
# PEAK PERFORMANCE BUOYANCY DIVER

## INSTRUCTOR GUIDE

PADI

Product No. 70236 (Rev. 07/22) Version 3.01

# PADI Peak Performance Buoyancy Diver Instructor Guide



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# INTRODUCTION

This section includes suggestions on how to use this guide, an overview of course philosophy and goals, a flow chart to show you how course components and materials work together, and describes ways you can organize and integrate student diver learning.

## How to Use this Guide

This guide speaks to you, the PADI Peak Performance Buoyancy Specialty Instructor. The guide contains four sections: the first contains standards specific to this course, the second contains knowledge development presentations, the third considers an optional confined water dive, and the fourth details the open water dives. All required standards, learning objectives, activities and performance requirements appear in **boldface** print. **The boldface assists you in easily identifying those requirements that you must adhere to when you conduct the course.** Items not in boldface print are recommendations for your information and consideration. General course standards applicable to *all* PADI courses are located in the General Standards and Procedures section of your PADI *Instructor Manual.*

**Note to Instructor**

This specialty diver course instructor guide is designed primarily for divers using open-circuit scuba. However, divers using rebreathers may also take the course. Throughout this guide, look for the prompt "Rebreather Note" to assist you in teaching Peak Performance Buoyancy to recreational divers using this equipment.

## Course Philosophy and Goals

Divers with peak performance buoyancy control will enjoy diving that's effortless and more fun, extend their bottom time through reduced gas consumption and prolong the life of their dive equipment by reducing inadvertent and accidental bumps and contact with the bottom and sharp objects. Further, divers will have more opportunities for positive interactions with aquatic life and help preserve fragile underwater environments – enhancing their commitment to the PADI AWARE philosophy.

The Peak Performance Buoyancy Specialty Diver course philosophy is to polish a diver's buoyancy control beyond the Open Water Diver level to be more efficient – saving air and energy – and help the diver avoid damage to the aquatic environment.

The goals of the training are to:

- Expand and refresh divers' knowledge about buoyancy fundamentals.
- Have divers position and distribute weight for comfort and desired body position (trim) in the water

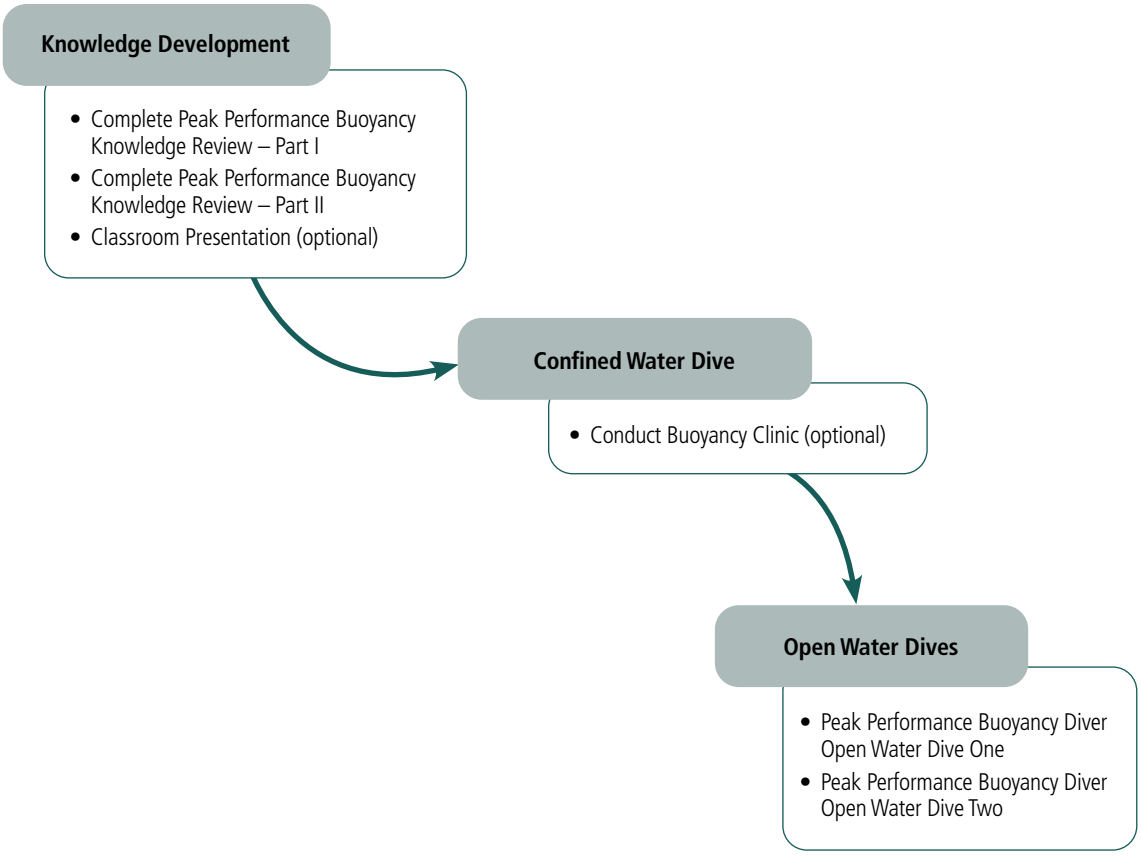
- Have divers practice visualization techniques prior to dives.
- Review the importance of and have divers practice buoyancy checks.
- Have divers establish neutral buoyancy during all segments of a dive.
- Have divers fine-tune neutral buoyancy underwater and hover effortlessly.

The Course Flow Options diagram provides a visual representation of how knowledge development and confined water and/or surface practice sessions support open water dives. When possible, it's preferable to have student divers interact with *Peak Performance Buoyancy eLearning* or complete and review Knowledge Reviews from the PADI *Peak Performance Buoyancy Manual* before participating in the open water dives.

Confined water and/or surface practice sessions are not required for the PADI Peak Performance Buoyancy course; however, you may choose to have practical sessions that allow student divers to practice skills such as estimating weight needed using Basic Weighting Guidelines, visualization skills, conducting predive buoyancy checks, controlled descents/ascents/safety stops, hovering, breath control for fine-tuning buoyancy underwater, maneuvering close to the bottom without touching, and post-dive buoyancy check.

There are two dives to complete. **You may rearrange skill sequences within each dive; however, the dive sequence must stay intact.** You may add more dives as necessary to meet student divers' needs. Organize your course to incorporate environmentally friendly techniques throughout each dive, to accommodate student diver learning abilities and preferences, logistical needs and your sequencing preferences.

## Course Flow Options




**Note to Instructor**

Knowledge Review – Part I is the same Knowledge Review that appears in the Peak Performance Buoyancy section of the *Advanced Open Water Diver Manual*. If you have a student's Knowledge Review – Part I on file, at your discretion, you need only have a student complete Knowledge Review – Part II.

# SECTION ONE

## Course Standards

This section includes the course standards, recommendations, and suggestions for conducting the PADI Peak Performance Buoyancy Diver Specialty course.

### Standards at a Glance

| Topic | Course Standard | |
|---|---|---|
| **Minimum Instructor Rating** | **PADI Assistant Instructor** | |
| **Prerequisites** | **PADI (Junior) Open Water Diver** | |
| **Minimum Age** | **10 years** | |
| **Ratios** | **Open Water: 8:1** | |
| **Site, Depths, and Hours** | **Depth:** 9–12 metres/30–40 feet recommended<br>**Minimum Open Water Dives: 2**<br>Minimum Hours Recommended: 12 | |
| **Materials and Equipment** | **Instructor:**<br>• **PADI Peak Performance Buoyancy Specialty Course Instructor Guide and PADI *Peak Performance Buoyancy eLearning* or *Manual***<br>• **PADI *Peak Performance Buoyancy* video**<br>• Obstacle course materials/ equipment<br>• Extra weight for positively buoyant students | **Student Diver:**<br>• **PADI *Peak Performance Buoyancy eLearning* or *Manual***<br>• PADI *Peak Performance Buoyancy* video |

## Instructor Prerequisites

**All Teaching status PADI Assistant Instructors or higher qualify to teach the Peak Performance Buoyancy Specialty course. PADI Assistant Instructors conduct the course under the direction of an instructor.** This means a Teaching status PADI Instructor must be available for consultation during the course, although not necessarily present during training sessions, and verify that all performance requirements are met by cosigning participant log books and training records.

## Student Diver Prerequisites

By the start of the course, a diver must be:

1. **Certified as a PADI (Junior) Open Water Diver or have a qualifying certification from another training organization.**
2. **At least 10 years old.**

## Supervision and Ratios

### Confined Water Dive

**Maximum inwater ratio is 10 student divers per instructor (10:1), with four additional student divers allowed per certified assistant.**

### Open Water Dives

**The course instructor or a certified assistant must supervise student divers. The course instructor must ensure that all performance requirements are met.**

**Maximum ratio is eight student divers per instructor (8:1), with four additional student divers allowed per certified assistant.**

> **Note to Instructor**
> **For confined open water sessions or open water dives that include 10- to 11-year-olds, the maximum ratio is four student divers per instructor (4:1). No more than two of the four divers may be 10 or 11. You may not increase this ratio with the use of certified assistants.**

# Sequencing

1. Ideally, student divers should complete Knowledge Review Part I before Peak Performance Buoyancy Dive One.
2. Student divers should complete Knowledge Review Part II before Peak Performance Buoyancy Dive Two.
3. **Training dives must be conducted in order.** You may rearrange skill sequences within a dive.

# Site, Depths and Hours

## Site

Choose sites with conditions and environments suitable for completing requirements. Ideally, select sites familiar to student divers. Use different open water dive sites, if possible, to give student divers experience in dealing with a variety of environmental conditions (incorporate environment-friendly techniques throughout each dive) and logistical challenges. Practice skills in confined water sessions first to better prepare divers to apply skills in open water later.

