the number in question?

- a.* The lower edge of the number
- b. The upper edge of the number
- c. The mid point of the number

4.83 What should a sea valve be sealed to?

- a. The pump-man's wheel wrench
- b. An adjacent static object such as another valve or railing
- c.* The main body of the sea valve
- d. The nameplate on the valve wheel

4.84 According to Energy Institute HM28/HM29, what should happen as part of a shore inspection?

- a. The Terminal should tell the Inspector the condition of the line
- b.* A line fullness verification procedure should be requested to verify line condition
- c. Unless instructed otherwise, the Inspector should assume that the line is full before and after transfer of product
- d. Answers a., b. and c. are all correct

4.85 You are sent to inspect a vessel discharge under closed gauging conditions and find that the valve adapters on board are not compatible with your electronic gauging equipment. What should you do?

- a. Contact your principal for instructions
- b. Use the ship's gauging equipment
- c.* Use the ship's gauging equipment but only after verifying this against your equipment and recording the results
- d. Use a manual tape and open gauging

SECTION 5 - SAFETY

5.01 You are instructed to sample a tank of methyl tertiary butyl ether (MTBE) which is a new product for you. Where should your first source of information be?

- a. The International Safety Guide for Oil Tankers and Terminals (ISGOTT)
- b. The Petroleum Handbook
- c.* The Material Safety Data Sheet (MSDS) for that product
- d. Energy Institute HM6 / ISO 3170 / ISO 3171

5.02 Regardless of the product, and in accordance with IP475/ISO 3170, what is the maximum level to which sample containers must be filled?

- a. 50%
- b. 80%
- c.* 95%
- d. 100%

5.03 What is the minimum personal protective equipment required when sampling?

- a. Gloves, respirator, hard hat and SCBA
- b.* Gloves, eye protection, hard-hat, flame retardant overalls & safety shoes
- c. Gloves, face-shield and sun glasses
- d. Gloves, uniform and SCBA

5.04 When gauging a tank that is emitting vapours, where should you position yourself?

- a. It is not important
- b. Up-wind of the gauge hatch
- c. With the wind in your face
- d.* With the wind at your left or right side

5.05 When lifting anything heavy, which muscles should take most of the weight?

- a. Upper arm muscles
- b.* Leg muscles
- c. Back muscles
- d. Answers a., b. and c. are all correct, to distribute the load equally

5.06 When are inspectors permitted to operate valves on board vessels?

- a. When accompanied by an authorised person on board
- b. When no-one else is around to do it
- c. When the vessel staff are too busy to do it themselves
- d.* Inspectors must not operate vessel valves

5.07 Which of the following safety equipment is not required on every job?

- a. Filter-type respirator
- b.* SCBA
- c. Hard hat
- d. Long-sleeve, fire resistant clothing

5.08 What should be your first reaction to any injury accident?

- a.* Raise the alarm to call for help
- b. To protect the injured person, if possible without risk to yourself, from exposure to further injury
- c. To render First Aid
- d. To report immediately to the person's supervisor

5.09 The responsibility for an inspector complying with the safety regulations in any terminal belongs to?

- a. The terminal staff
- b. The terminal's safety officer
- c.* The inspector
- d. The inspector's manager

5.10 All portable electronic equipment must be _____ immediately before use?

- a. Checked
- b. Cleaned
- c. Calibrated
- d.* Earthed (grounded)

5.11 On the IATA/IMDG diamond-shaped warning symbol, what does the colour Red indicate?

- a. Reactivity hazard level
- b.* Fire hazard level
- c. Corrosive hazard level
- d. Health hazard (toxicity) level

5.12 What is a 'UN Number'?

- a. A communication and shipping number assigned to a product by the manufacturer
- b. A chemical formula number used to identify the product
- c.* A unique identifying number assigned to a product by the United Nations
- d. An identifying number used only by manufacturers to assign categories of chemicals for sale

5.13 On which of the following documents would you find a 'UN' Number?

- a.* A material safety data sheet (MSDS)
- b. A Bill of Lading
- c. A Certificate of Analysis
- d. A Chemical compatibility list

5.14 Which of the following is defined as a corrosive liquid?

- a. An acid solution
- b. A caustic solution
- c. Acid and caustic solutions are not corrosive
- d.* Acid and caustic solutions are both corrosive

5.15 Corrosive liquids will directly injure the body tissue on contact.

- a.* True
- b. False

5.16 A chemical has a strong odour. What does this indicate?

- a. That a hazard exists
- b. That the vapour concentration is low
- c. That the vapour concentration is high
- d.* Odour is an unreliable source of specific information regarding a chemical

5.17 A hard hat's most important feature, when worn, is the distance between the shell and the wearer's head.

- a.* True
- b. False

5.18 What does H₂S stand for?

- a. Water
- b. Hydrogen
- c.* Hydrogen sulfide
- d. Dihydrosodium

5.19 To find out if a material is hazardous, you must consult the MSDS.

- a.* True
- b. False

5.20 Before gauging a tank, how can static electricity can be discharged from your body?

- a. By using a tank gauge meter
- b.* By touching a grounded structure such as a tank railing, with bare hands
- c. By using natural fiber sampling cords
- d. By touching a grounded structure such as a tank railing, while wearing rubber gloves

5.21 When using a metal tape to gauge a tank, the tape should always stay in contact with the gauge hatch.

- a.* True
- b. False

5.22 While sampling a crude ship, a small fire breaks out in the pump-room. What action should you take?

- a. Grab a type C fire extinguisher and enter the pump room
- b. Close the hatch and call for the launch
- c. Continue sampling because the crew will take care of the fire
- d.* Immediately secure your area and report to a responsible ship's officer

5.23 As you enter a banded area to sample a fuel oil tank, you begin to feel dizzy. What action should you take?

- a.* Get out of the tank area immediately
- b. Take a deep breath and run for the tank ladder
- c. Lie down because there is more oxygen closer to the ground
- d. Immediately put on your respirator with organic cartridges

- 5.24 How can the opportunity for a build-up and/or discharge of static electricity be reduced?**
- a. By wearing rubber gloves
 - b. By not allowing your hands to slide on the hand rail
 - c.* By grounding yourself and your equipment before opening the gauge/sample hatch and during subsequent operations
 - d. By using stainless steel equipment
- 5.25 A portable electronic thermometer should always be grounded after the probe has been lowered into the liquid.**
- a. True
 - b.* False
- 5.26 What can help prevent a build-up and/or discharge of static electricity when sampling?**
- a. Use of a sampling cord made of synthetic fibre
 - b. Tying the end of the sampling cord to the railing of the tank
 - c.* Use of a sampling cord that contains no synthetic fibre
 - d. Holding the sample cord against the gauge hatch throughout the sampling operation
- 5.27 Why is it important to wear gloves while sampling?**
- a. So that the sample is not contaminated
 - b. To prevent your hands becoming dirty
 - c.* To prevent hazardous substances being absorbed through the skin
 - d. Answers a., b. and c. are all correct
- 5.28 What should you do to avoid the build-up and/or discharge of static electricity when using a portable electronic thermometer (PET)?**
- a. Hold on to the railing or other metal part of the tank while using the PET
 - b.* Attach the ground wire of the PET to the tank before opening the gauge hatch then slowly lower the probe assembly into the oil
 - c. Since the probe is plastic and does not conduct electricity, no static electricity can form
 - d. Either a., b. or c. is acceptable

5.29 What is the main component of inert gas?

- a. Carbon sulfide
- b. Carbon dioxide
- c.* Nitrogen
- d. Hydrogen

5.30 Why should pumping be suspended when first-in or first-foot samples are taken?

- a. To allow any gas to dissipate
- b.* To allow static electricity to dissipate
- c. So the vapours don't blow in your face
- d. To give time for analysis results

5.31 Shipping declaration forms are required whenever a hazardous material is transported on a public road or highway.

- a.* True
- b. False

5.32 In addition to the labelled outer container, what are the other main components of a hazardous materials package?

- a. The material being shipped, absorbent and inner container
- b. The inner container, absorbent and cushioning material
- c. The material being shipped and the shipping papers
- d.* The material being shipped, the inner container, absorbent & cushioning material

5.33 When hazardous materials are transported on a public road or highway which document(s) does legislation require you to carry in addition to shipping papers?

- a. An MSDS for each product
- b. Emergency response documents
- c. Either a. or b.
- d.* Both a. and b.

