

# IANTD



## Advanced

# Open Water Diver

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1999-2000

# Инструкторы и ассистенты



# Поступление на данный курс и его оплата

## *Гарантируют*

- Лекции по теории погружений
- Отработку упражнений в бассейне
- Учебные погружения в открытой  
воде

# Учебник и вспомогательные материалы

- Учебник и рабочая тетрадь по курсу ИАНТД Advanced Open Water Diver
- Водолазная и декомпрессионная таблица для погружений на воздухе ИАНТД
- Рекреационный журнал погружений ИАНТД

# Требования по Сертификации

- Медосмотр (по необходимости)
- Удовлетворительное выполнение упражнений
- Экзамен по теории погружений
  - Тесты
  - 80% или выше по заключительному экзамену
- Подписание всех форм
- Выполнение погружений в открытой воде
- Утверждение инструктором

**Сертификацию  
Advanced Open Water**

***нужно  
заработать!***

# Обучение в открытой воде

- Требуется для сертификации
- 5 погружений с отработкой основных специализированных навыков
- Всемирная система направлений
- Не позднее, чем через 6 месяцев после занятий в классе
- Снаряжение кандидатов

# Погружения продвинутого уровня

- **Погружениями в открытой воде продвинутого уровня называются разные погружения в разных средах.**
- **Погружения продвинутого уровня требуют прочной основы, включая личный опыт.**



# Погружения продвинутого уровня

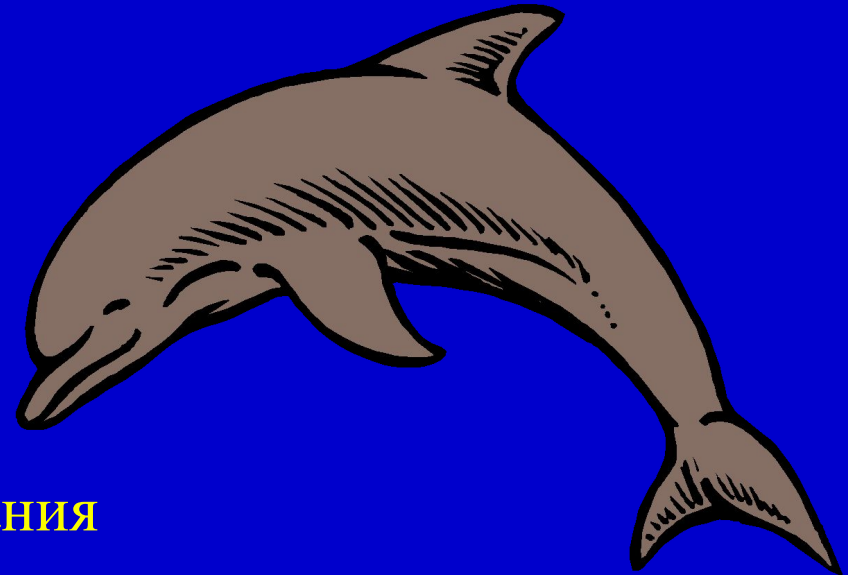
- **Опыт можно приобрести, лишь регулярно совершая погружения в разнообразных средах.**



- **Погружения в разных средах требуют соответствующего обучения.**

# Развитие аквалангиста

- Цель
- Планирование погружений
- Более глубокие погружения
- Ограниченная видимость
- Ночные погружения
- Основы подводного ориентирования
- Продолжение обучения (не прекращайте учиться)
- Основные виды погружений



# Раздел 1

## Планирование погружений на уровне Advanced Open Water Diver

# Задачи Раздела

- Самоподготовка
- Выбор напарника
- Выбор места погружения
- Среда
- Снаряжение
- Планирование на случай чрезвычайных обстоятельств
- Журнал рекреационных погружений ИАНТД



# Самоподготовка

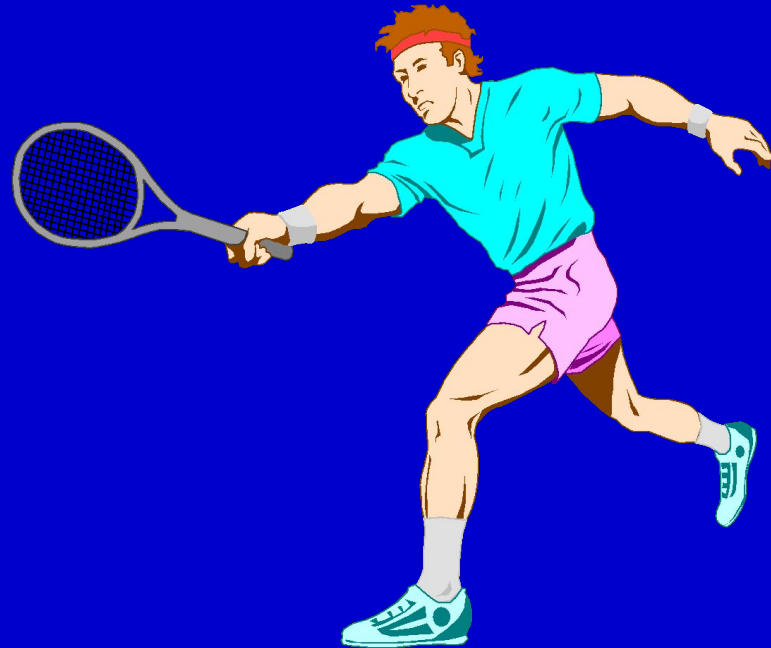
- Надлежащее обучение
  - Лекции по теории погружений
  - Отработка упражнений в бассейне
  - Обучение в открытой воде

# Физическая форма ради безопасности погружений

- Важность регулярных медосмотров
- Те, кому за 40, должны проходить медосмотр ежегодно
- Критическая важность здоровья сердечно-сосудистой системы
- Погружения в особых средах могут быть связаны с повышенной физической нагрузкой
  - Течение
  - Температура
  - Плавание на большие расстояния
  - Сопротивление дополнительного снаряжения
  - Более долгие погружения

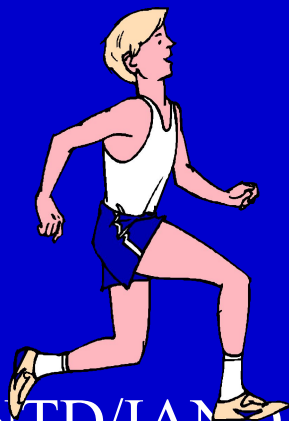
# Погружения как развлечение и способ улучшения формы

- Развлечение
- Поддержка и сопротивление
- Координация
- Расход калорий



# Альтернативные упражнения для повышения сердечно-сосудистой формы

- Спортивная ходьба
- Бег трусцой
- Бег
- Горный велосипед
- Альпинизм
- Stair Master
- Treadmill
- Exercise-Cycle
- Power Machine
- Rowing Machine
- Классы аэробики
- Командные виды спорта на выносливость





# Основы правильного питания

- Питаться регулярно
- Питаться продуктами с высоким содержанием сложных углеводов
- Питаться легкоусваиваемыми продуктами
- Избегать переедания
- Обеспечивать достаточную гидратацию



# Вещества, от которых необходимо воздерживаться

- Алкоголь
  - Обезвоживание
  - Повышение риска ДКЗ/ДКБ
  - Усиление наркоза
  - Переохлаждение
  - Неспособность справляться с множественными задачами
  - Нарушение суждения
  - Замедленность реакции
  - Нарушение координации и ослабление навыков



# Вещества, от которых необходимо воздерживаться

*Продолжение*

- Кафеин
  - Мочегонное воздействие
  - Стимулятор ЦНС
- Соляные таблетки
- Курение
  - Повреждение сердечно-сосудистой системы
  - Пагубное воздействие никотина



# Diet, Calorie Intake And Nutritional Supplements

- Consult Your Physician
- Eat a Balanced Diet
  - Eat foods high in complex carbohydrates
  - Reduce fat intake
  - Increase fiber intake
  - Avoid “junk food”
- Diet Sensibly
- Proactive Vitamin and Nutrition Supplement Program

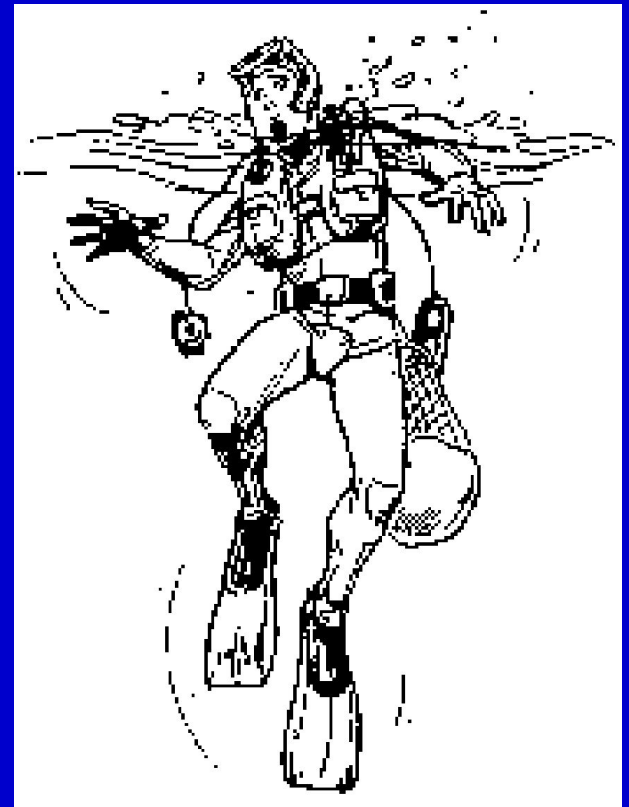
# Dangers Of Improper Rest

- Increased Likelihood of DCS/DCI
- Can Result in Poor Judgement
- Slow Choice Reaction Time
- Decreased Ability to Concentrate & Follow Dive Plan
- Increased Potential of Barotrauma
- Compromise the Ability of the Immune System to Fight Bacteria and Viruses

*Try to get 7 to 8 hours of sleep each night before diving!!!*

# Perceptual - *The Alien Aquatic Environment*

- Weightlessness in a 3-Dimensional Environment
- Altered Breathing Patterns
- Equipment
- Visibility
- Vision
- Hearing
- Touch
- Currents, Wave Action, and Surge

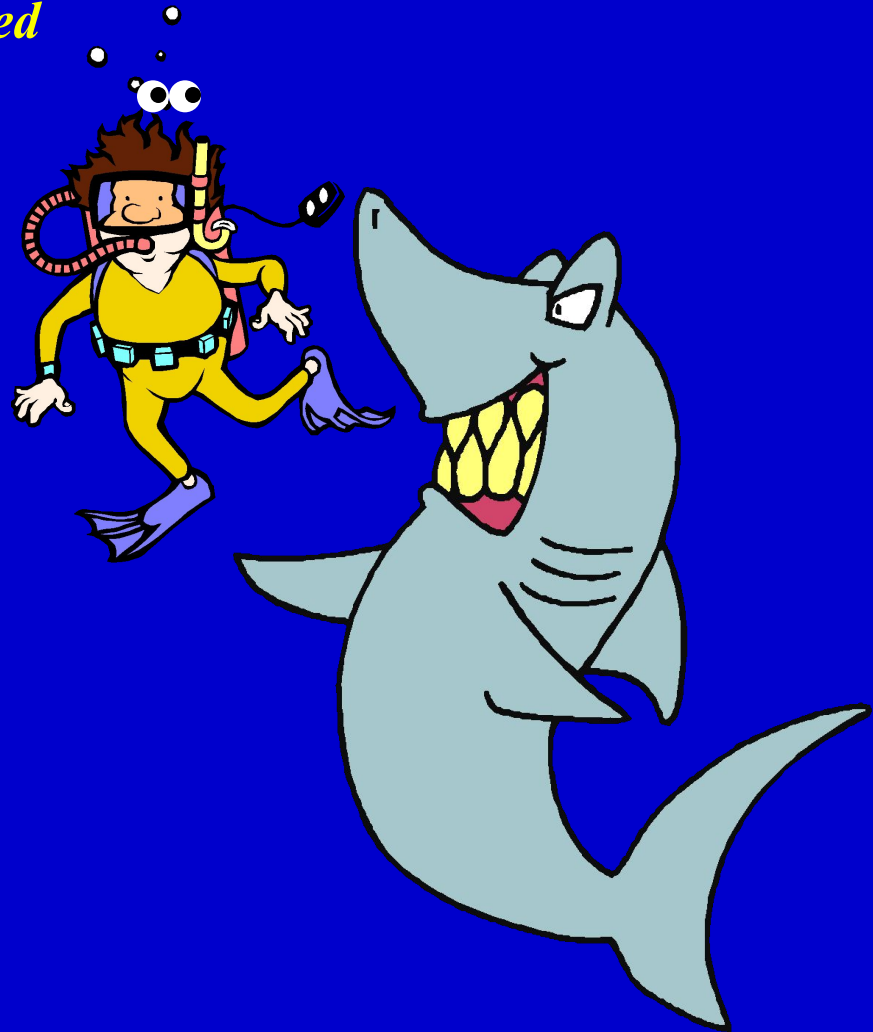


# Perceptual

## *The Alien Aquatic Environment*

*Continued*

- Marine Flora
- Exertion
- Marine Fauna
- Task Loading



# Perceptual - *Ways To Avoid Task Loading*

- Proper Training for the Equipment Used and the Particular Diving Environment
- Practice, Practice, Practice
- Never Dive Beyond Your Experience Levels
- Proper Dive Planning
- Never Try to Master Too Many Tasks or Dive Objectives at Once
- Gain Proficiency Before Attempting More Advanced Dives



# Attitudinal Fitness

- Common Sense
- High Standards
- Knowledge of Personal Limitations
- Detail Oriented
- Ability to Judge Physical, Psychological, and Emotional Status

# Criteria For Dive Buddy Selection

- Training
- Experience
- Skill Levels
- Equipment
- Physical Fitness Levels
- Emotional and Psychological Fitness Levels

# IANTD Recreational Advanced And Specialty Diving Programs

- Altitude
- Wreck (No penetration)
- U/W Naturalist
- Deep
- Night and Low Visibility
- River
- Ice and Cold Water
- Nitrox
- Ocean Diving
- Current, Surf, and Drift
- Basic Navigation
- Advanced Navigation
- Boat
- 35mm Photography

# Specialty Diving Programs

*Continued*

- Advanced Nitrox
- Recreational Rebreather
- DPV
- Marine Archeology
- Digital Photography
- Underwater Videography
- Underwater Modeling
- Salvage
- Rescue Diver
- Diving First Aid
- Wall Diving
- Full Face Mask
- Dive Medic
- Surface Supplied
- Dry Suit
- Scientific

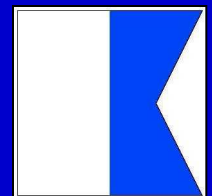
# Specialty Diving Programs

*Continued*

- Sign Language for Divers
- Advanced Buoyancy Skills
- Advanced Dive Physiology
- Multi-level Computer Assisted Diving
- EANx Gas Blending
- Life Support Service Technician
- Cavern Diving

# Dive Site Selection *Conditions*

- Temperature
  - Proper In-water Thermal Protection
  - Proper Protection on the Surface
- Predicted Atmospheric Conditions
- Surface Traffic
  - US Divers Flag - Red With White Diagonal
  - International Alpha Flag - Blue and White



# Dive Site Selection

## *Sea State Conditions*

- Surf
- Currents
  - Rip Currents
  - Longshore Currents
  - Tidal Currents
  - Prevailing Ocean Currents
  - River Currents

# Dive Site Selection

## *Depths*

- IANTD Advanced Open Water Certification  
*Maximum Depth 90 fsw (27 msw)*
- Stay Within Your Level of Training and Experience
- Consider the No Decompression Limits for the Depths of the Dive and Stay Within Them
- Check Gas Consumption at Depth Verses Your Gas Supply. Make Sure You Have the Required Gas for the Depth and Time of Your Dive



# Dive Site Selection

## *Underwater Visibility*

- Effected by Bottom Composition, Water Currents and Other Variables
- Sand and Rocky Bottoms Usually Have Good Visibility
- Mud and Clay Can Be Easily Stirred Up
- Good Buoyancy and Finning Technique Is A Must
- Tides and Moving Water Can Also Stir Up Silt and Reduce Visibility

# Dive Site Selection

## *Bottom Type And Configuration*

- Mud, Clay, or Silt Can Mean Reduced Visibility - Especially in Swift Water
- Bottom Configuration Will Aid in Natural Feature Navigation
- Knowing the Bottom Configuration Will Warn You of Potential Hazards Such As Extreme Depths
- Maps Are Available of Many Areas Through NOAA, USGS, Army Corps of Engineers, Etc.

