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IDP - Instructor Development Program

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>2</td>
</tr>
<tr>
<td>General Disclaimer</td>
<td>3</td>
</tr>
<tr>
<td>Preface</td>
<td>6</td>
</tr>
<tr>
<td>Trail Etiquette</td>
<td>8</td>
</tr>
<tr>
<td>Introduction</td>
<td>9</td>
</tr>
<tr>
<td>Chapter 1 - Guiding Skills</td>
<td>10</td>
</tr>
<tr>
<td>Doing the splits</td>
<td>11</td>
</tr>
<tr>
<td>Verbal Splits</td>
<td>11</td>
</tr>
<tr>
<td>Visual Splits</td>
<td>12</td>
</tr>
<tr>
<td>Setting Up For Success</td>
<td>12</td>
</tr>
<tr>
<td>Tour Introduction</td>
<td>12</td>
</tr>
<tr>
<td>Pre-Tour Skill Session</td>
<td>13</td>
</tr>
<tr>
<td>Prerequisites for Teaching A-Line Techniques</td>
<td>13</td>
</tr>
<tr>
<td>Pre-Tour Skill Session</td>
<td>14</td>
</tr>
<tr>
<td>Guiding Skills</td>
<td>15</td>
</tr>
<tr>
<td>Once Riding</td>
<td>15</td>
</tr>
<tr>
<td>Guiding the Trails</td>
<td>15</td>
</tr>
<tr>
<td>Once Riding on a Trail</td>
<td>16</td>
</tr>
<tr>
<td>If an Accident Occurs</td>
<td>17</td>
</tr>
<tr>
<td>Chapter 2 - BioMechanics</td>
<td>18</td>
</tr>
<tr>
<td>Centre of Mass</td>
<td>19</td>
</tr>
<tr>
<td>Base of Support</td>
<td>19</td>
</tr>
<tr>
<td>Stability</td>
<td>19</td>
</tr>
<tr>
<td>Chapter 3 - Mountain Bike Skills</td>
<td>22</td>
</tr>
<tr>
<td>Operation of Controls</td>
<td>23</td>
</tr>
<tr>
<td>Application of Brakes</td>
<td>23</td>
</tr>
<tr>
<td>Pedaling &amp; Gear Selection</td>
<td>23</td>
</tr>
<tr>
<td>Steering</td>
<td>23</td>
</tr>
<tr>
<td>BioMechanical Skills</td>
<td>24</td>
</tr>
<tr>
<td>Stance &amp; Balance</td>
<td>24</td>
</tr>
<tr>
<td>Range of Motion</td>
<td>24</td>
</tr>
<tr>
<td>Tactics</td>
<td>25</td>
</tr>
<tr>
<td>Pressure Control</td>
<td>25</td>
</tr>
<tr>
<td>Timing &amp; Coordination</td>
<td>25</td>
</tr>
<tr>
<td>Chapter 4 - Jump Theory</td>
<td>26</td>
</tr>
<tr>
<td>Dead Sailor Rotation on a Jump</td>
<td>28</td>
</tr>
<tr>
<td>Anatomy of a Jump</td>
<td>29</td>
</tr>
<tr>
<td>Basic Jump Technique</td>
<td>31</td>
</tr>
<tr>
<td>Step 1 - Jumping without Air (Rolling)</td>
<td>32</td>
</tr>
</tbody>
</table>
The Level 2 Mountain Bike Instructor Development Program (MBIDP) has been designed to provide the teaching skills necessary for instructors to develop intermediate to expert riders in a mountain bike park environment. It is assumed that most program participants will have successfully completed the Level 1 MBIDP and as such will be familiar with Park Riding and have the basic skills required to lead groups in this setting and to provide instruction for lower level riding abilities.

The Level 2 course will focus on developing the techniques necessary to successfully ride and enjoy more advanced Park Riding trails. More specifically, this course will focus on preparing students for jumps, drops and cornering. Developing skills in these areas are the key to riding the new style of machine made, jump and berm filled trails safely and with confidence. This type of trail was made popular with the introduction of A-Line in the Whistler Mountain Bike Park in 2001. For this reason, this course will use the term A-Line style trails to refer to this type of riding experience.
The curriculum and manual for this Level 2 Mountain Bike Instructor Development Program (MBIDP) was created and developed over a period of years by the experienced coaches of the Whistler Mountain Bike Park. The knowledge gained by teaching several thousand Park Riders each year has been combined with BMX coaching techniques to provide proven progressions for each skill area.

Good luck and I hope you enjoy the course

[Signature]

Mike Johnston
Trail Etiquette - IMBA

IMBA RULES OF THE TRAIL – taken from IMBAs “Trail Solutions: IMBAs Guide to Building Sweet Singletrack”

The way we ride today shapes mountain bike trail access tomorrow. Do your part to preserve and enhance our sport’s access and image by observing the following rules of the trail. These rules are recognized around the world as the standard code of conduct for mountain bikers:

RISE ON OPEN TRAILS ONLY
Respect trail and road closures (ask if uncertain); avoid trespassing on private land; obtain permits or other authorization as may be required. Federal Wilderness areas are closed to cycling. The way you ride will influence trail management decisions and policies.

LEAVE NO TRACE
Be sensitive to the dirt beneath you. Practice low-impact cycling. Recognize different types of soil and trail construction. Wet and muddy trails are more vulnerable to damage. When the trailbed is soft, consider other riding options. This also means staying on existing trails and not creating new ones. Don’t cut switchbacks. Be sure to pack out at least as much as you pack in.

CONTROL YOUR BICYCLE
It’s fine to get in the zone, but zoning out can cause problems. Obey all bicycle speed regulations and recommendations.

ALWAYS YIELD TRAIL
Let your fellow trail users know you are coming. A friendly greeting or bell is considerate and works well. Anticipate other trail users around corners or in blind spots. Show your respect when passing others on the trail by slowing to a walking pace or even stopping. Yielding means slowing down, establishing communication and being prepared to stop in order to pass safely.

NEVER SCARE ANIMALS
All animals are startled by an unannounced approach, a sudden movement or a loud noise. This can be dangerous for you, others, and the animals. Give animals extra room and time to adjust to your presence. When encountering horses, always be prepared to dismount, yield the trail and allow the horse and rider to pass. If the horse seems frightened, dismount, remain downslope of the animal and keep yourself between the horse and the bike so the horse focuses on you. Speak to horses in soothing tones and encourage equestrians to stay on the trail. Finally, running cattle and disturbing wildlife is a serious offence. Leave gates as you found them, or as marked.

PLAN AHEAD
Know your equipment, your ability, and the area in which you are riding and prepare for your trail experience accordingly. Be self-sufficient at all times, keep your equipment in good repair and carry necessary supplies for changes in weather or other conditions. Always wear a helmet and appropriate safety gear.
INTRODUCTION

“To create a safe and friendly atmosphere for guests to improve their Freeriding skills through proven instruction and coaching techniques set out and applied in a consistent format...”

This development course will introduce participants to the progressions and techniques required to teach and guide intermediate riders on groomed trails that include Higher Speed Corners, Jumps, and Drops. It will build on the skills, techniques and procedures introduced in the Level-I Guide & Instructor Development Course and progress to guiding more advanced terrain. It cannot be emphasized enough that this course is a starting point only, and it is strongly recommended that individuals gain experience before guiding high level trails.

Prerequisites:

The basic requirements for all individuals to participate in this development program include, but are not limited to:

**Advanced riding ability (see below):**
- Strong Safety and Risk Management skills
- Professional attitude
- Good interpersonal skills and group dynamics
- Good knowledge of the trails to be used when guiding

**Equipment requirements:**
- Freeride or Downhill bike
- Flat pedals are recommended
- Full face helmet
- Armor – elbow, knee & shin, upper body & spine strongly recommended
- Full finger gloves
- Guide pack

**Specific riding abilities:**
Participants should be comfortable riding the following:
- 15 foot table style jumps
- 3 foot drops to transition
- Flat and off-cambered turns at high speed
- Bermed corners at high speed
This chapter covers the basic requirements necessary to lead a group of riders in a mountain park environment. The processes and procedures contained in this section will form the fundamentals of any safe, effective and enjoyable lesson regardless of age, skill level or type of riding being taught. These are the basics of a good lesson utilized by the first year instructor and the seasoned veteran alike. Mastering these elements of successful group leadership is essential to becoming an effective Park Riding instructor.

While much of this material was presented in the Level 1 MBIDP its importance makes it worth repeating. Furthermore, this section will cover the specific leadership skills required to lead and manage groups of riders on more advanced trails where speeds, distances and possible trail congestion require a further development in this area.
Doing the Splits

One of the most important aspects of doing tours in outdoor activities is arranging everyone into appropriate groups; doing Splits. This can be done in two common ways; talking to them and asking questions (Verbal Split), and watching them do the activity (Visual Split). Splits are done based on the guest’s ability, speed, and most importantly, expectations.

As you are meeting the clients and introducing yourself, begin asking relevant questions to get a better idea of their abilities and expectations. This should be done with the utmost respect. Assuming that they are requesting a jump or drop session, ask them relevant questions about their riding experience. Some questions you may want to ask:

- What would you like to get out of this session? Learn / Tour?
- Are there any specific skills you want to learn? Jumps? Drops? High Speed Cornering?
- Have you done these skills before?
- What type of bike do you own? Mountain Bike? BMX? Motocross?
- How often do you ride?
- When did you ride last?
- What type of trails do you usually ride?
- What type of jumps have you done? How big?
- How do you feel about a 3” drop? - 6” drop

Knowing the resort’s ability guide and the groomed trails will be an asset in putting the clients into groups of similar ability and expectations (see Appendix D p.83). Knowing the clients abilities and expectations will make the “Setting the Tour up for Success” much easier. While talking to the group, do the pre-tour bike inspection and make sure they are properly prepared for the tour, paying attention to how they are dressed and their protective equipment.
Visual Splits

This is the easier and more accurate way to organize the groups and is normally done after a preliminary Verbal Split. During the basic techniques session and warm up, pay close attention to their riding. Things to watch for include:

- Basic skills
- Comfort with the bike
- Gear selection
- Confidence
- Speed

Note: The perfect split is rare to have, so be prepared to “work the split”

Setting Up For Success

Work with your clients to establish realistic and achievable goals within the time provided, and communicate those goals clearly with all the members of the group before beginning the session. If the guests have goals or expectations that may not be attainable within your group or the time provided, explain this and if possible, move them to another group, or arrange for alternative sessions.

Tour Introduction

Before beginning the session, take a few minutes to introduce the group and yourself. Let the group know what to expect, outlining your plan for the session, including the format, what you will teach and how much riding to anticipate. Remind your guests to always ride within their abilities and for them to let you know if they have any concerns or questions.
Pre-Tour Skill Session

It is necessary to do a short skill session before starting any guiding or instruction. Even if the clients have previous experience, quickly assess their basic skills and techniques to be certain that they have sufficient ability and confidence, before continuing on to more advanced sessions (see Prerequisites below). Pay special attention to how comfortable they are with their equipment if it was rented. This can all be done during a simple warm-up in the skills area and on the first lap down an easier trail. If the group wants to go directly to an advanced trail, do a qualifying session to confirm that everyone is at the required skill level for that trail. Always start with techniques that are on the ground (rolling a jump or drop) at slower speeds, and progress if they show proficiency. Do not move to the trail until the group has shown the required skill level.

Prerequisites for Teaching A-Line Techniques

For any advanced session to be successful, the clients need to have the necessary skills and mental attitude. The basic requirements for any client to participate in this level of session include, but are not limited to:

Intermediate riding ability:

Techniques that riders should be competent in before attempting the progressions in this manual:

- Maintain Neutral Position while riding at moderate to high speeds
- Use both brakes simultaneously but independently, to effectively brake on hills without skidding
- Ride basic level corners in control and by leaning the bike, and showing some Angulation when leaning
- Basic Wheel Lifts

If a rider is deficient in the skills required to perform the prerequisite techniques, move to more appropriate terrain to develop them first.
Beyond the physical requirements, riders will also need the correct mental attitude. Students should be aware of their limitations but have the confidence and willingness to do the progressions before they are attempted. If a client is uneasy or displays apprehension during a progression, discontinue the session and build up their confidence by developing the skills specific to the technique that they are having difficulty with, but on easier terrain.