## Depths

**Maximum – 30 metres/100 feet**

9–12 metres/30–40 feet (recommended)

## Hours

The PADI Peak Performance Buoyancy course includes at least two open water dives. The recommended hours are 12.

# Materials and Equipment

## Instructor

- **PADI *Peak Performance Buoyancy Specialty Course Instructor Guide***
- **PADI *Peak Performance Buoyancy* eLearning or *Manual.*** Use the student diver materials for detailed content explanation.
- **PADI *Peak Performance Buoyancy* video.**
- Extra weights to help positively buoyant student divers trim their buoyancy.
- Obstacle course materials/equipment.

### Student Diver

- **PADI *Peak Performance Buoyancy eLearning* or *Manual***
- PADI *Peak Performance Buoyancy* video

## Assessment Standards

**For eLearners, check the diver's eRecord to verify successful of completion of *Peak Performance Buoyancy eLearning,* including the Knowledge Review.**

**To assess knowledge of divers using the manual, have divers complete the Peak Performance Buoyancy Knowledge Reviews and review missed questions until they demonstrate accurate and adequate knowledge.** The Knowledge Reviews can be found in the *Peak Performance Buoyancy Manual* and in this Appendix; additionally, Knowledge Review I can be found in the PADI *Advanced Open Water Diver Manual.* **The student diver must demonstrate accurate and adequate knowledge during the open water dives and must perform all skills (procedures and motor skills) fluidly, with little difficulty, in a manner that demonstrates minimal or no stress.**

## Certification Requirements and Procedures

Document student diver training by completing the PADI Specialty Training Record for Peak Performance Buoyancy (see Appendix). **To qualify for certification, by course completion student divers must complete all performance requirements for Peak Performance Buoyancy Open Water Dives One and Two. The assistant instructor or instructor certifying the student diver must ensure that all certification requirements have been met.**

## Links to Other Courses

The Peak Performance Buoyancy Adventure Dive conducted during the PADI Advanced Open Water Diver course may count as the first dive toward this specialty at your discretion. Similarly, divers who successfully complete Peak Performance Buoyancy Open Water Dive One and Knowledge Review Part I may receive credit for an Adventure Dive toward the PADI Adventure Diver and Advanced Open Water Diver certifications. They may also credit the specialty certification toward the PADI Master Scuba Diver rating.

The Peak Performance Buoyancy Specialty may be taught concurrently with the PADI Open Water Diver course. Peak Performance Buoyancy Dive One skills may be completed any time during Open Water Diver course Dives 2–4. One additional dive (Dive Two of the Peak Performance Buoyancy Specialty course) must be completed after Open Water Diver certification to earn the Peak Performance Buoyancy certification. Once the specialty course is complete, the diver may earn credit toward the Advanced Open Water Diver course for the Peak Performance Buoyancy Adventure Dive.

# SECTION TWO

# Knowledge Development

## Conduct

Student divers complete independent study by interacting with *Peak Performance Buoyancy eLearning,* or by reading the PADI *Peak Performance Buoyancy Manual* and by watching the PADI *Peak Performance Buoyancy* video. Use the diver materials to address any misconceptions or to clarify certain points of interest.

If there is a need for instructor-led presentations, such as when the *Peak Performance Buoyancy eLearning* or *Manual* does not exist in a language student divers understand, use the following teaching outline to cover the knowledge development learning objectives and course content. **The Peak Performance Buoyancy Knowledge Reviews (Part I and Part II) must be completed and reviewed before the diver is certified.**

## I. Introduction

**Note to Instructor**

Have staff introduce themselves and provide a bit of background. Have student divers introduce themselves and explain why they are interested in peak performance buoyancy.

Review with student divers other specialty diver courses that would be easier once they know how to attain peak performance buoyancy, including: Dry Suit Diver, Deep Diver, Digital Underwater Photographer, Wreck Diver, and Underwater Naturalist.

### A. Course Goals

1. Develop your theoretical knowledge of proper weighting and peak performance buoyancy.
2. Increase your diving skills.
3. Improve your diving ability and skills while in a supervised environment.
4. Encourage you to participate in other specialty training.

### B. Course Overview and Schedule

**Note to Instructor**

Discuss the course sequence, assignments, meeting times, places and other information about all class, practical application sessions and training dives. Build excitement about the course, particularly the training dives.

### C. Costs, Equipment Requirements and Paperwork

**Note to Instructor**

Explain all costs, equipment requirements and logistical details as necessary. Reconfirm prerequisites if appropriate, ensure all paperwork is completed – see Section One, and Paperwork and Administrative Procedures, General Standards, PADI *Instructor Manual.* Collect outstanding fees. Explain the optional PADI AWARE certification card as an opportunity to show off their Peak Performance Buoyancy certification and help the environment.

### D. Performance Requirements and Certification

**1. To qualify for any PADI certification, you must meet specific performance requirements.**

a. You pay for the course, but must earn the certification.

b. Performance-based learning is objective – a student either meets a requirement or not; your instructor is not arbitrary in assessing performance.

2. Although you must meet all performance requirements, having difficulty does not mean you will be unsuccessful.

a. You take a course to learn – making mistakes and needing time to master knowledge and skill is part of learning.

b. You may pick up some things quickly and others slowly; what matters is that you demonstrate mastery – not how long it takes.

c. You move on at the pace you learn – you may need extra dives or other practice.

## II. Reasons to Fine-Tune Your Buoyancy Skills

### Learning Objectives

**By the end of this section, you should be able to answer the following question:**

**1. What are six reasons to fine-tune your buoyancy skills?**

### 1. What are six reasons to fine-tune your buoyancy skills?

A. There are six reasons to fine-tune your buoyancy skills and attain peak performance buoyancy:

1. Dive with less effort. This will allow you to be in control and have more fun. Peak performance buoyancy control means just what it says – that you're in control. You'll struggle less and relax more underwater. Peak performance buoyancy control allows you to descend and ascend slowly and easily. You'll be able to make effortless safety stops – even without a line.

2. Extend your bottom time through reduced air consumption. With peak performance buoyancy control you glide through the water sleek and streamlined, conserving energy and air. Diving becomes nearly effortless.
3. Have more opportunities for positive interactions with aquatic life. Practicing peak performance buoyancy allows you to move along the reef with precision and fluidity – blending in with the contours and life rhythms of the environment. You will find that this form of relaxed movement underwater allows you to glide closely by undisturbed aquatic life.
4. Preserve fragile underwater environments. Practicing peak performance buoyancy control allows you to protect fragile underwater life from damaging encounters and further your commitment to the PADI AWARE philosophy.
5. Preserve visibility. Practicing peak performance buoyancy keeps you from stirring up sandy and silty bottoms that reduce visibility.
6. Prolong the life of your dive equipment. By practicing peak performance buoyancy control you save your dive suit and other equipment from scrapes, tears and punctures.

B. For these reasons, peak performance buoyancy allows you to have more fun while diving.

## III. Buoyancy Check

### Learning Objectives

**By the end of this section, you should be able to answer the following questions:**

1. **Based on basic weighting guidelines, how much weight do you need for the Peak Performance Buoyancy dives?**
2. **What five steps do you take to conduct a buoyancy check at the surface?**
3. **Under what three circumstances should you conduct a buoyancy check before diving?**
4. **How does your buoyancy change due to consuming the air in your cylinder?**

### 1. Based on basic weighting guidelines, how much weight do you need for the Peak Performance Buoyancy Dives?

A. Understanding the PADI Buoyancy Assessment:
   1. In your Open Water Diver course, you learned the fundamentals of buoyancy control, which form the foundation for peak performance buoyancy.
   2. To take the next step, let's take a moment to find out where you are. Answer the following questions about yourself:

**Note to Instructor**

The Buoyancy Assessment can be found in the *Peak Performance Buoyancy eLearning* or *Manual* and below. If a printed form of the assessment is not available to students, simply read the assessment in class. Students can answer mentally or on a piece of paper.

| YES | NO | Buoyancy Assessment |
|---|---|---|
| ☐ | ☐ | 1. I stay in shape for diving, helping me avoid getting out of breath while underwater. This improves my breath control and allows me to fine-tune my buoyancy more efficiently. |
| ☐ | ☐ | 2. When I need to establish comfortable breathing and relax, I use visualization to help attain Peak Performance Buoyancy. |
| ☐ | ☐ | 3. Before I dive, I adjust the position and distribution of my weight to match the type of dive I'm making. |
| ☐ | ☐ | 4. I check my buoyancy at the beginning of any dive each time I change dive equipment, dive environment or haven't been diving in a while. |
| ☐ | ☐ | 5. When I haven't been diving for awhile, or when using new gear, I warm up my buoyancy skills at the beginning of my dive. |
| ☐ | ☐ | 6. When wearing a wet suit or dry suit, I need only add small amounts of air to my BCD (or dry suit) to remain neutrally buoyant. When not wearing an exposure suit (or a skin suit), I rarely need to add air to my BCD to remain neutrally buoyant. |
| ☐ | ☐ | 7. I can adjust my buoyancy using breath control. |
| ☐ | ☐ | 8. I'm streamlined in the water with all hoses and gear secure and tucked close to my body. Nothing hangs away from my body more than a few centimetres/inches in any position. |
| ☐ | ☐ | 9. I rarely touch the bottom accidentally while diving. |
| ☐ | ☐ | 10. I can hover comfortably at 5 metres/15 feet for a safety stop at the end of the dive. |

3. How did you do on the assessment?
    a. If you answered "no" to a lot of these, then you'll gain a lot during the Peak Performance Buoyancy course.
    b. If you said "yes" to almost everything, great, you're well on your way, and the dives will help put the finishing polish on your already well-developed skills.