5.34 What are the minimum markings on the outside of a package containing hazardous materials?

- a. A hazard label
- b. A proper shipping name and the name of the shipper
- c. UN Number, proper shipping name and hazard label
- d.* UN Number, proper shipping name, hazard label, name of shipper and the name and address of the consignee

5.35 What does a material that falls into two hazard classifications require?

- a.* A label for both classifications
- b. A label for the most hazardous of the two materials
- c. No labels are required
- d. This type of material cannot be shipped by road

5.36 Which of the following can IATA/IMDG hazardous goods publications supply information on?

- a. Description, proper shipping name and hazard class
- b. UN Number and what labels, if any, are required
- c. Information on regulations, exemptions and maximum sample sizes
- d.* Answers a., b. and c. are all correct

5.37 What must you do in order to transport flammable liquids on a public highway?

- a. Fully label all samples
- b. Place the samples in approved UN performance package tested containers
- c. Consult a Material Safety Data Sheet and Emergency Response Guide for the product being transported
- d.* Answers a., b. and c. are all correct

5.38 What is the correct source of information about the hazards of any product being inspected?

- a. The inspector's supervisor
- b. A knowledgeable chemist
- c. The inspector's previous experience
- d.* Material Safety Data Sheets

5.39 What is the most informative source of information about the hazards of a product or chemical?

- a. The job sheet
- b. The Bill of Lading
- c.* The Material Safety Data Sheet
- d. The operations supervisor

5.40 What do the initials “MSDS” stand for?

- a. Material Storage and Distribution System
- b. Material Safety and Distribution Sheet
- c. Material Storage and Data System
- d.* Material Safety Data Sheet

5.41 Who can supply an MSDS?

- a. The manufacturer of the material
- b. The seller of the material
- c. The distributor of the material
- d.* Answers a., b. and c. are all correct

5.42 A MSDS will list what type of protective equipment is required when working with a particular material.

- a.* True
- b. False

5.43 When is a tank with an external floating roof considered to be a confined space?

- a.* When the roof is located anywhere under the top ring or course of the tank plates
- b. Only when the tank is empty
- c. Only when the roof is resting on its legs
- d. Answers a., b. and c. are all wrong

5.44 Which of the following are considered to be confined spaces?

- a. A cofferdam
- b. An external floating roof tank
- c. A ship's pump-room
- d.* Answers a., b. and c. are all correct

5.45 What is the safe oxygen content range in a confined space?

- a.* Between 19.5% and 21.0%
- b. Between 18.6% and 20%
- c. Between 19% and 25%
- d. Answers a., b. and c. are all wrong

5.46 Products have defined limits of combustion. These are?

- a. The Permissible Exposure Limit and the Threshold Limit Value
- b.* The Lower Explosive Limit, Upper Explosive Limit and the Flash Point
- c. The Flash Point and the Threshold Limit Value
- d. The Permissible Exposure Limit and the Lower Explosive Limit

5.47 What defines a confined space?

- a. It has limited means of access and exit
- b. It is not designed for continuous occupation
- c. It has limited natural ventilation
- d.* Answers a., b. and c. are all correct

5.48 Before entering a confined space, which of the following tests are required?

- a. Oxygen content
- b. Lower explosive limit
- c. Toxic vapour testing
- d.* Answers a., b. and c. are all correct

5.49 According to the 'International Safety Guide for Oil Tankers and Terminals' (ISGOTT), for a tank to be safe for entry, what should the reading on a combustible gas detector be?

- a. Less than 15%
- b. Less than 10%
- c.* Less than 1%
- d. Less than 0.5%

5.50 Which of the following are examples of a confined space?

- a. A cargo tank
- b. A grain silo
- c. A pump-room on a ship
- d.* Answers a., b. and c. are all correct

5.51 Someone must always stand watch at the entrance to the confined space while you are in it.

- a.* True
- b. False

5.52 What do the initials 'LEL' stand for?

- a. Low explosion location
- b. Low environmental levels
- c. Lower environmental level
- d.* Lower explosive limit

5.53 If the atmosphere in a cargo tank is stated to be 'below the LEL' what does this mean?

- a. There is not enough oxygen in the tank to support combustion
- b. There is too much hydrocarbon vapor in the tank to support combustion
- c. Answers a. and b. are correct
- d.* There is not enough hydrocarbon vapor in the tank to permit combustion.

5.54 What do the initials 'UEL' stand for?

- a. Upper environmental level
- b. Unknown environmental level
- c.* Upper explosive limit
- d. Unknown explosive levels

5.55 What does an explosimeter measure?

- a. The amount of oxygen in a space
- b. Whether a space is safe for entry
- c.* Whether or not there is an explosive atmosphere in a space
- d. The flash point of a gas mixture.

5.56 An explosimeter measuring LEL% is utilized to sample the atmosphere within a cargo tank and a reading of 15% is observed. What does the reading mean?

- a. The atmosphere in the tank contains 15% oxygen
- b.* The atmosphere in the tank is 15% of the lowest concentration of an explosive mixture of air and hydrocarbon vapours
- c. The atmosphere in the tank is 15% hydrocarbon vapours
- d. The atmosphere in the tank is a 15% mixture of air and hydrocarbon vapours

5.57 What does an oxygen meter measure?

- a. The percentage of oxygen below the LEL of a hydrocarbon/air mixture
- b. The amount of oxygen needed to make a confined space safe for entry
- c.* The percentage of oxygen contained in the atmosphere being sampled
- d. Answers a., b. and c. are all wrong

5.58 What is the normal percentage content of oxygen in the air?

- a. 15.1%
- b. 19.1%
- c.* 20.9%
- d. 25.9%

5.59 What is the current exposure limit for benzene within the EEC (8 hour time weighted average)?

- a. 10 ppm
- b. 3 ppm
- c. 5 ppm
- d.* 1 ppm

5.60 Benzene is a health hazard. Which of the following are likely to contain benzene?

- a. Crude Oil
- b. Gasoline
- c. Ethylbenzene
- d.* Answers a., b. and c. are all correct

5.61 How can benzene enter your body?

- a. By inhalation
- b. By absorption through the skin
- c. By Ingestion
- d.* Answers a., b. and c. are all correct

- 5.62 What is the minimum respirator recommended by IMO MSC/Circ 1095 for working in an environment where the benzene concentration is expected to be greater than the exposure limit?**
- a. Half mask respirator with an organic vapor cartridge for up to 10ppm
 - b. Full face respirator with an organic vapour cartridge for up to 50ppm
 - c.* Answers a. and b. are both correct
 - d. Half-mask respirator with an acid gas cartridge
- 5.63 When working with benzene, in addition to a respirator, what other personal protective equipment is required?**
- a. Safety glasses, hard hat and leather gloves
 - b. Long-sleeve coveralls and leather boots
 - c.* Rubber gloves, goggles, chemical protection suit and hard hat
 - d. Personal Protective Equipment is not mandated by safety legislation
- 5.64 Which of the following statements are correct, when working with benzene?**
- a. As a minimum, a full face or half mask cartridge respirator must be worn for closed or restricted system gauging and sampling
 - b. A self contained breathing apparatus must be used in all open tank situations
 - c. A self contained breathing apparatus must be used if the exposure is expected to exceed 50ppm
 - d.* Answers a., b. and c. are all correct
- 5.65 Workers who are regularly exposed to benzene should have a regular medical examination.**
- a.* True
 - b. False
- 5.66 What is the permissible exposure limit for benzene (8 hour time weighted average)?**
- a. 10 ppm
 - b. 3 ppm
 - c. 5 ppm
 - d.* 1 ppm

5.67 Can gasoline contain benzene?

- a.* Yes.
- b. No

5.68 What is the appearance and characteristic odour of benzene?

- a.* Clear colourless liquid with a sweet odour
- b. Clear colourless liquid with a sour odour
- c. Light brown liquid with no distinguishable odour
- d. Light brown liquid with a strong pungent odour

5.69 Workers who are regularly exposed to benzene should have a regular medical examination.

- a.* True
- b. False

5.70 What effects may chronic exposure (long term) to benzene result in?

- a. Loss of vision
- b.* Various blood disorders ranging from anemia to leukemia
- c. Impaired Disability Syndrome (IDS)
- d. Answers a., b. and c. are all correct

5.71 How heavy are benzene vapours?

- a. Lighter than air
- b.* Heavier than air
- c. Same as air
- d. Answers a., b. and c. are all wrong

5.72 Hydrogen sulfide may be present in all petroleum products, crude oil and many types of petrochemicals.

- a.* True
- b. False

5.73 What are the effects of acute exposure (short term) to benzene?

- a. Shortness of breath, irritability, headache, nausea, dizziness, intoxication
- b. Irritation of the eyes, nose and respiratory tract
- c. Convulsions and loss of consciousness
- d.* Answers a., b. and c. are all correct

