

Section one: Diving Physics

Week 1 : March 24-29

Objective 1.1 – 1.4

Read Chapter 4, Encyclopaedia of diving, pg. 4-2 to pg. 4-18

FOCUS - Water & Heat (pg.4-10), Water & Light (pg.4-13), Water & Sound (pg. 4-17),

Week 2 : March 30- April 5

Objective 1.4 – 1.6

Read Chapter 4, Encyclopaedia of diving, pg. 4-18 to pg. 4-25

FOCUS - Buoyancy and the weightless world (pg. 4-18), Under pressure (pg. 4-25)

Week 3 : April 6 – 12

(Together with Nikki) Objective 1.7– 1.14

Read Chapter 4, Encyclopaedia of diving, pg. 4-26 to pg. 4-36

FOCUS – Boyles Lay (pg. 4-26), Charles Law (pg. 4-28), Daltons Law (pg. 4-29), Henry Law (pg. 4-34)

Section Two: Diving Physiology

Week 4 : April 13 – 19

Objective 2.1 – 2.3

Read Chapter 5, Encyclopaedia of diving, pg. 5-2 to pg. 5-13

FOCUS – Blood (pg. 5-5), Responses to breathing with equipment (pg. 5-10), Response to breath-hold diving (pg. 5-13),

Week 5 : April 20 – 26

Objective 2.4 – 2.6 and 2.10

Read Chapter 5, Encyclopaedia of diving, pg. 5-15 to pg. 5-22

FOCUS – Hypocapnia (pg. 5-15), Carotid-Sinus Reflex (pg. 5-15), Carbon monoxide poisoning (pg. 5-17), Gas Narcosis (pg. 5-20)

Week 6 : April 27 – May 3

Objective 2.11 – 2.15

Read Chapter 5, Encyclopaedia of diving, pg. 5-27 to pg. 5-36

Read Chapter 4, PADI Rescue diver Manual, Pressure related injuries

FOCUS – Problem in body air space (pg. 5-30), Summary of Ear (pg. 5-30-34), Ears (pg. 5-27), Lung Overexpansion Injuries (pg. 5-36)

Week 7 : May 4 – 10

Objective 2.7 – 2.9 and 2.14

Read Chapter 5, Encyclopaedia of diving, pg. 5-42 to pg. 5-53

Read Chapter 4, PADI Rescue diver Manual, Pressure related injuries

FOCUS – Inert gas absorption (pg. 5-42), Inert gas release (pg. 5-45), Lung Decompression Sickness (pg. 5-47), physiological rationale for first aid and treatment of DCS (pg. 5-53),

Week 8 : May 11-17

Review of Section One and Two

Section Three: Dive Equipment

Week 9 : May 12-24

Objective 3.1 – 3.7

Read Chapter 3, Encyclopaedia of diving, pg. 3-48 to pg. 3-55

Read Chapter 2, PADI Rescue diver Manual, Cylinders and cylinder valves

FOCUS – Tank Hieroglyphs (pg. 3-52), International cylinder capacity conversions made easy (pg. 5-49), Cylinders and cylinder valve (Rescue), Cylinder-Features (pg. 5-48), Cylinder care and maintenance(pg. 5-53)

Week 10 : May 25-31

Objective 3.8 – 3.15

Read Chapter 3, Encyclopaedia of diving, pg. 3-56 to pg. 3-73

Read Section 5, PADI Divemaster Manual, Special rules, recommendations Using RDP and Computer

Read Chapter 5, Open Water Manual, Using Dive computer

FOCUS – Regulators (pg. 3-56), Special rules (Divemaster), Using a dive computer (Open Water), Instrument Specifics (pg. 5-69),

Section Four: General skills and the diving environment

Week 11 : June 1-7

Objective 4.1 – 4.3

Read Chapter 3, Open Water Manual, Confined water dive preview – “CESA”.

