LEVEL 2 RIDING MATERIAL
INTERMEDIATE TO ADVANCED RIDERS

At this stage of biking, riders have now learnt all of the "Six Skills of Biking" and quite competent at the more fundamental skills of *Gears & Braking, Body Position & Balance* and *Line Selection.* As such, these first three skills are now being more refined than learnt as they apply the same skills and techniques to more challenging riding situations; higher speeds and/or more difficult trails. As for the remaining three skills, these have also been learnt by this stage and are also now in a stage of refinement - though less so than the fundamental skills. Because of this, much of an intermediate to advanced riders biking is largely similar techniques already described through parts A and B of the manual... only at higher speeds and on more challenging terrain.

1. GEARS & BRAKING

GEAR OPERATION

At this stage a rider is usually competent at operating the front and rear gears of the bike both independently and together, enabling them to be in the correct gear for most scenarios, most of the time. That said, there is still plenty of things to progress with in this basic mountain biking skill. As such, an intermediate to advanced rider will need or want to learn how to *refine* the use of their gears to develop their riding skills and confidence.

CADENCE

One of the main things riders can work on at this level is their cadence (how quickly they are turning the pedals) to not only find a more suitable cadence, but to also learn when different cadences can help in different situations; learning that they no longer have to try and feel like the pedaling force/rate is the same and "just right" (as per the "Cruise Mode" for beginner to novice riders), all the time.

The slower the cadence, the harder the muscles will have to work, but the slower the pedals will spin. This creates more of an *an*aerobic exercise - rather like pushing weights at the gym, where the muscles get a work out and the cardio-respiratory system, less so. If you were to keep pedaling like this, your legs would become very tired, very quickly and most likely the bike would stall as the gear would be too hard to keep the bike moving.

A faster cadence sees the opposite; less force required to push the pedals so it's easier on the muscles, but the pedals are spinning more quickly, so more of a work out for the lungs - more of an *ae*robic exercise like running, as opposed to lifting weights. If the cadence is too fast, riding becomes very inefficient with a lot of work for "little reward"; even though you are pedaling fast, the bike will still be moving slowly.

SETTING THE RIGHT CADENCE

So we need to find the right balance between muscle force and cardio-respiratory exercise… one where the pedaling force is light enough to not have to push too hard, without having to spin them too quickly. For most riders and most riding scenarios, a good cadence is typically between 60-90 rpm, should feel like you can pedal indefinitely and is usually a little quicker than people think.

Riders from road biking backgrounds or individuals with particularly strong legs, tend to pedal a cadence that is a little too slow for mountain biking - one where the gear is too hard. This makes for inefficient riding, tired legs and a bike that easily stalls on rocks and roots or climbs. With the right cadence, if the bike suddenly slows or hits a root, it is much easier to keep the power down and keep the bike moving. Really though, many intermediate riders suffer from this bad habit and luckily it is easy to break. Often the reason behind and therefore the fix, is down to pedaling technique.

PEDALING TECHNIQUE

The best, most efficient and smoothest way to pedal is in a circular motion, instead of just pushing in a downwards motion on the pedals. There are many advantages to this circular pedaling technique, whether you are riding x-country or downhill:

1. MORE EFFICIENT POWER TRANSFER FROM THE RIDER TO THE DRIVETRAIN
2. SMOOTHER PEDALING MOTION - THIS HELPS FIND THE RIGHT CADENCE (WHICH IS USUALLY A LITTLE QUICKER) AND HELPS KEEP FEET ON PEDALS IF NOT USING FLAT PEDALS
3. REDUCES THE AMOUNT OF SUSPENSION "BOB" (AND THEREFORE ENERGY WASTED) ON BIKES WITH SUSPENSION, WHILST PEDALING
4. ALLOWS FOR MORE CONSISTENT POWER TO GIVE A MORE CONTROLLED RIDE - ESPECIALLY WHEN CLIMBING, OR PEDALING HARD

HOW TO IMPROVE IT

STAGE 1: FORWARD & DOWN

As the pedal reaches about 1 o'clock, push the pedal forward and continue to do so as you begin to push it down after 12 o'clock.

STAGE 2: BACK & UP

As the pedal gets to about 5 o'clock, start to pull the pedal back as you begin to "pull"" it up after 6 o'clock. With flat pedals, you can drop your toes slightly and use the grip of your shoes to "scoop" the pedal up a little to help this.

With this combined forward/down and back/up motion, it allows riders to easily coordinate there leg movements to enable them to apply force to the drivetrain not just when the pedal is moving down, but when it is moving in all the other directions as well. This means a much higher efficiency and a much smoother pedaling motion. To begin with, the rider can practice this one side at a time until they feel ready to apply it to both pedals; as one foot is pushing forward and down, the other should be pulling/scooping back and up.