- 5.74 Who or what should you consult if you need to know detailed safety or exposure information about benzene?**
- a. Your doctor or pharmacist
 - b. Your Safety Manual
 - c.* The Material Safety Data Sheet
 - d. The International Safety Guide for Oil Tankers and Terminals (ISGOTT)
- 5.75 What is the most hazardous component of crude oil?**
- a. The smell
 - b. Pour point
 - c. Toxicity
 - d.* Hydrogen sulfide
- 5.76 When working in an environment suspected of containing H₂S what is the only effective protection?**
- a. Full face respirator
 - b. Half mask respirator
 - c.* Self-contained breathing apparatus (SCBA)
 - d. Answers a., b. and c. are all correct
- 5.77 When working in an environment suspected of containing H₂S, personal monitors must show a level below (or provide an alarm at) what limit?**
- a.* 5 ppm
 - b. 1 ppm
 - c. 10 ppm
 - d. 0.1 ppm
- 5.78 Organic filter respirators are sufficiently effective in a hydrogen sulphide atmosphere to be used for escape purposes.**
- a. True
 - b.* False
- 5.79 Hydrogen sulfide is probably the most dangerous gas commonly encountered in the petroleum industry.**
- a.* True
 - b. False

5.80 What are the characteristics of hydrogen sulfide?

- a. It is a pale yellow gas with a sweetish taste and strong pungent odour
- b. It is a pale yellow gas with the odour of rotten eggs
- c.* It is a colourless gas with a sweetish taste and the odour of rotten eggs
- d. It is a colourless gas with little or no odour

5.81 What is the maximum permissible 8 hour TWA (time weighted average) exposure level of hydrogen sulfide?

- a.* 5 ppm
- b. 10 ppm
- c. 25 ppm
- d. 30 ppm

5.82 Which of the following exposure limits for H₂S (for use with respirators) are correct?

- a. 500 ppm maximum exposure when using a full face respirator
- b. 100 ppm maximum exposure when using a half-mask respirator
- c. A self contained breathing apparatus must be used if the exposure exceeds 500 ppm
- d.* Only a self contained breathing apparatus is permissible for any exposure above the permissible exposure limit

5.83 Refineries are not the only sources of industrial hydrogen sulfide (H₂S). Which of the following are other sources?

- a. Pulp Mills
- b. Any agricultural facility where decay of organic matter may occur
- c. Drilling Rigs
- d.* Answers a., b. and c. are all correct

- 5.84 What is the maximum permissible 8 hour TWA (time weighted average) exposure level of H₂S?**
- a.* 5 ppm
 - b. 10 ppm
 - c. 15 ppm
 - d. 50 ppm
- 5.85 What is the short term exposure limit (STEL) for hydrogen sulfide?**
- a. 15 ppm
 - b.* 10 ppm
 - c. 25 ppm
 - d. 50 ppm
- 5.86 Why is the sense of smell not reliable for detecting hydrogen sulfide?**
- a. It is difficult to detect by sense of smell
 - b. The level at which you can smell it is above the permissible exposure limit
 - c.* At 100 ppm a person's sense of smell is deadened within minutes, thereby giving that person a false sense of security
 - d. You might have a cold and be unable to breath through your nose
- 5.87 What type of respirator filter cartridges should you use for protection against hydrogen sulfide?**
- a. Acid Gas
 - b.* None. Only a self contained breathing apparatus is acceptable
 - c. Organic Vapour
 - d. Radionucleides, highly toxic dusts, mists and fumes
- 5.88 When working with sour crude or other known or suspected hydrogen sulfide contaminated material you must wear SCBA**
- a.* True
 - b. False

5.89 The Short Term Exposure Limit (STEL) defines exposure to a substance over how long?

- a. 30 minutes
- b. 60 minutes
- c.* 15 minutes
- d. 20 minutes

5.90 What is the principal limitation of a filter or cartridge respirator?

- a.* It does not supply oxygen
- b. The face piece tends to fog up
- c. The expense to replace the cartridges
- d. Keeping the face piece from sweating up

SECTION 6 - SAMPLING

- 6.01 Which industry documents describe the procedures for manual sampling of petroleum and petroleum products?**
- a. API MPMS Chapter 17.1 / EI HM28
 - b.* IP 475 / API MPMS Chapter 8.1 / ISO 3170
 - c. EI HM6 / API MPMS Chapter 8.2 / ISO 3171
 - d. API MPMS Chapter 17.2
- 6.02 Which of the following types of sample containers are always unsuitable for use in handling or storage of jet fuel?**
- a. Clear glass bottles
 - b. Amber glass bottles
 - c.* Plastic bottles
 - d. Epoxy lined metal cans
- 6.03 Which of the following products should be stored in amber bottles?**
- a.* Gasoline, Diesel, Jet A, Styrene
 - b. Fuel oil, Gasoil
 - c. Heavy aromatics
 - d. No. 6 F.O, Heavy Fuel Oil
- 6.04 Which of the following types of container closure devices should not be used with glass bottles?**
- a. Plastic screw caps
 - b.* Rubber stoppers
 - c. Metal screw caps
 - d. Cork stoppers
- 6.05 Which product requires particular care when selecting a sample container?**
- a. Gasoline
 - b. Fuel oil
 - c. Benzene
 - d.* Jet fuel

- 6.06 Which documents contain guidance for selecting sample containers?**
- a. API MPMS Chapter 8.1 / ISO 3170
 - b. IP 476 / API MPMS Chapter 8.2 / ISO 3171
 - c.* API MPMS Chapter 8.3
 - d. API MPMS Chapter 8.4
- 6.07 For which products is it recommended to rinse the container with the liquid to be sampled before drawing the sample?**
- a. Jet fuel samples
 - b. Petrochemical samples
 - c. Vapour pressure samples
 - d.* Answers a., b. and c. are all correct
- 6.08 Jet fuel should not be sampled with equipment that contains brass, copper or copper alloy.**
- a.* True
 - b. False
- 6.09 What equipment is preferred to lower a sample bottle to the required level?**
- a. Ullage tape
 - b.* Natural fibre cord or non-sparking chain marked to indicate when the correct level has been reached
 - c. Innage tape
 - d. Brass sampling cage
- 6.10 Which equipment is best for sampling free water in a crude oil tank?**
- a. Zone sampler
 - b.* Dead bottom sampler
 - c. Bottle and sample cage
 - d. Weighted bottle and cord
- 6.11 What type of equipment would you use to sample liquid in a 55-gallon drum?**
- a. A dead-bottom sampler
 - b. A bottle and cage.
 - c.* A sampling tube.
 - d. A dipper sampler.

6.12 Which of the following samples could be taken with a zone sampler?

- a. Bottom samples
- b. Free water samples
- c. Spot samples
- d.* Answers a., b. and c. are all correct

6.13 Why is a sampling cage and bottle generally better than a weighted sampling can for sampling volatile liquids?

- a. The equipment is easier to handle
- b. A can sample is probably less representative
- c.* Loss of light ends is likely when the sample is transferred from the can
- d. Sample bottles are readily available

6.14 What samples is a 'bacon-bomb' sampler is used to take?

- a.* Bottom (dead-bottom) samples
- b. Running samples
- c. LPG samples
- d. Answers a., b. and c. are all correct

6.15 When would you take a free water sample ?

- a. When requested by the customer.
- b. They are not necessary.
- c. Immediately after every loading, except chemicals.
- d.* Whenever there is a sufficient quantity to sample.

6.16 Why are free water samples important?

- a. To check for contaminated water under gasoline
- b.* To determine the likely source of the free water
- c. To determining the influence of free water on the API gravity of a crude oil cargo
- d. Answers a., b. and c. are all wrong

6.17 A representative sample is a portion extracted from the total volume that contains its constituents in the same proportions as those present in the total volume.

- a.* True
- b. False

- 6.18 Why do sampling standards recommend that a vapour space should be left at the top of each sample container?**
- a. To permit the surface of the liquid to be visible in the laboratory
 - b. To allow space to test the vapour content of the sample
 - c.* To allow space for safe expansion of the liquid
 - d. To avoid the loss of light components
- 6.19 What is the name of a sample obtained by lowering a stoppered container to the draw-off level of a tank, removing the stopper and withdrawing the container at a steady rate?**
- a. Spot sample
 - b. Running sample
 - c.* All-levels sample
 - d. Composite sample
- 6.20 What is the name of a sample obtained by lowering an unstoppered container to the draw-off level of a tank and withdrawing the container without stopping?**
- a. Multi-level sample
 - b.* Running sample
 - c. All-levels sample
 - d. Composite sample
- 6.21 Before sampling oil in a tank, it is necessary to locate the oil/water interface.**
- a.* True
 - b. False
- 6.22 Before sampling a clean product or petrochemical, the container should always be rinsed with the product when possible.**
- a.* True
 - b. False
- 6.23 Samples containers may be 100% full when the vapour pressure of the product sampled is less than 10 psi.**
- a. True
 - b.* False

6.24 After taking a spot sample of gasoline, it is permissible to immediately pour off some of the product to allow room in the container for expansion.