Equipment requirements:

- Freeride or downhill bike
- Flat pedals are recommended
- Full Face helmet
- Armor – elbow, knee & shin, upper body & spine armor strongly recommended
- Full finger gloves

Bike Considerations:

Regardless of the type of bikes being used, saddles should be low to take advantage of maximum Range of Motion potential. Different bikes will produce different results, but it should be emphasized that the technique remains the same no matter what type of bike is being ridden. Hard Tail bikes require more precision and are less forgiving, but are more efficient in the transfer of forces between the rider and the ground. Full-suspension bikes deliver a smoother ride and are more forgiving, but are less efficient in transferring forces to the ground and will require more physical effort.

Some suspension designs are engineered to be more stable (platform designs) and therefore will produce even less efficient transfers of forces, and this will result in even more effort being required. However, platform designs can make it easier to stay balanced during some techniques. As above, the techniques remain the same.
Guiding the Trails

Remember to stop before heading down the trail and take a moment to set the ground-rules covered in the Level 1 course. Cover the Mountain Bike Responsibility Code (see Appendix F p.86). Below are some additions specific to level and type of trail:

Stay behind the guide:

Clients should never pass the Guide whenever the Guide is leading from the front. This may be harder on faster trails but is even more important; this gives the Guide better control over the speed and where the group stops. In order to do on-trail coaching or, if it is better to sweep the group down the trail, the Guide can take a different position in the group and let the clients go ahead of them. This should only be done after the Guide has lead the group down the same trail previously, focussing on any concerns and where each stop will be. Once the Guide is satisfied that the group is familiar with the trail and will stop in the right locations, they can allow clients to go ahead of them.

Stopping:

Tell your clients that you will be stopping often and to move as far off the trail as possible when stopped. Explain how high-speed riders may be moving down the trail and how to avoid stopping in the landing areas, approaches to features, or the outside of corners. Whenever possible, pick spots that offer a good view back up the trail before merging.

Spacing:

As speed increases, so must the distance between riders, 3-4 bike lengths may not be enough. They should be able to see enough of the trail between the rider in front and themselves in order to ride properly and avoid obstacles.

Once Riding:

Once underway, it will be the Guides job to choose the route, set the pace, monitor their clients and continue to coach them as they ride.

Trail choice:

The level of trail to use is based entirely on the rider’s ability; it is always better to err on the side of caution and choose a trail that is too easy than too hard. The first run should always be an easier trail with little consequence in order to warm up. If the trail is too easy, increase the challenge by increasing the speed.

Describe the trail:

At each stop point, take a moment to describe the upcoming section of the trail, highlighting any features. Remind clients of any relevant skills, about spacing, and to look up trail before starting.
Choosing the right speed:

Speed is controlled by the Lead Guide and depends on the ability of the group, and the difficulty of the trail. Maintaining a constant speed is acceptable for safety, but the tour will be more enjoyable if you increase and decrease the speed according to the terrain and the group’s ability. The first run down a jump or drop trail should always be taken slowly to let the group become familiar with the trail and its features. Always roll the jumps the first time. Speed can be increased as the group becomes familiar and comfortable with the trail. When setting a faster pace on jump trails, be aware that different riders will require different speeds to hit the backside of a jump, and that going too slow may cause more problems for the riders behind. Monitor how the riders are doing and if they do not have the skill to make the backside of the jumps, limit their speed to keep them from casing the jumps too hard. Once they have the ability and comfort to backside the jumps, increase the pace to an adequate speed. Choking can be used to control the group’s pace, but because of the higher speeds involved in this style of riding, the group will need to be warned and reminded to maintain their spacing. Remember to maintain the slower pace until everyone in the group has passed the reason in the trail for “Choking”.

Stop points:

Stop at each intersection to avoid confusion, before any section that requires a warning or coaching, and often, in order to collect the group and rest. Stop more frequently at the beginning of the tour to make sure that everyone is comfortable with the trail and pace, and then increase the ride time between stops as the group progresses. Stops must have enough space for everyone to be off the trail, offer good visibility of the trail above to see if riders are coming before merging. Stops should not be in approaches, landing areas, around blind turns, or on the outside of high-speed corners. Once you stop, make sure you’ve got everyone with you, check on how they are doing, and do not start again until everyone has had a chance to rest.

Look back often:

Looking back while riding is a difficult technique that requires constant practice, good judgement, and an awareness of one’s own skill level. Never risk your own safety to look back, if looking back is not an option, stop more often to collect the group.

Teaching on the trail:

Give relevant coaching and reminders for the trail at stop points and while moving. This is the basis of guided mileage and is a great way to improve technique and confidence. If you see something that should be corrected, try to introduce a drill, or focus immediately on the issue in order to develop a better technique, and not reinforce the bad habit. Give verbal cues while moving to remind them of the relevant techniques, timings, and terrain; always use the same terminology. As the riders become more proficient, introduce more techniques or challenges to keep them interested and to improve their riding.

When to spot and when to walk:

Whenever you come across a challenging obstacle or feature ask yourself; Does the rider have the ability, have they progressed to this level and what
are the consequences of failure?. If you feel that a trail feature may be too difficult for the client, that they don't have the confidence or experience, or the consequences of a fall could be serious, walk the section of trail and have your clients do the same. It is strongly recommended that Guides do not spot clients when they are attempting medium to higher-speed techniques as it may put both the Guide and client at risk.

Monitor your clients:

Keep a close watch for signs of fatigue, overheating, fear, dehydration, or coldness. These conditions will have an effect on their riding and decision making ability. Higher-speed riding requires good Balance and Timing & Coordination and these are normally the first things to suffer when a rider becomes fatigued or dehydrated.

Monitor bikes for mechanical problems:

Watch and listen to the bikes for potential problems and address any complaints or concerns your clients may have about the bikes. On extremely long Downhill’s, stop and give the brakes a chance to cool down (be wary of the hot rotors or rims), check that the brakes are still working before continuing. If a crash occurs, inspect the bike before you allow your client to continue. Follow the “Pre-tour inspection checklist” from the Level 1 manual. If suspension bikes are being used, watch for the suspension speeding up (forks and shocks becoming too springy like a pogo-stick caused by over-heating) as this will cause the bike to bounce back too quickly after landing jumps or drops and may cause serious control issues.

If an Accident Occurs

- Make the site safe, close the trail if necessary
- Follow first aid protocols
- Show compassion
- Contact Patrol if necessary
- Keep opinions and observations to yourself
- Do not assume responsibility
- Do not talk about insurance
- Fill out an accident report or write a statement as soon as possible, while events are still clear in your mind
- If you encounter an accident involving other riders, follow the same procedures
Biomechanics is the application of mechanical and physical principles to body movements; they can be used to help explain movement patterns for any sport or activity.

There are certain biomechanical principles and terms used from one sport to the next and below are some of the ones explained in this manual:

- Centre of Mass
- Base of Support
- Stability
- Forces & Torques
- Maximum Force
- Impulse
- Motion & Velocity
- Momentum
- Equilibrium or Balance
- Mental Focus
Centre of Mass (COM)

Centre of Mass (COM): There is also a Centre of Gravity but for the purposes of this manual we will just use COM. The Centre of Mass is an imaginary point around which a body’s weight is evenly distributed; this can be for the mass of the rider’s body, the bike or a combination of both.

The Centre of Mass for a rider’s body can change considerably because the segments of the rider’s body will move with joint rotations. This concept is important in understanding balance and stability. A bike’s COM can also change with large suspension movement. It is easy to demonstrate a wrench’s COM by balancing it on your finger.

Base of Support (BOS)

Base of Support (BOS): This is the area that supports the COM. A standing person’s BOS would be the area between their toes and heels and the distance between their feet. A bike’s BOS would be the area between the front and rear tire’s contact points on the ground.

Stability

Stability refers to the resistance the rider or bike has against disruptive forces. There is a strong relationship between the Centre of Mass (COM), the Base of Support (BOS) and the mass of the bike and rider. Lowering the COM in relation to the BOS, increasing the mass of the bike or rider, or increasing the size of the BOS will increase Stability. However, Stability and Mobility have an inverse relationship and the more stable a rider is, the less agile they may become. Lowering the rider’s COM also requires that the rider further flex their joints thus decreasing their Range of Movement (see Range of Motion on p.24). This is why nervous riders who hover low over their seats or sit while riding can experience difficulty maintaining balance.
Forces & Torques

A **Force** is simply an unbalanced push or pull that changes the motion of a bike or body segment. **Motion** is created and modified by the actions of forces (mostly muscle or bike forces, but also by external forces from the environment).

When a Force rotates a bike or body segment the effect is called a **Torque** or Moment of Force.

Maximum Force

Maximum Force is the force that can be applied when the rider uses all the joints and muscles efficiently to create maximum effect. An example would be the use of legs, hips, back and arms in sequence to execute a bunny-hop or level-lift.

Impulse

An Impulse is the application of a force for an amount of time. An example could be that a long slow extension (weaker Impulse) before a Level Lift may not produce the desired result, but the same extension over a shorter time (stronger Impulse) may meet with success.

Motion & Velocity

**Linear Motion** is when all points of an object travel in the same direction. **Rotational Motion** is a twisting or circling direction around an axis.

**Velocity** is the rate of motion (speed) in a certain direction.

Momentum

Momentum is essentially the quantity of motion an object possesses (Mass x Velocity). Momentum can be transferred from one object to another. For this manual’s purpose there are two types of momentum, Linear and Angular.

**Linear Momentum** is momentum in one direction.

**Angular Momentum** is rotational momentum and can be created by the rotations of various body segments.
Equilibrium or Balance is the control and coordination of Stability and Movement. When a rider is in control, they can neutralize the outside forces such as bumps or direction changes that would disrupt either their Stability or their Movement. For this manual, Balance can be broken into two types; Static and Dynamic. Static Balance is the rider’s control of the bike and body’s stability while stationary; and Dynamic Balance is the rider’s control of the bike and body’s stability while moving.

This is not a biomechanical skill but is an important aspect for the safety and enjoyment of your clients. Learning new techniques or riding new terrain may not be possible if the rider is unable to relax or focus, and they will certainly fail if they believe that they can’t succeed. Sports psychology is an in-depth field and we suggest that coaches learn more if they are serious about getting the best out of their clients. Some simple points to consider are:

Relax:
Humans are stronger and faster to react when relaxed. If your clients are riding with rigid muscles have them get off the bike and shake out their arms and legs. Show them the dynamic relaxed hand drill.

Breathe:
This will help with relaxing and staying focused. Maintain a slow and steady breathing pattern inhaling through the nose or mouth and exhaling through the mouth.

Focus and Stay in the moment:
Leave your every day baggage behind. Focus on the technique being done rather than the outcome. Stay in the present and avoid thinking too far ahead.

Think positive:
If you find yourself thinking negative thoughts, stop and think about your breathing. Focusing on the rhythm of your breathing will help pull you back into the present. If you are struggling with letting go of negative thoughts, smile. Simply forcing yourself to smile will quickly change your attitude.

Visualize success:
Before starting, take a moment to imagine the details of a previous success. This can be visual (images or pictures) or kinesthetic (how the move felt).

3 strikes and you move on:
If a rider is struggling and fails too many times they may develop a mental block that will make learning the technique harder, so after 3 failed attempts move on to something else and return later when the rider has more confidence.

If after this, the rider is still unable to relax or focus, move onto something else until they are better mentally prepared.
This chapter reviews the skills introduced in the Basic course and highlights how they relate to the techniques specific to the A-Line manual. As mentioned in the Basic manual, Skills are the fundamental elements required to perform techniques. If a rider is lacking in any particular skill they will find it difficult to progress and the instructor or coach must be able to determine what skills are limiting that progression. Once the deficient skills are known, drills and/or specific riding terrain can be chosen to develop the rider before returning to the present technique.