B. Estimate needed weight using the PADI Basic Weight Guidelines.
    1. The best divers don't wear more weight than they need. If you want peak performance buoyancy control, neither should you.

2. How do you know how much weight to wear?
    a. Perform a buoyancy check in the water.
    b. There's absolutely no other way to precisely figure out how much weight you need.
3. What if you have no idea of how much weight you need with a specific gear set up?
    a. To make your actual buoyancy check go quickly, you want to estimate the weight you need so you only need to make minor adjustments.
    b. Experience helps, but to estimate your needed weight, use the Basic Weight Guidelines.

**Note to Instructor**

The Basic Weight Guidelines can be found in the *Advanced Open Water Diver Manual,* the Peak Performance Buoyancy chapter, the specialty diver course *Peak Performance Buoyancy eLearning* or *Manual*, and in the Appendix of this guide. Have each student estimate the amount of weight he'll need to complete the dives in the course.

4. When using the Basic Weight Guidelines, keep in mind your cylinder's buoyancy characteristics as they affect your calculations.
    a. Cylinders with relatively little negative buoyancy, like some aluminum cylinders, may require more weight.
    b. Cylinders with relatively high negative buoyancy, like many steel cylinders, may allow you to remove weight from your system.
    c. As we've said, the only real way to determine exactly how much weight you need is by conducting a buoyancy check.

**Rebreather Note**

Rebreather divers can't really use course weighting guidelines. Beyond a proper buoyancy check when wearing all equipment, consider checking if rebreather manufacturer's literature provides some beginning, basic weighting guidelines.

## 2. What five steps do you take to conduct a buoyancy check at the surface?

C. Now that you've estimated your weight, you're ready to check it. Here are the five steps you take to conduct a buoyancy check:
    1. Enter water in which it is too deep to stand, fully equipped in what you'll wear on the dive.
        a. Be sure to breathe from your regulator and inflate your BCD to start, just in case you're a bit heavy.
        b. You can actually use water shallow enough to stand in, provided it's deep enough to bend your knees and float vertically.
    2. Completely deflate your BCD.

   a. If you're diving dry, also open the suit auto exhaust valve all the way.
   b. Keep breathing from your regulator, in case you sink.
3. Let yourself float vertically while holding a normal breath. This is the test point – if you're weighted properly, you should float at eye level while you hold your breath.
4. Adjust your weight until you float at eye level while holding a normal breath.
   a. Hold small weights in your hands if you want while you figure it out.
   b. This process goes faster if there's someone handing and taking weights from you until you get dialed in.
   c. Once you have the correct amount of weight, you can load it into your weight system, or trade many small weights for a fewer larger ones and load those, etc.
5. As a final check, you should sink slowly when you exhale. Deflating your lungs to decrease your buoyancy should be enough to start your descent.

**Rebreather Note**

1. Weight yourself so that at the surface, with the BCD/dry suit deflated and the counterlung set at minimum loop, you barely float and you begin to descend when you exhale through your nose, venting the counterlung.
2. Add about a kilogram/two pounds with an SCR (semi-closed rebreather) if you're checking with a full supply cylinder.
3. As in open circuit, overweighting makes buoyancy control difficult and wastes gas because you have bigger volume changes with depth changes – with rebreathers, you have less gas to waste.

**3. Under what three circumstances should you conduct a buoyancy check before diving?**

D. When to conduct a buoyancy check:
   1. For peak performance buoyancy, you check your buoyancy under these circumstances (at minimum):
      a. Any time you change your dive gear configuration.
         i. A change in gear is a change in buoyancy – and this especially applies to your exposure suit.
      b. Any time you change dive environments – especially fresh water to salt or vice-versa.
         i. Salt water is denser than fresh, so you're more buoyant in the ocean than in, say, your local quarry.
      c. Any time you haven't been diving for a while.

i. This tip has little to do with a rusty technique. The reason you check after you've been away from diving for a bit is because you can change physically.
ii. If you've dropped a lot of body fat, you won't need as much weight. Or if you've gained some, you'll need more.
iii. You can even stay the same body weight but change your proportion of lean mass to body fat, and that will affect how much weight you need.

**4. How does your buoyancy change due to consuming the air in your cylinder?**

E. Air consumption affects the buoyancy check.
1. During the dive, you gradually use up the air in your cylinder, so your cylinder becomes more buoyant (loses weight). Less air in the cylinder means less weight in the cylinder.
2. Although different cylinders have different buoyancy characteristics by themselves, the cylinder and its volume become part of your total mass and displacement when you gear up, so your buoyancy will increase as you consume your air, no matter what type of cylinder you're using.
3. Consuming the air from a typical cylinder, from full to reserve pressure, will usually increase your buoyancy about 2 kg/5 lbs. You need to account for this so that you're properly weighted at the end of the dive and can maintain a safety stop without struggling.
4. Ideally, check your buoyancy and set your weight with a near-empty cylinder, then switch to the same type cylinder, full, for the dive.
5. Doing a buoyancy check at the end of a dive is not always practical, so the alternative is to set your weight as you just learned with a full cylinder, then add about 2 kg/5 lbs. Take this into consideration when conducting buoyancy checks at the beginning of a dive, when your cylinder is full.
6. Does the type of cylinder affect how you determine your weight change due to gas consumption?
    a. Since steel cylinders are heavier and have less buoyancy than aluminum, would you add less weight to account for gas use? The answer is "no."
    b. The weight of a given amount of gas is the same whether it's in a cylinder made of steel or aluminum.

**Rebreather Note**

1. Needed underwater buoyancy adjustments due to using air from your cylinders is not as big a problem when using rebreathers, compared to open-circuit scuba.
2. eCCRs (electronic-closed circuit rebreathers) have little weight change during a dive.
3. eSCRs become slightly lighter during a dive because they have larger cylinders and vent gas, but less than you experience in open-circuit diving.
4. Hybrid rebreather models may need different buoyancy adjustments. See the manufacturer recommendations.

# IV. Fine-Tuning Your Buoyancy

## Learning Objectives

**By the end of this section, you should be able to answer the following questions:**

1. **What three variables require you to adjust your buoyancy as needed?**
2. **When should you use your BCD to adjust your buoyancy?**
3. **How do you control your buoyancy when using a dry suit?**
4. **How does your lung volume affect buoyancy, and how do you use it to fine-tune your buoyancy (open-circuit only)?**

### 1. What three variables require you to adjust your buoyancy as needed?

A. Buoyancy adjustment underwater.
   1. When properly weighted and wearing only a dive skin or swim suit, you'll rarely need to adjust your buoyancy.
      a. About the only adjustment you'll need is to release a bit of air from your BCD to compensate for the air you use.
      b. If you're making frequent buoyancy changes, you're probably overweighted.
   2. When wearing a wet suit or dry suit, you'll need to adjust your buoyancy throughout the dive to account for three variables:
      a. Suit Compression
         i. Adjust for buoyancy changes due to compression of your wet suit or the air in your dry suit.
         ii. As water pressure increases on the suit (descending), it compresses, making you less buoyant. This requires you to add air to your BCD or dry suit.
      b. Gas Consumption
         i. Adjust for buoyancy changes as you use gas from your cylinder.

ii. As the dive continues, you'll slowly become more buoyant. This requires you to release air from your BCD or dry suit.

c. Depth Change

i. Adjust for increased buoyancy during ascent. As water pressure decreases (ascending), the air you put in your BCD or dry suit to compensate for the loss of buoyancy during descent now expands.

ii. As you know, to keep from becoming too buoyant you therefore dump air from your BCD or dry suit as you ascend.

**Rebreather Note**

1. Descents with rebreathers differ somewhat to open-circuit scuba because you have an additional airspace – the counterlung. Once you start your descent, breathe normally. The ADV (automatic diluent valve) will keep the counterlung inflated to offset compression of the airspace.
2. Maintain minimum loop volume (recall that minimum loop is having no more than a single breath in the counterlungs). Having more than this makes descents and ascents more difficult.
3. Avoid lots of depth changes because repeatedly adjusting buoyancy during a dive consumes your limited diluent/gas supply. Go around obstacles instead of over them if you can.
4. As in *open-circuit* diving, if you're properly weighted and maintain minimum loop, you should only need to adjust your buoyancy when you change depth to compensate for suit compression or expansion.

**2. When should you use your BCD to adjust your buoyancy?**

B. These are some basic guidelines on when to use your BCD for buoyancy adjustment:

1. When you are not wearing a dry suit, the BCD is used for buoyancy control both underwater and at the surface.
   a. Don't use your BCD to dive overweighted.
   b. Conduct a buoyancy check as previously described whenever necessary.
   c. Regardless of what exposure suit you are wearing, the BCD is always used for surface transport. Use your fins and lungs to change depth.
2. When wearing a wet suit, put air in your BCD as you descend to remain neutral; let it out as you come up to do the same.
   a. Make small, frequent adjustments.
   b. Learn where all the valves are since modern BCDs usually have "quick dump" exhaust valves in two or three places.
3. One tenet of peak performance buoyancy is that you don't use your BCD as an elevator.

a. To ascend, you just start to swim up. To descend, you just exhale.
b. If you need to add or release air for these, you're not controlling your buoyancy closely.

**3. How do you control your buoyancy when using a dry suit?**

C. There are different protocols for controlling your buoyancy using a dry suit.
1. If you're diving in a shell dry suit, you primarily use your dry suit to control your buoyancy – not your BCD. If you're diving with a neoprene dry suit, you will probably use your BCD to control your buoyancy. This is because the neoprene compresses as you descend. You add just enough air to your suit to prevent suit squeeze, and control your buoyancy by adding air to your BCD.
2. The exception is at the surface, where it's more comfortable to float using your BCD.
3. Controlling buoyancy with your shell dry suit:
   a. Helps you avoid suit squeeze problems.
   b. Simplifies buoyancy control because you're not trying to control your BCD and your dry suit. However, with a neoprene dry suit you have two gas spaces from which you must release gas on ascent – your dry suit and your BCD.
4. If you're not already a PADI Dry Suit Diver and plan to dive dry:
   a. It's recommended that you complete the Dry Suit Adventure Dive in the PADI Advanced Open Water Diver program, as well as the PADI Dry Suit Diver course.
   b. You not only learn how to control your buoyancy with dry suits, but also suit selection, care, repairs and other topics you'll want to know as a dry suit diver.