- a.* True
- b. False

6.25 How is an all-levels sample obtained?

- a. By submerging an unstoppered container at a uniform rate to a point near the tank draw-off level then raising it so that it is no more than 85% full on emerging from the liquid.
- b. By blending tank upper, middle and lower samples.
- c.* By submerging a stoppered container to a point as near as possible to the draw-off (suction) level, then opening the sampler and raising it at a rate such that it is about 80% full on emerging from the liquid.
- d. By submerging a stoppered container to the bottom of the product in a tank, then opening the sampler and raising it at a uniform rate until the container is full.

6.26 How is a running sample obtained?

- a.* By lowering an unstoppered container from the top of the oil to the level of the outlet and returning it to the top of the oil at a uniform rate so that the container is between 75-85% full when withdrawn from the oil.
- b. By lowering a stoppered container to the level of the outlet, then opening the sampler and raising it at a uniform rate so that it is 75-85% full when withdrawn from the oil.
- c. By lowering a stoppered beaker to the bottom of the tank contents, then opening the sampler and raising and lowering it at a uniform rate until it is full.
- d. By lowering an unstoppered beaker or bottle to the mid point of the tank contents, then raising and lowering it at a uniform rate until it is full.

- 6.27 When sampling heavy fuel oils or crude oil or petroleum products in a tank with non-liquid or sediment deposits on the bottom, why may manual samples not be representative?**
- a. Because the material may be non-homogeneous
 - b. Because the concentration of entrained water is higher near the bottom
 - c. Because the interface between the oil and water is difficult to measure accurately
 - d.* Answers a., b. and c. are all correct
- 6.28 During a marine custody transfer, which of following is the preferred sample to best represent the cargo transferred?**
- a. A composite of shore tank samples.
 - b. A shore tank sample after a transfer
 - c.* Automatic pipeline samples during the transfer
 - d. Vessel composite samples
- 6.29 After obtaining a tank running sample, the inspector notices that the sampling bottle is full on withdrawing it from the tank. What should the inspector do?**
- a. Pour some of the sample into a second container
 - b. Pour some of the sample out of the bottle
 - c.* Retake the sample to comply with the method
 - d. Answers a., b. or c. are all correct
- 6.30 A storage tank is manually gauged and found to contain 4.0 metres of product. How many spot samples as a minimum should be obtained from this tank?**
- a.* 2 (Upper and lower)
 - b. 3 (Upper, middle and lower)
 - c. 1 (Middle)
 - d. None
- 6.31 When you are instructed not to allow the sampling cord to fall on the deck, what is the main concern?**
- a. The chance of contamination
 - b. Making a mess that could cause a danger of slipping
 - c. Wearing out the cord
 - d.* Answers a. and b. are correct

6.32 Which of the following statements is correct?

- a. Closed and restricted sampling are essentially the same
- b. Restricted sampling equipment may allow small amounts of vapour to escape to atmosphere
- c. Closed sampling equipment is designed to prevent any escape of vapour to atmosphere
- d.* Answers b. and c. are correct

6.33 You are sampling a shore tank containing a product with an observed density of 1100 kg/m^3 , and the main concern is water. Where would the water most likely be?

- a. 15 cm off the bottom
- b. Stratified between the lower and middle levels
- c.* Floating on top of the cargo
- d. No water can be found in oils with a density greater than 1000 kg/m^3

6.34 Why is a running sample not acceptable if the container is brought up full?

- a.* There is no way to tell when the bottle filled up
- b. There would be too much oil to test the density
- c. There is a chance of contamination from the bottle cap
- d. As the bottle warms up, it could shatter

6.35 When is it permitted to prepare composites of individual tank samples on board a marine vessel?

- a.* Only when the mixture can be prepared in exact proportion to the volume of material in each tank
- b. When it would take less than a 20 litre can to make the composite
- c. When there is no chance of foreign debris falling in to it
- d. When it will not result in delays to the vessel

6.36 What laboratory test will most likely be affected by using a sampling cord that was first used in black oil then used in clean oil?

- a.* Colour
- b. Vapour pressure
- c. S and W
- d. Flash Point

- 6.37 Tanks that are sampled do not need to be gauged.**
- a. True
 - b.* False
- 6.38 When taking a sample of a jet fuel cargo it is recommended to**
- a.* Take an initial sample in a clear bottle to examine for colour and sediment.
 - b. Use only steel sampling cans
 - c. Use only a clean zone sampler
 - d. Sample just below the surface to avoid free water
- 6.39 What is the principal disadvantage of using a sampling can to sample a marine vessel?**
- a. They are too heavy to hoist up and down
 - b.* If one tank is contaminated, subsequent samples could also become contaminated
 - c. There is no cap that fits them
 - d. They are too expensive and might be lost in the tank
- 6.40 What is the principal reason for taking bottom (dead-bottom) samples in Heavy Fuel Oil?**
- a. To determine the gauge height
 - b. To obtain a sample for sulfur & viscosity determination
 - c.* To locate any free water not identified by water paste
 - d. Bottom samples should never be taken in Heavy Fuel Oil
- 6.41 When attempting to take a running sample, your sample bottle comes up full. What should you do?**
- a. Pour out 20% - 25% of the sample, then cap and label the sample
 - b. Cap and label sample then place it in an ice chest
 - c. Make a special notation on the sampling report
 - d.* Discard the sample and re-sample the tank so that the bottle is about 80% full

- 6.42 When taking a running sample of a clear product such as jet fuel or a water-white chemical what procedure should you follow?**
- a. Rinse the inside of the sample bottle with product prior to taking the sample
 - b. Take a sample in a clear bottle to visually check the colour before drawing the official sample in an epoxy lined can or PTFE container
 - c. Ensure that product running down the sample cord cannot contaminate the sample
 - d.* Answers a., b. and c. are all correct
- 6.43 Samples should not be taken from an unslotted or unperforated standpipe.**
- a.* True
 - b. False
- 6.44 When taking liquid samples for hydrogen sulphide testing in accordance with IP 570 what is the approximate level to which sample containers must be filled?**
- a. 50%
 - b. 80%
 - c.* 95%
 - d. 100%
- 6.45 What should you do before taking a tap or line sample?**
- a. Ground your equipment
 - b.* Flush the tap and sample line until they are purged
 - c. Call your supervisor
 - d. Answers a., b. and c. are all correct
- 6.46 During preliminary sampling of a shore tank that will be used to load a vessel, you should also obtain a tape or side gauge reading.**
- a.* True
 - b. False

6.47 Where may composite samples be prepared?

- a. Only in a laboratory
- b. On board a vessel if separate samples are taken to the laboratory for analysis
- c.* Preferably in a laboratory but also on board a vessel if conditions and equipment allow the sample to be composited in proportion to the volume of material in each compartment
- d. On board a vessel for crude oil cargos only

6.48 At what point is a bottom (dead-bottom) sample taken?

- a. 15 cm below the outlet
- b. 10 cm below the outlet
- c.* At the lowest point in the tank
- d. Immediately above the free water level

6.49 What is the name for a sample taken at a specific point in a tank or from a pipe at a specific time during a pumping operation?

- a. An official sample
- b. A tank-side sample
- c.* A spot sample
- d. A single-tank composite sample

6.50 What is the term for a blend of spot samples from different shore tanks, mixed proportionally for testing?

- a. A composite spot sample
- b. A borings sample
- c. A clearance sample
- d.* A multiple shore tank composite sample

6.51 At what point in the product is a top sample taken?

- a. Middle of the upper third of the liquid
- b. 15 cm above the tank outlet
- c. Middle of the lower third of the tank
- d.* 15 cm below the surface of the liquid

6.52 A bottom (dead bottom) sample may not always be taken at the very bottom of a tank. What is the correct procedure?

- a.* Always specify the location where the sample was taken, for example 'Approximately 15 cm' from the bottom
- b. Always take a bottom sample 5 cm off the actual bottom because that is where the neck of the bottle will rest when the bottle is on its side
- c. Always use a bacon-bomb sampler to draw bottom samples
- d. Always use a zone sampler to draw bottom samples

6.53 Where is a 'top' sample taken from?

- a. The surface of the liquid
- b.* 15 cm below the surface
- c. The mid-point of the upper third of the liquid
- d. Anywhere in the top portion of the tank

6.54 Where is a 'lower' sample is taken from?

- a. The bottom of the tank
- b. Just above the water level
- c.* The mid-point of the bottom third of the liquid
- d. Answers a., b. and c. are all correct

6.55 A storage tank was manually gauged and found to have a product innage of 12.000 m. The tank gauge height is 13.000 m. At what innage level should the lower spot sample be obtained?

- a. 150 mm from the tank bottom
- b. At the outlet (suction) level
- c.* 2.000 m from the tank bottom
- d. 4.000 m from the tank bottom

6.56 A storage tank was manually gauged and found to have a product innage of 11.500 m. The tank gauge height is 12.500 m. At what innage level should the middle product spot sample be obtained?