The skills below are listed in the order of importance and the Assessment & Development should be done with the same priority. Each Skill includes the suggested level of proficiency or expectations for an intermediate rider and includes suggested drills or terrain to develop that specific skill.
Chapter 3 - Mountain Bike Skills

Operation of Controls

Application of Brakes

This is simply pulling the brake levers to apply a frictional force to the wheels to slow or stop their rotation. Riders of this level should be able to control their speed on steeper terrain without skidding and be able to control the front and rear wheels simultaneously but independently to provide strong stopping power. The brakes should be applied smoothly, and be modulated to control speed. Riders with disc brakes should be using just one finger.

Pedalling & Gear Selection

Pedalling is the application of pressure on the pedals during the down stroke of the pedaling cycle to create a rotational force to the rear wheel through the chain and gears. Gear selection is the choosing of the ratio difference between the front and rear cogs to cause the wheel to rotate more or less per pedal stroke, this also affects the leverage advantage the rider has in moving the bike forward. Riders should know what gear to use for the given situation and shift between gears smoothly.

Steering

This is simply the turning of the front wheel by rotating the handlebars around the axis of the headset. It should be done smoothly and only as much as necessary. Riders should be able to travel down the trail in a straight line with smooth direction changes.
Stance & Balance

Stance is simply the rider’s body position and its COM location in relation to the bike and body’s BOS. Stance will have an affect on the riders “Balance”, “Range of Motion” and “Pressure Control”. Riders should be able to maintain a Neutral Position while travelling over rough ground at a moderate speed, and change their Stance to remain Balanced under heavy braking, when leaning in a corner, and when the bike angle changes (as in going down steep hills). Teaching Track Stands or riding skinnies will help develop better Stance & Balance.

Range of Motion

This is a very important aspect to Stance and Balance and refers to the limits a rider can move their bike in relation to themselves and is based on their Stance and the movement of their joints and limbs. This can be looked at as the “Cone of Movement”, (see figure 3.1) the larger the cone, the greater the rider’s Range of Motion in relation to the bike, and the greater their ability to maintain balance.

Intermediate riders should be comfortable with moving the bike side to side enough to push against the inside of their legs, be able to sit on the rear tire, and be able to lower their chest close to the handle bars. Rolling over small drops, pump courses or round obstacles (see photos figure 3.2) can be used to make the rider more aware of their potential Range of Motion.

CONE OF MOVEMENT

Note: The Cone of Movement represents the limits of movement a rider has above their bike. Shown are the limits when standing (based at the pedals) and sitting (based at the seat).

Figure 3.1

Figure 3.2
This refers to a rider’s ability to execute skills and/or techniques accurately and efficiently at the proper time during a move or place on the trail. This is the hardest skill to develop and requires repetition and practice of techniques in various situations. Intermediate riders should be showing some flow when riding down the trail, and be performing techniques with minimal effort. Developing Timing & Coordination for the techniques in this course without actually doing them is difficult, but spending time on a pump track or similar terrain will improve all mountain bike skills without increased risk.

**Tactics**

**Speed** is an important ingredient required to maintain momentum over terrain or to achieve a desired result in more advanced techniques.

**Line Choice** is reading the terrain and choosing the most appropriate path based on an individual rider’s strengths and abilities. At this level, reading the terrain must be done more quickly due to the increased speed. Line choice must also take into account setting up for the next obstacle in the trail.

**Mental Preparation** is being prepared mentally for learning new techniques or just riding down the trail, and is a very important aspect to riding well. This topic is covered in more detail in the Biomechanics section.

**Pressure Control**

This is a sensory skill that refers to a rider’s ability to control the amount of pressure on the bike and the ground. This is achieved by changing the rider’s stance and/or by applying forces by moving the arms and legs within the Range of Motion. Intermediate riders should be adjusting their Stance to adjust hand and foot pressure, and then using the hands and feet to apply pressure to the front and rear wheels independently. They should be able to go up and down drops of street curb height smoothly without jarring themselves or requiring large suspension movement. They should be bending their knees and elbows to absorb small impacts on the trail and should be able to perform enough Preload to do Basic Wheel Lifts. Doing wheel lifts is a good way to improve the application of pressure, and rolling off small drops is good for learning how to absorb pressure.

**Timing & Coordination**

This refers to a rider’s ability to execute skills and/or techniques accurately and efficiently at the proper time during a move or place on the trail. This is the hardest skill to develop and requires repetition and practice of techniques in various situations. Intermediate riders should be showing some flow when riding down the trail, and be performing techniques with minimal effort. Developing Timing & Coordination for the techniques in this course without actually doing them is difficult, but spending time on a pump track or similar terrain will improve all mountain bike skills without increased risk.

**Note: Pump Riding**

When introducing pump riding, focus on using Range of Motion to keep a silent upper body while the bike moves up and down over the terrain. When pumping to increase speed, focus on pushing the rear wheel down with the legs and remember that being smooth is better than being strong. Focus on having the bike flow over the terrain.
Jump Theory

This theory section is designed to give instructors a better understanding of the forces involved in jumping and to explain how a ramp effects the Velocity of the bike and rider.

It should be noted that what happens on the ramp will generally dictate what happens in the air.

With gravity, a rider traveling along a smooth trail exerts a downward force against the bike and the bike exerts a force against the ground; the ground and bike are then exerting an equal and opposite force upwards. Without any outside forces, the bike and rider will maintain their course down the trail. In order for a jump to occur, the forward motion of the bike and rider needs to be changed from a horizontal direction to a more vertical direction. To do this, a large force will be required; this is achieved by the use of a ramp.

We will first look at the bike. When the bike starts to move up the ramp, a force is exerted against the bike, changing its direction of motion (Vector) from a horizontal direction to a more vertical direction.
When the bike reaches the top of the ramp and the front wheel rolls over the lip, the ramp is no longer exerting a force on the front wheel and the bike’s BOS (see Base of Support on p.19) becomes just the rear wheel. This creates an unstable position where the bike’s COM (see Centre of Mass on p.19) is now ahead and outside of it’s BOS. In this unstable position, the COM’s Vector can no longer be affected by the ramp. It will continue from it’s current Vector and will begin to arch back towards the ground due to the force of gravity.

As the COM begins arching forward and then towards the ground, the ramp is continuing to exert a force on the rear wheel as it travels up the ramp, and because the COM is now outside the BOS, a rotational force or Torque is applied to the bike. You can see this rotation when a bike is ghost ridden off of a jump or drop. We are not suggesting that you try this but, if you’ve seen it happen, it demonstrates the forces being applied to the bike.

As the ramp exerts a force against the bike, the bike exerts a similar force against the rider. If the rider does not exert a counter force to Balance against the force of the bike as it travels up the ramp, the bike will be pushed back and up in relation to the rider’s COM, resulting in an unstable riding position.

If the rider does exert a force, but only enough to maintain their relative position to the bike, they will follow a similar path as the bike, and the same Torque that is exerted on the bike when the front wheel leaves the ramp may be transferred to the rider. Unless absorbed, this Torque can result in a “Dead Sailor Rotation”.
This is the forward rotation of the rider in the air caused by the Torque of the bike as it leaves the ramp, being transferred to the rider. It is the common result of insufficient jumping technique and may have catastrophic results. Even if the rider does land safely and upright, it can frighten them enough to prevent them from ever learning to jump (see figure 4.1).

Figure 4.1

When the front wheel rolls over the ramp, it begins travelling forward whilst the rear wheel is traveling up the ramp. This causes the forward rotation that must be counteracted against.

The progression outlined in this manual is designed to decrease or eliminate this Torque and to teach the rider how to avoid this Torque from being transferred to the rider’s mass by absorbing the upward force of the rear wheel.

All jumping techniques avoid the Dead Sailor Rotation by applying extra forces that balance against the disruptive forces. Different techniques and/or timings will control the resulting arc that the rider and bike take in the air.

This is only a short and basic overview of the forces involved in jumping; a more detailed look at the variables and forces involved requires more space than is available for this manual but will be covered in more advanced manuals.
Approach area:
This is the run-in, or trail section approaching the base of the Take-Off Ramp. For teaching, it should be level or downhill and free of obstacles or debris, wide enough for the riders to easily stay on track, and long enough to reach the required speed for the jump before the Point of Commitment. If the approach is downhill, it should level out and stay level for 3-4 bike lengths before the Take-Off Ramp.

Point of Commitment:
The Point of Commitment is the point on the approach where the correct speed and Stance for the jump should be attained; there should be no pedaling, braking or shifting of Stance beyond this point. Any disruptive forces just prior to the take-off ramp may have negative affects on the rider’s Timing or Balance and could result in an unsuccessful jump.

- Pedaling will cause the rider to be in an incorrect Stance and may affect the timing and pressure of the Preload
- Braking will cause changes in pressure, balance, and Preload timing.
- If the approach is too fast, the rider may brake but no jump should be attempted.

If a rider is not prepared to jump by the Point of Commitment, they should abort the jump by slowing down and either turning away from the jump or slowly rolling over it. This will encourage the rider to stay focused on the execution of the Preload and jump. Think ‘relax, level pedals, focus on the jump’.
Take off Ramp:

This is the part of the jump that changes the bike’s horizontal path to a more vertical direction. For teaching, try to find a jump with a Ramp 2-4 bike lengths long that is not too steep and is gently concaved. Avoid jumps that are less than 2 bike lengths long. Longer ramps give the rider more time to do the Preload, produce less Torque and are easier to balance against. The steeper the Ramp, the more force it will exert against the bike. This will send the bike and rider more vertical but will require better Pressure Control and Timing & Coordination.

The Lip:

This is the end of the take-off ramp and the transition between the Ramp and the Table. A jump that is referred to as “Lippy” will have a Lip that is at or near vertical. As above, the steeper the Lip is, the more vertical the bike and rider will be sent, and the more skilled the rider will need to be. For these progressions, the jump should have little to no Lip and the transition from the Ramp to the table should be rounded slightly to make rolling over it easier.

The Table:

This is the area between the Lip of the jump and the Landing Ramp. Some jumps do not have a Table and they are referred to as “Gap Jumps”. Gap jumps cannot be used with the progressions used in this manual. Tables that are 2-3 times longer than the take-off ramp, are flat or slightly downhill and have no abrupt transition or “knuckle” between the Table and Landing Ramp are best for instruction purposes. This will make it difficult to over-shoot the landing and will prevent the riders being kicked by the rear wheel if it comes up short of the landing.

Landing Ramp:

The Landing Ramp or “Backside” is the surface that riders will be trying to land on as they progress. It should be longer, wider and less steep than the take-off Ramp. It should also be a smooth surface and free of debris or obstacles. This will give jumpers a comfortable landing that does not require high proficiency or accuracy while learning.

Exit Area:

This is the area beyond the base of the Landing Ramp and should be large enough to bring the bike to a stop after jumping without having to skid or avoid obstacles. The surface should be smooth and free of obstacles or debris.
Basic Jump Technique

It should be again clarified that this is by no means, the only way to jump. The technique taught here is often referred to as the ‘Preload Method’ and is very versatile and easily adaptable to riders who are learning to jump. This technique also allows the instructor to follow a safe and easy-to-follow progression that will not overwhelm a client.

Before Starting Your Jump Training:

A good way to test that a rider is proficient in the necessary skills for jumping is to have them perform the Level Lift off a small drop (curb height is fine). A successful Level Lift will show the ability to perform a balanced Preload, good rear wheel awareness, and adequate timing. Points to watch for:

- Relaxed and even Preload
- Both wheels being lifted together
- An adequate Pedal Grab
- The bike staying level throughout the move
- The rear wheel clearing the drop
- Both wheels landing simultaneously

If the rider is unable to perform a level lift, it should be taught. Start with a Front Wheel Lift, move to a Rear Wheel Lift, and then progress to a Level Lift. Develop until the Level Lift is proficient (refer to the Level I Basic Manual).