# Benefits Of Owning Your Equipment

- Fit
- Quality
- Maintenance and Reliability
- Sanitary Rationale
- Ability to Streamline, Configure and Customize
- Familiarity
- Economics

# Individual Dive Equipment Checklist For Underwater

- Mask
- Fins
- Snorkel
- Boots
- Gloves
- Buoyancy Control Device
- Weights
- Weight Belt or Integrated -BCD
- Dive Knife
- Regulator
- Dive Flag and Float
- Alternate Second Stage
- Cylinder(s)
- Submersible Pressure Gauge
- Underwater Compass
- Dive Computer and/or Dive Timer & Depth Gauge
- Environmental Protection
- Underwater Lights
- Slate and Pencil
- IANTD Dive Tables
- Emergency Signaling Device
- Equipment Bag

# Individual Dive Equipment

## Checklist - Surface

- **GENERAL**
  - Towel(s)
  - Swimsuit
  - Dive Logbook
  - C-Card
  - Personal & Emergency Medical Information
- **WARM ENVIRONMENT**
  - Sunglasses
  - Hat
  - Sun Block
- **COLD ENVIRONMENTS**
  - Deck Boots
  - Light Clothing
  - Warm Hat
  - Jacket
  - Extra Sweatshirt
  - Gloves
  - Wind or Rain Protective Clothing
  - Wool Socks
  - Insulated Boots

# Dive Equipment Checklist

## Tools And Spare Parts

- Mask Straps & Chin Straps
- Snorkel Clips
- “O” Rings - Assorted
- Appropriate Lubricant/Grease
- Defog
- Extra Regulator Port Plugs
- Low and High Pressure Hoses
- Spare Regulator Mouthpiece
- Extra Batteries
- Extra Light Bulbs
- Clips and Buckles
- Weight Stops
- Allen Wrenches
- Adjustable Wrench
- Needle Nose Pliers
- Assorted Screw Drivers
- “O” Ring Pick
- Suit Shampoo
- Suit Hangers
- Duct Tape
- Zip Ties
- Surgical Tubing
- Knife

# Dive Equipment Checklist - Team Equipment

- First Aid Kit
- DAN Approved Oxygen Unit
- First Aid Manual(s)
- Dive Manuals, References, Handbooks
- Dive Tables, Records and Worksheets
- Clipboards
- Extra Pencils, Pens, Markers, and Paper
- Emergency Procedures and Information Sheet
- Team Spare Parts and Repair Kit
- Radio, Telephone Access, or Cellular Phone
- Appropriate Lights for Surface Use When Night Diving - and Associated Spare Parts
- Dive Timing Device
- Blanket
- Extra Fluids - Non-diuretic

# Common Diver Emergencies

- Mask Flooding
- Loss of Mask
- Flooded Regulator 2nd Stage
- Loss of Regulator Mouthpiece
- Loss of Gas Supply
- Inability to Equalize
- Loss of Buoyancy
- Uncontrolled BCD Inflation
- Scuba Cylinders Release
- Multiple Equipment Problem
- Muscle Cramp
- Fatigue Due to Overexertion
- Hypothermia
- Entanglement
- Lost / Separated Buddy
- Loss of Visibility
- Planned Depth Exceeded
- Planned Time Exceeded
- Caught in a Strong Current
- Injury While on the Dive
- Motion Sickness



*Always  
remember:*

**Any diver can call a dive  
at any time  
for any reason!**

# IANTD Recreational Logbook

## *Training Record*

- Course
- Location
- Certification Number
- Date
- Instructor



# IANTD Recreational Logbook

## *Personal Information*

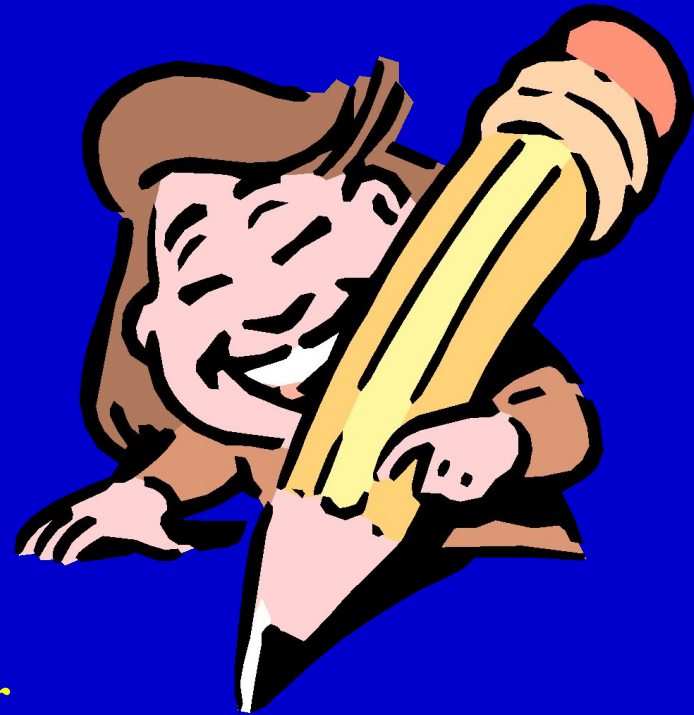
- Name
- Address
- Phone
- Height
- Weight
- Sex
- Birth Date
- Hair Color
- Eye Color



# IANTD Recreational Logbook

## *Medical Information*

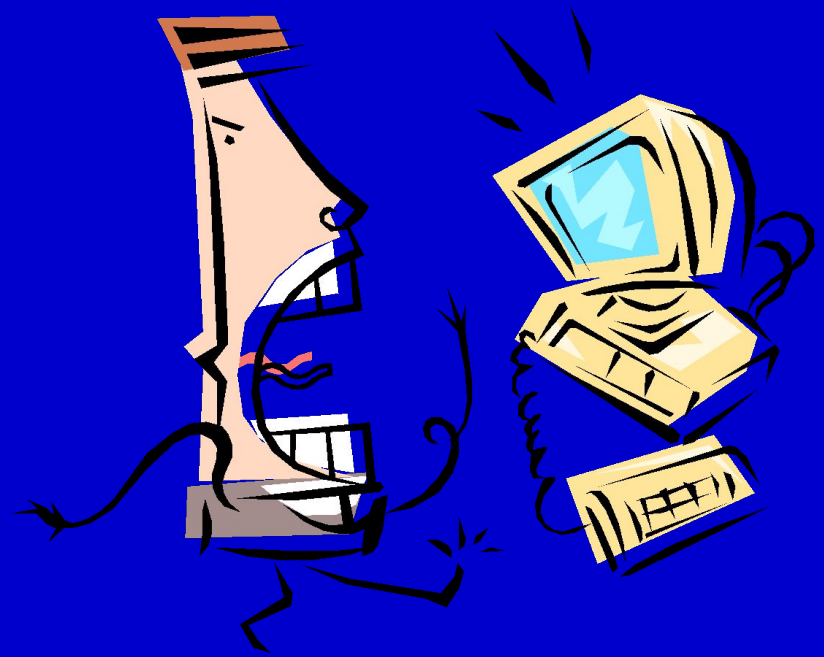
- Medications
- Drug Allergies
- Medical Conditions
- Blood Type
- Distinguishing Marks
- Physician
- Physicians' Phone
- Health Insurance Carrier
- Dive Insurance Carrier



# IANTD Recreational Logbook

## *Emergency Contact Information*

- Name
- Relationship to Diver
- Address
- City
- State Zip
- Country
- Phone
- Second Contact Information





# The IANTD Gas Management Planner

FSW	MSW	ATA	Mix %O <sub>2</sub>	PO <sub>2</sub>	Time	%CNS per minute	%CNS	UPTD OTU per minute	UPTDs OTUs	SCR	Gas Used psi /bar
0	0	1.00									
10	3	1.30									
15	4.5	1.45									
20	6	1.61									
30	9	1.91									
40	12	2.21									
50	15	2.52									
60	18	2.82									
70	22	3.12									
80	25	3.42									
90	28	3.73									
100	31	4.03									
110	34	4.33									
120	37	4.64									
130	40	4.94									
140	43	5.24									
<b>Totals: %CNS _____ UPTDs/OTUs _____ Gas _____</b>											

# IANTD Recreational Dive Log

## *Dive Information Page 2*

- Type of Dive Check Boxes
- Equipment
- Skills
- Instructor Signature



# IANTD Recreational Dive Log

## *Dive Planner Information Page 2*

- Gas
- Depth
- Actual Bottom Time
- Residual Bottom Time
- Total Bottom Time
- Surface Intervals
- Deco / Safety Stops
- % CNS Acquired During the Dive
- % Residual CNS
- Total % CNS at Dive End
- OTU's Acquired on the Dive
- Cumulative OTU's
- Total % CNS for Dive Day
- Total OTU's for the Dive Day

# Risk-Benefit Assessment

- Factors That Place Diver At Risk
  - Environment
  - Buddy
  - Inadequate Equipment
  - Emotional Discomfort
  - Unknowns
- “Is The Pleasure Or Benefit That I Will Derive From This Dive Worth The Risks?”

# Pre-Dive Checklist

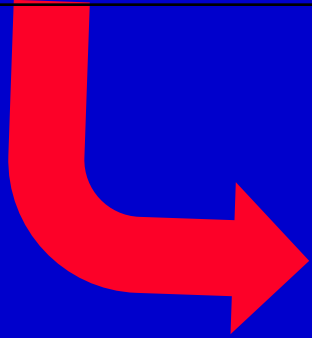
- Mask in Place and Strap Secured
- Snorkel in Place and Secured
- Air Turned On
- Adequate Cylinder Pressure
- BCD Harness Properly Adjusted
- Inflator Hoses in Place and Connected
- Cylinder Secured and Labeled
- 2nd Stages Properly Positioned
- Environmental Suit Zipped
- Weights Secured
- Dive Knife in Reach
- Boots Zipped
- Fins Secure
- Instrumentation Visible:
  - Dive Computer
  - SPG
  - Depth Gauge
  - Dive Timer

# In Water Checklist

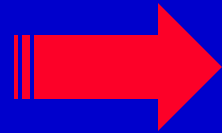
- Check and Record Gas Pressures
  - Start Pressure
  - Turn Pressure
- Bubble Check
  - Valves
  - Hoses
  - First Stages
  - Second Stages
- BCD Inflation and Deflation
- Dry Suit Inflation and Deflation
- Mask Position and Seal
- Dive Lights
  - Primary
  - Secondary
- Breathe Off All Regulators While Slightly Submerged and Check for Proper Function
- Share Air Drill
  - First Dive of the Day
  - New Dive Buddy
- Make Sure Dive Computer Is Activated or Record Time From Watch

# Advanced Dive Planning

Determine Dive Objective  
Where, When, With Who



Plan the Fundamentals  
(Using Dalton's Law)