- a. 6.750 m from the tank bottom
- b.* 5.750 m from the tank bottom
- c. 6.250 m from the tank bottom
- d. 6.250 m below the surface of the product

- 6.57 A storage tank was manually gauged and found to have a product innage of 9.000 m. The tank gauge height is 12.000 m. At what innage level should the upper product spot sample be obtained?**
- a.* 7.500 m from the tank bottom
 - b. 2.000 m below the surface of the product
 - c. 11.850 m from the tank bottom
 - d. 150m below the surface of the product
- 6.58 Where is an 'upper' sample taken from?**
- a. The surface of the liquid
 - b. 150 mm below the surface of the liquid
 - c.* The mid-point of the upper third of the liquid
 - d. Anywhere in the top portion of the tank
- 6.59 Which of the following statements about upper, middle, and lower samples is correct?**
- a. They can be taken in any order.
 - b. They must be taken in the order lower, middle, upper.
 - c.* They must be taken in the order upper, middle, lower.
 - d. They are less reliable than an all-levels sample, no matter how they are taken
- 6.60 When upper-middle-lower samples are taken from a tank, from what point is the lower sample is taken?**
- a. 1/3 of the liquid height from the tank bottom
 - b. At the middle of the tank outlet fitting
 - c.* 1/6 of the liquid height from the tank bottom
 - d. 150 mm off the tank bottom
- 6.61 When drawing upper-middle-lower samples from any tank, which sample should be taken first?**
- a. Lower
 - b. Middle
 - c.* Upper
 - d. It doesn't matter

- 6.62 When upper-middle-lower samples are taken from a tank, what point is the upper sample taken from?**
- a. 1/3 of the liquid height from the tank bottom
 - b. At the middle of the tank outlet fitting
 - c.* At the middle of the upper third of the tank contents
 - d. 15 cm off the tank bottom
- 6.63 When drawing upper-middle-lower samples from any tank, which sample should be taken last?**
- a.* Lower
 - b. Middle
 - c. Upper
 - d. It doesn't matter
- 6.64 When drawing upper-middle-lower samples from any tank, which sample should be taken second?**
- a. Lower
 - b.* Middle
 - c. Upper
 - d. It doesn't matter
- 6.65 At what vertical location in the liquid is an upper sample taken?**
- a.* 1/6 of the liquid depth below the surface of the liquid
 - b. 25 mm below the surface of the liquid
 - c. 150 mm below the surface of the liquid
 - d. The middle of the lower third of the tank
- 6.66 Both free water and entrained water are found in the sample taken by an automatic in-line sampling system.**
- a.* True
 - b. False
- 6.67 Automatic samplers can be either time proportional or pressure proportional.**
- a. True
 - b.* False

- 6.68 Which of the following items are parts of an automatic sampling system?**
- a. Probe
 - b. Receiver
 - c. Controller
 - d.* Answers a., b. and c. are all correct
- 6.69 Before each use the sample receiver of an automatic sampling system must be inspected to ensure that it is clean and dry.**
- a.* True
 - b. False
- 6.70 Before being split up for testing, the product in the receiver of an automatic sampler must be allowed to settle.**
- a. True
 - b.* False
- 6.71 The controller on an automatic sampler is a device that governs the operation of the sample extractor.**
- a.* True
 - b. False
- 6.72 According to IP476/ISO 3171, sampling in a time proportional mode is acceptable if the flow rate variation is less than ± 10 percent of the average rate over the entire parcel.**
- a. True
 - b.* False
- 6.73 Both free water and entrained water are found in the sample taken by an automatic in-line sampling system.**
- a.* True
 - b. False
- 6.74 What should be used to take a sample that is to be tested for vapour pressure?**
- a. A zone sampler
 - b. A glass bottle with suitable cage or weight
 - c. A dedicated closed or restricted vapour pressure sampler
 - d.* Answers b. and c. are correct

- 6.75 When taking samples for vapour pressure testing, samples must not be composited.**
- a.* True
 - b. False
- 6.76 When drawing a running sample for vapour pressure, how full should the sample bottle be when withdrawn from the tank?**
- a. 50% full.
 - b.* 75% full.
 - c. 95% full.
 - d. 100% full
- 6.77 When/where should samples be labeled?**
- a. In the laboratory.
 - b.* Immediately after the sample is obtained.
 - c. Before transportation to the laboratory.
 - d. Immediately upon arrival in the laboratory.
- 6.78 Why is it important to label all of your samples as soon as possible?**
- a. National and/or local Government regulations require it.
 - b. An incorrectly labeled sample could generate a legal action
 - c. It is easy to label samples incorrectly if you do not label them promptly
 - d.* Answers a., b. and c. are all correct
- 6.79 When should a sample be labelled?**
- a. When you return to our office
 - b. After removing them from your sample transportation box.
 - c. Just before you leave the facility
 - d.* Immediately after it is obtained
- 6.80 When drawing gasoline/naphtha samples for vapour pressure testing which comment(s) apply to the sample containers?**
- a. They should be kept as cool as possible
 - b. They should be filled to approximately 75% level
 - c. They should be fitted with vapour tight lids
 - d.* Answers a., b. and c. are all correct

6.81 What is the most important feature of a container to be used for a sample of gasoline/naphtha for vapour pressure testing?

- a. It should be made of glass
- b. It should be made of plastic
- c. It should be made of metal
- d.* It should be fitted with a vapour-tight lid

6.82 How should samples of gasoline/naphtha which will require subsequent testing for vapour pressure be transported?

- a. Cooled
- b. Inverted so the liquid covers the inner lid surface
- c. Fitted with waterproof labels
- d.* Answers a., b. and c. are all correct

6.83 Why is a 'first foot' sample taken?

- a. To determine the quality of the product in the shore tank
- b. To confirm that the vessel's tanks are clean
- c. To confirm that the product in the shore pipeline meets the specification
- d.* As an indication that the cargo is has not been contaminated by residues from the ship's manifold or lines.

6.84 According to ISO 3171, what is the typical number of grabs suggested when using an automatic sampler for transfers lasting over 6 hours?

- a. 100,000
- b.* 10,000
- c. 1,000
- d. 100

SECTION 7 - TANK GAUGING

7.01 What is commonly meant by the term 'dip'?

- a. Ullage
- b.* Innage
- c. Free water measurement
- d. Swing gauge

7.02 What occurs when a shore tank is filled to a level in the 'critical zone'?

- a. The flexing bottom of a tank is at its highest point
- b. The tank will overflow if more liquid is added
- c. The floating roof is no longer resting on its legs
- d.* The floating roof is only partially afloat and the capacity table may be inaccurate

7.03 A 'tank capacity table' is also referred to as a 'tank strapping table'.

- a.* True
- b. False

7.04 What is a 'master tape'?

- a. The only tape that may be used to take custody transfer measurements
- b. A tape belonging to the National Certification Body
- c. A tape to be used only for tank calibration
- d.* A reference tape, traceable to National Standards, to be used only for verifying the accuracy of tapes used in the field

7.05 What does an innage/sounding measure?

- a. The distance from the surface of the liquid in the tank to the reference gauge point of the tank.
- b. The distance between the point where the floating roof of the tank is floating freely and the point where it is resting fully on its supports.
- c.* The level of liquid in a tank measured from the datum plate or tank bottom to the surface of the liquid.
- d. The distance from the tank datum plate or bottom to the tank reference gauge point.

7.06 What does an outage/ullage measure?

- a. The distance from the tank datum plate or bottom to the tank reference point.
- b.* The distance from the surface of a liquid in a tank to the reference gauge point of the tank.
- c. The amount of product transferred out from a tank.
- d. The level of liquid in a tank measured from the tank bottom to the surface of the liquid.