**4. How does your lung volume affect buoyancy, and how do you use it to fine-tune your buoyancy (open-circuit only)?**

D. You fine-tune buoyancy with breath control.
1. Your BCD or dry suit gives you coarse buoyancy control.
2. You fine-tune buoyancy using your lung volume.
   a. When you inhale, you increase your displacement and buoyancy, and tend to rise slightly.
   b. When you exhale you tend to sink.
   c. Adjust your buoyancy through breathing without holding your breath.
      i. This is accomplished by timing your breathing – breath in to rise slightly and breath out to descend slightly.
      ii. However, never hold your breath.

3. Once you're neutrally buoyant with your BCD or dry suit, you make minor buoyancy changes by timing your breathing and breathing with somewhat full or somewhat empty lungs as you need to – but never holding your breath.
4. With practice, this becomes automatic and you do it without thinking. That's the first mark of mastering peak performance buoyancy.

**Rebreather Note**

1. Fine-tuning buoyancy using a rebreather:
   a. When using a rebreather you cannot fine-tune your buoyancy using breath control and lung volume as you would using open-circuit equipment. Breathing does not affect buoyancy because the counterlung collapses when you inhale and expands when you exhale. Your net volume doesn't change.
   b. With a rebreather, all your buoyancy control is through proper weighting and your BCD/dry suit.
   c. This fact emphasizes how important it is to conduct a buoyancy check at the beginning of a dive with a rebreather. If during the buoyancy check adjustments are deemed necessary, make them before starting the dive.
   d. With rebreathers, use minimal hand and fin sculling to fine-tune buoyancy and maintain depth control. As you become proficient, however, you learn to simply set your buoyancy so that an occasional kick, at most, is all you need to maintain your depth.
2. Hovering with a Rebreather
   a. Hovering with a rebreather is easier than with open-circuit in some ways, but harder in others.
   b. You must adjust your buoyancy by feel until you're neutral – fin pivots and similar techniques don't work because breathing doesn't affect buoyancy.
   c. As you attempt to hover, fine-tune by inflating and deflating your BCD/dry suit.
   d. Not having breath control makes it harder at first. Don't hold your breath!
   e. Note that as you ascend and descend slightly, your counterlung gas expands and compresses, affecting your buoyancy. Setting the OPV (over pressure valve) for minimum loop helps if your model rebreather allows you to, but you may have to exhale from your nose to keep the loop volume under control. Do so in small amounts.
   f. Hovering takes practice. But, once you have your buoyancy set for a given depth, hovering is easier because your breathing doesn't affect your buoyancy. You can hover for a very long time with no further adjustments.

# V. Weight Position and Distribution

## Learning Objectives

**By the end of this section, you should be able to answer the following question:**

1. **How do you distribute weight for better attitude and position underwater?**

### 1. How do you distribute weight for better attitude and position control underwater?

A. It's one thing to wear the right amount of weight, and another to distribute it for optimum performance.
   1. The amount determines your buoyancy, but where you wear it determines your natural orientation (attitude) in the water column.
   2. While the correct amount of weight for a given diver wearing specific equipment in a given environment is always the same, the same diver may distribute the weight differently depending upon the purpose of the dive.
      a. Example: If you're taking pictures along a wall you may prefer a head up position, but during a search for a small object over silty bottom you may prefer a head down position.
      b. Setting your weight accordingly saves your energy and lets you focus on the task at hand.
      c. The type of exposure suit may also affect how you distribute your weights.

B. Typically, you'll want to distribute weight so you swim as horizontally as possible.
   1. This minimizes drag as you swim, saves energy and keeps your feet off the bottom.
   2. To swim as horizontally as possible you want to:
      a. Position your weight forward, toward your sides and stomach, which helps you maintain a neutral swimming position.
      b. Position your weights in this manner especially when you're using a heavy cylinder. Distributing more weight on your back and around your cylinder tends to make you "turn turtle" (belly up), which most divers find uncomfortable and fatiguing.

C. To determine what your "trim" is, i.e. how your weight distribution orients you:
   1. First, become neutrally buoyant and hover in shallow water and then relax completely.
   2. Next, let your body turn however it will. You may end up on your back or upside down. It doesn't matter – you're trying to find out how to redistribute weight for maximum comfort and minimum fatigue.

3. To adjust for being feet low, adjust weight toward your head.
    a. This can include sliding your cylinder up in the BCD a bit, especially if it's a steel one.
    b. To bring your feet down, shift weight down.
    c. If you have extreme leg buoyancy, you can use ankle weights or switch to heavier fins (but don't use ankle weights if you don't need them – they drag your feet down and disturb good trim instead of assist it).

D. If you're wearing a lot of weight, such as with a full wet suit or dry suit, you may opt for multiple weight systems, such as a weight-integrated BCD and weight belt, or a weight-integrated BCD and weight harness.
    1. This gives you more options in weight distribution, and eliminates a single, massive, hard to handle system.
    2. If you use multiple weight systems, distribute the weight so you can expect ample buoyancy in an emergency by ditching only one part.
        a. One of the advantages of multiple weight systems is that in an emergency you don't have to dump everything, which reduces the likelihood of a hazardous runaway ascent.

**Rebreather Note**

1. Position your weights for a comfortable swimming position, or as specified by the rebreather manufacturer.
2. Some rebreathers have special weight pockets specifically for assisting with trim so you can stay in a proper swim position with the best breathing performance.
3. Note that weight distribution and positioning are important for optimum breathing performance with a rebreather. Follow the manufacturer guidelines for appropriate weight distribution with your specific rebreather.

# VI. Streamlining

## Learning Objectives

**By the end of this section, you should be able to answer the following questions:**

1. **What are four reasons for being streamlined while diving?**
2. **How do you look when you're streamlined underwater?**

### 1. What are four reasons for being streamlined while diving?

A. There are at least four reasons for to be streamlined while diving:
    1. You can have the best buoyancy in the world, but it amounts to nothing if your equipment pokes out, hangs and drags.

2. For peak performance buoyancy, you need to be tight and streamlined. Streamlining:
   a. Makes your kicks more efficient.
   b. Makes you comfortable because everything's where it belongs.
   c. Reduces the energy you need to swim.
   d. Reduces damage to the environment because you're not dragging gear across sensitive aquatic life.

**2. How do you look when you're streamlined underwater?**

B. Here's what you look like when you're streamlined:
   1. Correct fit and adjustment. You wear the right size gear, adjusted properly for a good fit. Your scuba rig rides high and tight on your back.
   2. Correct weight. You don't have excess drag because your BCD and dry suit aren't inflated any more than necessary.
   3. Horizontal in the water. You set your trim for proper swimming position.
   4. Streamlined kicks. You kick from the hip, with only slight bends to the knee when flutter kicking, or use an alternate kick like a gently sculling kick (a modified frog kick).
   5. Hoses are clipped and secured. The SPG comes up, close to the chest to take up slack; the alternate air source is visible, but secured for immediate release with a firm tug.
   6. Accessories pocketed. When streamlined you carry slates, signal sausages, etc., in a pocket. The only ones clipped outside are in use, or absolutely won't fit in a pocket.
   7. Clipped items rigged properly. You attach clips to the accessory, then clip the accessory to the BCD – not vice-versa. Everything clips so it doesn't dangle.
   8. You don't look different when you change position. If you are a peak performance buoyancy diver, your look doesn't change when you change attitude because everything is secure; nothing swings in or out – clipped or not – when you change position.

# VII. Visualization Techniques

## Learning Objectives

**By the end of this section, you should be able to answer the following questions:**

1. **How does visualization help you relax, breathe comfortably and swim gracefully?**
2. **How do you use visualization to achieve peak performance buoyancy?**

**1. How does visualization help you relax, breathe comfortably and swim gracefully?**

A. Many sports and recreational enthusiasts attain peak performance by visualizing themselves performing their best.

B. Visualization has been objectively studied many times, and researchers have found that it unambiguously improves performance.

C. You can enhance your performance of any motor skill – including peak performance buoyancy – through visualization (also called mental rehearsal). Multiple studies show that mental practice improves performance because in essence, your mind programs your body to do it right.

**2. How do you use visualization to achieve peak performance buoyancy?**

D. To help you attain peak performance buoyancy, visualize yourself:
   1. Swimming underwater in your gear, streamlined, horizontal, with the right amount of weight properly distributed.
   2. Moving through the water, and adjusting your buoyancy with your BCD, dry suit and through your breathing.
   3. Feel yourself suspended while hovering in mid water. Feel yourself slightly rising and sinking as you breathe with perfect buoyancy control (open-circuit scuba only).
   4. Relaxing underwater – breathing slowly and deeply.

E. Now, go make the dive you just visualized.
   1. During the dive, think back to your visualized dive.
   2. Mimic the buoyancy you visualized on your real dive.

F. After the dive:
   1. Visualize what you did and compare it with your mental rehearsal.
   2. Adjust your mental rehearsal, if necessary, to further improve your performance. This can help you program your mind for your next dive.