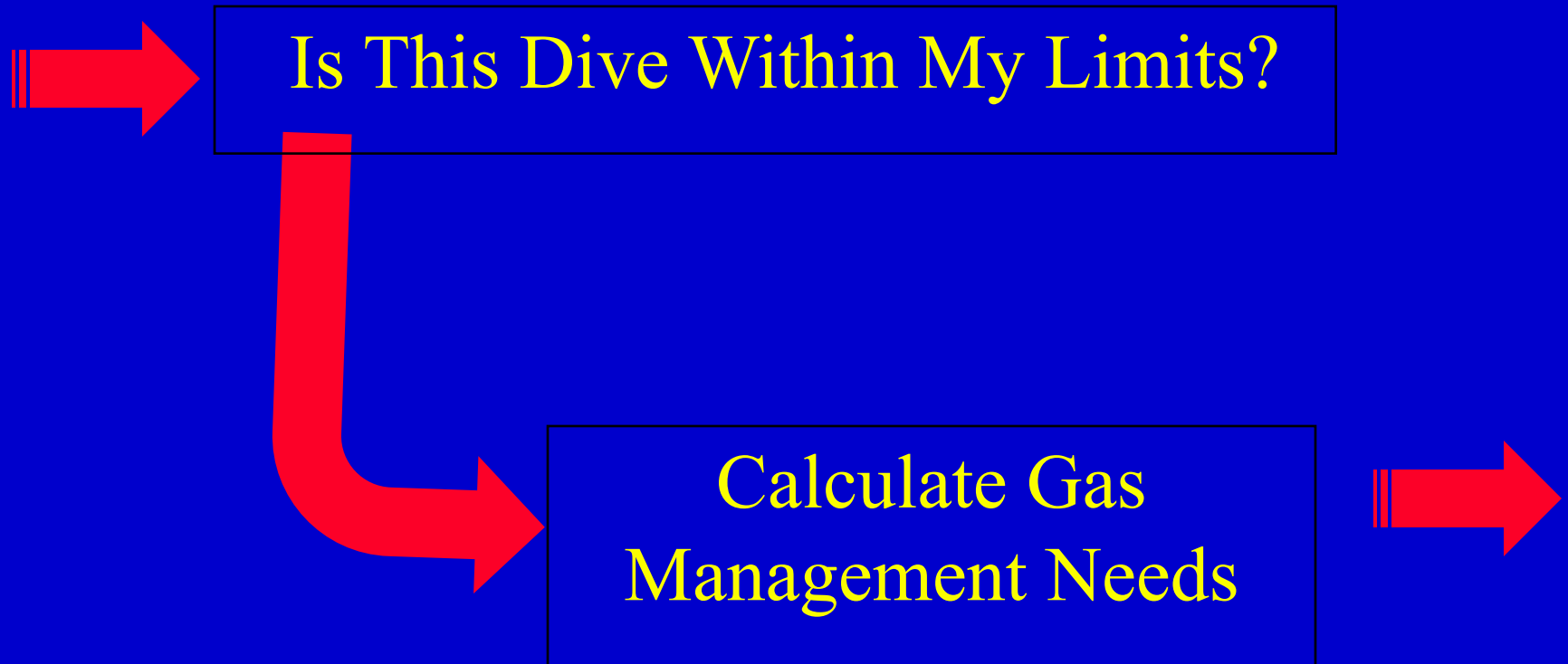
# Advanced Dive Planning

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graph LR; A[Determine Bottom Times And Decompression Requirements] --> B[Balance Oxygen Exposure];
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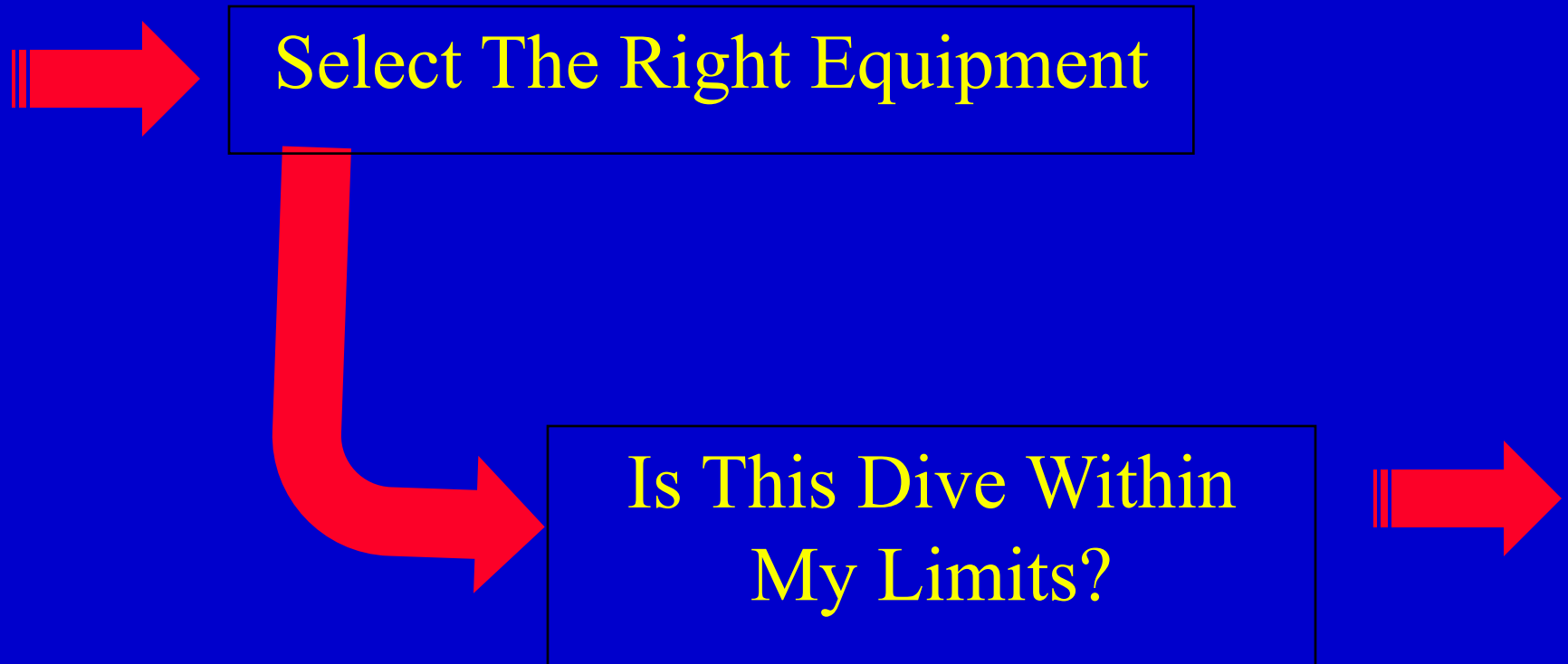
Determine Bottom Times  
And  
Decompression Requirements