7.07 What is water indicating paste used for?

- a. To determine the S&W of the product in the tank
- b. To detect the presence of suspended water within the product in the tank
- c.* To indicate the product / free water interface within the tank
- d. Answers a., b. and c. are all wrong

7.08 An innage gauge bob is pointed to aid in penetration of tank non-liquid. Where is its zero point?

- a. Top of the eye
- b. Bottom of the eye
- c.* Tip of the bob
- d. Inside of the tape swivel

7.09 What is the observed gauge height of a tank?

- a.* The distance from the reference gauge point to the bottom of the tank or the datum plate as measured during the gauging operation
- b. The distance from the reference gauge point to the bottom of the tank or the datum plate as shown on the tank capacity tables
- c. The distance from the ullage pipe to the liquid level
- d. Usually written somewhere on the ullage pipe

7.10 What is innage or dip best described as?

- a.* The distance from the datum plate or the tank bottom to the surface of the product
- b. The measurement from the tank bottom to reference point
- c. The cut found on the bob
- d. The distance from the reference point to surface of the product

- 7.11 What is the distance between the point where the floating roof begins to rest on its normal supports and the point where it begins to float freely known as?**
- a. The floating level
 - b. The lower leg level
 - c.* The critical zone
 - d. The displacement level
- 7.12 On a shore tank, what is the term for the distance between the Reference Gauge Point and the Datum Point, as measured at the time of gauging?**
- a. Observed reference point
 - b. Reference gauge height
 - c. Total gauge height
 - d.* Observed gauge height
- 7.13 What is a tank datum plate?**
- a. The position on a tank where the gauge height is noted.
 - b. The point marked on the gauge hatch of a tank to indicate the position from which the tank is to be gauged.
 - c. The plate on the tank shell that lists the tank general data such as roof weight, height of tank, etc.
 - d.* A plate placed in the tank and directly under the reference gauge point to provide a fixed contact surface.
- 7.14 When rainwater or snow accumulates on the roof of an external floating roof tank, what will happen to the gauged level in the tank?**
- a. It will decrease
 - b. It will remain the same
 - c.* It will increase
 - d. Answers a., b. and c. are all wrong
- 7.15 An ullage gauge is the same thing as an outage gauge.**
- a.* True
 - b. False

- 7.16 According to common industry practice when must gauge tapes be verified for accuracy?**
- a.* Before initial use and once per year
 - b. Once per month
 - c. Before each use
 - d. Once every three months
- 7.17 Some measurement systems are gas-tight (closed) and others are only liquid-tight (restricted) permitting some vapour to escape around the Portable Measurement Unit (PMU) when tanks are under positive pressure.**
- a.* True
 - b. False
- 7.18 Which gauge measures the distance from the datum plate or tank bottom to the surface of the liquid?**
- a.* Innage
 - b. Ullage
- 7.19 Which gauge measures the distance from the surface of the liquid to the tank reference gauge point?**
- a. Innage or dip
 - b.* Ullage
- 7.20 What is the measured distance from the datum plate or tank bottom to the reference gauge point called?**
- a.* The observed gauge height
 - b. The innage gauge height
 - c. The reference gauge height
 - d. The ullage gauge height
- 7.21 What is the term for the distance from the datum plate or tank bottom to the reference gauge point, as shown on the tank capacity table?**
- a. Observed gauge height
 - b. Innage gauge height
 - c.* Reference gauge height
 - d. Ullage gauge height

- 7.22 To what precision should gauge tape readings be repeated?**
- a. The nearest 12mm
 - b. The nearest 6mm
 - c.* The nearest 3mm
 - d. The nearest 9mm
- 7.23 Which of the following can affect the accuracy of tank's capacity table?**
- a. The flexing of the tank bottom with the transfer of contents
 - b. Expansion at the vertical middle (barreling) occurring during filling
 - c. Accumulated deposits of previous contents on the tank shell
 - d.* Answers a., b. and c. are all correct
- 7.24 If a portable measurement unit (PMU) is used to measure free water, which of the following procedures should be followed?**
- a. Rely on the PMU alone for free water level measurement because that is the same instrument used to measure the oil level
 - b.* Apply water-finding paste to the bob of the PMU and compare the water level indicated by the paste to the water level indicated by the PMU
 - c. Rely on water-finding paste alone
 - d. Recommend to the terminal that the free water received and measured ashore be applied to the vessel figures
- 7.25 Which Energy Institute guideline describes the procedures for the manual gauging of petroleum or petroleum products in shore tanks and marine tank vessels?**
- a. HM28
 - b. HM29
 - c.* HM4
 - d. HM6
- 7.26 When gauging light products, it is permissible to use chalk or talcum powder to facilitate reading the cut on the tape.**
- a. True
 - b.* False

7.27 When using water indicating paste in light products, how long should the gauging bar be left in position?

- a. A minimum of 5 seconds
- b.* A minimum of 10 seconds
- c. A minimum of 30 seconds
- d. A minimum of 45 seconds

7.28 When using water indicating paste in heavy oils, which of the following actions should you take to enable the paste to be read more easily?

- a. Gently blowing on the gauging bar to remove the heavy oil.
- b. Use a soft cotton rag or towel to remove the excess oil
- c.* Use a suitable solvent to gently wash to surface of the paste.
- d. Immerse the gauging bar in a container full of light product such as gasoline.

7.29 To try to ensure gauging accuracy in shore tanks, the minimum number of dips recommended is?

- a. 1
- b.* 2 identical dips out of three
- c. 3 identical dips out of 4
- d. 4 dips, averaged

7.30 For what reasons may a quantity of free water (water bottoms) be maintained within a shore tank?

- a. To permit easy determination of the shore tank free water quantity.
- b. So that a certain percentage of free water can be pumped with each movement in order to aid in S&W blending of cargoes.
- c.* To negate any effect that bottom flexing of the tank bottom would have on tank measured quantities.
- d. To aid in detection of any product seepage from the tank.

7.31 For best measurement when gauging through stand pipe or still wells, it is preferred to have two rows of overlapping slots located on opposite sides of the pipe.

- a.* True
- b. False

- 7.32 The use of non-slotted standpipes is not recommended for custody transfer measurements.**
- a.* True
 - b. False
- 7.33 When gauging a terminal storage tank prior to loading a barge, an inspector notes that his observed gauge height does not match the reference gauge height. On gauging the same tank on completion of loading the barge he again observes the same difference in observed and reference gauge heights, such that both opening and closing observed gauge height readings are identical. Can the gauges obtained be used for determining the loaded volume?**
- a.* Yes
 - b. No
- 7.34 When gauging a tank by the innage method, a comparison between the observed and reference gauge height is made to ensure which of the following?**
- a. The gauge tape and bob are suspended in a vertical position within the tank.
 - b. The gauge bob is in contact with the tank bottom or datum plate
 - c. The tape has not been lowered too far into the tank
 - d.* Answers a., b. and c. are all correct
- 7.35 When gauging a shore tank you read your tape to the nearest 10mm?**
- a. True
 - b.* False
- 7.36 Can you obtain accurate volumes by gauging a tank while the roof is in the critical zone?**
- a. Yes, when the tank legs are on low setting
 - b. Yes, when the tank legs are on high setting
 - c.* No, it cannot be done
 - d. No, unless it is an internal floating roof

- 7.37 If you find a discrepancy between Reference Gauge Height and Observed Gauge Height when gauging a shore tank what action should you take?**
- a. Adjust your gauge to observed reference height
 - b. Ullage the tank
 - c.* Recheck your gauge, make a note of the difference and inform your supervisor
 - d. Ignore it as long as the ship to shore difference does not exceed 0.5%
- 7.38 When inspecting Heavy Fuel Oil are you required to check for free water?**
- a.* Yes
 - b. No
- 7.39 If the density of a product within a tank is greater than the density of water, where would you expect to find any free water in this tank?**
- a. You would not find it as it would not settle out of this product but would remain in suspension
 - b.* On top of the product
 - c. Below the product
 - d. Answers a., b. and c. are all wrong
- 7.40 According to common industry practice, How often must a gauging tape be checked for accuracy by comparison against a traceable master tape?**
- a. Prior to each use
 - b. Every six months
 - c.* Prior to initial use and at least annually
 - d. At least once per week
- 7.41 How often should a working gauge tape be inspected for 'wear and tear'?**
- a.* Daily or prior to each use
 - b. Once per week
 - c. Once per month
 - d. Once per year

7.42 Which of the following statements regarding reference gauge heights is correct?

- a. They should be recorded from the calibration tables, before you start the tank gauging
- b. They should be checked against the observed gauge heights
- c. They should be included in the inspection report
- d.* Answers a., b. and c. are all correct

7.43 How are free water measurements normally taken?

- a.* By the innage method
- b. By the ullage method
- c. By the Heimlich method
- d. Answers a. and b. are correct

7.44 When would you check for water on the top of a cargo?

- a. If the observed density is less than 1000 kg/m^3
- b.* If the observed density is greater than 1000 kg/m^3
- c. You never check for the presence of water on top of a cargo
- d. When you are in the Southern Hemisphere

7.45 Which of the following is acceptable for the determination of free water for marine vessel custody transfer measurements?