## VIII. Connection Between PPB and Staying Physically Fit

### Learning Objectives

**By the end of this section, you should be able to answer the following question:**

**1. How does physical fitness fit into peak performance buoyancy?**

**1. How does physical fitness fit into peak performance buoyancy?**

A. Physical fitness plays an important role in peak performance buoyancy.
   1. When you're physically fit, you have more stamina and more muscle power.
      a. You cruise through the water well within your physical limitations rather than pushing them.

b. You're not overexerted and you have the reserves you need to handle problems.
c. Since you're not overexerted, you don't breathe hard. An exhausted diver who huffs and puffs loses the ability to control buoyancy through breath control.
d. The more stamina you have, the harder you can exert yourself when necessary without losing breath control.

B. Lean mass sinks; fat tissue floats.
1. When you're fit, you have more lean mass and less fat tissue, and therefore require less weight, which not only means less to lug around, but less problem distributing it effectively.
2. It's easier for a fit diver to trim for an effortless, horizontal swimming position.
a. When you're fit, you're sleeker and more naturally streamlined.
i. Your body presents minimum drag.
ii. An out of shape diver tends to be fatter, which means more drag.
b. It also means a larger exposure suit, which adds buoyancy beyond the fat tissue's buoyancy. So, all else being the same, the out of shape diver tends to need more weight than the fit diver.

C. The bottom line is that diving is like any physical activity. The better shape you're in, the more you get out of it and the better you do it.

# SECTION THREE

# Confined Water Dive – Buoyancy Clinic

## Conduct

You have the option of adding a confined water dive to introduce and practice peak performance buoyancy skills. Have a variety of weight systems, buoyancy related accessories and BCDs for student divers to try. Divers who have not yet purchased these items will appreciate the opportunity to try them prior to selection.

## Buoyancy Clinic

A. Goals

Introduce the tasks and skills from Peak Performance Dive One and have divers practice them. These include estimating weight needed for their equipment configuration using the Basic Weighting Guidelines; visualization skills; conducting predive buoyancy checks; controlled descents, ascents and safety stops; hovering; breath control for fine-tuning buoyancy underwater; maneuvering close to the bottom without touching; and post-dive buoyancy checks. You may also use some or all of the following buoyancy challenges during the clinic to reinforce skills.

B. Peak Performance Buoyancy Challenges

1. Directly from the hover, have divers swim midwater to the outside edge of the pool (or a specific point) with their buddy. From there, divers swim underwater from deep to shallow next to the pool wall (or along a designated course.) During the swim, divers adjust for neutral buoyancy, concentrate on an efficient kicking style, practice gliding after kicks and streamline their body/equipment as much as possible. Explain that the goal is to complete two trips around the pool (or designated course) without any part of their body or equipment touching the bottom or breaking the surface.
2. Divers swim through obstacle course with weighted PVC pipe, Hula-Hoops™ or other devices. Direct divers to try to swim through the obstacles without touching them.
3. Divers simulate a safety stop by hovering midwater for three minutes.
4. Divers practice one or more of the following: 1) One-finger push-offs off the pool bottom or nonfragile bottom. 2) Sculling forward and backward using minimal hand or fin movement. 3) Dropping weights at the surface. Use soft weights if possible. Be cautious of divers under the weights and of damaging the pool or fragile bottom. Have divers with weight-integrated BCDs reload weights following the manufacturer's instructions.

# SECTION FOUR

# Peak Performance Buoyancy Open Water Dives

## Open Water Guidelines for Peak Performance Buoyancy Dives

### Conduct

The PADI Peak Performance Buoyancy Specialty course has two required open water training dives. You also have the option of adding a confined water dive to practice any skills (see Section Three).

You may add training dives for additional experience as needed for student divers to demonstrate mastery. However, student divers must demonstrate mastery of all performance objectives for each dive prior to progressing to the next training dive.

The purpose of Dive One is to have divers estimate weight, and practice their hovering and trim. On Dive Two, student divers practice visualization techniques, streamlining and hovering.

Prior to certification, student divers must demonstrate mastery of all performance objectives.

### Dives, Times, Depths and Gases

1. **The minimum number of dives for certification as a PADI Peak Performance Buoyancy Diver is two open water dives.**
2. **All dives must be planned as no stop (no decompression) dives.** Divers may use enriched air to extend no stop time or add conservatism if they are certified as PADI Enriched Air Divers (or have a qualifying certification).
3. **The maximum depth for any training dive is 30 metres/100 feet,** though it's recommended that you keep training dives shallower (9–12 metres/30–40 feet is recommended). **For 12- to 14-year-olds, maximum depth is 18 metres/60 feet or 21 metres/70 feet if they have taken the Adventure Deep Dive. For 10- to 11-year-olds, the maximum depth is 12 metres/40 feet.**

## General Considerations

1. Involve students in dive planning activities.
2. Choose a dive site, preferably a sandy bottom, where fragile marine life will not be damaged during initial buoyancy skills practice for descents, ascents, pivots, hovers etc.
3. Conduct a thorough knowledge orientation and dive briefing. Emphasize that students should interact responsibly with the aquatic life by maintaining neutral buoyancy, avoiding unnecessary contact, securing dangling equipment, and moving slowly to minimize disturbing the aquatic life.
4. Assign logistical duties to staff and review emergency protocols.
5. The use of qualified assistants is highly recommended. Assistants can help keep track of buddy teams, help with check-in/check-out procedures, and be prepared to help in an emergency.
6. Make open water dives fun by including open water specific buoyancy games. Suggestions are included in Open Water Dive One outline.
7. For those students using dry suits, remind them of protocols based on the type of dry suit they have. Further, remind students of the possibility of a suit squeeze during descent and over-inflation during ascent.
8. It may be appropriate to provide a descent/ascent line for student divers to use if necessary to measure their descent/ascent rate. To complete the course successfully, they should be able to control their rates without the use of the line. The line may, however, be useful as they begin to master Peak Performance Buoyancy.
9. For each hovering exercise, consider using a line with a mark or other visual reference to help students maintain a constant depth level.
10. The bottom time should never exceed the no decompression limits on the Recreational Dive Planner or each student's dive computer. Preferably, plan dives to end with a margin of extra conservatism.
11. Additional dives may be added at the instructor's discretion.

## Sequence Options and Dives

1. Ideally, student divers should complete the Knowledge Review before Peak Performance Buoyancy Dive One.
2. **Training dives must be conducted in order.** You may rearrange skill sequences within a dive.

# Peak Performance Buoyancy Dive One

## Performance Objectives

**By the end of Peak Performance Buoyancy Dive One, student divers should be able to, with a buddy and with instructor guidance as appropriate:**

1. **Rig a weight system with the following considerations in mind:**
   a. Estimate the amount of weight to begin a dive using PADI's "Basic Weighting Guidelines" or the manufacturer recommendations (if using a rebreather).
   b. Position and distribute the weight for comfort and desired body position (trim) in the water.
2. **Streamline equipment by properly securing and attaching all hoses, gauges and accessories.**
3. **Adjust for proper weighting – float at eye level at the surface with an empty BCD, while holding a normal breath (top of head level if using a rebreather).**
4. **Make a controlled, slow descent to the bottom and, if needed, adjust for neutral buoyancy using the BCD.**
5. **Adjust for neutral buoyancy at a predetermined depth.**
6. **Hover for 60 seconds without rising or sinking more than 1 metre/3 feet by making minor depth adjustments using breath control only (open-circuit scuba), or using very minor hand/fin sculling only (rebreathers).**
7. **Throughout the dive, control buoyancy and swim relaxed and neutrally buoyant in a horizontal position without touching the bottom or breaking the surface, making frequent small adjustments to buoyancy as needed.**
8. **Adjust weights (trim) and practice hovering in different positions – vertical, horizontal, feet slightly elevated and head slightly elevated.**
9. **Conduct a post-dive buoyancy check to confirm the appropriateness of the amount of weight worn.**

## I. Peak Performance Buoyancy Dive One Standards

**A. Environment: Open water**

**B. Maximum Depth: 30 metres/100 feet** (9–12 metres/30–40 feet recommended)

## II. Suggested Sequence

**A. Briefing**

1. Evaluate dive site conditions.
2. Identify facilities at the dive site.
3. Explain interesting and helpful facts about the dive site, including bottom topography, bottom composition, depth range and points of interest (use a dive site map if appropriate).
4. Describe entry and exit techniques for the dive site.

5. Have buddy teams plan their turn pressure, ascent pressure and reserve pressure for the dive based on gas supply limits.
6. Have buddy teams establish maximum depths and bottom times, and plan contingency profiles for longer and deeper dives than planned.
7. Review the dive sequence and performance requirements.
8. Review communication and other emergency protocols as required by local regulations.

**B. Predive Procedures**

1. Have divers prepare all standard and specialized equipment, including assembly of weight system. Note method of ditching weights in an emergency.
2. Estimate amount of weight needed for the dive using PADI's "Basic Weighting Guidelines."
3. Confirm that divers have all dive data: turn-around gas pressure, maximum depth and bottom time on a slate.
4. Visualization practice. Just before suiting-up, take time to visualize yourself attaining Peak Performance Buoyancy while diving.
5. Suiting up – streamline all equipment. Make sure all loose equipment (alternate air sources, gauges, BCD hose) is secured.
6. Review check-out/in procedure with surface support staff (as required).

**C. Peak Performance Buoyancy Dive One**

1. Predive check
   a. Buddies conduct a predive safety check.
   b. Watch for and correct errors as appropriate.
2. Entry
3. Buoyancy check and proper weighting
4. Gas management
   a. Before beginning the descent, remind divers to check their starting pressure and make a note of their turn pressure.
   b. During the dive, check cylinder pressures at irregular intervals to confirm appropriate gas management.
5. Descent
   a. Buddies execute a five-point descent. You should be able to descend without kicking – just by exhaling. Concentrate on descending slowly and neutralizing your buoyancy as needed during descent.
   b. Bubble check and acclimatization below the surface (3–6 metres/ 10–20 feet recommended).