Balance Oxygen  
Exposure

# Advanced Dive Planning

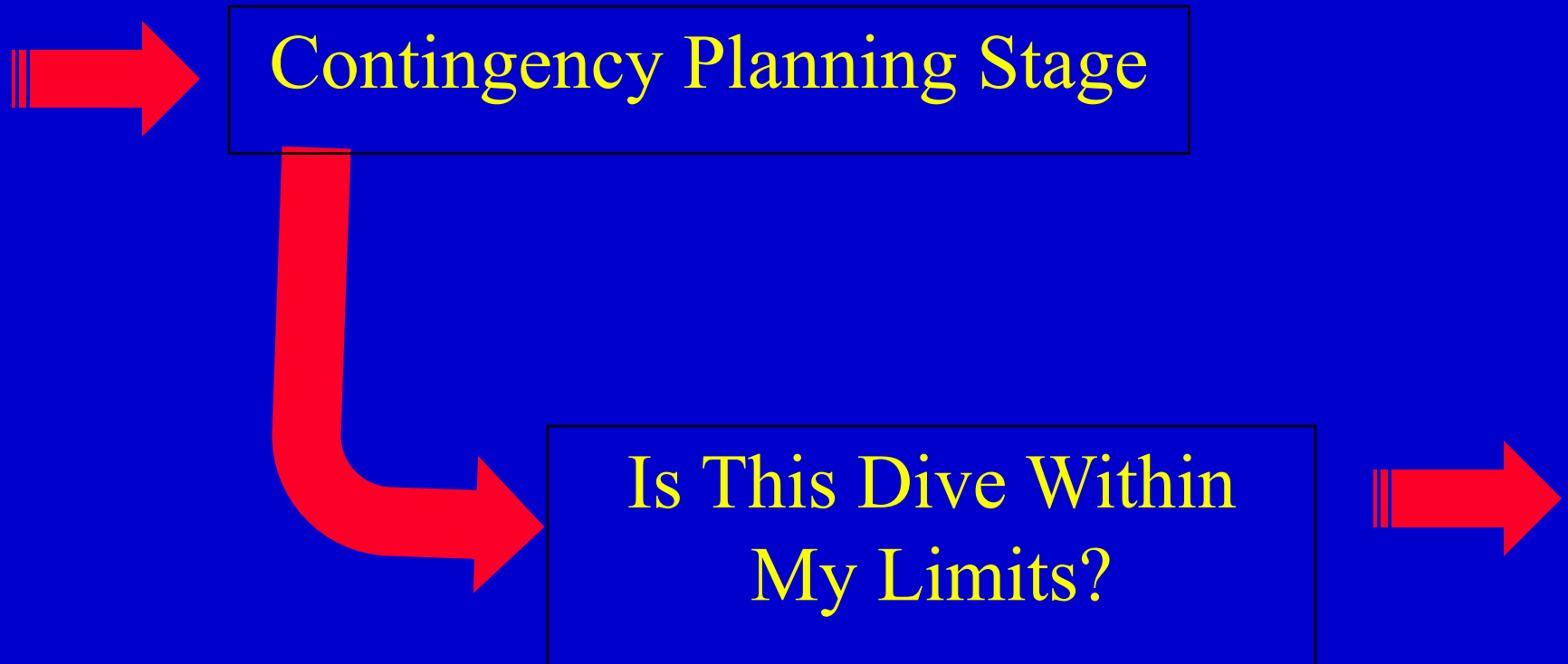


# Advanced Dive Planning

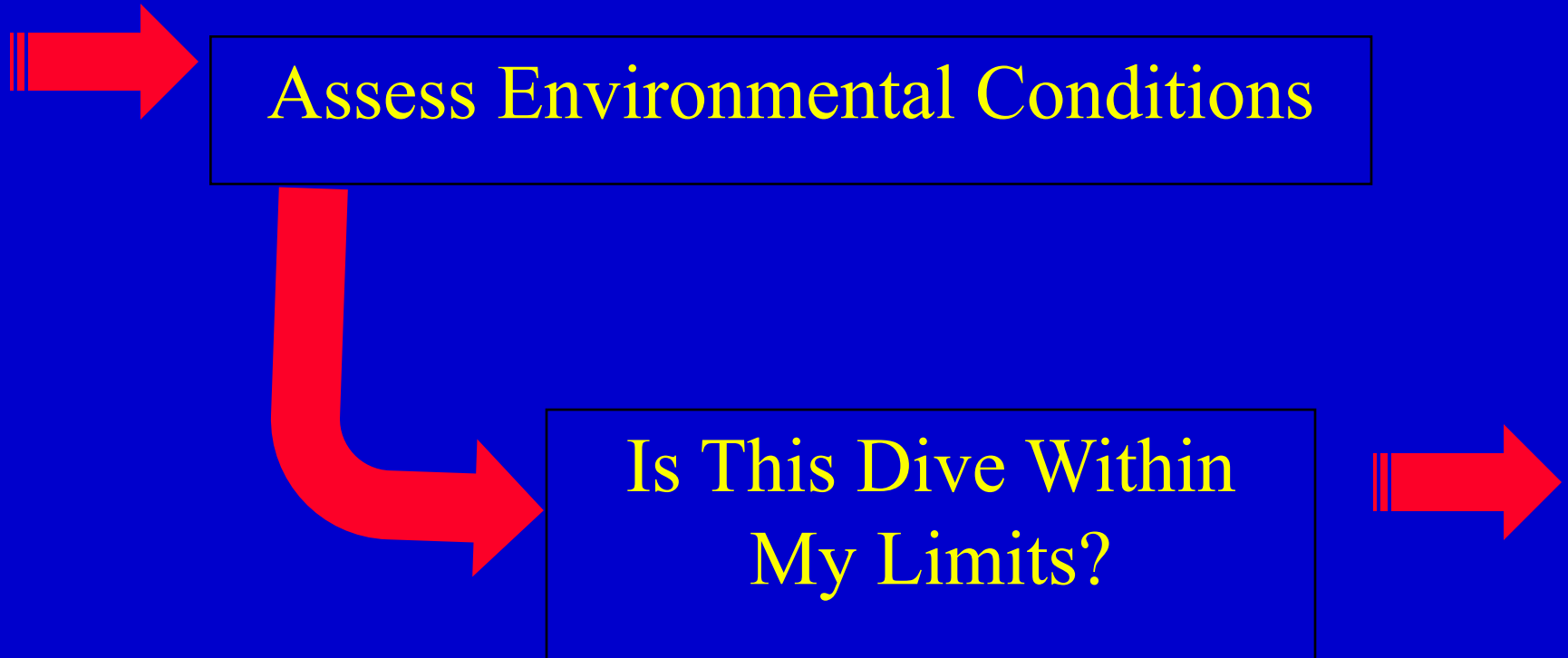




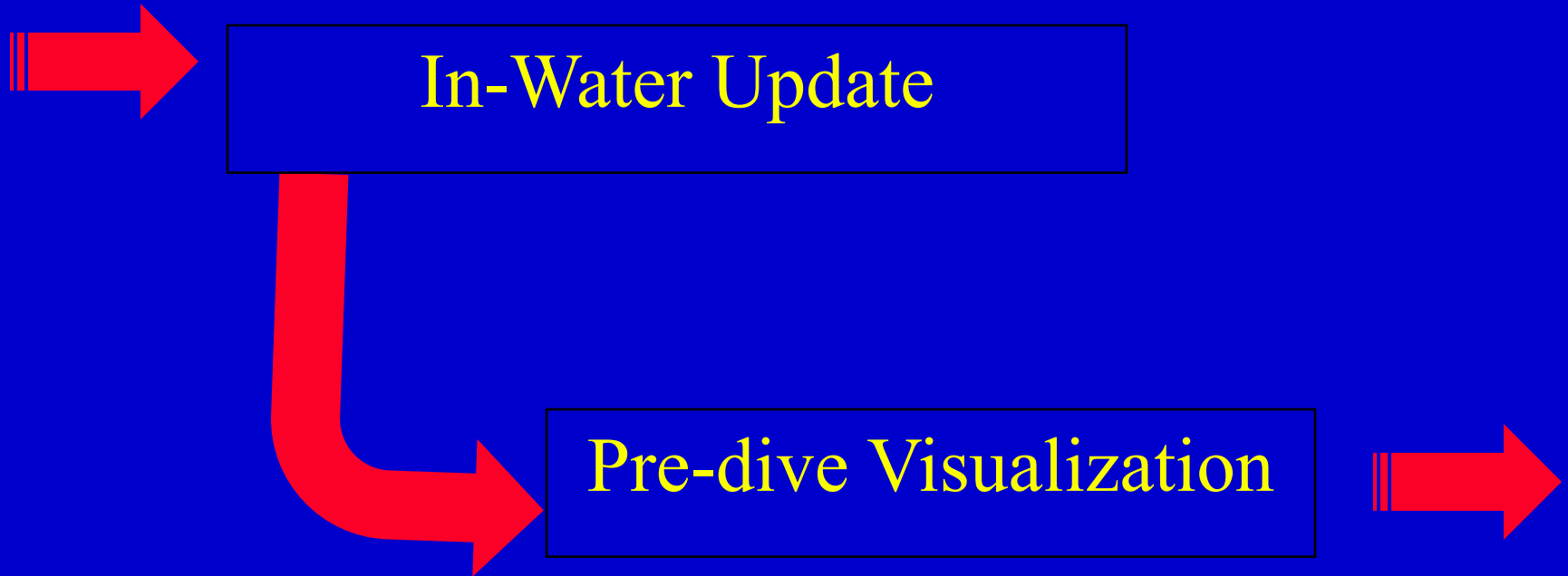
# Advanced Dive Planning



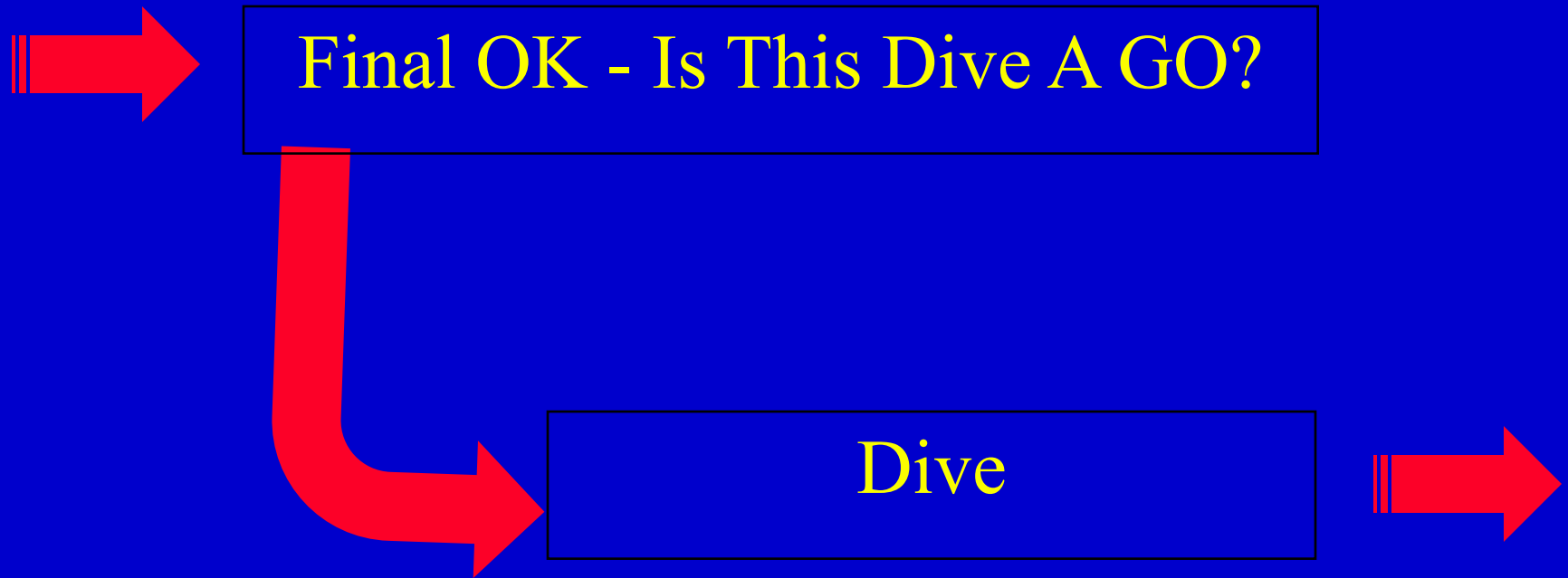
# Advanced Dive Planning



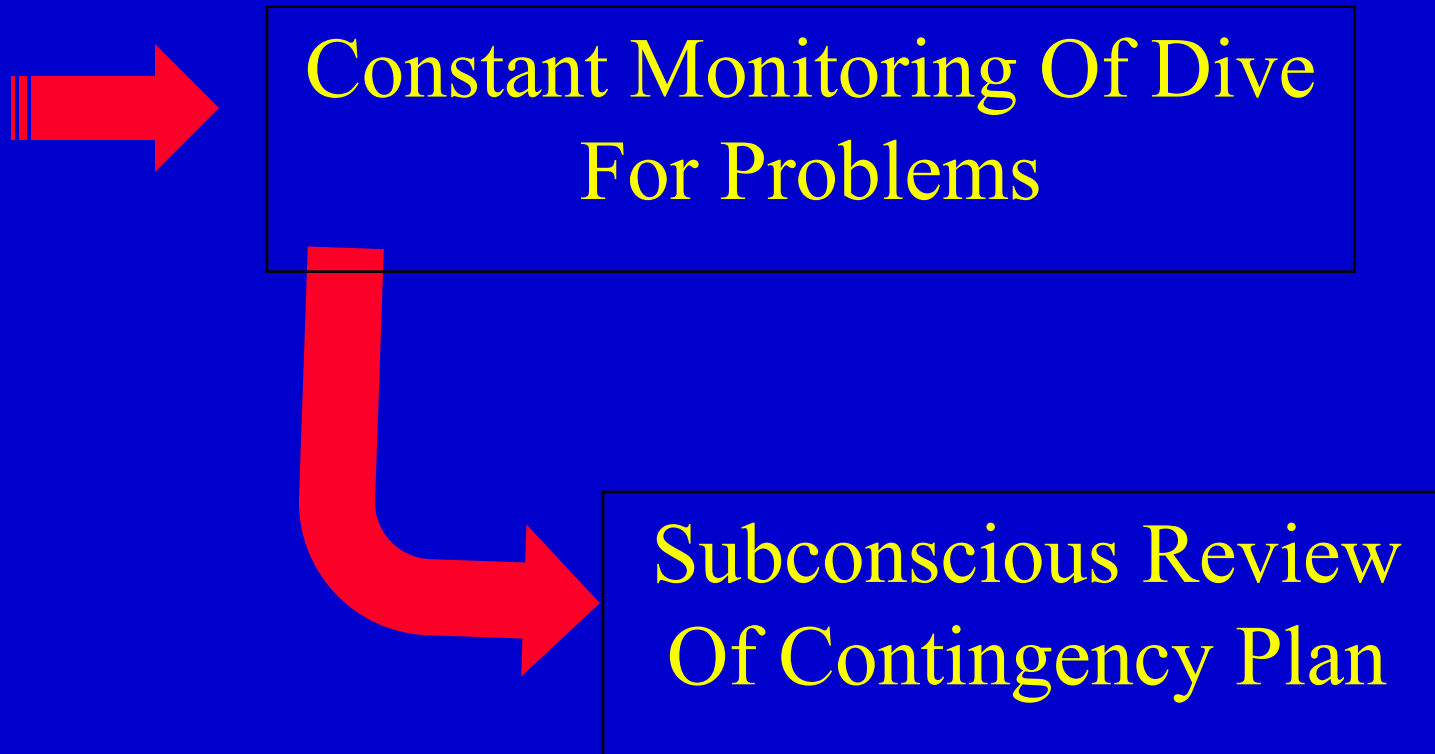
# Advanced Dive Planning



# Advanced Dive Planning



# Advanced Dive Planning



# Chapter 2

## Diving Deeper

### The 60-90 fsw (18-27 msw) Range

# Equipment Requirements

- *The Cylinder: Must Supply an Adequate Amount of Gas for the Planned Depth and Time of the Dive, Using the Appropriate Gas Management Rule: 1/2 + 200 Psig (14 Bar) Is Minimum Reserve.*
- The Regulator:
  - Dependable
  - High Flow Rate for Deeper Depths
  - Well Maintained
  - Low Inhalation Effort
  - Low Exhalation Effort

# Equipment Requirements

- The Dive Instrumentation:

*Accurate*

*Easy to Read*

*Easily Accessible*

- Submersible Pressure Gauge
- Depth Gauge
- Bottom Timer
- Dive Compass
- Temperature Gauge
- Dive Computer





# Equipment Requirements

- The Buoyancy Control Device
  - Adequate Lift Capacity for Dive Equipment
  - Must Have Proper Fit
  - Easy Inflation / Deflation
  - Clips/“D” Rings for Attachment of Accessories
- The Environmental Protection - Wetsuit or Drysuit
  - Must Provide Adequate Thermal Protection
  - Greater Protection Needed:
    - Longer and/or Deeper
    - Thermoclines

# Specialty Equipment Requirements

- Night Diving
  - Primary Light
  - Secondary Light
  - Dive Marker Light(s)
- Limited Visibility
  - Dive Lights: Same As Above
  - Cavern/Wreck Reel
  - Lift Bag (50 Lb. / 22.5 Kg)
- Basic Underwater Navigation
  - Underwater Compass
  - Dive Slate
- General Configuration Accessories
  - Clips
  - Tie Bands
  - Surgical Tubing
  - Rings: Split & Standard
  - Quick Release Buckles
  - “D” Rings
  - “D” Ring Holders
  - Stage Bands

# Equipment Configuration Criteria

- **Streamlined**
- **Low Drag**
- **Reliable**
- **Easy Access**
- **User Friendly**
- **Logical**
- **Self Rescue and Recovery Capable**
- **Simple**
- **Balanced**

# Risk Factors for Decompression Sickness

- Dehydration
- Obesity
- Alcohol Consumption
- Flying After Diving
- Physiological Aging
- Physical Exertion
- Carbon Dioxide Buildup
- Fatigue
- Improper Diet
- Hypothermia
- Hyperthermia
- Altitude
- Lack of Sleep
- Injuries
- Forceful Movements
- Quick Ascents
- Tight Equipment
- Ascent w/o Safety Stop
- Inaccurate Gauges
- Poor Cardiovascular Shape
- Poor State of Health
- Deco w/o Proper Training
- Deco on Air
- Certain Drugs

# Reducing the Risk of DCS/DCI

- Hydrate
- Ascend Slowly
- Safety Stop of 3-5 Minutes @ 15 fsw (4.5 msw)
- Avoid NDL's by 5 Min.
- Good Cardiovascular Shape
- Plenty of Rest
- Avoid Flying 12-24 Hrs. After Dive
- Maintain Proper Body Weight
- Proper Breathing Pattern
- Practice Skills
- Over-learn Skills
- Excellent State of Health
- Deeper to Shallower Profile
- Avoid Hot Baths After Dive
- Check With DAN Any Medications You May Have
- Plan for Altitudes
- Check Gauges for Accuracy
- Service BCD Annually
- Service Regulator Annually
- Avoid Heavy Exercise

# Reducing the Risk of DCS/DCI

## *Continued*

- **Avoid Alcohol at Least 12 Hours Before and After Dive**
- **Gradually Warm After Dive**
- **Don't Smoke**
- **Continue Your Dive Education**
- **Stay Informed About DCS**
- **Dive Conservatively**
- **Take Longer Surface Intervals**
- **Get Certified In and Use EANx**
- **Eat a Balanced and Low-fat Diet**
- **Stay Warm While at Depth - Wear Adequate Thermal Protection**
- **Wear Properly Fitting Equipment**
- **Have Regular Physicals**
- **Update Your Knowledge: *IANTD Nitrox Diver Magazine* Subscription**

# Type I Decompression Sickness

## By Category And Symptoms

- Muscular/Skeletal DCS

- Pain in the Joints
  - Limb Pain
  - Irritation
  - Soreness
  - Swelling
  - Flu-like Malaise
  - Unusual Fatigue
  - Lesions in Bone Tissues
- Only Detectable by X-ray

- Skin DCS

- Rash
- Discoloration
- Itching

- Lymphatic DCS

- Edema
- \* Limbs
- \* Face
- \* Hands
- \* Feet
- \* Joints

# Type II Decompression Sickness By Category And Symptoms

- Neurological DCS - Cerebral & CNS

- Lack of Strength
- Lack of Sensation
- Paralysis
- Unusual Fatigue
- Tunnel or Blurred Vision
- Dizziness
- Disorientation
- Headache
- Auditory Abnormalities
- Loss of Bladder Control

- Loss of Bowel Control
- Encircling Girdle Pain
- Loss of Consciousness
- Convulsions

- Cardiovascular/Pulmonary DCS

- Dry Unproductive Cough
- Rapid Shallow Breathing
- Substernal Pain
- Shock
- Cardiovascular Collapse



# Decompression Sickness

## First Aid

- **Check:**
  - **Airway**
  - **Breathing**
  - **Circulation**
- **Be Trained in CPR**
- **Activate the EMS and Have:**
  - **Emergency Phone Numbers**
  - **Emergency Radio Frequencies**
  - **A Cellular Phone**
- **Administer 100 % Oxygen**
  - **Be Sure You Get Certified in an IANTD/DAN Oxygen Provider Course**
- **Administer Non-diuretic Fluids - Stop If There Is An Indication of Fluid Retention**
- **Call the Divers Alert Network (DAN):**  
**(919) 684-8111**

# Contributing Factors To Nitrogen Narcosis

- **High Gas Consumption Rates**
- **Depths Below 60 fsw (18 msw)**
- **Cold**
- **Limited Visibility**
- **Darkness**
- **Exertion at Depth**
- **Anxiety**
- **Loss of Orientation**
- **Carbon Dioxide Buildup**
- **Fatigue**
- **Task Loading**
- **Rapid Descent**
- **Predisposing Psychological Outlook**
- **Lack of Sleep**
- **Certain Medications and Drugs**
- **Lack of Deep Diving Experience**

# Symptoms of Nitrogen Narcosis

- Relaxation
- Light-headedness
- Slowed Response
- Feeling of Well-being
- Euphoria
- Giddiness
- Errors in Judgement
- Time Distortion
- Deterioration of Fine Dexterity
- Fixation of Ideas
- Inability to Multi-task
- Numbness
- Tingling Sensation
- Confusion
- Sleepiness
- Inability to Remember
- Semi-consciousness
- Distorted Memory of Dive
- Inability to Perform Well on Conceptual Reasoning Tasks
- Visual and Auditory Hallucinations
- Unconsciousness

# Nitrogen Narcosis

## Management Techniques

- ◆ **Get Proper Training for the Depths at Which You Intend to Dive**
- ◆ **Never Exceed the Maximum Depth to Which You Are Certified and Feel Comfortable at**
- ◆ **Get Training for Specialized Environments (Cave, Wreck, Ice, Cavern, Etc.)**
- ◆ **Get Training in the Use of Special Gasses for Deep Diving (Trimix)**
- ◆ **Descend Slowly - 30 Feet (9 Meters) Per Minute**
- ◆ **Get Plenty of Rest Before the Dive**
- ◆ **Keep the Pre-dive As Well As the Dive As Stress Free As Possible**
- ◆ **Visualize the Dive**
- ◆ **Keep Dive Objectives as Simple As Possible Until You Gain Plenty of Experience at Depth**
- ◆ **Avoid Diving If You Feel Apprehensive**
- ◆ **Over-learn Your Dive Skills**

# **Nitrogen Narcosis Management Techniques**

- ◆ **Maintain Visual Orientation During the Dive**
- ◆ **Wear Appropriate Protection to Keep Warm During the Dive**
- ◆ **Keep Multiple Tasking to a Minimum**
- ◆ **Don't Consume Alcohol Within 12 Hours Either Side of a Dive**
- ◆ **Check With DAN on Their Information Number (919-684-2948) Before Diving on Any Type of Medication – Even Over-the-Counter Medicines**
- ◆ **Listen to Your Intuition**
- ◆ **Stay in Good Cardiovascular Condition**
- ◆ **If You Haven't Been Diving for a While, Work up to Deeper Depths**
- ◆ **Abort Any Dive You Feel Apprehensive About**
- ◆ **Have a Regulator Which Will Provide Low Breathing Resistance**
- ◆ **Dive With a Buddy You Feel Comfortable With and Who Has Proper Training, Equipment and Experience to Dive to the Depths of Your Dive Plan**

# Hypothermia

**Hypothermia Is a Major Concern  
For Divers Venturing Below  
60 fsw (18 msw)**

# Dressing To Keep Warm

- Wetsuit and Components
  - Insulation Is Decreased With Increasing Depth
  - Thicker Suits for Deeper, Longer & Colder Dives
  - Components:
    - Hood - Short and Long Bib
    - Hooded Vest
    - Gloves
    - Mitts
    - Spine Pads
    - Kidney Pads
- Drysuit and Components
  - Insulation Stays Constant Via Trapped Gas
  - Argon As Inflation Gas Increases Insulation Factor
  - Components:
    - Undergarment Can Provide Various Degrees of Insulation
    - Wet and Dry:
      - Hoods
      - Gloves
      - Boots

# Other Methods To Keep Warm

- Active Heating Systems - Can Be Found for Both Wet and Dry Suits.
- Dressing Properly on the Surface
  - Wear a Good Insulating Hat
  - Have an Extra Jacket or Sweatshirt of Appropriate Thickness
- A Diet for Keeping Warm
  - Stay Hydrated
  - Complex Carbohydrates Provide Steady Burn Fuel
  - Proteins Help Turn up the Metabolic Thermostat



# First Aid For Hypothermia

- **Get the Diver Out of the Water**
- **Place Them in a Sheltered, Warm Environment Out of the Wind**
- **Have Them Dress in Dry Warm Clothing**
- **Give Warm (Not Hot) Fluids**
- **Re-warm Gradually – Too Rapid of a Re-warming Process Can Be Extremely Dangerous**
- **Activate the Emergency Medical System (EMS) - Get Medical Help**
- **Monitor Vital Signs**
- **If CPR Is Needed And/or Drowning Is Involved, Don't Give up Because There Have Been Cases of Revival Even After an Hour or More of Submersion**

# Hand Signs For Diver

## Communication

- Yes
- No
- Question “?”
- Slow Down
- Hurry up ... Pickup the Pace
- Do You Understand?
- I Understand
- I Don't Understand
- Which Way?
- Go This Direction
- Where's the Boat?
- Where's the Ascent Line?
- Where's the Exit?
- Ascend to \_\_\_\_\_ Depth (Know the Proper Hand Signals for Numbers)
- I Am Experiencing Narcosis
- Something Is Wrong
- Ok?
- Okay!
- Sign Again – Repeat
- I'm Bent
- Air Leak - Bubbles
- Descend
- Terminate the Dive – Abort
- Level off at This Depth

# Gas Management

## The $\frac{1}{2} + 200$ PSIG (14 Bar) Rule:

This rule is employed in open water environments where there are no obstructions above the diver such as cavern, wreck or ice. It is used only on dives where no decompression stops are required: “no-stop dives”. It is used only on dives shallower than 130 fsw (40 msw). In most cases the Advanced Open Water Diver will use this rule as their turn pressure.