Front Wheel Lift    Rear Wheel Lift    Level Lift

... Once you are satisfied with the skill level of the clients, you can move onto the jump lesson.
Rolling up the ramp, across the top, and down the landing of a tabletop style jump helps develop a rider's Range of Motion, Pressure Control, and Timing. When learning to jump, it will also give the rider a chance to feel most of the movement patterns for jumping without actually leaving the ground.

**Technique:**

1. Ride slower than the speed required to get air. A jogging pace should be adequate.
2. Approach the ramp in the Neutral Position with arms and legs slightly extended.
3. As the ramp pushes the front wheel up, flex the arms and allow the handlebars to rise; Then as the rear wheel is pushed up by the ramp, flex the legs and allow the rest of the bike to rise up to the body.
4. Ride over the top of the table or highest point in a crouched position.
5. As the front wheel begins to move down the landing ramp, extend the arms and push the wheel down the ramp.
6. Then as the rear wheel begins to roll down the landing ramp, extend the legs, pushing the rear wheel down the ramp.
7. Try keeping a silent upper body and have the bike move up and down underneath the rider.
## Components of a Rolling Jump Without Air

<table>
<thead>
<tr>
<th>Step</th>
<th>Action Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Approach the jump in a Neutral position but slightly more extended</td>
</tr>
<tr>
<td>2</td>
<td>Flex the arms as the front wheel comes up the ramp</td>
</tr>
<tr>
<td>3</td>
<td>Bend the knees as the rear wheel comes up the ramp</td>
</tr>
<tr>
<td>4</td>
<td>Cross the table in a crouched position</td>
</tr>
<tr>
<td>5</td>
<td>Begin extending the arms as the front wheel rolls down the ramp</td>
</tr>
<tr>
<td>6</td>
<td>Extend the legs as the rear wheel rolls down the ramp</td>
</tr>
<tr>
<td>7</td>
<td>Return to the Neutral Position at the bottom of the ramp</td>
</tr>
</tbody>
</table>

![Image of a rolling jump without air](image)
1. The Tabletop or roll should be between 1 and 2 feet high with no lip and a smooth approach and exit.
2. Identify the point of commitment (2-3 bike lengths), start point, and safe walking and standing areas.
3. Demonstrations should show a side view and emphasis should be on the flexing and extension of the arms and legs.
4. Have them relax and let the ramp push the bike to them.
5. Pay close attention to their approach and the wheels going up the ramp. This is when most issues will occur.

**Teaching Points:**

1. **Front wheel leaves the ground:** (Stance & Balance, Pressure control, Range of movement)
   - If the rider is approaching too fast, there may be too much force for them to absorb, and the front wheel will get popped up, therefore have them approach slower. If their Stance is backward during the approach, have them bounce on the pedals before the point of commitment in order to help them stay balanced. If their Stance is moving back when the front wheel moves up the ramp, they may be getting defensive or are too stiff in the arms, have them relax and approach slower. If the arms are too stiff and they are not flexing them enough, try having them think about ‘rubbery arms’ and exaggerate the flexing of the elbows.

2. **Rear wheel kick or feet lifting off the pedals:** (Stance & Balance, Pressure control, Range of Movement)
   - If their speed is too fast they may be getting thrown forward as the front wheel hits the ramp, therefore have them slow down. If their stance is too forward on the approach, have them bounce on the pedals before the point of commitment to help them stay balanced. Watch that the legs are flexing as the rear wheel moves up the ramp, as a small amount of Torque is applied to the bike and if it is not absorbed it may cause the rider's feet to leave the pedals or the rear wheel to pop up. Ensure that the brakes are not being applied on the ramp.

**Assessment & Development:**

Look for a silent upper body, smooth movements, with both wheels staying on the ground.
STEP 2 - Introduction of a Preload

The Preload:

A Preload is the loading of the suspension or bike prior to the rider exerting a force on the ground through the bike, in order to decrease the amount of force that will be absorbed by the suspension. The action is normally a rapid and forceful lowering of the body down into the bike in order to compress the suspension or tires while flexing the joints in preparation for exerting a force.

For the purposes of this manual the term "Preload" will refer to the 'flexing to preload the bike', and the 'extension to exert force', as one move.

In jumping, a Preload is done to balance against the forces of the ramp and to change the vector or arc of the rider’s body. At this level of riding, the effectiveness of the flexion portion of the Preload is not as important, but it should be a balanced and smooth movement that flows into the extension. The extension should be a smooth and deliberate movement done as the bike moves up the ramp, not a snappy punch. This will make it easier to balance against the force from the ramp pushing the bike, and any other disruptive forces. Because the rider is balancing against the forces acted on the bike from a ramp, the direction of the press will move more forward, as opposed to down, as the bike and rider progress up the ramp. (See figure 4.4)

Figure 4.4

As the rider moves up the ramp, the force being exerted from the legs, moves from a downwards direction to a forwards direction.
Timing of a Preload:

For this manual, the timing of the Preload will refer to the completion of the extension of the legs in relation to the ramp. Where on the ramp the force of the extension is done directly affects the arc the body and bike will take in the air and how much torque is applied to the bike by the ramp. This makes focusing on the timing of the extension portion of the Preload very important. With each rider and jump being different, when to start the Preload is unique to the individual and situation, and can be very difficult to point out. Where to exert the force on the ramp remains more consistent, so basing the timing on the completion of the Preload is easier to teach and learn.

All other factors being equal, an early Preload (see figure 4.5) will create a lower, longer arc by creating less vertical motion. This is done to stay low and fast over a jump. The result of less vertical motion will be an increased amount of force from the ramp pushing the bike up and a greater amount of torque that will need to be absorbed as the bike leaves the ramp. This is a more advanced technique that requires advanced Range of Motion, Pressure Control, and Timing and Coordination.
A later Preload (see figure 4.6) with the extension finishing just before or at the lip of the ramp will result in a greater change of direction and more vertical motion, creating a higher, slower arc. This will also result in less force from the ramp that needs to be absorbed, less torque as the bike leaves the ramp and less chance of a “Dead Sailor Rotation”. This technique is used to give the rider more hang time in the air and is close to the best timing for beginners.

Figure 4.6

Later Timed Preload

Timing the Preload too late (see figure 4.7) will allow the front wheel to leave the ramp before the extension is finished. At the same time, the rear wheel is still finishing traveling up the ramp which can cause a large amount of torque, and as a result, will have a greater chance of producing a “Dead Sailor Rotation”.

Figure 4.7

Too Late Timed Preload

... Therefore, a properly timed Preload should fall between the two extremes.

Depth of a Preload:

The deeper the Preload, or greater the extension, the greater the change in direction of motion will be. A greater extension during the Preload also puts the rider in a better position to absorb the lip of the ramp. This will allow the rider to stay better balanced.
Introducing the Preload:

Technique:

1. Approach the ramp in a Neutral Position, have your speed set before reaching the Point of Commitment and focus on the jump.
2. Based on timing the Preload to finish 6” before the lip of the ramp, begin the Preload by crouching down in one smooth dynamic move.
3. From the crouched position begin to extend the legs to press back against the force of the ramp.
4. 6” before the front wheel leaves the ramp, stop extending, begin to relax and prepare to absorb the lip of the jump.
5. When the front wheel leaves the lip, hold the front wheel up to maintain the bike's upward angle until the rear wheel leaves the ramp.
6. As the rear wheel leaves the lip of the ramp, relax and flex the joints to let the rear wheel come up into the body.
7. Fly level in a crouched position.
8. Spot your landing, extend the arms and legs to match the bike's angle to the landing and to absorb any impact from landing.
9. If the landing is a downhill transition, try to land both wheels simultaneously or the front wheel slightly before the rear wheel.
Components of a Preload Jump With Air

1. Have your speed set by the point of commitment
2. Begin the preload by crouching in one smooth motion
3. Extend the legs and press into the ramp
4. Maintain the bike's angle until the rear wheel leaves the lip
5. Relax and allow the bike to come up to the body
6. Fly crouched and level
7. Extend for the landing
8. Land both wheels together or the front wheel just before the rear wheel
Teaching Points:

Terrain Considerations:

Tabletop style jumps with a ramp that is 2-3 bike lengths long, have little or no lip, and riders should be able to roll the entire feature safely. The jump should have a 1:3 height to length ratio, with the table being flat or slightly down hill. There should be no abrupt transition or knuckle between the table and the landing; the smoother the transition the better. The approach and landing should be clean and unobstructed, with the landing being less steep than the take-off.

1. Identify the Point of Commitment (3-4 bike lengths away from the ramp), start point and safe walking and standing areas.
2. Before introducing the Preload, have the riders roll the jump.
3. Begin to introduce the Preload to allow for flight.
4. Demonstrations should show a side view with emphasis on the crouching and extension of the Preload, and then the crouching of flight and extending for the landing.
5. Ensure that they are not pedaling or braking beyond the Point of Commitment.
6. If they are having trouble getting up to speed before the Point of Commitment, choose a gear that will make it easier to reach the required speed with fewer pedal strokes.
7. For Safety, focus the timing of the Preload so it finishes about 6 inches before the lip.
8. Emphasize that jumping is about timing and balance, not strength. Try to be as smooth as possible and relax.
9. The crouch and then extension of the Preload should be done in one consistent, smooth movement.
10. Think about scooping the feet down and forward into the ramp during the extension part of the Preload.
11. Flying level and crouched makes it easier to extend the bike to the landing.
12. Spot the landing and “Stick It”
STEP 3 - Increasing the Intensity

Timing of the Preload:

As mentioned previously, different timings will have different results on the arc of the jump. With Beginner level jumpers, the timing should remain close to 6 inches from the lip but timing it slightly later is alright as they gain proficiency and consistency.

Depth and Intensity of Preload:

A deeper Preload is always preferred at this level but if the riders are beginning to increase the intensity of the extension, be sure that they continue to do it as a smooth movement in order to maintain their balance and make sure that you watch that they do not begin pulling up on the bars.

Increased Speed:

The greater the speed, the more force that is exerted on the bike from the ramp, and the greater the results will be. Remember that these increased forces will need to be balanced against, so the rider’s Range of Motion, Pressure Control and Timing will need to be more proficient. Depending on the depth and timing of the preload, more force will produce a higher arc or a longer distance traveled. More speed will also change the point when the preload should start in order to ensure that it is finished at the same point on the ramp.
Teaching Points:

1. Encourage a relaxed posture on the bike and being smooth.
2. At the point of commitment – relax and focus on the jump.
3. Encourage working in Timing and Depth of Preload before introducing more speed.
4. Focus on technique and don’t worry about making the backside of the jump. Ensure technique does not suffer in the attempt to go further.
5. If increasing speed, choose a gear that will let the rider reach the required speed for the jump through fewer pedal strokes and well before the point of commitment. Watch their timing!
6. Progress to larger jumps as the riders progress so that they increase their confidence.
7. Never attempt to reach the backside of a tabletop jump on the first try. Instead, land on the table to get a feel for the jump and then progress to making the backside.

Note:

First attempts should aim to land on the table. With practice and confidence, the speed and/or preload can be adjusted to increase distance and/or amplitude of the flight.

WARNING:

As speed and confidence builds, the ramp should be sufficient enough to allow for any mistakes in the timing of the preload to be consequence free. If the ramp is too short, Preload timing needs to be very precise.
Assessing jumping requires that you focus on what is happening between the Point of Commitment and when the rear wheel leaves the ramp. What happens in the air is a result of what happens in this time period. Below are common things to watch for and the results they can produce in the air. Be aware when assessing, that multiple things on the ramp may produce the same results in the air:

Stance & Balance: The rider should remain centered throughout the entire move.
If the arms are too stiff, the result will be a stance that is too far back. A bike and rider that have a ‘nose-up’ attitude through the air will confirm this. The rider should think about bending or having a “rubbery” arm feeling.