6. Adjust for neutral buoyancy at depth determined by instructor.
    a. If appropriate and using open-circuit scuba, establish neutral buoyancy using the fin pivot.
7. Hovering (open-circuit scuba only).
    a. Once neutral buoyancy is established, hover for one minute without fin movement or hand movement.
    b. The goal is to remain at one depth level, rising or sinking no more than 1 metre/3 feet while using breath control to make minor depth adjustments.

**Rebreather Note**
Hover for at least 60 seconds without rising or sinking more than 1 metre/3 feet. You may use minimal and periodic hand or fin sculling to make minor depth adjustments.

8. Open Water Peak Performance Buoyancy game suggestions:
    a. Directly from the hover, swim above the bottom.

**Note to Instructor**
The swim could be a guided tour of an underwater area or directed along a marked route.

    b. Throughout the dive, control buoyancy and swim relaxed and neutrally buoyant in a horizontal position without touching the bottom or breaking the surface, making frequent and small adjustment to buoyancy as needed.
    c. Swim through an obstacle course with weighted PVC pipe, Hula-Hoops™ or other such devices in midwater.
        i. As a challenge, try to swim through the obstacles without touching them with your equipment or body.
    d. Practice the following:
        i. One-finger push-offs – practice on areas that won't disturb aquatic life.
        ii. Sculling forward and backward using minimal hand or fin movement.
        iii. Streamlining to reduce drag while swimming on the surface. Practice efficient, well-paced fin kicks with neutral buoyancy.
9. Ascent
    a. Divers ascend at a maximum rate not exceeding 18 metres/60 feet per minute or according to dive computer. (Determine the rate of ascent using your depth gauge and timer or dive computer with ascent-rate indicator.)

b. Vent air as needed from your BCD or dry suit to maintain neutral buoyancy.
c. Perform a safety stop at 5 metres/15 feet for three minutes. Maintain neutral buoyancy at the safety stop.
d. Divers establish positive buoyancy at the surface.
e. Conduct a postdive buoyancy check. Even while wearing a cylinder low on air, you should still be neutrally buoyant.
f. Divers exit the water appropriately for the environment, with assistance as necessary.

10. Exit

**D. Post-dive Procedures**

1. Check in with surface support staff (as required).
2. Divers stow dive equipment as appropriate.

**E. Debriefing**

1. Provide positive reinforcement and assess performance.
2. Have student divers critique themselves on their performance. Add your observations as appropriate.
3. Log the dive (instructor signs log book/approves digital log).

# Peak Performance Buoyancy Dive Two

## Performance Objectives

**By the end of Peak Performance Buoyancy Dive Two, student divers should be able to, with a buddy and with instructor guidance as appropriate:**

1. **Rig a weight system with the following considerations in mind:**
   a. Estimate the amount of weight to begin a dive using PADI's "Basic Weighting Guidelines" or the manufacturer recommendations (if using a rebreather), or based on experience from previous dives.
   b. Position and distribute the weight for comfort and desired body position (trim) in the water.
2. **Use visualization techniques to help you relax, establish a comfortable breathing pattern and move gracefully through the water.**
3. **Conduct a pre- and post-dive buoyancy check by adjusting the amount of weight worn to achieve neutral buoyancy at the surface of the water with the BCD deflated.**
4. **Make a controlled, slow descent to the bottom and if needed, adjust for neutral buoyancy using the BCD.**
5. **Demonstrate efficient fin kicks, using long, slow strokes and gliding after each kick.**
6. **Hover for 90 seconds without rising or sinking more than 1 metre/3 feet by making minor depth adjustments using breath control only (open-circuit scuba), or using very minor hand/fin sculling only (rebreathers).**
7. **Flood and clear your mask while holding a specific hover depth and compensating for sudden buoyancy changes (rebreather divers only).**
8. **Maneuver as close to a nonliving portion of the bottom (rock, sand, etc.) without touching it and then back away using neutral buoyancy with hand or fin sculling.**

## I. Peak Performance Buoyancy Dive Two Standards

**A. Environment: Open water**

**B. Maximum Depth: 30 metres/100 feet** (9–12 metres/30–40 feet recommended)

## II. Suggested Sequence

**A. Briefing**

1. Evaluate dive site conditions.
2. Identify facilities at the dive site.
3. Explain interesting and helpful facts about the dive site, including bottom topography, bottom composition, depth range and points of interest (use a dive site map if appropriate).
4. Describe entry and exit techniques for the dive site.
5. Have buddy teams plan their turn pressure, ascent pressure and reserve pressure for the dive based on gas supply limits.

6. Have buddy teams establish maximum depths and bottom times, and plan contingency profiles for longer and deeper dives than planned.
7. Review the dive sequence and performance requirements.
8. Review communication and other emergency protocols as required by local regulations.

**B. Predive Procedures**

1. Have divers prepare all standard and specialized equipment, including assembly of weight system. Note method of ditching weights in an emergency.
2. Estimate amount of weight needed for the dive using PADI's "Basic Weighting Guidelines" and info from Dive One's pre- and post-dive buoyancy checks.
3. Confirm that divers have all dive data: turn-around gas pressure, maximum depth and bottom time on a slate.
4. Visualization practice. Just before suiting-up and remembering Dive One, take time to visualize yourself attaining Peak Performance Buoyancy while diving.
5. Suiting up – streamline all equipment. Make sure all loose equipment (alternate air sources, gauges, BCD hose) is secured.
6. Review check-out/in procedure with surface support staff (as required).

**C. Peak Performance Buoyancy Dive Two**

1. Predive check
   a. Buddies conduct a predive safety check.
   b. Watch for and correct errors as appropriate.
2. Entry
3. Buoyancy check and proper weighting
4. Gas management
   a. Before beginning the descent, remind divers to check their starting pressure and make a note of their turn pressure.
   b. During the dive, check cylinder pressures at irregular intervals to confirm appropriate gas management.
5. Descent
   a. Buddies execute a five-point descent. You should be able to descend without kicking – just by exhaling. Concentrate on descending slowly and neutralizing your buoyancy as needed during descent.
   b. Bubble check and acclimatization below the surface (3–6 metres/ 10–20 feet recommended).
6. Demonstrate efficient fin kicks, using long, slow strokes and gliding after each kick.
7. Avoid all contact with the bottom – body and equipment.

8. Hovering (open-circuit scuba only).
    a. Once neutral buoyancy is established, hover for 90 seconds without fin movement or hand movement.
    b. The goal is to remain at one depth level, rising or sinking no more than 1 metre/3 feet while using breath control to make minor depth adjustments. You should find that hovering is easier now than in Dive One.

**Rebreather Note**

1. Hover for at least 90 seconds without rising or sinking more than 1 metre/3 feet. You may use minimal and periodic hand or fin sculling to make minor depth adjustments.
2. At end of the hover interval, flood and clear your mask. Hold your hover depth as best as possible. You should expect a sudden buoyancy change and to be prepared to compensate for it.
3. When clearing your mask, use the minimum gas possible to reduce buoyancy effects.
4. You should find that hovering is now easier than in dive one.

9. While hovering, practice making minor depth adjustments using breath control only (open-circuit scuba only).
10. Maneuver close to a nonliving portion of the bottom (rock, sand, etc.) without touching it and then back away using neutral buoyancy with hand or fin sculling. Repeat this skill two to three times.
11. Ascent
    a. Divers ascend at a maximum rate not exceeding 18 metres/60 feet per minute or according to dive computer. (Determine the rate of ascent using your depth gauge and timer or dive computer with ascent-rate indicator.)
    b. Vent air as needed from your BCD or dry suit to maintain neutral buoyancy.
    c. Perform a safety stop at 5 metres/15 feet for three minutes. Maintain neutral buoyancy at the safety stop.
    d. Divers establish positive buoyancy at the surface.
    e. Conduct a postdive buoyancy check. Even while wearing a cylinder low on air, you should still be neutrally buoyant.
    f. Divers exit the water appropriately for the environment, with assistance as necessary.
12. Exit

**D. Post-dive Procedures**

1. Check in with surface support staff (as required).
2. Divers stow dive equipment as appropriate.

**E. Debriefing**

1. Provide positive reinforcement and assess performance.
2. Have student divers critique themselves on their performance. Add your observations as appropriate.
3. Discuss differences between buoyancy checks at the beginning and end of the dive.
4. Log the dive (instructor signs log book/approves digital log).

# APPENDIX

# PADI's Basic Weight Guidelines

How much weight do I need? This is a tough question that every diver will face. Although only a buoyancy check precisely determines the proper amount of weight needed, here are some basic weight guidelines that will get you started. These guidelines are based on individuals of average build (not over or underweight), diving in salt water. Lean individuals may need less weight. Heavy individuals may need more.

## Basic Weight Guidelines

### Basic Guidelines for Salt Water

| Exposure Suit Type | Begin With |
|---|---|
| Swimsuit/dive skin | 0.5–2 kg/1–4 lbs |
| Thin (3 mm/1/16 in.) one-piece wet suit, shorties, jump suits | 5% of your body weight |
| Medium thickness (5 mm/3/16 in.) two-piece wet suit | 10% of your body weight |
| Cold water (7 mm/1/4 in.) wet suit with hood and gloves | 10% of your body weight, + 1.5–3 kg/3–5 lbs |
| Neoprene dry suit | 10% of your body weight, + 3–5 kg/7–10 lbs |
| Shell-style dry suits* (light undergarment, nonfoam underwear) | 10% of your body weight, + 1.5–3 kg/3–5 lbs |
| Shell-style dry suit* (using heavyweight or foam underwear) | 10% of your body weight, + 3–7 kg/7–14 lbs |

* Regarding shell-style dry suits – the lead needed beyond 10% of your body weight is primarily determined by the buoyancy of your underwear. The buoyancy of different underwear types varies greatly.