### **Imperial Example: 3500 psig Starting Pressure:**

- $3500/2 = 1750 + 200 = 1950$  psig
- Rounded up = 2000 psig Turn Pressure

### **Metric Example: 240 bar Starting Tank Pressure:**

- $240/2 = 120 + 14 = 134$  bar Turn Pressure

# Gas Management

## Formula for Determining Surface Air Consumption Rate or SAC:

- SAC = Surface Air Consumption: Either As psig Per Minute or bar Per Minute
- AC = Air Consumed in psig
- T = Time at Depth in Minutes
- ATA = Average Depth of the Dive Expressed in Atmospheres Absolute

**FORMULA: SAC = AC / (ATA x Time)**

# Gas Management

## Formula for Determining Respiratory Minute Volume or RMV

- RMV = Respiratory Minute Volume in Cubic Feet Per Minute or Free Liters Per Minute
- SAC = Surface Air Consumption: Either Expressed As psig Per Minute or bar Per Minute
- CWP = Cylinder's Rated Working Pressure in psig or bar
- CV = Cylinder Volume At Working Pressure (Amount of Total Gas When Released at 1 ATA)

**FORMULA:  $RMV = (SAC \times CV) / CWP$**

# Lift Bag

## Emergency Procedures

- Equipment Requirements
  - Lift Bag of 50 lb. (22.5 kg) Lift Capacity
  - Cavern/Wreck Reel With 150 ft (45 m) of Line
- Emergency Deployment Situations:
  - Disorientation
  - Narcosis
  - Vertigo
  - Lost Ascent Line
  - Lost Anchor Line

# Chapter 3

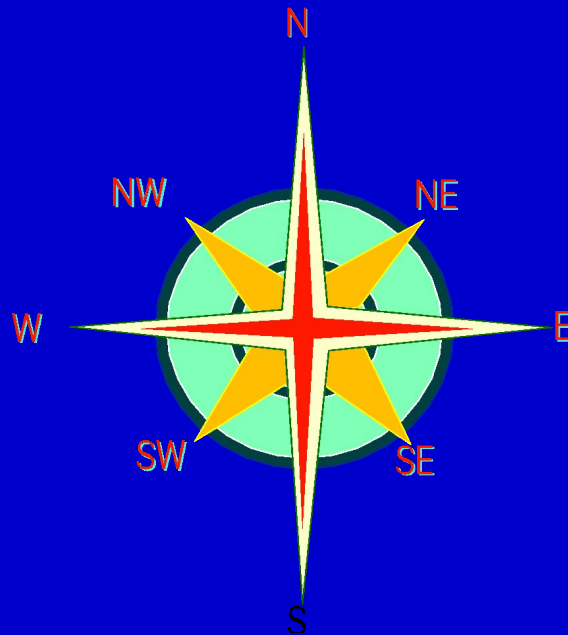
## Limited Visibility And Night Diving

# Limited Visibility Diving

## Limited Visibility Diving

requires good basic navigation skills!

Requires good basic navigation skills!





# Causes Of Limited Visibility

- **Sediment**
  - Sand
  - Mud
  - Clay
- **Biological Activity**
  - Decaying Organic Matter
  - Plants High in Tannic Acid
  - Animal Life
  - Plant Life
- **Water Movement**
  - Tidal Influence
  - Current
  - Aeration
  - Seasonal Turnover
- **Diver Activity**
  - Many Divers on Site
  - Poor Buoyancy Control
  - Poor Finning Technique

# Added Risks Of Limited Visibility

- **Buddy Separation**
- **Entanglement**
- **Psychological Stress**

## The Keys To Risk Management

[ **Quality Training**

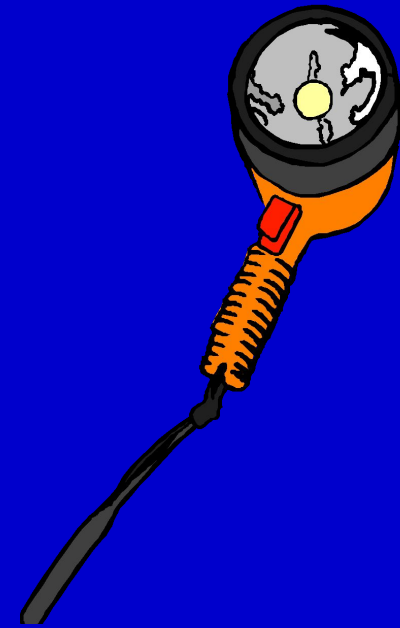
[ **Sound Dive Skills and Techniques**

[ **Proper Equipment**

[ **Experience**

# Equipment For Limited Visibility

- **Lights**
- **Compass**
- **Cutting Device**
- **Reel**
- **Buddy Line**
- **Lift Bag and Up Reel**
- **Ultrasonic Locator (Optional)**



# Planning Limited Visibility Dives

- **Standard Dive Plan**
- **Environmental Assessment**
- **Dive Objectives**
- **Risk Assessment**
- **Dive Abort Agreement**

# Maintaining The Buddy System

- **Commitment and Slow Movement**
- **Physical Contact**
- **Buddy Line**
- **Emergency Procedure for Buddy Separation:**
  - **Remain Calm**
  - **Look and Listen for Your Buddy**
    - **Bubbles**
    - **Light**
  - **Surface and Reunite**
  - **Mark Location If Buddy Doesn't Surface**

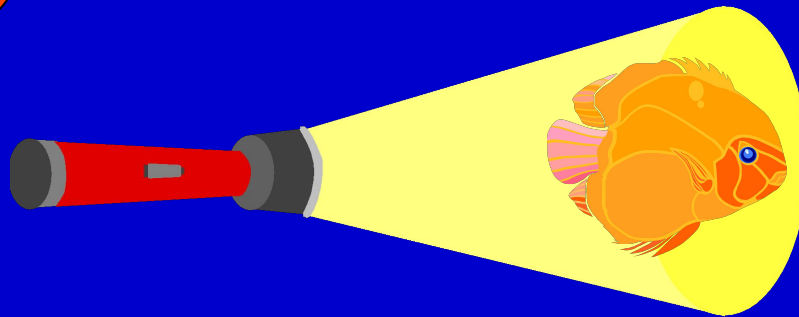
# The Descent And Bottom Phase

- **Use a Descent/Ascent Line**
- **Descend Feet First and Head up**
- **Break Your Descent**
- **Get Organized Before Leaving the Line**
- **Check Buoyancy**
- **Employ Proper Navigation**
- **Use Anti-Silting Technique**
- **Hold Your Light Out From Your Body**
- **Maintain Your Orientation:**
  - **Watch Your Bubbles**
  - **Use a Little Water in the Mask As a Level**
  - **Trust Your Compass**
  - **Check Your Depth Gauge**

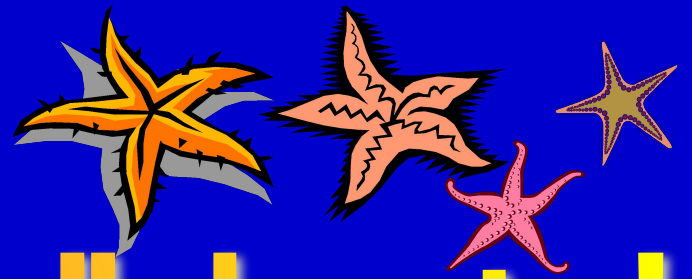
# The Ascent

- **Use Proper Air Management**
  - **1/2 + 200 Rule Is Minimum**
- **Use an Ascent Line**
- **If You Can't Find The Ascent Line,  
Use Your Reel and Lift Bag**
- **Beware of Overhead Objects**
- **Clean Up**

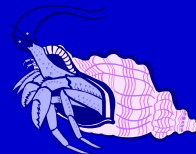
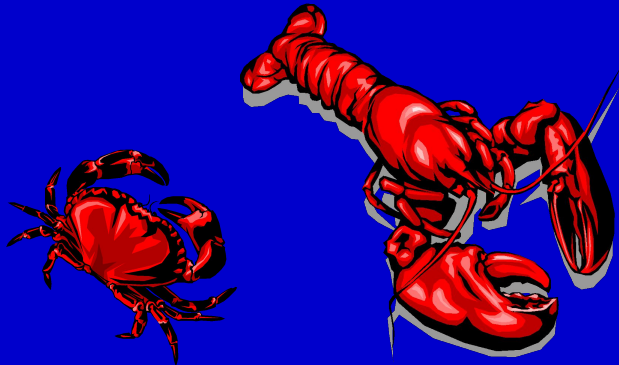
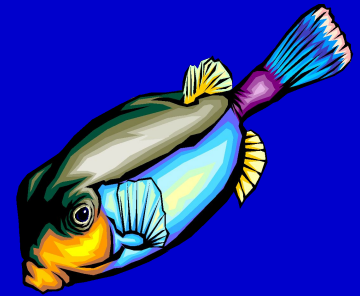
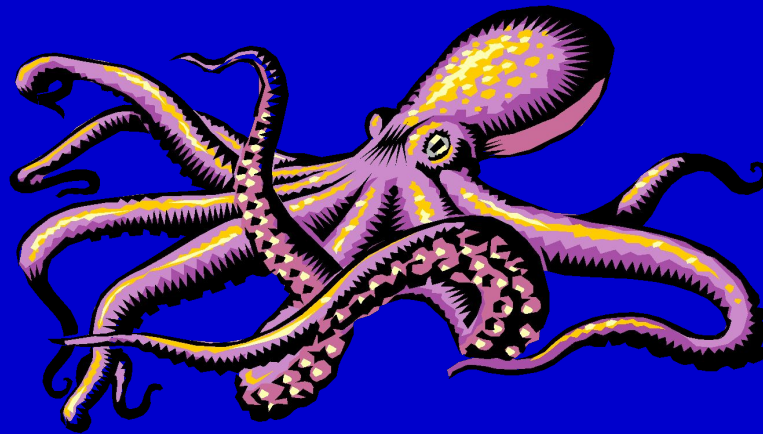
# Night Diving







# Night is a Magical Time Underwater!

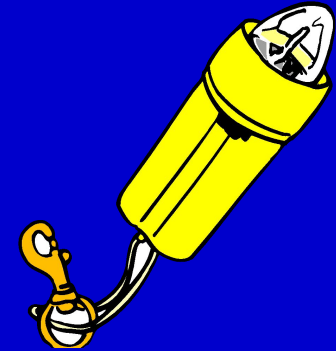


# Reconnaissance Information To Gather For A Night Dive

- > **Compass Headings and Distance From the Point of Entry to the Site**
- > **Compass Headings and Distance From the Site to Your Point of Exit**
- > **Distinctive Landmarks That May Be of Help for Surface Swims at Night - Pay Special Attention to Those That Might Be Illuminated**
- > **Natural Features and How They Are Configured on the Site in Relation to Each Other**
- > **Depths at the Dive Site**
- > **When in Areas Effected by Tides, Try to Dive the Site in the Daytime Under the Same Tidal Conditions**
- > **Make Note of the Marine Life**
- > **Investigate Any Potential Hazards On or Near the Dive Site**

# Equipment For Night Diving

- **The Primary Light**
- **The Secondary Light**
- **Dive Marker Lights**
  - **Chemical Light Sticks**
  - **“Standard” Lights**
  - **Dive Strobe**
- **Dive Control Marker Lights**
  - **Surface Dive Control Marker Lights**
  - **Underwater Dive Control Marker Lights**
- **Boat or Shore Lights**
  - **Boat Lights**
  - **Shore Lights**



# Equipment For Night Diving

- **Bulbs for Underwater Lights**
  - **Standard Vacuum Bulbs**
  - **Rare / Inert Gas Bulbs**
  - **Experimental Bulbs**
- **Batteries for Underwater Lights**
  - **Disposable**
    - **Carbon-zinc**
    - **Alkaline**
    - **Disposable Lithium**
  - **Rechargeable**
    - **Gel Cell**
    - **NiCad**
    - **Lithium-ion**
- **Beam Angle**
  - **Fixed Beam Angle**
  - **Dual Beam Bulb**
  - **Changeable Beam Angle**
  - **Adjustable Beam Angle**
- **Other Features to Check**
  - **Buoyancy**
  - **Battery Pack**
  - **Burn-time**
  - **Candlepower**
  - **Depth Rating**
  - **Grip Type**
  - **Size**
  - **Warranty**

# Caring For Your Dive Light

- ✓ **Rinse Your Light in Clean Fresh Water After Each Dive Dry the Exterior Surfaces**
- ✓ **Open the Light and Check for Moisture**
- ✓ **Remove the Batteries and Care for in the Appropriate Manner**
- ✓ **Clean Any Sand, Silt, or Debris From the Casing and Screw-down Threads With a Soft Brush**
- ✓ **Check All Electrical Connections and Clean If Needed**
- ✓ **Check All O-rings - Clean Them by Wiping Lightly With a No Lint Soft Cotton Cloth - Coat With a Very Light Coat of Silicone**
- ✓ **If Your Light Has a Hydrogen Absorbing Catalyst Inside, Make Sure It Is Dry - If It Gets Wet, Replace It**

# Selecting A Site For Night Diving

- All Criteria for Selecting a Day Dive Site Should Apply
- This Should Be a Site You Have Been on During Daylight
- Make Surface Swim Moderate or Slow
- Site Should Have Limited Wave and Current Activity
- Easy and Safe Access
- Free of Surface Traffic
- Good Surface and Underwater Visibility
- Good Navigational Features
- Good Anchorage or Staging Area
- Interesting Features and/or Marine Life

# Night Diving - The Pre-Dive

- **Site Selection**
- **Arrival and Setup**
- **Your Dive Buddy**
- **Special Light Signals**
  - **“OK”**
  - **“Help” - “Attention” - “Emergency”**
- **Swim Area**
- **Emergency Plan**
- **Time Schedule**
- **Marker Lights**
- **Refined Navigation Techniques**
- **Air Management**
- **Surface Float Option**
- **Dive Marker Lights**