If the Preload is directed down and not into the ramp, a ‘nose-down’ attitude through the air can result and the potential for a Dead Sailor Rotation increases. The rider should think about scooping the feet into the ramp to focus the Preload effort into the ramp.

Range of Motion:
The rider should start from a Neutral Position so that there is enough Range of Motion to effectively Preload the suspension. Even though we do not focus on this technique at this level, it is a good habit to get into.

Reaching a low, crouched position before the extension will allow for maximum Range of Motion during the extension and for greater Pressure Control.

The rider’s legs should be adequately extended at the end of the Preload or there may not be enough Range of Motion to absorb the lip of the jump. Failure to extend the legs could negatively affect the rider’s Pressure Control abilities. Have them think about extending their legs deeper into the ramp, be aware that this could throw off their timing so they should start the Preload sooner.

Pressure Control:
This can be divided into two sub-sections: at the Preload and at the lip of the jump.

- **At the Preload:**

  Too much absorption instead of pressing will create excess forward momentum and a large amount of rotational force off the lip that will have to be dealt with. Focus on increasing the depth of the Preload.

  There should be adequate pressure exerted against the ramp in order to change the direction of Motion upwards. This will result in less torque and less absorption being required.
Too fast a pressure build-up (snappy Preload) on the ramp can cause the bike to become difficult to control and/or balance against irregularities on the ramp. Have them relax and think about being smooth, also have them start their Preload sooner as attempting to be smoother may throw off their existing timing.

- **At the lip of the jump:**

  There should be adequate absorption of pressure as the rear wheel leaves the ramp or a rotational force (Torque) will be transferred to the body and a Dead Sailor Rotation will result. Focus on letting the rear wheel come up to the body.

  Too much absorption of the pressure before the rear wheel reaches the lip of the jump is not necessarily a bad thing and will produce a lower arc as the rear wheel leaves the ramp early. However it will limit the rider’s ability to use the ramp to its full potential when more advanced jumping techniques are being trained. Have them relax and allow the rear wheel to come up on it’s own instead of pulling it up.

  **Timing & Coordination:** Based on the release of Preload pressure.

  If the Preload is too early, the rider will have to absorb more force from the ramp that is pushing the bike up as well as an increased amount of Torque from the lip of the jump. If the forces from the jump are not absorbed, a Dead Sailor Rotation will occur. Have the rider think about scooping the middle of the ramp, finishing when the front wheel is 6 inches from the lip.

  If the Preload is too late, the front wheel will fall forward off the lip of the jump while the rider is still extending. The rider may fall forward and a Dead Sailor Rotation may result. As explained before, think about scooping the middle of the ramp, finishing 6 inches from the lip.

- **Speed:**

  Too little speed can result in the rider compensating with an over-aggressive Preload which could lead to Balance issues. If they are uncomfortable with the speed required, discontinue jump training and work on getting comfortable with speed.

  Too much speed will increase all forces related to jumping and therefore make Pressure Control and Timing and Coordination more difficult. Check their starting point and focus on technique instead of speed.

  Slightly too fast may produce the desired results but can inhibit the rider developing proper Preload techniques.

  If the rider is deficient in the basic skills required to jump, don’t train these skills on jumps. Move to more appropriate and less consequential terrain in order to develop those skills required for proper progression.
The aim of this theory section is to give a quick explanation and hopefully provide a better understanding of the forces involved and how the surface prior to the lip of the drop effects the bike and rider. It should be noted that what happens prior to the drop will dictate what happens in the air. The effects of a drop on the bike and rider are similar to what happens on the ramp of a jump.

As mentioned in the Jump Theory section, a rider traveling along a smooth trail exerts a force against the bike and the bike exerts a force against the ground, the ground and bike are then exerting an equal and opposite force to create a balance. Without any outside forces the bike and rider will maintain their course down the trail.

When the bike reaches the drop and the front wheel rolls over the lip, the surface of the approach (or ground) is no longer exerting a force on the front wheel and the bike’s BOS becomes just the rear wheel. This creates an unstable position where the bike and rider’s COM is now ahead and outside of the bike’s BOS. In this unstable position, the bike and rider’s COM will continue from it’s current Vector and begin to arc downwards due to the force of gravity. As the COM begins arcing downwards, the approach to the drop is continuing to exert a force on the rear wheel as it travels towards the lip. Because the COM is now outside the BOS a rotational force or Torque is applied to the bike. If this Torque is transferred to the rider a situation similar to the Dead Sailor Rotation will result (see figure 5.1 and also Jump Theory).
All drop techniques, irrelevant of the type, are aimed at dealing with the rotational forces described above. There are many different drop techniques and it is not our aim to dictate what is right or wrong per situation, but to present the more common techniques used in an A-Line style trail. Drop techniques can be categorized under two headings and are based on the bike’s attitude during flight and when landing. Some common examples:

**Front wheel up or level drops:**
- Loft or manual drop
- Wheelie drop
- Hop drop

**Front wheel down drops:**
- DH lunge style drop
- Preload DH style drop
- Pre-jumping the drop

The technique used is commonly dictated by the landing. Front wheel up is better suited to flat landings; Front wheel down is better suited to sloped transition landings.

---

Figure 5.1

As the front wheel falls off the drop, the rear wheel is still traveling forward. This causes a rotation that needs to be dealt with.
Basic Drop Technique

This manual will cover the Downhill Lunge Style drop and the Preload Downhill Style drop techniques.

Downhill Lunge-Style Drops

What we call the DH Lunge Style drop is used to eliminate rotational forces while keeping the Horizontal distance traveled between the lip of the drop and the landing to a minimum. This is a more difficult technique to learn but it is adaptable to most moderate to high-speed drops and allows the rider to develop their Range of Motion, Pressure Control, and Timing and Coordination in relation to drops, with a safe progression.
Rolling the Drop

Rolling off an appropriate sized drop is used as a skill qualifier before teaching the DH Lunge Style Drop techniques and introduces the rider to the required movement patterns in a low consequence situation. It can also be used to help develop the rider's Range of Motion, Pressure Control and Timing & Coordination, if these skills are not adequate with respect to the drop technique.

**STEP 1 - Downhill Lunge-Style Drops**

1. Approach the drop in a comfortable neutral position.
2. Speed should be no more than a walking pace. Feather the brakes if necessary.
3. As you approach the drop, bend at the waist and elbows and shift your shoulders slightly forward over the handle bar.
4. Keep looking past the edge of the drop to the landing area where you will be rolling.
5. Let off the brakes as the front wheel reaches the edge of the drop.
6. "Lead" the front wheel down the drop by extending the arms and pushing the bike ahead of you down the drop.
7. The rear wheel will begin moving upwards in relation to the body as the body moves down the drop; absorb the force of the rear wheel moving upwards by flexing the legs until the rear wheel passes the lip of the drop.
8. As the rear wheel comes off the drop, extend the legs to "lead" the rear wheel down to the landing.
Rolling the Drop Continued ...
Chapter 5 - Drop Theory

Teaching Points:
The rolling drop should be about curb height with a flat or slightly downhill approach. The approach, landing area and exit should be free from debris. The take-off should be wide enough to allow a rider to stand straddling the bike at the lip of the drop. The landing pitch should be consistent with a moderate steepness, yet still allow the drop to be rolled without impacting the chain rings on the drop.

1. Identify the start point and safe walking and standing areas
2. Demonstrations should show a side view with emphasis on the extension of the arms and the flexing of the legs
3. Tell them to move the shoulders over the bars in order to look at the landing area, before rolling off the drop
4. Encourage them to be in control of the front wheel and to lead it down the drop, not to just go along for the ride
5. Tell them to think about pushing the bike ahead and sitting on the rear tire
6. Absorbing the rear wheel can be explained as “almost sitting on the rear tire” or “touching the seat to the stomach”

Assessment & Development:

Rider gets pitched forward as front wheel drops (Range of Motion, Timing & Coordination):
This is normally caused by the rider not extending the arms to lead the front wheel down the drop and by becoming too far forward as the front wheel drops. Ensure that the arms are flexed before the drop in order to increase the available Range of Motion and then extended as the front wheel rolls over the drop’s lip. Have them think about coiling their arms up and then leading the front wheel down the drop to the ground.

Rider gets thrown forward as the rear wheel approaches the Lip of the drop (Range of Motion, Pressure Control):
This is normally caused by torque being transferred to the rider as a result of the rear wheel still traveling forward as the front wheel starts to drop. This disruptive force must be absorbed by flexing the legs. Have the rider think about letting the rear wheel come up as it roles forward towards the Lip of the drop. If they need to increase their Range of Motion, have them think about sitting on the rear tire or letting the seat come up between their legs and touching their stomach. This can be tried while riding on flat terrain to get familiar with the position.
STEP 2 - Downhill Lunge-Style Drops

Small Air Drop

By introducing some speed to the same drop that was previously rolled, the DH Lunge Style drop can be introduced.

Technique:

1. Approach the ramp in a Neutral Position, have your speed set at a jogging pace before reaching the Point of Commitment, and focus on the drop.
2. As you approach the drop, bend at the waist and elbows and shift your shoulders forward over the handle bar.
3. Keep looking past the edge of the drop to the landing area.
4. Just before the front wheel leaves the drop, lunge the bike straight ahead in order to decrease the time that the rear wheel remains on the drop.
5. Once the front wheel leaves the drop, the rider’s mass will begin to drop and the rear wheel will begin to rise in relation to the rider. Absorb the rear wheel by bending the legs until it passes over the edge of the drop.
6. Once off the drop, spot your landing, extend the arms and legs to match the bike's angle to the landing, and absorb any impact from landing.
7. If the landing is a downhill transition, try to land both wheels simultaneously or the front wheel slightly before the rear wheel.
8. Reapply the brakes if necessary, after both wheels are back on the ground.
Small Air Drop Continued ...

**Figure 5.5**
Shift the shoulders forward and look at the landing

**Figure 5.6**
Lunge the bike ahead and sit on the rear tire

**Figure 5.7**
Extend the legs after the rear wheel clears the lip

**Figure 5.8**
Reapply the brakes after both wheels have landed
Teaching Points:

Terrain Considerations:
The starting drop should be rollable, with a flat or slightly downhill approach. The approach, landing area and exit should be free from debris. The take-off should be wide enough to allow a rider to stand straddling the bike at the lip of the drop. The landing pitch should be consistent with a moderate steepness, yet allow the drop to be rolled and the landing should begin immediately at the base of the drop with no gap or step.

1. Identify the point of commitment; approximately 2 bike lengths from the edge of the drop.
2. Demonstrations should be viewed from the side with emphasis on the lunge and the flexing of the legs.
3. Shoulders should be over the bars to be able to spot the landing before the drop, and to allow maximum range of movement for the lunge.
4. The bike should be lunged ahead, not pulled up.
5. Absorbing the rear wheel can be explained as “almost sitting on the rear tire” or “touching the seat to the stomach”.
6. Introduce the drop at moderate speeds, and then decrease the speed to develop the technique and a greater Range of Motion. Going slower forces the move.
7. When progressing to a higher drop, increase the speed the first time to make the drop easier. Then as comfort with the drop increases, start to slow the rider down again to progress the technique.
8. Initial height increases should be about 15cm at a time. Larger increases are possible when progressing from larger drops.
9. Initial drop sessions should not go above 50cm. Mileage is important before progressing to higher drops.
Chapter 5 - Drop Theory

Bike and rider are thrown into a rotation:
(Speed, Range of Motion, Timing & Coordination)

- **Speed**

Going too slow will cause a larger amount of torque and may even cause the rear wheel to get hung up on the lip of the drop. Make sure they are moving fast enough to be able to get the whole bike off the drop with the lunge. Check their starting point and/or change their gearing so that they can reach the necessary speed before the Point of Commitment.

**Note:** Going too fast will make the drop technique easier, but will cause the rider to land further down the landing area. Check where they are starting from and adjust their entrance speed.