- a. A zone sampler
- b. A portable measurement unit (PMU)
- c. A bob with water-finding paste
- d.* Answers b. and c. are correct

7.46 If during gauging the water cut falls on the clip of the gauge tape, what must be done?

- a. Repeat the water cut using a 30 cm or 50 cm water bar
- b. Repeat the water cut taking an ullage of the water
- c. Interpolate the cut
- d.* Answers a. and b. are correct

7.47 What is the minimum amount of time the bob should stay in position while water cutting a heavy crude oil?

- a. 10 seconds
- b. 30 seconds
- c.* 60 seconds
- d. There is no set time

7.48 When is a 'provisional gauge' taken prior to the 'official gauge'?

- a.* When the 'official gauge' will not be taken for a significant period of time.
- b. When it is required by your employer's insurance company
- c. When it is required by the Charter Party
- d. Answers a., b. and c. are all correct

7.49 What is one of the problems with water finding paste?

- a. It tends to freeze in cold weather
- b.* It does not perform consistently with all crudes
- c. Tends to run down the bob
- d. It is easily confused with gasoline paste

7.50 If a tank's capacity table is an innage or dip table, what is the preferred method of gauging?

- a. Side Gauge
- b. Ullage
- c.* Innage or dip
- d. Outage

7.51 What do slip-tube gauging devices on rail tank cars measure?

- a. Any liquid in the tank car deeper than 75 mm
- b.* Any liquid under positive pressure in a tank car
- c. Any vapour in a tank car
- d. Any vapour with a depth greater than 1.2 m

7.52 When inspecting a series of rail tank cars the liquid outage/ullage level must be measured in all cars

- a.* True
- b. False

7.53 Which correction may be required when measuring rail tank car contents using built-in magnetic gauging equipment?

- a.* A density correction
- b. A temperature correction
- c. A tank shell expansion correction
- d. Answers a., b. and c. are all correct

7.54 The floating roof of a shore tank displaces a certain volume of liquid when it is floating freely. What is the weight of the volume of liquid displaced equal to?

- a.* The weight of the roof and attached deadwood
- b. A weight greater than the weight of the roof and attached deadwood
- c. A weight less than the weight of the roof and attached deadwood
- d. Answers a., b. and c. are all wrong

7.55 What is the purpose of a floating roof correction in a shore tank calculation?

- a. To account for the compression of the liquid due to the roof weight
- b.* To account for the volume of liquid displaced as a result of the weight of the roof
- c. To allow for the effect of the roof temperature on the temperature of the product
- d. To allow for the effect of the temperature on the thickness of the roof

SECTION 8 – TEMPERATURE MEASUREMENT

8.01 Is a portable electronic thermometer required to have a low voltage indicator?

- a.* Yes
- b. No

8.02 Why do portable electronic thermometers have low-voltage indicators?

- a. So that it will not fail half way through the inspection
- b.* The unit could give false readings if the battery is low
- c. If the voltage drops, the night-light will not work
- d. Most portable electronic thermometers do not have an indicator

8.03 How does calibration of a portable electronic thermometer differ from a field check?

- a. It is done by the responsible manager
- b. It is performed by a certified third party auditor
- c.* It is verified in controlled conditions against a standard thermometer traceable to national standards
- d. There is no difference between the two

8.04 On a portable electronic thermometer, what should be checked at least once per month?

- a. The junction between the cable and the probe for mechanical damage
- b. The cable insulation for cuts, breaks, or abrasion.
- c. Two or more temperatures near the ends of the range of the probe
- d.* Answers a., b. and c. are all correct

8.05 When verifying a portable electronic thermometer with a range of 0 to 95 °C, what is the maximum permissible error before it should be recalibrated?

- a.* $\pm 0.3\text{ }^{\circ}\text{C}$
- b. $\pm 0.05\text{ }^{\circ}\text{C}$
- c. $\pm 1.0\text{ }^{\circ}\text{C}$
- d. Answers a., b. and c. are all wrong - it must be exact

- 8.06 To what precision should temperatures obtained using portable electronic thermometers be read and recorded?**
- a.* The nearest 0.1 °C
 - b. The nearest 0.5 °C
 - c. The nearest 1.0 °C
 - d. The nearest 1.5 °C
- 8.07 What is the minimum acceptable accuracy for a portable electronic thermometer when it is indicating a temperature reading of 101 °C?**
- a. ± 1.0 °C
 - b. ± 0.5 °C
 - c.* ± 0.3 °C
 - d. ± 0.75 °C
- 8.08 To what increment should the display of a portable electronic thermometer be capable of reading?**
- a. 0.5 °C
 - b.* 0.1 °C
 - c. 1.0 °C
 - d. 0.25 °C
- 8.09 If a portable electronic thermometer has a range of 0 - 95 °C, what is the required resolution?**
- a. ± 1 °C
 - b. ± 2 °C
 - c.* ± 0.1 °C
 - d. Answers a., b. and c. are all wrong
- 8.10 When using a liquid-in-glass thermometer it is important to consider that**
- a. They should remain in the oil long enough to reach the temperature of the liquid
 - b. It takes longer to obtain temperatures with a liquid in glass thermometer than a portable electronic thermometer
 - c. They should be lowered using a gauging tape
 - d.* Answers a. and b are correct.

- 8.11 If you are required to take a temperature of a cargo using an in-line probe what must you record?**
- a. The last calibration date
 - b. The serial number of the unit being used.
 - c.* The last two times the probe was checked for accuracy
 - d. Answers a., b. and c. are all wrong
- 8.12 What is the first thing you must do when you are ready to take cargo temperatures using a portable electronic thermometer?**
- a. Set the temperature range selector.
 - b. Earth (ground) the unit, after opening the gauge hatch or vapour control valve
 - c. Check the battery for low voltage
 - d.* Earth (ground) the unit, before opening the gauge hatch or vapour control valve
- 8.13 If a tank has more than 3.0 m of liquid, what is the minimum number of temperature readings that must be taken?**
- a. 5
 - b.* 3
 - c. 1
 - d. one every 1 m
- 8.14 If only one temperature is required where should this temperature be taken from?**
- a. The middle of the upper third
 - b.* The middle of the liquid level
 - c. The middle of the lower third.
 - d. Use a side readout thermometer
- 8.15 The quickest way to stabilize the reading from a portable electronic thermometer (PET) is to?**
- a. Allow the probe to stay in the product for twice the required time
 - b.* Move the probe up and down at least 30 cm above and below the spot the temperature is to be taken
 - c. Use fresh batteries
 - d. There is no way to speed up the stabilization process

8.16 What is the minimum amount of product needed for a temperature to be taken?

- a.* Whenever there is sufficient material present to immerse the probe
- b. 30 cm
- c. One metre
- d. Temperatures should only be taken when the roof is floating freely

8.17 To what increment should a portable electronic thermometer be read and recorded?

- a. The nearest 0.5°C
- b. The nearest 1°C
- c.* The nearest 0.1°C
- d. Answers a., b. and c. are all wrong

8.18 According to common industry practice how should the working spot check (field check) of a portable electronic thermometer be performed?

- a. Daily comparison to another portable electronic thermometer
- b.* By comparing it to a liquid-in-glass thermometer, before each use or once per day
- c. By checking the unit weekly, for accuracy
- d. Calibrate against a thermometer (traceable to national standards) at prescribed intervals

8.19 The minimum amount of time a stationary PET should stay in a product with a density greater than 935 kg/m³ is ?

- a. 80 minutes
- b. 1 minute
- c. 30 minutes
- d.* Until the readout doesn't vary by more than 0.1°C for 30 seconds

8.20 The minimum amount of time that an 'in motion' probe should stay in a product with a density greater than 935 kg/m³ is?

- a. 10 minutes
- b. 5 minutes
- c.* Until the readout doesn't vary by more than 0.1°C for 30 seconds
- d. 1 minute

- 8.21 On a portable electronic thermometer, at what temperature should the field check be performed ?**
- a. 0°C
 - b. 100°C
 - c.* Ambient temperature
 - d. Expected cargo temperature
- 8.22 When using a portable electronic thermometer what is an indication of temperature stabilization?**
- a. Comparison with the side temperature on the tank
 - b. Comparison with a cup-case thermometer
 - c. Comparison with the last temperature recorded by the terminal
 - d.* Readout doesn't vary by more than 0.1°C for 30 seconds
- 8.23 Is it acceptable to seal a portable electronic thermometer with a paper seal to indicate that the calibration adjustments have not been tampered with?**
- a.* Yes, if the seal has been applied by the calibration laboratory
 - b. No
- 8.24 According to EI HM28, what is the minimum number of temperatures to be taken on a marine vessel with tanks each containing less than 3.0m of cargo?**
- a.* One per tank
 - b. Three per tank
 - c. Weighted average per tank
 - d. Answers a., b. and c. are all wrong
- 8.25 ISO 4268 recommends that additional temperature measurements should be taken when the temperature difference between upper, middle and lower readings is ?**
- a. Greater than 0.2 °C
 - b. Greater than 0.5 °C
 - c.* Greater than 1.0 °C
 - d. Greater than 30 °C

- 8.26 What is the maximum amount by which the reading on a portable electronic thermometer can vary when it may be considered to have stabilized?**
- a. 0.2 °C
 - b. 1 °C
 - c. No variance is permitted
 - d.* 0.1 °C
- 8.27 What should you ensure when taking temperatures on tanks containing oil and water?**
- a. That the probe doesn't touch the steam coils
 - b. That the tank is corrected for list / trim
 - c.* That the probe is placed at the mid-point of the oil or the oily layer
 - d. That only a middle temperature is taken for slops
- 8.28 When using a portable electronic thermometer, what is the minimum amount of time the probe must stay in a middle distillate of density of 821.7 kg/m³, if the probe is moving?**
- a.* Until the readout doesn't vary by more than 0.1 °C for 30 seconds
 - b. 30 seconds
 - c. 10 minutes
 - d. Until the readout doesn't vary by more than 0.2 °C for 30 seconds
- 8.29 A thermowell used to measure temperature must be filled with a suitable heat-transfer liquid.**
- a.* True
 - b. False
- 8.30 Which ISO standard covers temperature determination?**
- a. 3171
 - b.* 4268
 - c. 4512
 - d. 4266