# Night Diving - Descent Phase

- **Use a Descent Line**
- **Check Descent Marker Light**
- **Stop Descent Above the Bottom**
  - **Check Buoyancy**
  - **Check Your Breathing**
  - **Check Your Air Supply**
  - **Check Your Buddy**
  - **Get Horizontal**



# Night Diving - Ascent Phase

- **Return to the Ascent Line**
- **Signal Your Buddy**
- **Stay Together**
- **Perform a Safety Stop**
  - **3-5 minutes @ 15 fsw (4.5 msw)**
- **Signal Surface Support**
- **Exit the Water**

# Twilight Diving

- **Arrive at Dive Site Before Dark**
- **Complete All Planning and Preparation Well Before Dark**
- **Deploy Just As Sun Goes Down**
  - **First 1/3 of Dive in Low Ambient Light (Twilight)**
  - **Become Familiar With Area**
- **Last 2/3's of Dive in Darkness**
- **Surface at Predetermined Location in Darkness**

# Chapter 4

## Basic Underwater Navigation

# The Value Of Underwater Navigation

- **Finding Your Dive Site**
- **Safer Dive Profiles**
- **Avoiding Hazards**
- **Lower Stress Levels**
- **Allows the Diver to Take the Most Direct Route**

# Navigation By Natural Features

- Water Movement
  - Prevailing Currents
  - Surge
- Bottom Striations
- Underwater Vegetation
- Aquatic Animal Life
- Reef Structures
- Sunlight

# Calculating Travel Distance And Swim Speed Kick Cycle Method

- This Method Measures the Diver's Swim Speed and Distance Traveled by the Distance He/She Travels Per Complete Kick Cycle

## *Example (Metric):*

- A Diver With the Swim Rate of 0.95 Meters Per Kick Cycle Wishes to Swim 150 Meters From Shore to a Reef. Assuming There Is No Current, What Will Be the Number of Kick Cycles Required Accomplishing This Task?
  - $150 \text{ Meters} / 0.95 \text{ Meters Per Kick Cycle} = 158 \text{ Kick Cycles}$

# Calculating Travel Distance & Swim Speed Timed Swim Speed Method

- This Method Measures the Diver's Swim Speed and Distance Traveled by the Distance She/He Travels Per Minute

## *Example (Metric):*

- It Takes a Diver 6 Minutes 30 Seconds to Complete a 100-meter Course. What Is the Diver's Swim Speed?
  - $100 \text{ Meters} / 6.5 \text{ Minutes} = 15.4 \text{ Meters Per Minute}$

# The Time, Distance, Rate Formula

- **The Variables for This Formula Are:**
  - **$D = \text{Distance}$     $R = \text{Rate}$     $T = \text{Time}$**
- **This Formula Is Usually Expressed As:**
  - **$D = R \times T$**

*Example: (U.S.):*

- **A Diver With a Swim Rate of 15 Yards Per Minute Swims a Direct Course Out From the Beach for 10 Minutes. Assuming There Is No Current, How Far Did the Diver Swim?**
  - **$D = 15 \text{ Yards Per Minute} \times 10 \text{ Minutes}$**
  - **$D = 150 \text{ Yards}$**

*Example (Metric):*

- **A Diver With a Swim Rate of 16.5 Meters Per Minute Swims a Direct Course Out From the Beach for 17 Minutes. Assuming There Is No Current, How Far Did the Diver Swim?**
  - **$D = 16.5 \text{ Meters Per Minute} \times 17 \text{ Minutes}$**
  - **$D = 280.5 \text{ Meters}$**



# The Time, Distance, Rate Formula

## Determining Rate

$$R = D/T$$

*Example: (U.S.):*

- **A Diver Swam a 150-yard Course in 8 Minutes. What Was the Diver's Swim Rate?**
  - **R = 150 Yards / 8 Minutes**
  - **R = 18.75 Yards Per Minute**

*Example: (Metric):*

- **A Diver Swam a 120-meter Course in 11 Minutes. What Was the Diver's Swim Rate?**
  - **R= 120 Meters / 11 Minutes**
  - **R = 10.9 Meters Per Minute**

# The Time, Distance, Rate Formula

## Determining Time

$$T = D/R$$

*Example: (U.S.):*

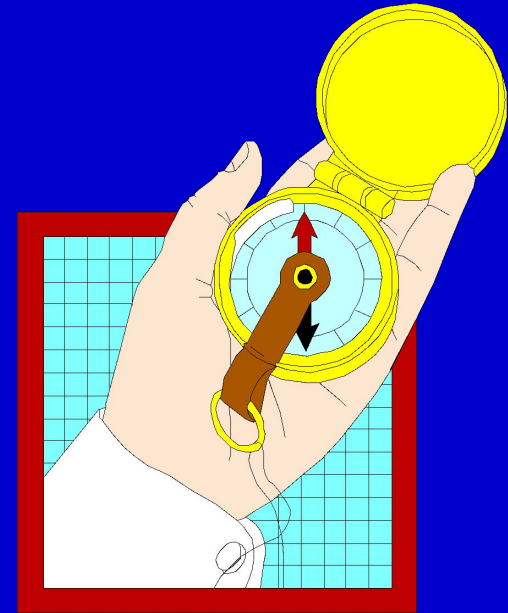
- A Diver Wishes to Swim North on a Reef for 200 Yards. His Swim Rate Is 14 Yards Per Minute. Assuming There Is No Current, How Long Will It Take Him/Her to Make This Swim?
  - $T = 200 \text{ Yards} / 14 \text{ Yards Per Minute}$
  - $T = 14.3 \text{ Minutes}$

*Example: (Metric):*

- A Diver Wishes to Swim Out From the Beach 175 Meters. His Swim Rate Is 15 Meters Per Minute. Assuming There Is No Current, How Long Will It Take Him/Her to Make This Swim?
  - $T = 175 \text{ Meters} / 15 \text{ Meters Per Minute}$
  - $T = 11.67 \text{ Minutes (11 Minutes 40 Seconds)}$

# Elements Of An Underwater Compass

- Magnetic Needle
- Compass Scale
- Lubber Line
- Bezel
- Witness Marks



# Sighting On An Object And Finding The Azimuth

- **To Find the Azimuth to a Sighted Object From Where You Are Located, You First Point the Lubber Line at the Object. If the Object Is Large in Size, You Should Pick a Particular Point on the Object or a Specific Side to Point the Lubber Line at. The Compass Must Be Held Level in Order to Allow the Magnetic Needle to Swing Freely. Without Moving the Compass in Respect to Where the Lubber Line Is Pointing, You Would Follow the Next Steps, Specific to Your Compass Type, in Order to Read the Correct Azimuth to the Object.**
- **Type I Compass:**
  - **Once You Have Sighted on the Desired Object, You Rotate the Bezel So That the Witness Marks (0 Degrees) Align With the Tip of the Magnetic Needle. You Would Then Read the Azimuth From the Point at Which the Compass Scale Intersects the Top End of the Lubber Line.**
- **Type II Compass:**
  - **Once You Have Sighted the Object, You Rotate the Bezel So That the Tip of the Magnetic Needle Falls Between the Witness Marks. You Would then Read the Azimuth From Where the Tip of the Magnetic Needle (Between the Witness Marks) Intersects the Compass Scale.**

# Following A Given Azimuth

**For the sake of clarity, we shall use an azimuth of 120 degrees to illustrate how to follow a given azimuth for both types of compasses.**

- **Type I Compass:**
  - **Rotate the bezel so that the given azimuth on the compass scale (in this case 120 degrees) intersects the top of the lubber line. Rotate your body in a horizontal plane so the tip of the magnetic needle aligns with the witness marks (0 degrees). Align your body with the lubber line, while keeping the magnetic needle on the witness marks, and move in the direction the lubber line points.**
- **Type II Compass:**
  - **Rotate the bezel so that the given azimuth (in this case 120 degrees) falls between the witness marks. Rotate your body in a horizontal plane so that the tip of the magnetic needle aligns with the witness marks. Align your body with the lubber line, while keeping the magnetic needle between the witness marks, and move in the direction the lubber line points.**

# Tips To Ensure Navigational Accuracy

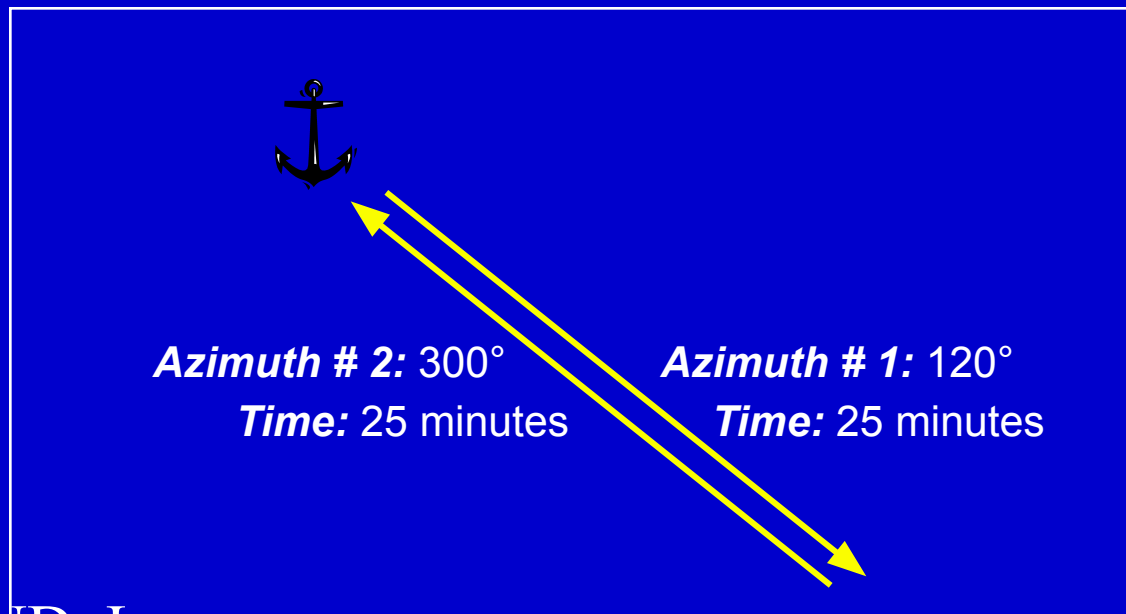
- **Make Sure the Magnetic Needle Swings Freely**
- **Keep the Magnetic Needle Aligned With the Lubber Line**
- **Check Your Body Alignment**
- **View the Compass From the Same Angle Throughout the Dive**
- **Practice the Course on Land Before Attempting Underwater**
- **Have All Azimuths Recorded Before Entering the Water**

# The Line And Reciprocal Course

- In the Illustration Below We See That the Diver Swims Out From the Boat Anchor Line for 25 Minutes on an Initial Heading of  $120^\circ$ . To Return to the Anchor Line the Diver Must Swim 25 Minutes on a Reciprocal Azimuth of  $300^\circ$  ( $120^\circ + 180^\circ = 300^\circ$ )

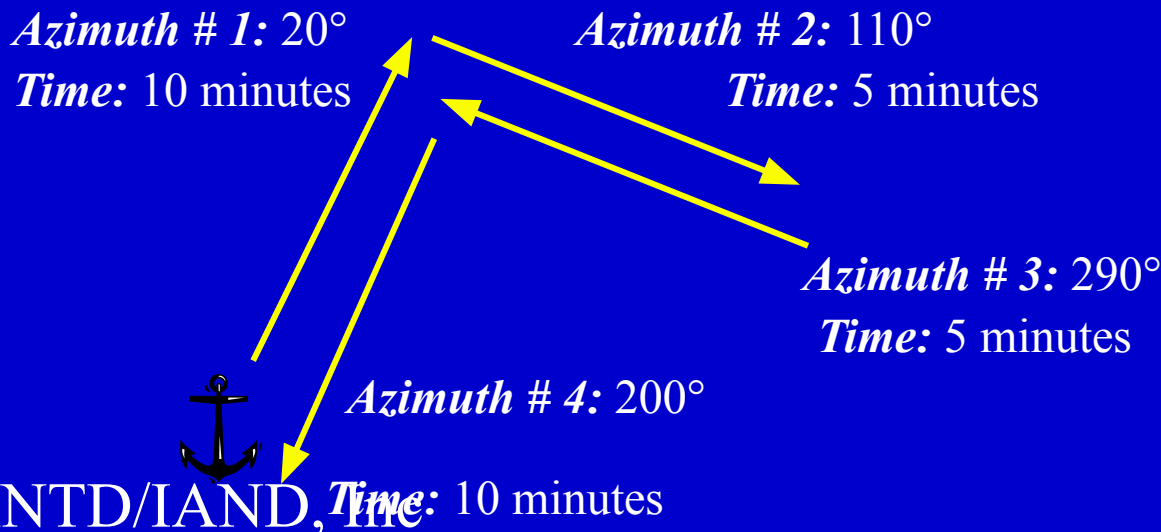
## SLATE DATA:

- AZIMUTH # 1:  $120^\circ$       TIME: 25 minutes
- AZIMUTH # 2:  $300^\circ$       TIME: 25 minutes



# The Dogleg & Reciprocal Course

- In the Following Illustration the Diver Swims Out on Leg # 1 at an Initial Azimuth of  $20^\circ$  Swimming for 10 Minutes. S/He Then Turns Right for Leg # 2, Giving Her/Him a Heading of  $110^\circ$  ( $20^\circ + 90^\circ = 110^\circ$ ). S/He Swims 5 Minutes on This Second Heading. The First Reciprocal Azimuth Will Be  $290^\circ$  for 5 Minutes. The Final Reciprocal Azimuth Will Be  $200^\circ$  for 10 Minutes.
- SLATE DATA:
  - *AZIMUTH # 1:  $20^\circ$       TIME: 10 minutes*
  - *AZIMUTH # 2:  $110^\circ$       TIME: 5 minutes*
  - *AZIMUTH # 3:  $290^\circ$       TIME: 5 minutes*
  - *AZIMUTH # 4:  $200^\circ$       TIME: 10 minutes*