Read Chapter 2, Open Water Manual, Weight system

Read Section 10, PADI Adventure in Diving Manual, Peak performance buoyance

Read Chapter 2, Open Water Manual, Buddy System

Read Chapter 3, Open Water Manual, Underwater problems

FOCUS – CESA (OW), Weight System (OW) Peak performance buoyancy (ADV), Buddy System (OW), Underwater Problems (OW)

Week 12 : June 8-14

Objective 4.4 – 4.8

Read Section 11, PADI Adventure in Diving Manual, Search and recovery diving

Read Section 13, PADI Adventure in Diving Manual, Underwater navigation

Read Section 9, PADI Adventure in Diving Manual, Night Diving

Read Section 1, PADI Adventure in Diving Manual, Altitude Diving

FOCUS – Search and Recovery (ADV), Underwater navigation (ADV) Night Diving (ADV), Altitude Diving (ADV),

Week 13 : June 15-21

Objective 4.9 – 4.13

Read Chapter 4, PADI Rescue diver Manual, Managing an unresponsive diver at the surface

Read Chapter 4, PADI Rescue diver Manual, Near- Drowning

Read Chapter 5, Encyclopaedia of diving, pg. 5-14 The Physiological rationale for the first aid drowning

Read Chapter 5, Encyclopaedia of diving, pg. 5-53 The Physiological rationale for the first aid DCS

Read Chapter 4, PADI Rescue diver Manual, First Aid for Decompression Illness

Read Chapter 2, PADI Rescue diver Manual, Common Aquatic Life Injuries first aid

FOCUS – Unresponsive diver (Rescue), Near-Drowning (Rescue), First aid Near Drowning (pg. 5-14), First aid DCS (pg 5-53) First aid DCS (Rescue), Aquatic life injuries (Rescue)

Week 14 : June 22-28

Objective 4.14 – 4.18

Read Chapter 2, Encyclopaedia of diving, pg. 2-35 Tides

Read Chapter 2, Encyclopaedia of diving, pg. 2-28 Surface currents

Read Chapter 3, Open Water Manual, The dive environment

Read Chapter 1, Encyclopaedia of diving, pg. 1-64, your role in the seas future

Read Section 12, PADI Adventure in Diving Manual, Underwater naturalist

FOCUS – Tides (pg. 2-35), Surface currents (pg. 2-28), The dive environment (OW), Your role in the seas future (1-64), Underwater naturalist (ADV)

Section Five: The recreational dive planner

Week 15: June 29 – July 5

Objective 5.1 – 5.4

Read Chapter 5, Encyclopaedia of diving, pg. 5-54, Decompression Models

Read Chapter 5, PADI Divemaster manual, Decompression theory and the RDP

Read Section 1, PADI Adventure in Diving Manual, Altitude diving

FOCUS – Decompression models (pg. 5-54), Decompression theory (Divemaster), Altitude diving (ADV)

Week 16 : July 6 – 12

Objective 5.5 – 5.8

PADI RDP and RDP Manual

Read Chapter 5, Open water Manual, Altitude diving

Read Chapter 5, Encyclopaedia of diving, pg. 5-78, Flying after diving

Week 17: July 13-19

Review of Section Three, Four and Five

Final Questions, Review of Calculations, Boyle, Dalton ect.

STUDY GUIDE - Section one: Diving Physics

Objective 1.1 (Water & Heat)

Explain why water is able to dissipate body heat faster than air, at what rate this occurs and what effect this has upon the diver.

Objective 1.2 (Water & Light)

Explain the behaviour of light as it passes from an air/water interface and what effect this has upon the diver.

Objective 1.3 (Water & Light)

Define the “visual reversal” phenomenon and explain its effect upon the diver.

Objective 1.4 (Water & Sound)

Explain why sound travels faster in water than in air, by approximately how much and what effect this has upon the diver.

Objective 1.5 (Buoyancy and the weightless world)

State Archimedes’ Principle and calculate the buoyancy required to either lift or sink an object in both fresh and seawater.

Objective 1.6 (Under pressure)

Define the terms “absolute,” “ambient” and “gauge” pressure and calculate pressure at any depth as expressed by these terms in both fresh and seawater.

Objective 1.7 (Boyle’s Law)

Explain the relationship between pressure and volume on a flexible gas-filled container, and calculate (in increments of whole atmospheres) the changes that will occur to that container as it is raised and lowered in the water column.

Objective 1.8 (Boyle's Law)

Explain the relationship between depth and the density of the air a diver breathes, and calculate this relationship in increments of whole atmospheres.

Objective 1.9 (Boyle's Law)

Given a diver's air consumption rate at one depth, calculate how that consumption rate changes when depth changes.

Objective 1.10 (Charles' Law)

Describe how the behaviour of a gas within both a flexible and inflexible container is affected by changes in pressure and temperature.