### Conversion Estimates from Salt to Fresh Water

The Basic Weight Guidelines in the chart above are for use in salt water. If you use these guidelines but plan to dive in fresh water, you need to subtract weight from your weight system since fresh water is less buoyant. Fresh water has fewer dissolved compounds (salts) that add to buoyancy.

**Note to Instructor**
You may also use the conversion numbers in this chart to convert an appropriate weight for a diver from fresh to salt water by adding the listed amount of weight.

## Salt/Fresh Water Change

| **Body Weight** | **Amount of Lead Weight to Subtract** (Salt Water to Fresh Water) |
|---|---|
| 45–56 kg/100–125 lbs | 2 kg/4 lbs |
| 57–70 kg/126–155 lbs | 2.3 kg/5 lbs |
| 71–85 kg/156–186 lbs | 3 kg/6 lbs |
| 86–99 kg/187–217 lbs | 3.2 kg/7 lbs |

## Estimating Weight Change Due to Air Consumption

Depending on the type of cylinder you use, it can become 1–2 kg/3–5 lbs. more buoyant by the end of your dive. The popular 80 cubic foot/11 litre cylinder will become approximately 2 kg/5 lbs. more buoyant. To compensate for this increased buoyancy near the end of your dive, you may need to add some weight beyond the basic guidelines above. Additional weight, beyond the guidelines may not be needed for some types of steel cylinders.

# Peak Performance Buoyancy

## Knowledge Review – Part I

Answer the following questions by selecting the best choice (or choices) from those provided.

1. I'm about to dive in a freshwater lake. I'm using exactly the same equipment I always use in seawater, and I'm familiar with the buoyancy change to expect. Nonetheless, it would be best to conduct a buoyancy check.
   - ☐ True
   - ☐ False

2. Number the five steps for conducting a buoyancy (weight) check in the correct order:
   - _____Enter water too deep to stand, and deflate my BCD (and dry suit) completely.
   - _____Hang vertical and motionless while holding a normal breath.
   - _____Put on all equipment.
   - _____Add or subtract weight until I float at eye level while holding a normal breath.
   - _____As a test, exhale. I should sink slowly.

3. My buddy and I adjust for neutral buoyancy at the beginning of the dive, and continue at the same depth throughout the dive. I notice that I must occasionally let a little air out of my BCD to remain neutral during the dive. Why?
   - ☐ a. To compensate for the gas used from my cylinder.
   - ☐ b. To compensate for buoyancy changes due to exposure suit compression.
   - ☐ c. Because as I tire, I breathe deeper and keep my lungs more inflated.
   - ☐ d. Because as I tire, I kick less efficiently.

4. If diving with a steel cylinder, I do not need to account for the air I consume during the dive.
   - ☐ True
   - ☐ False

5. When I'm neutrally buoyant, I_____ slightly as I inhale and _____ slightly as I exhale
   - ☐ a. sink; rise
   - ☐ b. sink; move
   - ☐ c. glide; rise
   - ☐ d. rise; sink

6. Besides wearing the correct amount of weight, generally I want to distribute weights so that my natural orientation in the water is as _____ as possible.
   - ☐ a. vertical
   - ☐ b. horizontal
   - ☐ c. negative
   - ☐ d. positive

7. I want to be streamlined when diving because it helps me (choose all that apply):
   - ☐ a. maintain an efficient kicking style.
   - ☐ b. use less gas.
   - ☐ c. stay warmer.
   - ☐ d. avoid damage to gear and aquatic life.

8. If I'm wearing a lot of weight, such as with a full wet suit or dry suit, using multiple weight systems gives me more options for positioning and managing my weights.
   - ☐ True
   - ☐ False

9. In any environment, when wearing a wet suit or dry suit, I need to adjust my buoyancy as I change depths during the dive. Why does this occur?
   - ☐ a. Water density changes with depth.
   - ☐ b. My lung volume changes with depth.
   - ☐ c. Depth changes a suit's water volume.
   - ☐ d. Pressure change affects the gas bubbles in my wet suit and/or the gas volume in my dry suit.

**Student Diver Statement:**

I've reviewed the questions and answers, and any I answered incorrectly or incompletely I have had explained to me and/or reviewed the material, so that I now understand what I missed.

Student Name _____

Student Signature _____ Date _____

# Peak Performance Buoyancy

## Knowledge Review – Part II

Instructions: For questions 1 and 2 use PADI's Basic Weighting Guidelines to determine the amount of weight the diver will want to begin with, prior to a buoyancy check. Use exact numbers from the guidelines when calculating answers – do not round numbers. You only need to provide answers in the weight measurement (kilograms or pounds) you are familiar with.

1. A diver weighing 70 kg/155 lb. is using a rented two-piece 5 mm/3/16 inch wet suit and conducts his buoyancy check with a full aluminum 11 litre/80 cubic foot cylinder. Using the Basic Weighting Guidelines, the described diver should begin with _____ prior to a buoyancy check in salt water. In fresh water the diver should be begin with _____ prior to a buoyancy check.

   Calculations:

   a. In salt water, a medium thickness, two-piece 5 mm/3/16 inch wet suit requires 10 percent of the diver's body weight.

   b. The diver conducts his buoyancy check with a full cylinder of gas, so he adds 2 kg/5 lb.

   c. For fresh water, the diver can begin with:

2. A diver weighing 90 kg/200 lb. buys a new shell-style dry suit with heavy-weight, cold water underwear and wants to calculate how much weight he needs to begin his buoyancy check at the beginning of a dive. Because the diver is a bit overweight for his height, he uses the maximum amount of weight recommended for his suit and underwear as listed on PADI's Basic Weighting Guidelines chart. The boat uses steel cylinders, and manages to find one that is empty to conduct his buoyancy check. Using the Basic Weighting Guidelines, the described diver should begin with _____ prior to a buoyancy check in salt water. In fresh water the diver should would begin with _____ prior to a buoyancy check.

   Calculations:

   a. In salt water, a shell-style dry suit with heavy weight, cold water underwear requires 10 percent of diver's body weight PLUS, the maximum additional weight listed on the chart because the diver is overweight. This additional maximum weight listed on the chart is 7 kg/14 lb. The diver weighs 90 kg/ 200 lb. The calculation is as follows:

   b. Being overweight the diver uses the maximum amount of additional weight needed as listed on the Basic Weighting Guidelines chart – 7 kg/14 lb.

   c. The diver is conducting his buoyancy check with an empty cylinder. Therefore he does not need to add additional weight to compensate for loss of buoyancy due to gas use.

   d. For fresh water, the diver should begin his buoyancy check with:

3. Reasons to fine-tune your buoyancy skills: (Check all that apply.)
   - ☐ Dive more effortlessly
   - ☐ Extend your bottom time through reduced air consumption
   - ☐ Have more opportunities for positive interactions with aquatic life
   - ☐ Preserve fragile underwater environments
   - ☐ Preserve visibility
   - ☐ Prolong the life of your dive equipment

4. How can you adjust buoyancy through breathing control without holding your breath?
   - ☐ You can't.
   - ☐ By timing your breathing – breath in to rise slightly and breath out to descend slightly. However, never hold your breath.

5. If you are diving in a shell dry suit, you primarily use _____ to control your buoyancy underwater.
   - ☐ your BCD
   - ☐ specialized weights on your ankles and tank
   - ☐ your dry suit

6. When diving with a dry suit, controlling buoyancy underwater using your suit: (Check all that apply.)
   - ☐ Helps you avoid suit squeeze problems.
   - ☐ Should only be done when you are not wearing a BCD.
   - ☐ Simplifies buoyancy control because you're not trying to control your buoyancy with your BCD and your dry suit.

7. When you are physically fit you have more stamina and muscle power, plus you'll have a leaner mass. How does this fact affect buoyancy? (Check all that apply.)
   - ☐ You will be too heavy to achieve positive buoyancy due to lean muscle mass.
   - ☐ You are less likely to overexert yourself, so you don't breathe hard losing your ability to adjust buoyancy through breath control.
   - ☐ You are less likely to need a larger exposure suit and as much weight as a non-fit diver.

**Student Diver Statement:**

I've reviewed the questions and answers, and any I answered incorrectly or incompletely I have had explained to me and/or reviewed the material, so that I now understand what I missed.

Student Name _____

Student Signature _____ Date _____

# Peak Performance Buoyancy

## Knowledge Review – Part I Answer Key

**Note to Instructor**

To assess knowledge you may review the Knowledge Review from the student diver's manual with the diver, ideally prior to participating in skill practice. Prescriptively teach answers to questions student divers may have missed or have answered incorrectly or incompletely. Ensure student divers understand what they have missed.

Answer the following questions by selecting the best choice (or choices) from those provided.

1. I'm about to dive in a freshwater lake. I'm using exactly the same equipment I always use in seawater, and I'm familiar with the buoyancy change to expect. Nonetheless, it would be best to conduct a buoyancy check.
   - ■ True
   - ☐ False

2. Number the five steps for conducting a buoyancy (weight) check in the correct order:
   - **2** Enter water too deep to stand, and deflate my BCD (and dry suit) completely.
   - **3** Hang vertical and motionless while holding a normal breath.
   - **1** Put on all equipment.
   - **4** Add or subtract weight until I float at eye level while holding a normal breath.
   - **5** As a test, exhale. I should sink slowly.

3. My buddy and I adjust for neutral buoyancy at the beginning of the dive, and continue at the same depth throughout the dive. I notice that I must occasionally let a little air out of my BCD to remain neutral during the dive. Why?
   - ■ a. To compensate for the gas used from my cylinder.
   - ☐ b. To compensate for buoyancy changes due to exposure suit compression.
   - ☐ c. Because as I tire, I breathe deeper and keep my lungs more inflated.
   - ☐ d. Because as I tire, I kick less efficiently.