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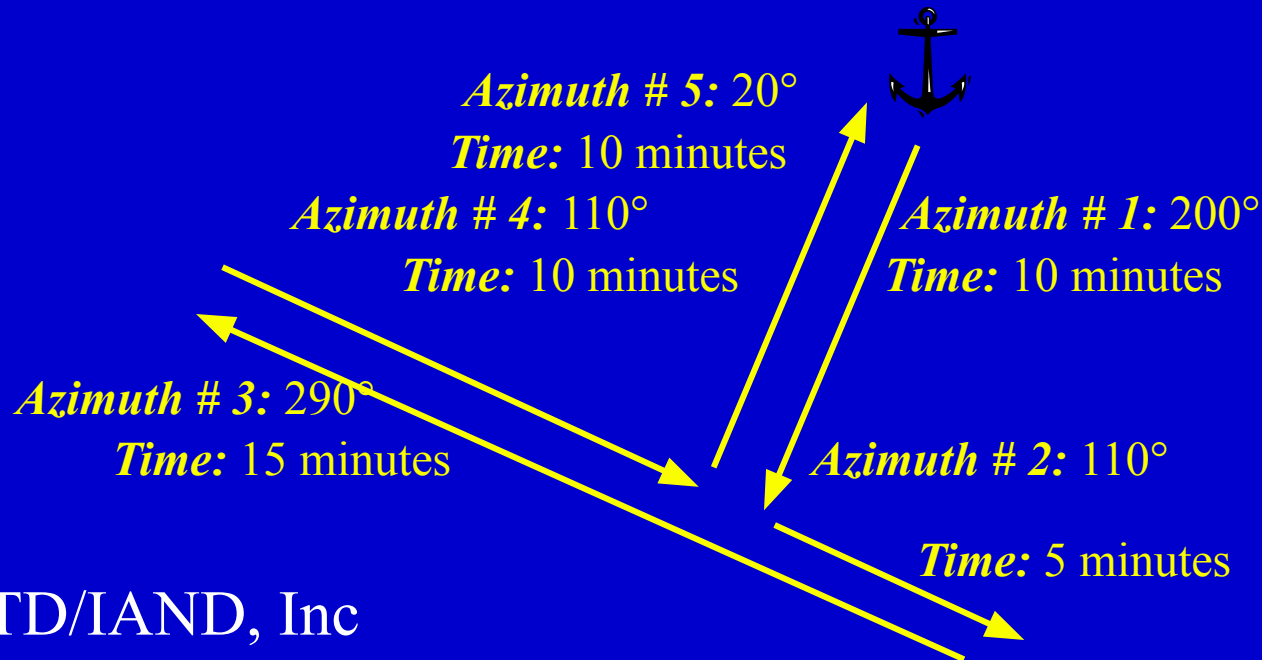


# The “T” & Reciprocal Course

- In the Illustration Below the Diver Swims Out on His First Azimuth of a “T” Course at a Heading of  $200^\circ$  for 10 Minutes. Then Turn Left for the Second Leg at a Heading of  $110^\circ$  ( $200^\circ - 90^\circ = 110^\circ$ ) for 5 Minutes. The Third Leg’s Azimuth Is the Reciprocal of the Second Heading. For the Third Leg the Diver Swims at an Azimuth of  $290^\circ$  ( $110^\circ + 180^\circ = 290^\circ$ ) for 15 Minutes. The Fourth Leg Will Be at the Same Heading As the Second Leg,  $110^\circ$ , for the Time/distance of the Third Leg Minus the Time/Distance of the Second Leg or 10 Minutes ( $15 \text{ Minutes} - 5 \text{ Minutes} = 10 \text{ Minutes}$ ). The Fifth and Final Leg Would Be the Reciprocal of the First Leg for the Same Time/Distance. The Azimuth Would Be  $20^\circ$  ( $200^\circ - 180^\circ = 20^\circ$ ) for 10 Minutes.

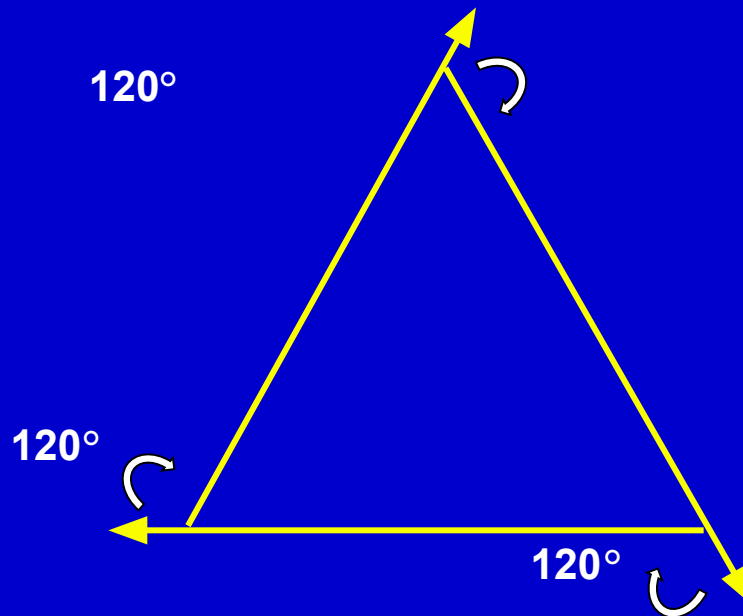
## SLATE DATA:

<i>AZIMUTH # 1: <math>200^\circ</math></i>	<i>TIME: 10 minutes</i>	<i>AZIMUTH # 2: <math>110^\circ</math></i>	<i>TIME: 5 minutes</i>
<i>AZIMUTH # 3: <math>290^\circ</math></i>	<i>TIME: 15 minutes</i>	<i>AZIMUTH # 4: <math>110^\circ</math></i>	<i>TIME: 10 minutes</i>
<i>AZIMUTH # 5: <math>20^\circ</math></i>	<i>TIME: 10 minutes</i>		



# The Equilateral Triangular Course Basic Characteristics

- All Sides of the Equilateral Triangle Are Equal in Length
- All Interior Angles Are the Same
- Each Interior Angle Equals  $60^\circ$
- Each Exterior Angles Equals  $120^\circ$



# The Clockwise Equilateral Triangular Course

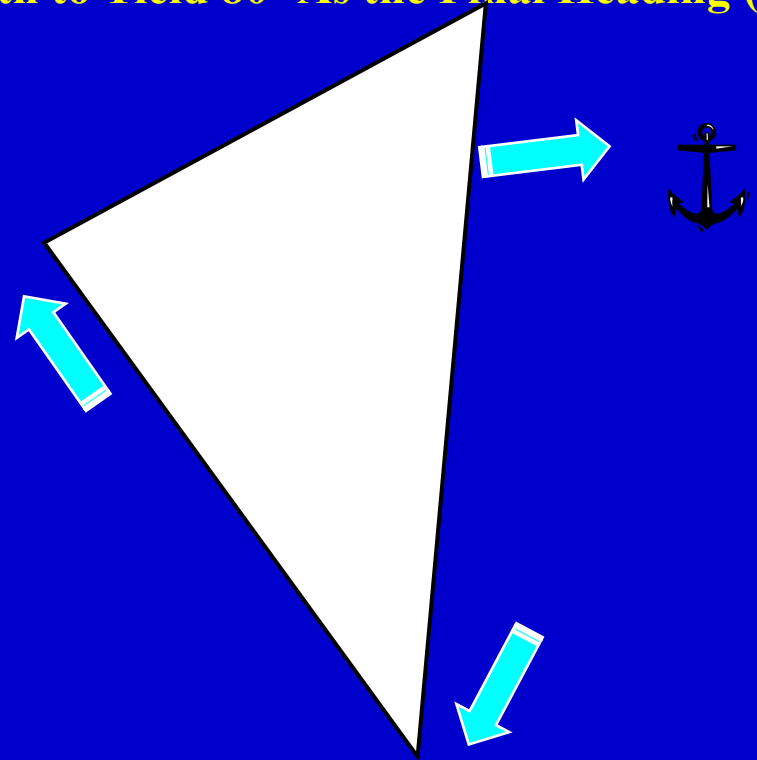
- **Our Divers Wish to Run a Clockwise Equilateral Triangular Course With 5-minute Legs. Their First Azimuth Will Be  $200^\circ$ . They Then Calculate Their Second Azimuth and Find It to Be  $320^\circ$  ( $200^\circ + 120^\circ = 320^\circ$ ). They Next Calculate Their Final Azimuth and Find It to Be  $440^\circ$  ( $220^\circ + 120^\circ = 440^\circ$ ). This Number Is Greater Than  $360^\circ$  So the Divers Must Correct the Azimuth to Yield  $80^\circ$  As the Final Heading ( $440^\circ - 360^\circ = 80^\circ$ ).**

## SLATE DATA:

*AZIMUTH # 1:  $200^\circ$       TIME: 5 minutes*

*AZIMUTH # 2:  $320^\circ$       TIME: 5 minutes*

*AZIMUTH # 3:  $80^\circ$       TIME: 5 minutes*



# The Counter-Clockwise Equilateral Triangular Course

- Our Divers Wish to Run a Counter-clockwise Equilateral Triangular Course With 7-minute Legs. Their First Azimuth Will Be  $90^\circ$ . They Then Calculate Their Second Azimuth and Find It to Be  $-30^\circ$ . Since This Is a Negative Number, Its Absolute Value Must Be Subtracted From  $360^\circ$  to Get the Corrected Azimuth ( $360^\circ - 30^\circ = 330^\circ$ ). Their Second Heading Is Really  $330^\circ$ . They Then Calculate Their Final Heading ( $330^\circ - 120^\circ$ ) and Find It to Be  $210^\circ$ .

## SLATE DATA:

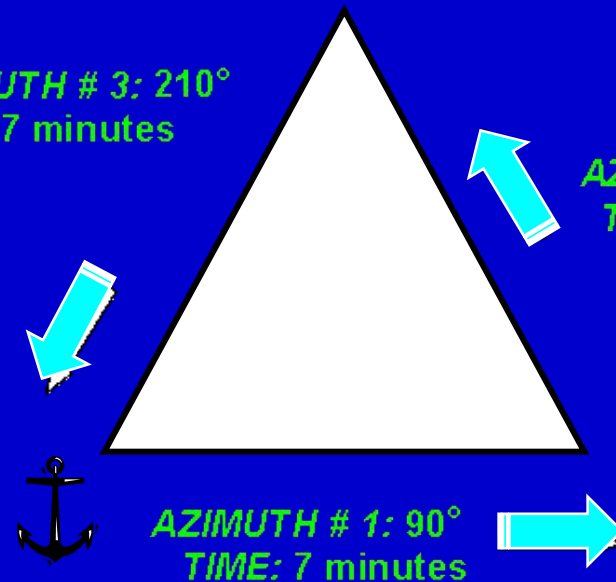
*AZIMUTH # 1:  $90^\circ$       TIME: 7 minutes*

*AZIMUTH # 2:  $330^\circ$       TIME: 7 minutes*

*AZIMUTH # 3:  $210^\circ$       TIME: 7 minutes*

*AZIMUTH # 3:  $210^\circ$   
TIME: 7 minutes*

*AZIMUTH # 2:  $330^\circ$   
TIME: 7 minutes*



# Five Characteristics Of The Square And Rectangular Compass Courses

- On a Square Compass Course All Sides Are Equal in Time and Distance
- On a Rectangular Compass Course the Opposite Sides Are Equal in Time and Distance
- All Interior Angles Are Equal
- All Interior Angles Equal  $90^\circ$
- All Exterior Angles Equal the Interior Angles

# The Clockwise Square Compass Course

- Two Divers Wish to Run a Square Compass Course With 5-minute Legs. Their Initial Azimuth Is  $110^\circ$ . They Calculate Their Second Azimuth by Adding  $90^\circ$  to Their Initial Heading. The Second Azimuth Is  $200^\circ$  ( $110^\circ + 90^\circ = 200^\circ$ ). They Then Calculate Their Third Azimuth. The Third Azimuth Is  $290^\circ$  ( $200^\circ + 90^\circ = 290^\circ$ ). Finally They Calculate Their Last Azimuth. The Calculation Yields  $380^\circ$  ( $290^\circ + 90^\circ = 380^\circ$ ), Which Is Greater Than  $360^\circ$ , and Must Be Corrected. They Subtract  $360^\circ$  From  $380^\circ$  and Find That Their Final Heading Is  $20^\circ$ .

## SLATE DATA:

AZIMUTH # 1:  $110^\circ$       TIME: 5 minutes

AZIMUTH # 2:  $200^\circ$       TIME: 5 minutes

AZIMUTH # 3:  $290^\circ$       TIME: 5 minutes

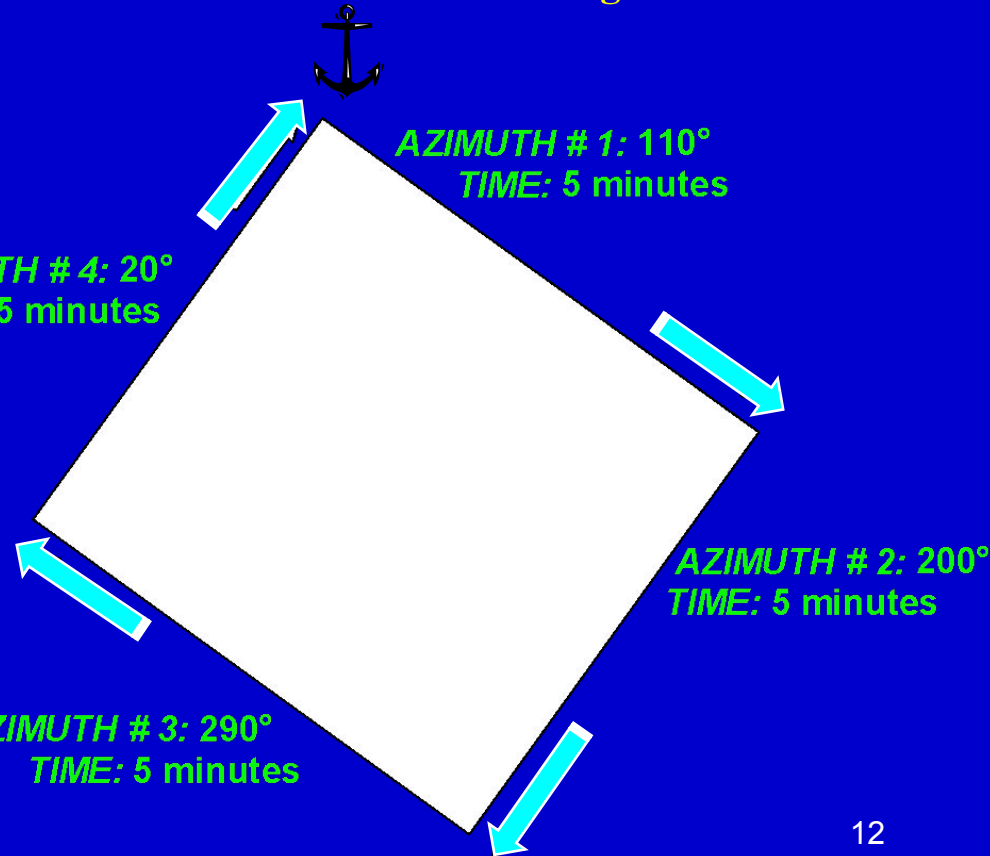
AZIMUTH # 4:  $20^\circ$       TIME: 5 minutes