- **Range Of Motion:**

Weak Range of Motion in the legs will limit the amount of torque that can be absorbed. This will make some riders unwilling to decrease their speed or may cause them to be pitched forward as the front wheel drops. Have them exaggerate the absorption of the rear wheel by thinking about sitting on the rear tire, or letting the seat pass their legs and touching them in the stomach.

- **The Lunge:**

A weak lunge will not get the bike off the drop fast enough and will increase the amount of rotational force. Have them practice the lunge on flat ground to get a feeling for how far the bike can be pushed ahead.

- **Lunge Timing:**

Too early and the rear wheel will hang on the edge of the drop creating increased rotation. Too late, and the front wheel will fall off the edge of the drop before the lunge can be properly executed, causing a hyper-extension of the arms and loss of balance. Practice doing lunges on flat ground with a line to represent the edge of the drop.

When assessing the drop technique of riders, pay close attention to what happens on the approach and during the drop itself. Correct these three components of the technique in the following order of priority, SPEED, LEG RANGE OF MOTION, and the LUNGE. Some of the common issues to watch for:

Assessment & Development:

- **The Lunge:**

A weak lunge will not get the bike off the drop fast enough and will increase the amount of rotational force. Have them practice the lunge on flat ground to get a feeling for how far the bike can be pushed ahead.

- **Lunge Timing:**

Too early and the rear wheel will hang on the edge of the drop creating increased rotation. Too late, and the front wheel will fall off the edge of the drop before the lunge can be properly executed, causing a hyper-extension of the arms and loss of balance. Practice doing lunges on flat ground with a line to represent the edge of the drop.
Bike lands rear wheel first or drops with front wheel up (Range of Motion, Pressure Control, Timing & Coordination):

Front wheel is up in the air - Too much or too aggressive a lunge could become a Manual Front Wheel Lift and will result in a rear wheel landing. This may not be appropriate for the landing and can cause other control issues. Have them relax and think about pushing the bike ahead of them, not throwing their weight back.

Front wheel is level in the air but lands rear wheel first - Too much leg extension or not enough arm extension. After the rear wheel leaves the drop, the legs are extended to match the bike's angle to the drop. If the legs are extended too far, or the arms are kept flexed, the bike may land rear wheel first.

Have the rider relax and think about landing the front wheel slightly before the rear wheel, or move back to an easier drop to practice placing both wheels down together.

Bike lands front wheel heavy without rotation (Range of Motion, Timing & Coordination):

This is very rare but is caused by a lack of leg extension after the rear wheel leaves the ramp. Have the rider focus on extending the legs and ‘sticking’ the landing with their feet.
The Preload DH drop is generally used to minimize rotational forces, or to increase the horizontal distance traveled when the rider leaves the drop. An example of minimizing the rotational forces would be when the rider is forced to approach a drop too slowly to perform a DH Style drop. Covering extra distance may be needed when the landing does not start at the base of the drop and a distance must be covered in order to reach the landing (step down type jump). This small addition to drop technique will open up a much larger array of drop situations.

**WARNING:**
The addition of the Preload will increase the rotational forces if the Preload is poorly timed.

**Technique:**

1. Approach the drop in a Neutral Position, have your speed set at a jogging pace before reaching the Point of Commitment, and focus on the drop.
2. Based on timing the Preload to finish 4 inches before the lip of the drop, begin the Preload by crouching down in one smooth, dynamic move.
3. From the crouched position, begin to extend the legs, and press against the ground. Keep the press gentle enough that the wheels remain on the ground for safety.
4. Four inches before the front wheel reaches the Lip, stop extending and begin the DH Lunge Drop technique.
5. Just before the front wheel leaves the drop, lunge the bike straight ahead in order to decrease the time the rear wheel is still on the drop.
6. Once the front wheel leaves the drop, the rider’s mass will begin to drop and the rear wheel will begin to rise in relation to the rider. Absorb the rear wheel by bending the legs until the wheel passes over the edge of the drop.
7. Once off the drop, spot your landing, extend the arms and legs to match the bike’s angle to the landing and to absorb any impact from landing.
8. If the landing is a downhill transition, try to land both wheels simultaneously or the front wheel slightly before the rear wheel.
9. Reapply the brakes, if necessary, after both wheels are back on the ground.
Figure 5.9
Approach in the Neutral Position

Figure 5.10
Preload the bike

Figure 5.11
Perform a DH Lunge style drop

Figure 5.12
Reapply the brakes after both wheels have landed
Teaching Points:

Terrain Considerations:

The riders should be proficient with the DH Lunge style drop and the Level Lift, or Jumping, before adding the Preload to the DH Lunge style drop. Move to a smaller drop than you are currently comfortable with, before introducing the new technique. The starting drop should be rollable, with a flat or slightly downhill approach. The approach, landing area and exit should be free from debris. The take-off should be wide enough to allow a rider to stand straddling the bike at the lip of the drop. The landing pitch should be consistent with a moderate steepness, yet allow the drop to be rolled, and the landing should begin immediately at the base of the drop with no gap or step.

1. Identify the point of commitment; approximately 3 bike lengths from the edge of the drop.
2. Have the riders do the DH Lunge style drop technique on the drop to re-familiarize themselves with the drop height and technique.
3. Demonstrations should be viewed from the side, with emphasis on the timing of the Preload, the Lunge and the Flexing of the legs.
4. Time the Preload to finish 4 inches before the lip of the drop.
5. Bike should be lunged ahead, not pulled up.
6. Absorbing the rear wheel can be explained as “almost sitting on the rear tire” or “touching the seat to the stomach”.
7. Teach at moderate speeds, and then decrease the speed to develop technique and a greater Range of Motion.

WARNING:

Going slower forces the move but, going too slow can cause a large Rotational Force, never progress to going slow enough that the rear wheel does not clear the lip of the drop with a lunge.
8. Before progressing to higher drops, progress the depth of the Preload and allow the wheels to leave the approach ‘before’ the lip.

9. Once the wheels are leaving the surface, the Lunge and absorption of the rear wheel may decrease, and the drop technique will begin to look more like a Jump.

10. As the Preload increases, the rider will likely land further down the landing area with increased landing force to absorb. Keep this within the limit of the rider’s strength, the bike’s suspension and the space of the landing area.

11. When progressing to a higher drop, increase the speed and eliminate or decrease the Preload to make the drop easier. As comfort with the drop increases, increase the Preload and start to slow the rider down again being aware of going too slow.

12. Height increases should initially be about 15cm at a time. As the rider’s confidence increases so too can the incremental increases in height.

13. Initial drop sessions should not go above 50cm. Mileage is important to helping gain confidence when progressing to higher drop heights.
Preload DH Drops & Step Downs Continued

Figure 5.13
Approach in Neutral Position

Figure 5.14
Begin to Preload by flexing into a crouch position

Figure 5.15
Extend the legs and lift into the air

Figure 5.16
Spot the landing
Bike and rider are thrown into a rotation:
(Speed, Range of Motion, Pressure Control, Timing & Coordination)

- **Speed:**

  Going too slow will cause a larger amount of torque and may even cause the rear wheel to get hung-up on the lip of the drop. Make sure they are moving fast enough to enable the whole bike to leave the drop with the Lunge. Check their starting point and/or change their gearing so that they can reach the necessary speed ‘before’ the Point of Commitment.

  **Note:** Going too fast will make the drop technique easier, but will cause the rider to land further down the landing area. Check where they are starting from and adjust their entrance speed.

- **Preload Timing:**

  If the **Preload is too early** the rider will have to absorb an increased amount of torque as the rear wheel approaches the lip. If the forces from the drop are not absorbed, a Dead Sailor Rotation will occur. Have the rider think about hopping off the lip of the drop, leaving the approach approximately 4 inches from the lip.

  If the **Preload is too late**, the front wheel will fall forward off the lip into the drop while the rider is still extending. The rider may fall forward into an unstable position and be unable to absorb the disruptive forces; a Dead Sailor Rotation may result. As above, think about hopping off the lip, leaving the approach 4 inches from the lip.

- **Range Of Motion:**

  Weak Range of Motion in the legs will limit the amount of torque that can be absorbed. This will make some riders unwilling to decrease their speed or it may cause them to be pitched forward as the front wheel drops. Have them exaggerate the absorption of the rear wheel by thinking about sitting on the rear tire, or letting the seat pass their legs and touching them in the stomach.

- **The Lunge:**

  A weak lunge will not allow the bike to leave the drop fast enough and will increase the amount of rotational force. Have them practice the lunge on flat ground in order to get a feeling for how far the bike can be pushed ahead.

When assessing the drop technique of riders, pay close attention to what happens on the approach, the Preload, and during the drop itself. Correct these four components of the technique in the following order of priority: SPEED, PRELOAD, LEG RANGE OF MOTION, and the LUNGE. Some of the common issues to watch for:
• **Lunge Timing:**

Too early and the rear wheel will hang on the edge of the drop creating increased rotation. Too late, and the front wheel will fall off the edge of the drop before the Lunge can be properly executed causing a hyper-extension of the arms and a loss of balance. Practice doing lunges on flat ground with a line to represent the edge of the drop.

Bike lands rear wheel first or drops with front wheel up (Stance & Balance, Range of Motion, Pressure Control, Timing & Coordination):

**Front wheel is up in the air** – An unbalanced Preload or too much Lunge. It is more common for the Preload and lift to be unbalanced, have them practice their Level Lift technique before returning to the drop. Too much or too aggressive a lunge could become a Manual Front Wheel Lift and result in a rear wheel landing. This may not be appropriate for the landing and can cause other control issues. Have them relax and think about pushing the bike ahead of them, not throwing their weight back.

Bike lands front wheel heavy without rotation (Range of Motion, Timing & Coordination):

This is very rare but is caused by a lack of leg extension after the rear wheel leaves the ramp. Have the rider focus on extending the legs and sticking the landing with their feet.
Medium to High Speed Cornering Theory

This theory section is designed to give instructors a better understanding of the forces involved in cornering and to explain how Traction Control is used to affect the Velocity (rate of Motion in a certain direction) of the bike and rider.

As mentioned in the Jump Theory section, a rider traveling along a smooth trail exerts a force against the bike and the bike exerts a force against the ground, the ground and bike are then exerting an equal and opposite force to create a balance. Without any outside forces the bike and rider will maintain their course down the trail.

For the rider to change direction, a force must be exerted in order to change their direction. In cornering, this force is exerted against the ground through the bike and the tires by steering the front wheel. When only the front wheel is steered to change the direction of the bike, Centrifugal forces throw the bike over on its side and send the rider outside the turn (High Siding). To keep from High Siding, the bike is leaned into the turn to allow the force of gravity to balance against these Centrifugal forces. All cornering will contain a degree of steering and leaning (Inclination). As the speed increases, so does the amount of Centrifugal Force and so must the degree of Inclination in order to stay balanced and not High Side. On any given radius of turn, as the speed and Inclination increase at the same time, the amount of steering angle required will decrease. There are many forces involved that allow the Steering Angle to decrease at speed, but because these are in-depth they will not be explained in this manual. Lean or Inclination is normally achieved by two common methods: by Counter Steering, and by moving the riders COM outside the turn.

Counter Steering is the steering of the front wheel away from the turn. When the front wheel is steered away, the BOS (the tires) of the bike moves away
from the COM (the rider) and a Centrifugal Torque is generated that leans the bike towards the direction of the turn. Once the bike reaches the required lean angle for the turn, the front wheel is steered into the turn and the bike turns into the corner. On mountain bikes this steering is done ever so slightly and is often done unconsciously by the rider. While riding at a brisk pace (possibly downhill to avoid the complications of pedaling), let go with your left hand while pushing the right handlebar with the open palm of right hand. Since your hand is open, you can only turn the handlebar left, but the bike will turn right. (Ref; J. Fajans, Department of Physics, University of California, Berkeley).

By slightly changing the steering angle in either direction, the rider can control the bike’s degree of Inclination and turning radius.