Standing up, sitting down, hard-tail bike or downhill bike… if it's a bike and your pedaling, this technique will help. To get back to cadence for a second, **it ultimately allows the intermediate rider to pedal smoothly at higher cadences, making it easier for them to find the best cadence for them whilst mountain biking.**

ADJUSTING CADENCE - SEATED CLIMBING

If you're climbing sitting down, then generally the cadence will not change too much. That said, when climbing the chances that a rider begins to push harder on the pedals and slows down the pedaling rate/cadence, is fairly high. As long as this doesn't happen too much, the rider will typically make a successful climb. Here's a table to illustrate some typical reasons behind why riders stop on seated climbs and what they can do to fix it:

REASONS FOR STOPPING	SOLUTION
Gear is too hard - cadence is too slow	Select an easier gear for a quicker cadence
Gear is too easy - cadence is too fast	Select a slightly harder gear and put down the power smoothly!
Don't change gear early enough so they get "caught out" on steeper and/or longer sections	Look ahead during the climb for changes in terrain pitch and/or surface to change gear beforehand
Too tired to continue	Select an easier gear so you can keep going to the top
Lose balance and or line choice	Look ahead for the smoothest line and for balance and/or pick a slightly harder gear to speed up

SLOWER CADENCE (HARDER GEAR) FOR DOWNHILL RIDING & RACING

Changing gears whilst riding cross country typically involves doing so as the terrain, and therefore the rider speed changes. The same is true for downhill riding, only it's based more on the riders desire to go downhill at a specific speed by how much they pedal and/or brake on the descent.

As a typical rule of thumb, it is usually best to opt for a harder gear (slower cadence) when downhill riding than an easier gear. This is because as you are going downhill, if you start pedaling hard in a gear that is slightly too easy, it will very quickly become much too easy as you pick up speed. On the other hand, if the gear is slightly too hard, the downhill gradient will only serve to work with you. The speed of the bike will soon increase and the gear will soon be just right. In addition to this, harder gears allow for more power from which to accelerate with, whilst easier gears have less power but more torque (which you are less likely to need going downhill).

SLOWER CADENCE (HARDER GEAR) - STANDING CLIMB

The typical scenario for standing up on a climb is when the terrain is steep and relatively short - where the rider needs to get out of the seat for some extra power. The trick here is to change into a harder gear *before* you stand up and start pedaling hard. Because the rider will be standing up, they will be able to use their body weight to help pedal harder. As such, a harder gear needs to be selected to make sure they don't "spin out" because the gear is too easy/ cadence is too fast. Typically, dropping the chain down 2 or 3 harder gears will do the job.

Using this technique of making the cadence slower will only work if the rider is standing up - otherwise the force required to spin the pedals sitting down will be too much, and the rider risks stopping.

SLOWER CADENCE: Because the rider is climbing out of the seat, choosing a harder gear will help him avoid "spinning" out.

BRAKING

At this ability level, braking can involve simply refining the basics previously learnt as beginner to novice riders. How to apply the brakes using the *GCF Principles* and when to brake according to *Selective Braking* is simply applied to the more challenging environment of an intermediate to advanced rider; one of higher speeds and more difficult terrain. Review the braking section in the Novice to Intermediate section for more details.

SELECTIVE BRAKING CONTINUED - BRAKING POINTS

An easy way to improve performance whilst maintaining control is to pick braking points before sections of trail you would prefer not to brake on: like rock gardens, roots or corners. Braking points are a specific section of trail in which to apply the brake and slow down to the desired speed, before the next section of trail is reached and the brakes can be released.

For more intermediate riders, these braking points will be longer and earlier (a further distance) before the part of trail they don't want to brake on. For stronger riders, braking points consequently become shorter and later (closer) to the next section of trail - this allows them to brake less and so carry more speed as they avoid the Factors of Braking.

BRAKING RATIOS

How much a rider uses the front brake compared to the rear brake is typically based on how quickly they are trying to slow down. When a rider applies the brakes, the bike weighs much less than the rider so it slows down a lot more easily and therefore more quickly. As the rider is much heavier than the bike, it takes longer for the body/mass of the rider to slow down. Because of this, the body begins to "overtake" the bike and because the rider is standing on and holding onto the bike the result is the rider's body weight ends up being "pushed" towards the front of the bike. This *can* adversely affect a beginner or novice rider's balance and control of the bike, but can be used in certain braking situations by more advanced riders to actually enhance braking power, wheel grip and therefore overall control. So let's look how the speed of deceleration can affect this and therefore the ratio of braking power between the front and rear wheels.

SLOWING DOWN SLOWLY: If a rider is taking a long time/distance in which to slow down, the speed of their deceleration is quite slow; the rate at which their speed decreases is slow. In this situation, the rider's COM is not significantly being affected by the deceleration of the bike (nor is the mass of the bike itself, for that matter), relative to the BOS. In other words, the rider's body is not being "pushed" forward towards the front of the bike very much.