4. If diving with a steel cylinder, I do not need to account for the air I consume during the dive.
   - ☐ True
   - ■ False

5. When I'm neutrally buoyant, I_____ slightly as I inhale and _____ slightly as I exhale.
   - ☐ a. sink; rise
   - ☐ b. sink; move
   - ☐ c. glide; rise
   - ■ d. rise; sink

6. Besides wearing the correct amount of weight, generally I want to distribute weights so that my natural orientation in the water is as _____ as possible.
   - ☐ a. vertical
   - ■ b. horizontal
   - ☐ c. negative
   - ☐ d. positive

7. I want to be streamlined when diving because it helps me (choose all that apply):
   - ■ a. maintain an efficient kicking style.
   - ■ b. use less gas.
   - ☐ c. stay warmer.
   - ■ d. avoid damage to gear and aquatic life.

8. If I'm wearing a lot of weight, such as with a full wet suit or dry suit, using multiple weight systems gives me more options for positioning and managing my weights.
   - ■ True
   - ☐ False

9. In any environment, when wearing a wet suit or dry suit, I need to adjust my buoyancy as I change depths during the dive. Why does this occur?
   - ☐ a. Water density changes with depth.
   - ☐ b. My lung volume changes with depth.
   - ☐ c. Depth changes a suit's water volume.
   - ■ d. Pressure change affects the gas bubbles in my wet suit and/or the gas volume in my dry suit.

# Peak Performance Buoyancy

## Knowledge Review – Part II Answer Key

**Note to Instructor**

To assess knowledge you may review the Knowledge Review from the student diver's manual with the diver, ideally prior to participating in skill practice. Prescriptively teach answers to questions student divers may have missed or have answered incorrectly or incompletely. Ensure student divers understand what they have missed.

Instructions: For questions 1 and 2 use PADI's Basic Weighting Guidelines to determine the amount of weight the diver will want to begin with, prior to a buoyancy check. Use exact numbers from the guidelines when calculating answers – do not round numbers. You only need to provide answers in the weight measurement (kilograms or pounds) you are familiar with.

1. A diver weighing 70 kg/155 lb. is using a rented two-piece 5 mm/3/16 inch wet suit and conducts his buoyancy check with a full aluminum 11 litre/80 cubic foot cylinder. Using the Basic Weighting Guidelines, the described diver should begin with **9 kg/20.5 lbs**. prior to a buoyancy check in salt water. In fresh water the diver should be begin with **6.7 kg/15.5 lbs.** prior to a buoyancy check.

   Calculations:

   a. In salt water, a medium thickness, two-piece 5 mm/3/16 inch wet suit requires 10 percent of the diver's body weight.

      **The diver weights 70 kg/155 lb.**

      **10% of 70 kg = 7 kg.**

      **10% of 155 lb. = 15.5 lb.**

   b. The diver conducts his buoyancy check with a full cylinder of gas, so he adds 2 kg/5 lb.

      **7 kg + 2 kg = 9 kg**

      **15.5 lb. + 5 lb. = 20.5 lb.**

   c. For fresh water, the diver can begin with:

      **9 kg – 2.3 kg = 6.7 kg**

      **20.5 lb. – 5 lb. = 15.5 lb.**

2. A diver weighing 90 kg/200 lb. buys a new shell-style dry suit with heavy-weight, cold water underwear and wants to calculate how much weight he needs to begin his buoyancy check at the beginning of a dive. Because the diver is a bit overweight for his height, he uses the maximum amount of weight recommended for his suit and underwear as listed on PADI's Basic Weighting Guidelines chart. The boat uses steel cylinders, and manages to find one that is empty to conduct his buoyancy check. Using the Basic Weighting Guidelines, the described diver should begin with **16 kg/34 lb.** prior to a buoyancy check in salt water. In fresh water the diver should would begin with **12.8 kg/27 lb.** prior to a buoyancy check.

   Calculations:

   a. In salt water, a shell-style dry suit with heavy weight, cold water underwear requires 10 percent of diver's body weight PLUS, the maximum additional weight listed on the chart because the diver is overweight. This additional maximum weight listed on the chart is 7 kg/14 lb. The diver weighs 90 kg/ 200 lb. The calculation is as follows:

      **10% of 90 kg = 9 kg.**

      **10% of 200 lb. = 20 lb.**

   b. Being overweight the diver uses the maximum amount of additional weight needed as listed on the Basic Weighting Guidelines chart – 7 kg/14 lb.

      **9 kg + 7 kg = 16 kg**

      **20 lb. + 14 lb. = 34 lb.**

   c. The diver is conducting his buoyancy check with an empty cylinder. Therefore he does not need to add additional weight to compensate for loss of buoyancy due to gas use.

   d. For fresh water, the diver should begin his buoyancy check with:

      **16 kg – 3.2 kg = 12.8 kg**

      **34 lb. – 7 lb. = 27 lb.**

3. Reasons to fine-tune your buoyancy skills: (Check all that apply.)
   - ■ Dive more effortlessly
   - ■ Extend your bottom time through reduced air consumption
   - ■ Have more opportunities for positive interactions with aquatic life
   - ■ Preserve fragile underwater environments
   - ■ Preserve visibility
   - ■ Prolong the life of your dive equipment

4. How can you adjust buoyancy through breathing control without holding your breath?
   - ☐ You can't.
   - ■ By timing your breathing – breath in to rise slightly and breath out to descend slightly. However, never hold your breath.

5. If you are diving in a shell dry suit, you primarily use _____ to control your buoyancy underwater.
   - ☐ your BCD
   - ☐ specialized weights on your ankles and tank
   - ■ your dry suit

6. When diving with a dry suit, controlling buoyancy underwater using your suit: (Check all that apply.)
   - ■ Helps you avoid suit squeeze problems.
   - ☐ Should only be done when you are not wearing a BCD.
   - ■ Simplifies buoyancy control because you're not trying to control your buoyancy with your BCD and your dry suit.

7. When you are physically fit you have more stamina and muscle power, plus you'll have a leaner mass. How does this fact affect buoyancy? (Check all that apply.)
   - ☐ You will be too heavy to achieve positive buoyancy due to lean muscle mass.
   - ■ You are less likely to overexert yourself, so you don't breathe hard losing your ability to adjust buoyancy through breath control.
   - ■ You are less likely to need a larger exposure suit and as much weight as a non-fit diver.

# PADI Specialty Training Record

## Peak Performance Buoyancy Course

### Instructor Statement

I verify that this student diver has satisfactorily completed all academic and/or any confined water training sessions as outlined in the PADI Specialty Course Instructor Guide for Peak Performance Buoyancy. I am a renewed, Teaching status PADI Instructor in this specialty.

Instructor Name _____ PADI # _____

Instructor Signature _____ Completion Date _____

## Open Water Dives

### Dive 1

### Instructor Statement

I verify that this student diver has satisfactorily completed Dive One as outlined in the PADI guide for Peak Performance Buoyancy, including:

- Assembly of weight system
- Gearing up
- Streamlining equipment
- Predive safety check (BWRAF)
- Entry
- Predive buoyancy check
- Neutral buoyancy during slow descent
- Hover for 60 seconds without rising or sinking more than 1 m/3 ft
- Control buoyancy and swim relaxed throughout dive
- Hover in different positions
- Ascent – safety stop
- Post-dive buoyancy check

I am a renewed, Teaching status PADI Instructor in this specialty.

Instructor Name _____ PADI # _____

Instructor Signature _____ Completion Date _____

## Dive 2

### Instructor Statement

I verify that this student diver has satisfactorily completed Dive Two as outlined in the PADI guide for Peak Performance Buoyancy, including:

- Assembly of weight system
- Visualization practice
- Gearing up
- Predive safety check (BWRAF)
- Entry
- Predive buoyancy check
- Neutral buoyancy during slow descent
- Demonstrate efficient fin kicks
- Hover for 90 seconds without rising or sinking more than 1 m/3 ft
- Flood and clear mask while hovering
- Maneuver close to a nonliving portion of the bottom without touching it and then back away using neutral buoyancy with hand or fin sculling

I am a renewed, Teaching status PADI Instructor in this specialty.

Instructor Name _____ PADI # _____

Instructor Signature _____ Completion Date _____

### Student Diver Statement:

I verify that I have completed all performance requirements for this Peak Performance Buoyancy specialty. I am adequately prepared to dive in areas and under conditions similar to those in which I was trained. I agree to abide by PADI Standard Safe Diving Practices.

Student Name _____

Student Signature _____ Completion Date _____

# PADI Adventure Dive Training Record

## Peak Performance Buoyancy

### Skills Overview

- Knowledge Review
- Briefing
- Assembly of weight system
- Gearing up
- Predive safety check (BWRAF)
- Entry
- Predive buoyancy check
- Neutral buoyancy during slow descent
- Hover for 60 seconds without rising or sinking more than 1 m/3 ft
- Control buoyancy and swim relaxed throughout dive
- Hover in different positions
- Ascent – safety stop
- Post-dive buoyancy check
- Exit
- Debrief
- Log dive – complete Adventure Dive Training Record

### Instructor Statement

I verify that this student diver has satisfactorily completed the Knowledge Review and Performance Requirements (as described in Advanced Open Water Diver Course Instructor Guide) for this PADI Adventure Dive. I am a renewed, Teaching status PADI Instructor for the current year.

Instructor Name _____ PADI # _____

Instructor Signature _____ Completion Date _____

### Instructor Contact Information (please print)

Instructor Mailing Address _____

City _____ State/Province _____

Country _____ Zip/Postal Code _____

Phone _____ Email _____

### Student Diver Statement

I verify that I have completed all performance requirements for this Peak Performance Buoyancy Adventure Dive. I am adequately prepared to dive in areas and under conditions similar to those in which I was trained. I agree to abide by PADI Standard Safe Diving Practices.

Student Name _____

Student Signature _____ Completion Date _____