Moving the rider’s COM outside the bike’s BOS is another way to create lean and can be referred to as Angulation. While still traveling in a straight line, the rider can create a Torque by pushing the handlebars and bike inside the turn while shifting the hips and the rider’s COM outside the turn. With the rider’s mass being greater, the bike will lean into the turn and the rider’s COM will remain over the BOS. It should be noted that there is still some steering involved to remain balanced during this move.

Even with the Centrifugal and Gravitational forces being balanced out by leaning the bike, the path taken through the turn will be limited by the Friction or Traction of the tires. If traction is not maintained or the Centrifugal force is too great, the bike and rider will begin to slide (or drift) outside the turn. Mountain bike tire design has improved and traction has become better, but modern tires still have limitations. Cornering traction typically increases as the tire is leaned onto it’s edge, but studies show that Road bike tires start to decrease in traction when leaned beyond 45 degrees. Downhill mountain bike tires likely have similar limitations.

The techniques and progressions outlined in this manual are designed to focus on balancing against the forces listed above and to increase traction at moderate to higher speeds.
Medium & High-Speed Cornering Technique

These techniques will focus on creating more Inclination, Angulation, and maintaining greater Traction throughout the turn compared with the basic cornering techniques covered in the Level 1 course. Types of corners will be introduced as well as line selection in bermed corners.

As indicated in the basic manual, a rider should approach the corner at an appropriate speed. Generally this means you will have to slow down. Look through the corner and focus on the where you want to go.

**Technique:**

This technique is presented irrespective of line choice or corner type.

1. Approach the corner in the Neutral Position looking at the entrance of the turn and then through the turn
2. Try to do your slowing down before the turn but continue braking as needed without skidding
3. Enter the turn with slightly more pressure on the front wheel, focusing the pressure on the outside hand once the bike begins to be leaned
4. Look through the turn and 'initiate' the turn by performing a Counter Steer by slightly pushing the inside bar to steer the front wheel outside the turn and begin the leaning of the bike. Adjust the steering as required to maintain balance and control the bike's degree of inclination. Remember that this is done unconsciously and does not need to be taught.
5. As the bike leans over, bend the knees and begin twisting at the waist to move the hips to the outside of the bike. Point the knees to the inside of the turn to create more angulation
6. If more traction is required, transfer more weight to the outside foot
7. Continue steering the bike through the turn
8. As you pass the apex of the turn start releasing the brakes, if they are still being used.
9. As you approach the exit of the turn, begin extending the legs down and forward, pushing the bike out of the turn and transferring more pressure to the rear tire.
10. Straighten out the bike, return to the Neutral position and continue down the trail.
Approach the turn at an appropriate speed. Look through the turn.

Initiate the turn by leaning the bike. Keep more pressure in the outside hand.

Bend the knees and twist the hips to get more angulation.

Extend the legs to push the bike out of the turn.
Teaching Points:

Terrain Considerations:

Cornering is easier to demonstrate in one spot but then practice while riding. Cornering, more than any other technique, requires repetition to improve. Try to find a series of level to slightly downhill corners that are flat or only slightly bermed of similar radius. From the Basic Cornering Technique in the Level 1 manual, begin to introduce one aspect at a time in the order outlined below. If introducing a new aspect causes the previous movements to suffer, return to the previous aspect until proficient.

Points to Always Consider:

1. Have the riders pick a wider outside line for learning, this will make line choice easier and decrease the chance of the rider being surprised by a corner that tightens up at the exit.
2. Try to do all the slowing down before the turn, heavy braking will make the bike want to stand up and can cause a wheel to lose traction and start skidding.
3. Using the brakes to continue slowing down or to maintain speed through the turn is necessary but must be done carefully. It is very difficult for a rider to accurately judge the required speed for any given corner, so adjustments in speed may need to be made after initiating the turn.
4. Approach the corner with level pedals, it is normal for the outside foot to drop through the turn with the changes in the body position and traction control, but the turn should be started from level pedals.
5. Always look where you want to go, through the turn and onwards down the trail.
Introducing More Angulation:

1. After the turn is initiated, begin to bend the knees and twist the hips, pointing the belly button or knees through the turn.
2. This lowers the rider’s COM and shifts it and the bulk of the rider’s weight out over the contact patch of the tires to increase traction.
3. This also helps move the knees out of the way so the bike can lean further over.
4. It is normal for the outside foot to drop slightly. This makes it easier to lean the bike and twist the hips.
5. Warn the riders to start with only a little bit of twisting, and increase as they become comfortable. The bike will seem to dive into the corner when this move is added.
6. Once comfortable, try to exaggerate the move; it is possible to twist until the legs are 90 degrees to the frame of the bike.
7. This move normally has the single greatest affect on improving cornering.
8. Once they are comfortable with this aspect, introduce the hand or leg pressure.
Teaching Points Continued:

Hand Pressure:

1. Even though most of the rider’s weight is in their feet, how they pressure the front wheel with their hands will have an affect on the rider’s body position and the front wheel’s traction.

2. The Counter Steer and then the maintenance of the lean is easier to do with the inside hand, but that is not the best place to pressure the front wheel from. This position is inside the contact patch of the tire and, if anything, will decrease the wheel’s traction. By moving as much pressure as possible to the outside hand, the shoulders will shift to the outside of the bike and the front wheel will gain a small amount of traction.

3. As the knees bend and the hips twist, the shoulders will start to move inside the turn. Have them think about pushing the bike further into it’s lean with the outside hand, or just focus on keeping pressure on the outside hand.

4. If attempting this causes the rider to lose the twisting of the hips, return to focusing on the hips and relax the amount of pressure on the outside hand.

5. This move can be better demonstrated with a Static Demo. Hold the bike in a leaned position and have the rider bend their knees and twist the hips. Have them thinking about and pressuring the inside hand, and to notice the feeling and the position of the shoulders. Then have them do the same for the outside hand. They should feel a difference in balance and see a change in their shoulder position in relation to the bike.

6. As the rider gains proficiency and confidence, have them try slightly increasing the amount of front wheel pressure as they enter the turn. Increased front wheel traction will result in stronger cornering. Rear wheel pressure and traction is not as important as the front, as the rear wheel will always trail the front.
1. This can be introduced before the Hand Pressure or after, depending on the type of corners available. Large sweeping corners lend themselves well to teaching either, but are better suited to learning these leg Pressure Control movements.

2. Pressure on the tires equals traction. As the knees are bent and the hips are twisted, the arms and legs are flexed into a loaded position. Extending the arms and legs fast enough to exert a force will pressure both wheels into the ground and therefore increase their traction. At the same time the rider’s COM is pushed further inside the turn, essentially cutting the corner.

3. This move is normally done at the end of the turn and is a pressing of the feet down and forward to increase traction to the rear wheel and to push the bike out of the turn. However, it can be done without the forward component at any time that more traction and a greater turning angle are required. The best way to get a feel for this is to find some longer sweeping turns with good traction and practice pressing down with the feet as they travel through the turn. They should experience an increase in turning when they press down with their feet. This can then be introduced to the exit of normal corners with the addition of pushing the feet forward to press the bike out of the turn.

4. Keep in mind that the hips will not remain twisted as the legs extend, but if the riders are forgetting to twist the hips when they flex the knees, return to focusing on that technique first.
Assessment & Development:

Watch the rider as they enter the turn that they do not have too much speed, and watch the Inclination and Angulation of the bike and the overall Stance of the rider.

Rider gets pushed outside of the turn (Stance & Balance, Range of Motion, Traction Control, Mental Focus):

The rider may be entering the corner too fast and either being pushed out of the turn by speed or by using too much brake causing the bike to stand up. Have them slow down more before the turn, or use their brakes to maintain their speed through the turn if they are speeding up after entering.

Ensure that the rider is looking ahead through the turn and beyond the exit.

Watch for Inclination and Angulation. If they are not leaning the bike over, then it will want to travel in a straight line. If they are not Angulating the bike, they may not have enough traction to hold the chosen line at the chosen speed.

Rear wheel skids out (Braking, Stance & Balance, Range of Motion, Pressure Control, Traction Control):

Check for too much rear brake. Make sure they are using the appropriate number of fingers on the brake lever and are entering the corner at an appropriate speed.

Watch their Stance to make sure the rider is not too far forward. This leaves no pressure and thus no traction on the rear wheel. Have them focus on riding from the feet and have them bounce on the pedals before entering the corner.

If the rider is not Angulating the bike as they lean, the rear wheel is not getting as much traction as possible. Focus on bending the knees and twisting the hips.

It is unlikely but possible that the rider may be leaning the bike too far. If the rider is pressuring the front wheel heavily and leaning the bike too far, the front wheel will hold traction but the rear will slide out. Have them relax the amount of lean.

Front wheel skids out (Braking, Stance and Balance, Pressure Control, Traction Control):

Check for too much front brake. Make sure they are using the appropriate number of fingers on the brake lever and are enter the corner at an appropriate speed for the corner.

Watch their Stance to make sure that the rider is not too far back. This leaves no pressure and thus no traction on the front wheel. Have them focus on riding from the feet and maybe have them bounce on the pedals before entering the corner to re-center.

If the rider is not Angulating the bike as they lean, the front wheel is not getting as much traction as possible. Focus on bending the knees and twisting the hips. Add pressuring to the outside bar.
It is possible that the rider may be leaning the bike too far. If the rider is in a back position, pressuring the rear wheel and leaning the bike too far, the front wheel may wash out and slide. Have them relax the amount of lean and correct their Stance.

Bike stops suddenly and Rider goes over the bars (The dreaded Endo). (Braking, Stance & Balance, Steering, Traction Control):

This is caused when the front wheel stops suddenly for some reason. This is normally caused by too much braking, but can also be caused by too much steering for the amount of lean. Ensure that the rider is using the appropriate number of fingers on the brake lever and that they are not applying too much brake. Have them focus on leaning the bike instead of steering into the turn.

For this level of rider, corners can be looked at by their radius and by the angle of the cross section of the surface.

As a corner decreases in radius it becomes tighter and will require a greater turning angle to follow. This means turning harder with more lean and a greater need for traction is required; the other option is to enter slower.

The angle of the corner is important for traction and is classified in three types:

**Off-Cambered Corners:**

These are corners that are sloping down and away from the inside and, from a rider's perspective, the wrong way. These corners require much better Traction Control to ride them well. Angulation and Pressure Control will be the key techniques required to ride these types of corners fast. Be aware that drifting, even when Angulated, will be more common as it will be easier to lean the tires past 45 degrees.

**Flat Corners:**

These types of corners require less effort and Traction Control than Off Cambered corners but the same techniques apply. It is unlikely that the bike will be leaned beyond 45 degrees at this level but it could theoretically happen.

**Cambered or Bermed Corners:**

These are the fun corners to ride; they slope upwards as they move away from the inside of the corner - the right way! These turns require less Traction Control as the banked wall that you are riding on increases the pressure on the tires for you. As a result of better traction, the need for Angulation decreases and the rider may do less without realizing it. This is not a concern. Line selection does become more important with bermed corners.
Corner Type - Riding Bermed Corners

Entering early, riding high and cutting down and out:

This is the safest way to ride a bermed corner. It produces an initially wider turn and allows the rider to exit the turn early if the exit is blown out.

Entering in the middle and riding the middle right through:

This is the fastest line for an intermediate rider but requires that the exit be in reasonable condition.