Objective 1.11 (Dalton's Law)

Given their percentages, calculate the partial pressure of gases in a mixture at any depth.

Objective 1.12 (Dalton's Law)

Explain the effect of breathing contaminated air mixtures at depth and calculate the equivalent effect such contamination would have upon the diver at the surface.

Objective 1.13 (Henry's Law)

Explain what will occur to a liquid saturated with a gas at high pressure when the pressure of the gas contact with the liquid is quickly reduced)

Objective 1.14 (Henry's Law)

Define "supersaturation" and explain what conditions are necessary for gas bubbles to form in a supersaturated liquid.

STUDY GUIDE - Section Two: Diving Physiology

Objective 2.1 (Blood)

Identify the substance within the blood that aids in the transport of oxygen, and in what component of the blood this substance is contained.

Objective 2.2 (Responses to breathing with equipment)

Explain how proper diving techniques and equipment can help avoid exhaustion and excessive buildup of carbon dioxide.

Objective 2.3 (Responses to breath-hold diving)

Explain the physiological mechanism by which voluntary hyperventilation enables a diver to extend breath-holding time.

Objective 2.4 (Hypocapnia)

Explain the physiological mechanism that causes a “shallow-water blackout” and why this condition usually occurs during ascent rather than descent.

Objective 2.5 (Carotid-Sinus reflex)

Explain the physiological mechanism that causes a “carotid-sinus reflex,” and how this affects the diver.

Objective 2.6 (Carbon monoxide poisoning)

Explain the physiological effect of increased carbon monoxide levels (including cigarette smoking) on the diver and how they can be avoided.

Objective 2.7 (Inert gas absorption)

Explain the physiological mechanism of decompression sickness (DCS), and list the common susceptibility factors that can contribute to its occurrence.

Objective 2.8 (Inert gas release)

Define the term “silent bubbles” as it relates to decompression sickness.

Objective 2.9 (Inert gas absorption, physiological rationale for first aid and treatment of DCS)

Explain why individuals with decompression sickness (DCS) are given pure oxygen as a first aid measure.

Objective 2.10 (Gas Narcosis)

Explain the cause of nitrogen narcosis, state the approximate depth at which the disorder occurs and list three common signs/symptoms.

Objective 2.11 (Problems in body air spaces)

Define the term “barotrauma,” and explain how it can occur to the lungs, sinuses and ears of the diver during both ascent and descent.

Objective 2.12 (Summary of ear and sinus barotrauma treatment)

Define the term “vertigo” and explain the mechanism by which this normally occurs in the divers.

Objective 2.13 (The ears)

Describe the basic anatomy of the ear and which area/ structures are most affected by changing pressure.

Objective 2.14 (Decompression sickness)

Compare and contrast the various signs/symptoms of decompression sickness and air embolism.

Objective 2.15 (Lung over expansion injuries)

State the most serious form of lung overexpansion injury in diving and how it occurs, and what factors can contribute to its occurrence.

STUDY GUIDE - Section Three: Equipment

Objective 3.1 (Deciphering cylinder hieroglyphics)

Explain the meaning of each legally required mark that appears on the neck of a scuba cylinder including: alloy designation, hydrostatic test date, working pressure, and over pressurization designation.

Objective 3.2 (International cylinder capacity conversions made easy)

Contrast the difference between steel and aluminium scuba cylinders in terms of their relative ability to resist corrosion and calculate the capacity of cylinders with different pressure and volume.

Objective 3.3 (Cylinders and cylinder valves)

Explain the purpose of a J valve and how it is designed to work.

Objective 3.4 (Cylinders - features)

Explain the safety device and design feature that prevents an over-pressurized scuba cylinder from exploding.

Objective 3.5 (Scuba cylinder care and maintenance)

Explain the effect of extreme heat upon the structural integrity of a scuba cylinder, and what should be done in the event cylinders are exposed to such conditions.

Objective 3.6 (Scuba cylinder care and maintenance)

Explain how scuba cylinders are hydrostatically tested, and to what pressure this test is conducted.

Objective 3.7 (Scuba cylinder care and maintenance)

List at least three reasons a scuba cylinder should be visually inspected annually.

Objective 3.8 (Regulators)

Explain the term “open-circuit demand” regulator and describe what advantages this design has over other types.

Objective 3.9 (Regulators - features)

List the major parts and explain the general function of the first and second-stage of a scuba regulator.