- 8.31 How should scale graduation marks be applied to a liquid-in-glass thermometer?**
- a.* They must be etched permanently on the stem of the thermometer
 - b. They must be etched permanently on the cup-case assembly
 - c. They must be on a metal plate attached to either the thermometer or the cup-case assembly
 - d. Answer a., b. or c. is correct
- 8.32 A liquid-in-glass tank thermometer has a scale range of -20 °C to 110 °C. What should the graduations on this thermometer be?**
- a. 0.1° C
 - b. 0.25° C
 - c. 1.0° C
 - d.* 0.5° C
- 8.33 When first received from the manufacturer or equipment supplier, what should happen to a new liquid-in-glass tank thermometer?**
- a. It can be used immediately because the manufacturer calibrates the thermometer before it is shipped
 - b. It must be checked to see that the liquid column is intact, then it may be used since the manufacturer will have calibrated the thermometer.
 - c. It must be checked to see that the glass stem is not cracked or broken, then it may be used since the manufacturer will have calibrated the thermometer
 - d.* It must be compared against a thermometer certified by a National Standard body or an equivalent thermometer of traceable accuracy.
- 8.34 To what precision should temperatures taken with a liquid-in-glass thermometer in a cup-case assembly be read and recorded?**
- a. The nearest 1.0 °C
 - b. The nearest 0.1 °C
 - c.* The nearest 0.5 °C
 - d. The nearest 5.0 °C

- 8.35 'In motion' is defined as continuously raising and lowering the probe above and below the desired temperature measurement depth, by approximately how much?**
- a. 15cm
 - b. 1metre
 - c.* 30cm
 - d. 3 feet
- 8.36 What does the term 'horizontal temperature stratification' mean?**
- a. The temperature in a tank is different near the tank centre than at the gauge hatch
 - b.* Any difference in temperature measured at different levels in a tank
 - c. That the temperature difference measured at any two levels in a tank exceeds 2 °C
 - d. Answers a., b. and c. are all correct
- 8.37 To comply with ISO 4268 when using a liquid-in-glass thermometer in a cup-case assembly to measure a product with density of 904 kg/m³, what is the minimum length of time the thermometer should be immersed in the liquid when the assembly is in motion during the measurement process?**
- a. 5 minutes
 - b. 10 minutes
 - c.* 20 minutes
 - d. Until the readout doesn't vary by more than 0.2 °C for 30 seconds
- 8.38 According to EI HM28 what is the minimum number of temperatures to be taken in a tank containing more than 3.0 metres of product?**
- a. 1
 - b.* 3
 - c. 5
 - d. 2

- 8.39 When taking the temperature of a product in a tank and there is more than 1°C difference between upper, middle and lower temperatures, what steps should be taken?**
- a. Retake the temperatures since there must be an error
 - b. Use the middle temperature only for the entire tank contents
 - c. Average the upper, middle and lower temperatures
 - d.* Take temperatures at more frequent, equally-spaced vertical increments
- 8.40 When taking temperatures, 'in motion' means to move the temperature measurement device approximately 60cm above and 60cm below the desired measurement location?**
- a. True
 - b.* False
- 8.41 To comply with ISO 4268 what is the recommended immersion time, for a liquid-in-glass thermometer in a cup-case assembly, in motion, in a product with density of 950 kg/m³.**
- a.* 45 minutes
 - b. 10 minutes
 - c. 20 minutes
 - d. Until the readout doesn't vary by more than 3.0 °C for 30 seconds
- 8.42 What temperature is to be used during an ROB survey if there is only 5 mm of liquid in the bottom of the tank?**
- a. The measured temperature at the middle of the liquid
 - b.* Standard Temperature
 - c. The average temperature of the product in the tank before it was discharged
 - d. The temperature stated by the vessel's representative
- 8.43 A 4000 m³ capacity storage tank has a depth of product of 4.70 m in the tank. What is the minimum number of temperature measurements that should be obtained on this tank to comply with EI HM28?**
- a. One
 - b. Two
 - c.* Three
 - d. Five

8.44 The stabilization time for a cup-case assembly is minimized by continually raising and lowering the assembly 30 cm above and below the desired temperature measurement point.

- a.* True
- b. False

SECTION 9 - METERING

9.01 When correcting a metered volume from line conditions to standard conditions manually which of the following corrections need to be applied?

- a. Pressure and temperature corrections for the liquid
- b. Pressure and temperature corrections for the meter body
- c. No corrections are necessary if the meter is calibrated
- d.* Corrections a. and b. must be applied

9.02 When calculating standard volume from a raw meter output which of the following corrections need to be applied?

- a. Pressure and temperature corrections for the liquid
- b. Pressure and temperature corrections for the meter body
- c.* Corrections a. and b. and a K-Factor
- d. Corrections a. and b. only

9.03 How should a meter be proved?

- a. By comparing meter readings with shore tank measurements
- b. By comparing meter readings with Total Received Volume (TRV) on-board ship
- c.* Using a prover loop
- d. By comparison against the next meter in the 'meter bank'

9.04 What is the minimum number of sphere detectors which are used on a uni-directional pipe prover?

- a.* 2
- b. 4
- c. 3
- d. 1

9.05 Under what conditions should a meter factor remain constant?

- a.* Different flow rates
- b. Different products
- c. Under conditions a. and b.
- d. All transfers between successive calibrations

SECTION 10 - ETHICS

10.01 Which of the following actions represents an ethical problem for an Inspector?

- a. Correcting the temperature of a shore tank when the PET has been found to be inaccurate
- b. Changing the VCF after finding an error in the API gravity of the cargo
- c.* Changing the temperature of the cargo in a ship's tank because it is too far off the shore tank temperature
- d. Answers a., b. and c. are all correct

10.02 The liquid level of a shore tank is changed in the raw data book after it is found to be wrong upon re-gauging. The original data is covered with white-out fluid and the correct information is written over the blanked-out data. Is this a permissible way to handle raw data corrections?

- a. Yes
- b.* No

10.03 The key person involved in managing ethics concerns in an inspection company would usually be the Compliance Officer.

- a.* True
- b. False

10.04 When inspecting a petroleum or chemical cargo, which of the following represents sound ethical business conduct for an Inspector?

- a. Making sure that the Inspector's results match the results required by the customer
- b.* Making sure that the job is done according to industry standards
- c. Making sure that the laboratory gets their sample on time
- d. Answers a., b. and c. are all correct

10.05 Which procedure is acceptable when raw data, such as dips or temperatures, must be corrected?

- a. White out the original measurements and write the correct measurements clearly over the blanked-out area
- b.* Draw a single line through the original measurements so they can still be read and rewrite the correct measurements on the next line.
- c. Tear the original page out of the raw data book or pad and start again
- d. Answers a., b. and c. are all wrong

10.06 The Compliance Programme established by your Company requires that you comply with national regulations issued by:

- a. Agencies for the Environment, Food and Agriculture
- b. Customs and Excise authorities
- c. Agencies for Occupational Health and Safety
- d.* Answers a., b. and c. are all correct

10.07 'Zero Tolerance' means that any and all infractions of your Company's Regulatory Compliance Program are subject to disciplinary action.

- a.* True
- b. False

10.08 IFIA Member Companies strictly prohibit any form of retaliation against any person who, in good faith, files a complaint under their Regulatory Compliance Program, or assists in a Program violation investigation.

- a.* True
- b. False

10.09 Changes to raw data cannot be made without a sound technical justification or re-measurement.

- a.* True
- b. False

10.10 Reported data must be backed by, and be identical to its recorded data.

- a.* True
- b. False

- 10.11 It is acceptable to alter analytical results based solely upon repeatability provided that the new result falls within the precision limits of the test method.**
- a. True
 - b.* False
- 10.12 It is acceptable to ignore a potential violation of your Company's Regulatory Compliance Program if the violation does not directly involve you.**
- a. True
 - b.* False
- 10.13 On finishing the closing inspection on a shore tank, following the completion of a marine vessel discharge operation, a representative who is witnessing your actions requests that you change the observed tank product temperature reading obtained as he feels that it is incorrect. What should you do?**
- a. Comply with his wishes
 - b. Use the observed temperature of the product on the vessel prior to discharge
 - c.* Inform him that you will re-check the product temperature if he requires but that you will record and use the product temperature that you have observed
 - d. Use the tank auto temperature reading instead