AZIMUTH # 4:  $20^\circ$   
TIME: 5 minutes

AZIMUTH # 3:  $290^\circ$   
TIME: 5 minutes

AZIMUTH # 1:  $110^\circ$   
TIME: 5 minutes

AZIMUTH # 2:  $200^\circ$   
TIME: 5 minutes

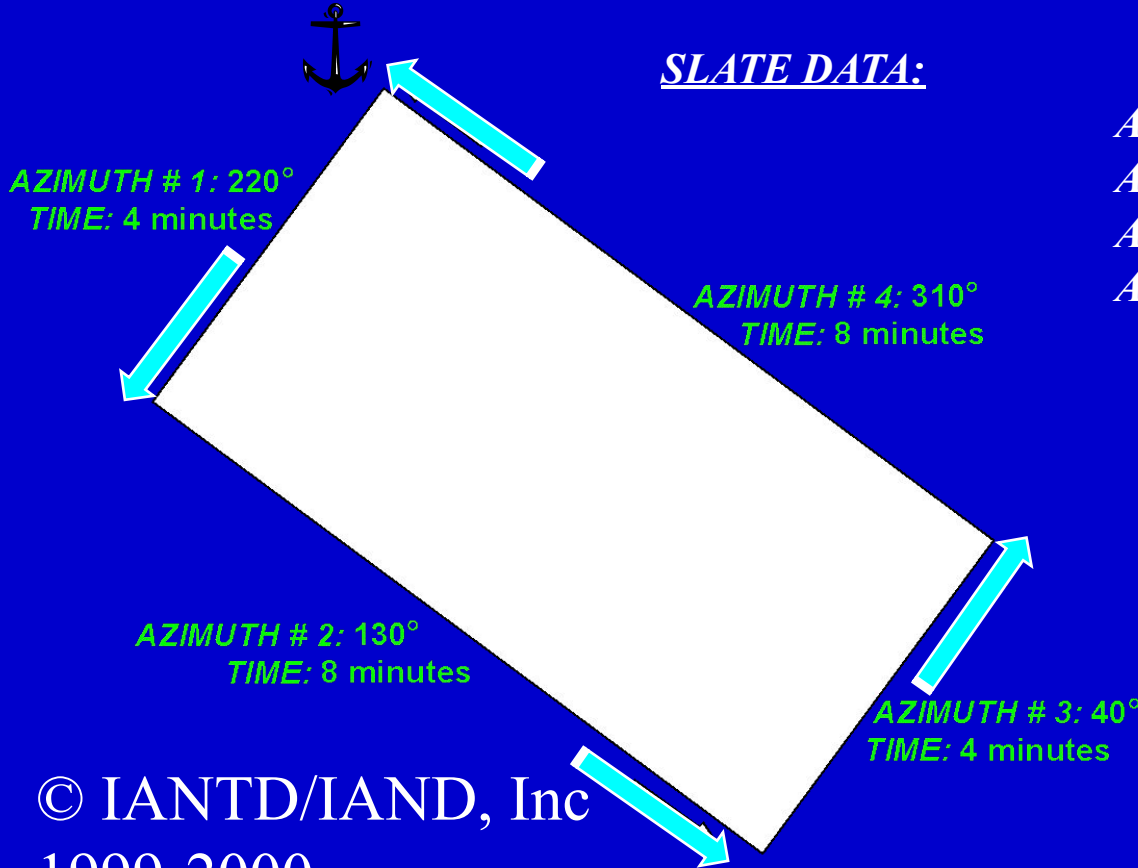


# The Counter-Clockwise Rectangular Course

- Two Divers Wish to Run a Rectangular Compass Course. The Short Legs Will Be 4 Minutes and the Long Legs Will Be 8 Minutes. Their Initial Azimuth Is  $220^\circ$  for 4 Minutes. They Then Calculate Their Second Leg. They Find That Their Azimuth Will Be  $130^\circ$  ( $220^\circ - 90^\circ = 130^\circ$ ) for 8 Minutes. They Calculate Their Third Azimuth and Find the Heading to Be  $40^\circ$  ( $130^\circ - 90^\circ = 40^\circ$ ) for 4 Minutes. Finally They Calculate Their Last Heading and Find That It Turns Out to Be a Negative Number:  $-50^\circ$  ( $40^\circ - 90^\circ = -50^\circ$ ). They Must Correct for the Negative Reading by Subtracting Its' Absolute Value From  $360^\circ$ . They Find That This Gives Them a Final Azimuth of  $310^\circ$  ( $360^\circ - 50^\circ = 310^\circ$ ).

## SLATE DATA:

<i>AZIMUTH # 1: <math>220^\circ</math></i>	<i>TIME: 4 minutes</i>
<i>AZIMUTH # 2: <math>130^\circ</math></i>	<i>TIME: 8 minutes</i>
<i>AZIMUTH # 3: <math>40^\circ</math></i>	<i>TIME: 4 minutes</i>
<i>AZIMUTH # 4: <math>310^\circ</math></i>	<i>TIME: 8 minutes</i>



# Safety Guidelines For Practicing Basic Navigation

- ❑ **Practice in Areas With Little or No Current. The Scope of This Course Does Not Pertain to Making Corrections for Current - If You Are Interested in How This Is Performed, Take the IANTD Advanced Navigation Course**
- ❑ **Keep Your Depths Reasonably Shallow**
- ❑ **Check Your Total Running Time at the Particular Depth You Intend to Practice and Make Sure That You Will Have Enough Air Using the  $\frac{1}{2} + 200$  Rule**
- ❑ **Check Your Total Running Time at the Particular Depth You Intend to Practice and Make Sure That You Do Not Exceed the No-decompression Limits for Your Dive**
- ❑ **Walk Through the Course on Land Prior to Running It Underwater**
- ❑ **Draw Out the Course on Your Underwater Slate and Check It for Accuracy**
- ❑ **Record the Azimuths and the Times and Distances on Your Underwater Slate As Part of Your Pre-dive Planning. Never Enter the Water Without This Information**
- ❑ **Maintain the Dive Team Integrity - Stay With Your Buddy - It Is Far More Important to Keep the Buddy Team Together Than to Be Accurate in Your Navigation**
- ❑ **Many Times It Is Easy to Get Caught up in the Challenge of Navigation and Forget to Monitor Critical Dive Information - Be Sure to Check Your Depth, Air and Bottom Time Frequently**
- ❑ **Know Your Abilities and Limits - Dive Within Them**



# Continuing Your Education

**“We Can Never Stop Learning. Dive Courses Open Many Doors to Different Types of Diving. It Is a Safe and Complete Way to Be a Safe Diver.”**



# What's Next

- You Will Gain Some Insight on What Type of Diving Activity Appeals to You
- Your Instructor Will Help You Determine What Course You Should Take Next
- Like Martial Arts, a Diver's Training Does Not Finish After She/He Has Earned Her/His  
*... 'White Belt'*

*Check out what IANTD has to offer...*

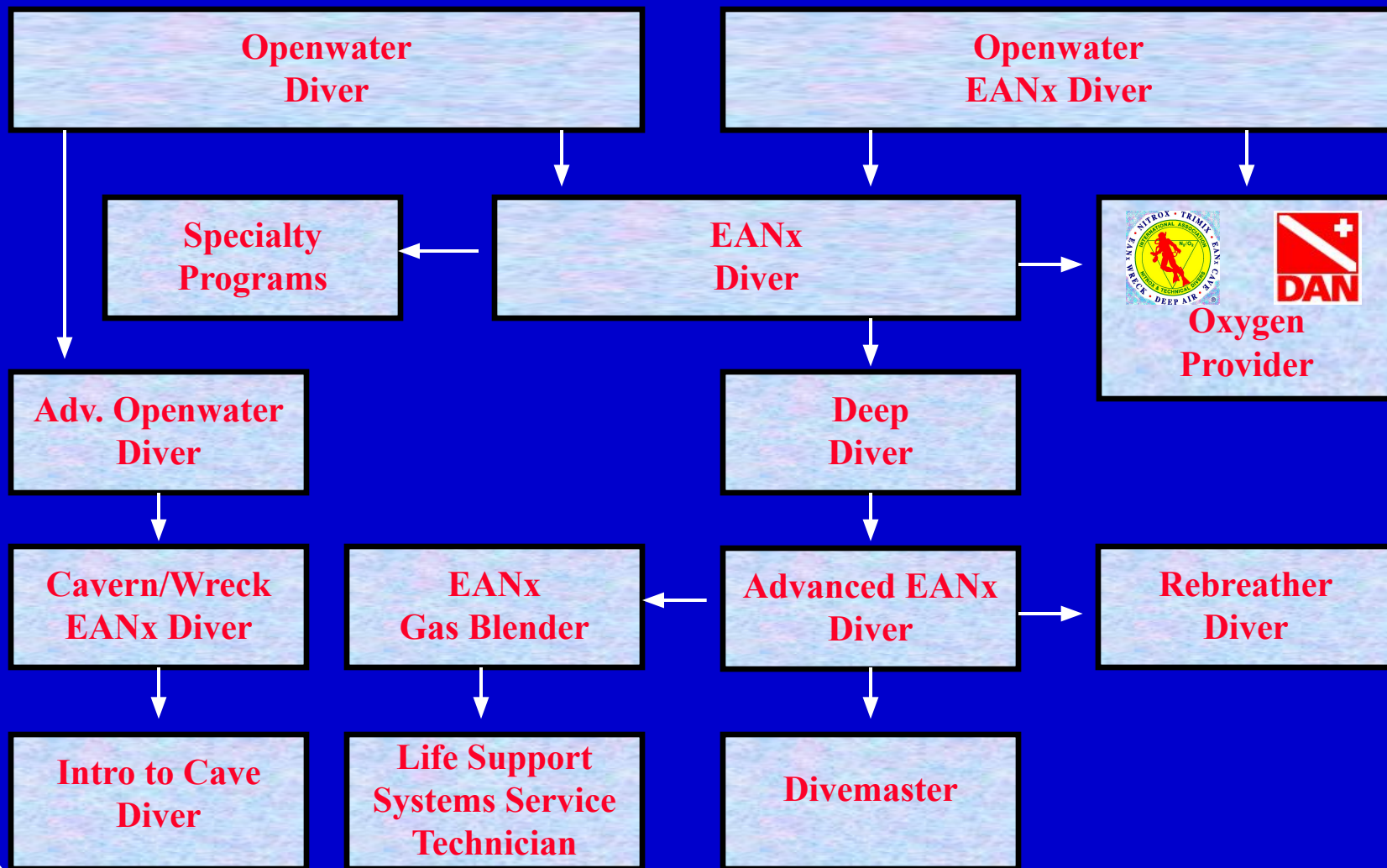
# Continuing Education With IANTD

## Recreational Sport Diver Training

- Openwater
- Openwater Nitrox
- Advanced Openwater
- Basic Nitrox
- Deep Diver
- Advanced Nitrox
- Rebreather
- IANTD - DAN Oxygen Provider
- Overhead Environment
- Introductory Cave
- Divemaster
- Gas Blender
- L.S.S. Technician
- Specialties

# IANTD/IAND, Inc.

## Recreational Sport Diver Programs



# IANTD/IAND, Inc.

## Technical Training Programs

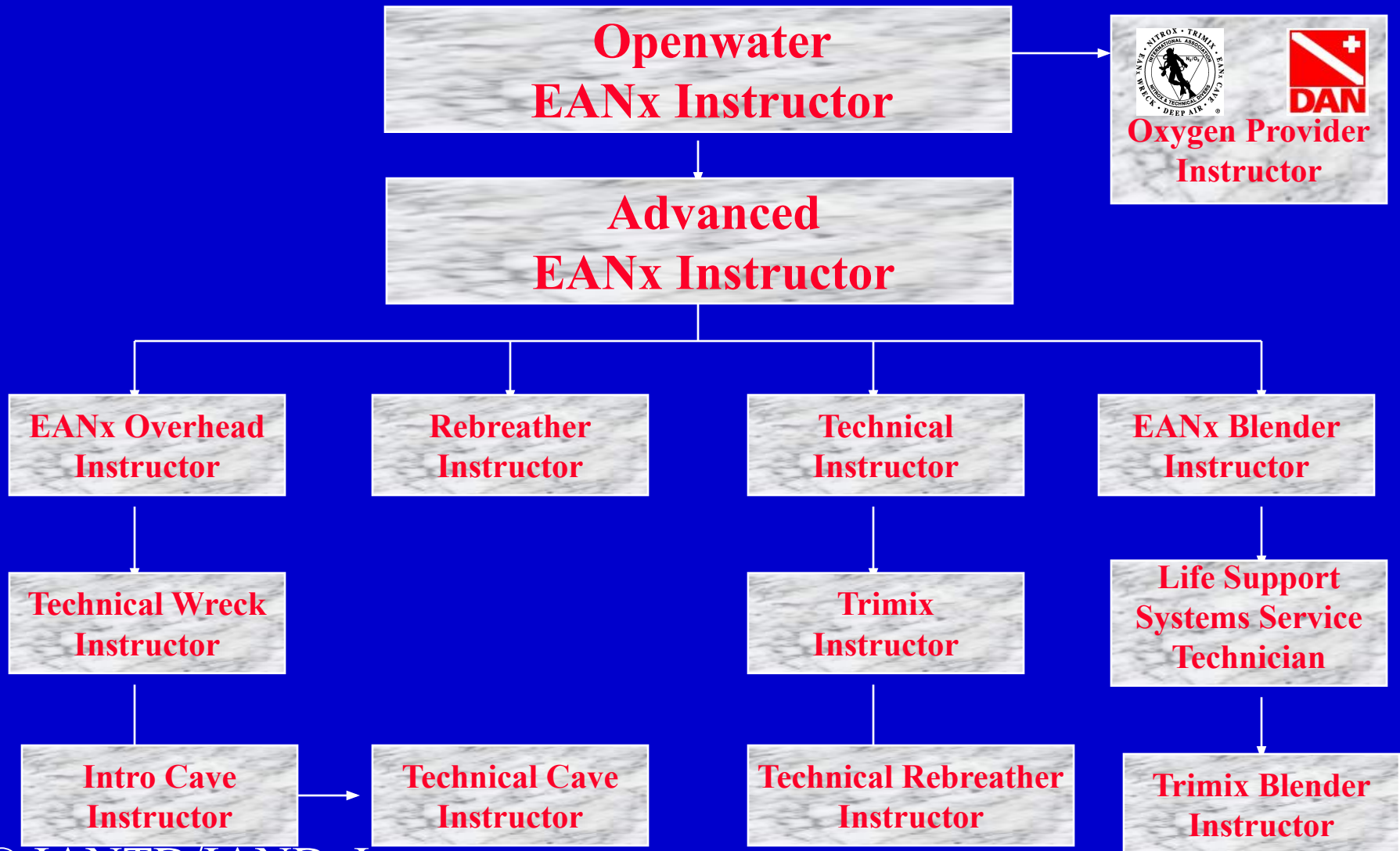
- Technical Diver
- Normoxic Trimix Diver
- Technical Rebreather
- Technical Supervisor
- Trimix Gas Blender
- Trimix Diver
- Cave Diver
- Technical Cave
- Wreck Diver
- Technical Wreck



# Программы обучения инструкторов IANTD

- Basic EANx
- Advanced EANx
- Overhead Environment
- Introductory Cave
- Rebreather
- Gas Blending
- Technical Instructor
- Technical Cave
- Technical Wreck
- Trimix Instructor
- Technical Rebreather
- Life Support Systems Service Technician

# IANTD/IAND, Inc. Instructor Training Programs





# КРИТИЧЕСКИЙ ПЕРИОД

- Познание себя
- Постепенность
- Повторение
- Закрепление навыков
- Продолжение обучения
- Обзорные курсы

**К новым приключениям!**



**IANTD**

**International Association of  
Nitrox & Technical Divers**