Objective 3.10 (Regulators - features)

Define the term “fail-safe” as it relates to regulator design and how this feature operates in the event of regulator malfunction.

Objective 3.11 (Regulators - features)

Define the term “environmental seal” and what this device is designed to prevent.

Objective 3.12 (Regulators – features, Differences between balanced and unbalanced valves)

Define the term “balanced”, “unbalanced”, “upstream” and “downstream” as they relate to regulator design.

Objective 3.13 (Using a dive computer)

Explain the proper procedures for the use of dive computers among buddy teams.

Objective 3.14 (Instrument specifics, Altitude diving)

State the type of depth gauge which automatically compensates for high altitude diving.

Objective 3.15 (Instrument specifics, deep diver)

List at least three reasons related to equipment why divers should always avoid maximum decompression limits.

STUDY GUIDE - Section Four: General Skills and the diving environment

Objective 4.1 (Controlled emergency swimming ascent)

Explain the proper procedure for executing a controlled emergency swimming ascent.

Objective 4.2 (Weight systems, peak performance buoyancy)

Define the term "neutral buoyancy" and describe how to execute a buoyancy check at the surface.

Objective 4.3 (Buddy system)

Demonstrate and explain the meaning of the 25 common hand signals.

Objective 4.4 (Search and recovery diving)

List at least 2 factors which dictate the type of pattern to be used when searching for an underwater object.

Objective 4.5 (Underwater navigation)

State the most accurate means of measuring distance underwater without the use of a calibrated measuring device.

Objective 4.6 (Search and recovery diving)

State the guideline for the maximum negative buoyancy of an object if it is to be recovered without the assistance of a lift bag.

Objective 4.7 (Night diving)

List the minimum suggested equipment necessary to safely engage in night diving activities.

Objective 4.8 (Altitude diving)

State the maximum altitude above which special procedures are required for the use of most dive tables and explain why diving at altitude requires such special consideration.

Objective 4.9 (Managing an unresponsive diver at the surface)

Explain why you should give rescue breaths to an unconscious, nonbreathing diver while towing to shore even if no pulse is suspected.

Objective 4.10 (Emergency first response manual)

State the compression-to-ventilation ratio for administering one-rescuer CPR

Objective 4.11 (Near-drowning)

Explain what action should be taken with a victim of a near-drowning accident.

Objective 4.12 (Physiological rationale of first air and treatment of DCS)

Explain what action should be taken for a diver suffering from decompression sickness, and under what circumstances the patient should be taken back into the water for recompression.

Objective 4.13 (Common aquatic life injuries)

List at least 3 common signs/symptoms of marine life injuries.

Objective 4.14 (Tides)

Explain how tides are caused.

Objective 4.15 (Surface currents)

Given the nature of the circulation of major ocean currents (Coriolis effect), state the direction of flow for such currents in relation to the coastline of any continent.

Objective 4.16 (The dive environment)

Define the term “environmental orientation” and explain for whom such an orientation is intended.

Objective 4.17 (Your role in the sea’s future)

List at least 5 ways a diver can protect the aquatic realm.

STUDY GUIDE - Section Five: The recreational dive planner

Objective 5.1 (Decompression models)

Explain why the recreational dive planner “surface interval credit table” times are significantly shorter than that of the U.S. Navy tables, and why such a difference is possible.

Objective 5.2 (Decompression models)

Explain what is meant by a “multitissue” decompression model, and state the number of tissue compartments used in the creation of the recreational dive planner versus U.S. Navy models.

Objective 5.3 (Altitude diving)

When diving above sea level, explain why it is critical to know the altitude at which the dive is to take place.

Objective 5.4 (Decompression models)

Explain why pressure groups from one model/table cannot necessarily be transferred to another model/table.

Objective 5.5 (Recreational dive planner)

Using the RDP table, demonstrate how to find a no-decompression limit (NDL), and state the procedure for emergency decompression and omitted decompression.

Objective 5.6 (Recreational dive planner)

Using the RDP table, calculate the dive profiles for three or more repetitive dives demonstrating the correct guidelines and procedures for: determining minimum surface intervals; taking safety stops; and applying the special multiple dive rules.

Objective 5.7 (Altitude diving)

State the recommendations for flying after diving and demonstrate its use.

Objective 5.8 (eRDPml, multilevel manual)

Using the eRDPml, demonstrate how to calculate multilevel dive.