Entering later or low and riding up the berm:

This is a move reserved for racers and is the most consequential for intermediate riders. If the rider enters this line too fast, they will be pushed into a high line that cannot be finished before the berm ends, or worse, it forces the rider over the edge of the berm and may cause a crash. Taking this line is a common problem in bike parks and the exits of the berms are regularly wrecked, or ‘Blown Out’ by people being forced over the berm, or braking on the edge of the berm.
The following is a list of appendices to accompany the relevant sections in this manual. The appendix sections are as follows:

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A</td>
<td>Radio Protocols</td>
<td>p.79</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Pre-Tour Inspection Checklist</td>
<td>p.80</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Trail Difficulty Rating</td>
<td>p.81</td>
</tr>
<tr>
<td>Appendix D</td>
<td>Rider Ability Rating</td>
<td>p.83</td>
</tr>
<tr>
<td>Appendix E</td>
<td>Guide Pack Contents</td>
<td>p.85</td>
</tr>
<tr>
<td>Appendix F</td>
<td>Mountain Bike Responsibility Code</td>
<td>p.86</td>
</tr>
</tbody>
</table>
Radios are very useful when used correctly. They keep guides in contact with each other, with their Supervisors, and with Bike Park Patrol. To be effective, radios need to be fully charged each night. They should also be easily accessible but protected from the elements. Things to remember when operating radios include:

- Your radio is only useful if it’s turned on and you can hear it
- Come to a complete stop before using your radio
- Take a moment to gather your thoughts and decide what you will say before you key up the radio
- Listen for radio traffic before keying up, accidents take priority over all other traffic
- Push the “press-to-talk” button and wait a moment before talking or the first part of your message will be cut off
- An example of a standard call-out is: “Bike Patrol, Bike Patrol from John”
- Keep what you say short and to the point
- Keep Radio traffic to a minimum. Use other means of communication whenever possible (Phones, Cells, or In person)
- Use radio “call-outs” at the designated points whenever travelling on roads that are shared with vehicles. An example of a radio call out would be: “Bikes down the main at 1.7”

The following is a list of ‘10’ codes commonly used in the bike park:

- 10 - 4 ———— Message received and understood
- 10 - 7 ———— On scene
- 10 – 8 ———— Lift is running
- 10 - 9 ———— Please repeat your message
- 10 - 20 ———— What is your location?
- 10 – 21 (number) ——— Call me at (number)
- 10 – 40 ———— An accident
- 10 – 60 ———— Lift Down (Not Running)
- Affirmative ———— Yes
- Negative ———— No
Appendix B
Pre-Tour Inspection Checklist

Before starting any tour do a quick but complete inspection of all bikes. If you come across any problems with rental bikes, take it back to the rental tech so that they may correct the problem. Any problem with a client’s bike is the responsibility of the owner; help as much as you can, or recommend they rent a bike for the session.

The inspection includes:

1. Sufficient tire pressure
2. Adequate tire tread and sidewall
3. Wheels spin straight without rubbing the frame or fork
4. Quick releases or wheel bolts are secure
5. Wheel hubs are not loose
6. Cranks & Pedals are secure and not loose
7. Brakes are adequate and the brake pads have enough material to complete the tour
8. Brake levers are adjusted adequately
9. Headset is tight
10. Bar and grips are secure
11. Seat is secure
12. Check that shifting won’t put the chain into the wheel
13. Check that suspension is set for the rider, not too stiff, and that the compression and rebound speeds are adequate. Remember that forks stored upside down may take a few pumps to get working properly
Appendix C
Trail Difficulty Rating

There are 3 types of trails or trail sections to consider when looking at difficulty, with each requiring a different mind set and skills focus to navigate.

Natural:
These are the most common type of trails and are composed entirely of what Mother Nature supplies. The ever sought after and popular single track is almost always of the natural type. Difficulty on this type of trail can range from simple paths to technical trails infested with roots, rocks, steep lines and drop-offs.

North Shore or Stunt:
These trails are composed of natural or groomed trails connecting a series of man made structures that are the normally the challenging aspect of the trail. The Freeriders of Vancouver’s North Shore Mountains have made this type of trail famous enough that the style of building has been adopted throughout the mountain biking community. Difficulty on this type of trail can range from a simple set of bridges to elevated Skinnies with teeter-totters, jumps, and drops.

Groomed Trails:
These trails are typically entirely man made with a groomed or smooth surface; BMX tracks are an example of a groomed trail. Difficulty can range from the easiest paved roads to trails filled with jumps, drops, wall rides and other stunts. The latter often being referred to as A-Line type trails, named after the first jump trail of this type built in the Whistler Bike Park.
Trail Difficulty Rating continued...

Green:
These trails are smooth with little gradient and no tight turns. Only the Basic riding skills will be required.

Blue:
These trails will be faster, not as smooth, and will give the rider the opportunity to leave the ground with small drops or jumps; these will not be mandatory and can be rolled or avoided. Proficiency in the Basic riding skills will be required and there will be the opportunity to safely practice more advanced skills.

Black:
These trails will be more challenging and will require proficiency in the advanced skills specific to the style of trail. The trail will contain challenges hard enough to force intermediate riders to walk instead of just slowing down, and while having the tires leave the ground is still not required, it is recommended.

Double Black:
These trails are not forgiving and should not be used for learning new skills. They require an expert level of riding, mental focus and confidence to navigate successfully. Being comfortable with the tires leaving the ground is mandatory as rolling or avoiding obstacles may not be an option. On this level of trail it is quite often safer to ride something then to walk it.
## Appendix D

### Rider Ability Rating

The following ability chart is unique to the Whistler Mountain Bike Park:

<table>
<thead>
<tr>
<th>Level 1</th>
<th>![Symbol]</th>
</tr>
</thead>
<tbody>
<tr>
<td>You have little or no experience on a bike, and have trouble keeping the front wheel straight while riding.</td>
<td></td>
</tr>
<tr>
<td>Recommended equipment:</td>
<td>Gloves, elbow, knee and shin pads, helmet (CSA certified), mountain bike with front suspension, minimum V-brakes required, and adequate tread on tires</td>
</tr>
<tr>
<td>Trails:</td>
<td>Skills centres only (under the supervision of a Bike Park Guide)</td>
</tr>
<tr>
<td>Skill Focus:</td>
<td>Pre tour Basic Riding Skills</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level 2</th>
<th>![Symbol]</th>
</tr>
</thead>
<tbody>
<tr>
<td>You have limited experience on a bike. You can control bike speed and direction on paved surfaces, but have little or no experience riding off-road terrain.</td>
<td></td>
</tr>
<tr>
<td>Recommended equipment:</td>
<td>Gloves, elbow, knee and shin pads, helmet (CSA certified), mountain bike with front suspension, minimum V-brakes required, and adequate tread on tires.</td>
</tr>
<tr>
<td>Trails:</td>
<td>Green trails only (EZ Does-it)</td>
</tr>
<tr>
<td>Skill Focus:</td>
<td>Pre tour Basic Riding Skills</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level 3</th>
<th>![Symbol] ![Symbol]</th>
</tr>
</thead>
<tbody>
<tr>
<td>You have limited experience riding off-road terrain. You are capable of controlling bike speed and direction on gentle single-track trails and slightly uneven surfaces.</td>
<td></td>
</tr>
<tr>
<td>Recommended equipment:</td>
<td>Gloves, elbow, knee and shin pads, helmet (CSA certified), mountain bike with front suspension, minimum V-brakes required, adequate tread on tires.</td>
</tr>
<tr>
<td>Trails:</td>
<td>Green trails, easier Blues (B-Line)</td>
</tr>
<tr>
<td>Skill Focus:</td>
<td>Basic Riding Skills including Basic Wheel Lifts, with an emphasis on bike movement.</td>
</tr>
</tbody>
</table>
Rider Ability Rating continued...

<table>
<thead>
<tr>
<th>Level 4</th>
<th></th>
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<tbody>
<tr>
<td>You have been mountain biking for at least two years. You are capable of controlling bike speed and direction on moderately steep and technical single-track trails.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended equipment:</td>
<td>Gloves, elbow, knee and shin pads, mountain bike with front suspension and a minimum of four inches of travel (dual suspension suggested), minimum V-brakes required (disc brakes suggested), adequate tread on tires, full-face helmet, chest and spine protection</td>
<td></td>
</tr>
<tr>
<td>Trails:</td>
<td>Green and blue trails only</td>
<td></td>
</tr>
<tr>
<td>Skill Focus:</td>
<td>Introduce Advanced Skills specific to the type of trail expected to be riding.</td>
<td></td>
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<table>
<thead>
<tr>
<th>Level 5</th>
<th></th>
<th></th>
<th>◆</th>
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</thead>
<tbody>
<tr>
<td>You are a Downhill or Freeride mountain biker who is confident riding most types of terrain but large jumps, drops and narrow elevated trail sections are still challenging.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended equipment:</td>
<td>Gloves, elbow, knee and shin pads, mountain bike with front suspension and a minimum of four inches of travel (dual suspension suggested), minimum V-brakes required (disc brakes suggested), adequate tread on tires, full-face helmet, chest and spine protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trails:</td>
<td>All trails except double black diamond</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill Focus:</td>
<td>Advanced skills specific to the type of trail expected to be riding with an emphasis on refining their technique, or coaching to improve performance.</td>
<td></td>
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<thead>
<tr>
<th>Level 6</th>
<th></th>
<th></th>
<th>◆</th>
<th>◆</th>
</tr>
</thead>
<tbody>
<tr>
<td>You are a Downhill or Freeride mountain biker who is confident riding all types of terrain including large jumps, drops and narrow elevated trail sections.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended equipment:</td>
<td>Gloves, elbow, knee and shin pads, mountain bike with front suspension and a minimum of four inches of travel (dual suspension suggested), minimum V-brakes required (disc brakes suggested), adequate tread on tires, full-face helmet, chest and spine protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trails:</td>
<td>All trails</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill Focus:</td>
<td>Coaching to improve performance</td>
<td></td>
<td></td>
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</table>

*** We strongly recommend that children 12 years and younger be accompanied by an adult at all times while in the Park. Parents wishing their children to ride unsupervised by an adult should sign a form to that effect. Please ask Guest Relations for this form. ***
Appendix E

Guide Pack

Contents

Guide Pack:

1. First Aid Kit
2. Any tools specifically required for the rental bikes
3. Allen Keys
4. Chain Break tool w/ spare links
5. Adjustable Wrench
6. Pump x 2
7. Tire levers (metal is preferred)
8. Patch Kit
9. Spare tubes – Presta 26” x 2
10. Spare Brake Pads – 2 sets (these may be used but not worn out)
11. Rain Jacket
12. Zip Ties – assorted sizes
13. Notebook and Pencil
14. Energy Bar or Gel
15. Water

First Aid Kit:

The following list outlines the items that should be carried by guides when conducting mountain bike tours. This is the suggested minimum requirement, and most guides add items to their pack as they gain experience.

First Aid Kit - check it often, and keep it well stocked, common items include:

- 4 Latex gloves
- Tweezers
- 2 Triangular Bandages
- First Aid Scissors (not pointed tips)
- 6 Band-Aids
- 2 Accident reports
- 4 Safety pins
- Pocket mask
- 10 Antiseptic towelettes
- 2 Rolls of gauze
- 2 Tensor rolls
- 6 Knuckle Band-Aids
- 2 Bee sting relief
- Safety blanket
- 2 Tongue depressors
- Gauze Pads
- 5 Suture strips
- SAM splint or wire splint
- Medical Tape
Appendix F

Mountain Bike Responsibility Code

1. Stay in control at all times. It is your responsibility to avoid other persons and objects around you.
2. Do not stop where you obstruct the trail or are not visible from above.
3. When entering a trail or starting downhill, you should look uphill and yield to other riders.
4. Please assist if you are involved in or witness a collision or accident and identify yourself to the Bike Patrol.
5. Keep off closed areas and obey all signs and warnings.
7. Stay off lifts and away from the Bike Park if your ability is impaired through the use of drugs or alcohol.
8. You must have sufficient dexterity, ability and knowledge to safely ride and unload lifts. If in doubt, ask the attendant.
9. Hiking in the Bike Park is not permitted.
10. Do not feed, provoke or approach wildlife.

KNOW THE CODE – BE SAFETY CONSCIOUS.

IT IS YOUR RESPONSIBILITY

PARK PRIVILEGES MAY BE REVOKE FOR BREACH OF THE MOUNTAIN BIKE RESPONSIBILITY CODE