Because of this, the front wheel stays **similarly weighted** to the rear wheel and so **both wheels have a similar level of grip**, which means the **braking power should be fairly equal** between the front and rear brakes.

SLOWING DOWN QUICKLY: If a rider wants to slow down quickly/in a short distance, they will have to apply more braking power - brake harder. This will naturally cause the bike to slow down much quicker than the rider's mass, resulting in his/her body moving forward over the bike as it continues to travel from it's own momentum. The rider will eventually brace against the bars to prevent their body moving any further forward on the bike and therefore avoid going over the handlebars.

The **front wheel will now become more weighted as the rider's body weight (and the weight of the bike itself) moves forwards**, and so the rear wheel also becomes less weighted. The **front wheel now has more grip** than the rear wheel, meaning the rider can apply **more braking power to the front wheel without it skidding**. If the rider were to keep the braking power equal, the rear wheel would most likely skid and the rider would not slow down in control, or for that matter, slow down very quickly.

BRACE BRAKING - TO ALLOW THE FRONT WHEEL TO BECOME WEIGHTED

On this steep rock face the rider is not moving back over the bike significantly, even though he has his brakes on. This is to allow the front wheel to stay weighted thereby maximizing grip, so he can apply the front brake and control his speed. If he were to move over the back of the bike, the front wheel would be too “light” for any effective braking because their would not be enough traction, and so he would have little to no speed control.

The rider achieves this by “bracing” against the bars as he feels his body wanting to move forward. Rather than actively pushing against the bars to move his weight back, he is simply resisting his body moving forward by “bracing” instead; therefore keeping his body position relatively neutral (centered) on the bike, and so enabling the front wheel to become weighted (ensuring traction) as the brakes are applied.

2. RIDING POSITION & BALANCE

For the Intermediate to Advanced rider, this skill now involves learning to refine their body positions and swap between the different ones more often and to varying degrees to maximize the rider's weight distribution over the bike and therefore the ability to control it and balance on the bike, more of the time, in more challenging environments. To review the main riding positions of a mountain biker, please see this section in the Novice to Intermediate part of the manual.

The **common goal of this skill is to maximize stability and grip between the two tires, keeping them evenly weighted** for as much as possible. When the bike is weighted evenly it handles much better, is more stable, has more grip and will react to the rider's demands happily... it's like a happy horse. When the bike is not evenly weighted it acts like a grumpy horse... not wanting to do what you say, not as stable and the grip is compromised.

MAINTAINING A CENTERED BODY POSITION

Indeed, **this particular skill gets more simple as the ability level of the rider increases; stay centered and relaxed**. However, because the riding speed and trail difficulty become much more difficult, this simple idea also becomes increasingly difficult in itself. A true advanced rider is one who can refine this skill to the point where they are centered over the bike in all situations... Sam Hill is a master of this on technical terrain and it's exactly why he is the fastest man in the world on rough, steep, challenging terrain.

Here, he's just ridden down a steep section that crosses a road (just next to his left elbow) before dropping in the steep, rough section he's on now... and was going very fast. The whole time his eyes were over the bars - he was centered - and he was relaxed.

FINDING THE "SWEET SPOT"

To be truly centered on the bike, a rider needs to be centered in all of the three planes; fore-aft, lateral and vertically. Lateral balance involves moving/shifting the riders mass left to right over the bike and is much harder to maintain if the fore-aft and vertical balance is compromised. However, fore-aft and vertical balance requires more practice to find the ideal position according to the rider's body type and bike they are riding, to maintain overall balance in the first place.

By trying different positions in each plane as they ride, a rider is more likely to find their optimum body position over the bike. It's like the porridge... to find the one that's just right, you have to try one that's too hot or too cold first. The key is to experiment with one plane at a time and realize that small adjustments can make a big difference in stability, balance and control at this level.

MOVING OFF-CENTER: STABILITY vs. BALANCE

Often when a rider brakes hard, they will shift their mass backwards over the bike to maintain balance and control. This is a common and basic example of riding off-centered on the bike as an advantage - moving back helps the rider push more directly against those forces that are pushing the rider forwards on the bike.

Outside of this, the rule of thumb up until the intermediate stage of riding is to stay centered on the bike for stability and balance. As such, many **beginner to intermediate riders are primarily focused on stability first to ensure balance, second**. They are used to staying in the middle of the bike most of the time, and consequently have a small range of movement on the bike, and so are less able to deal with changes in body position and be able to recover to a centered position.

However, intermediate to advanced riders have often begun to gain a better understanding (whether knowingly or not) of the difference between stability and balance. That is, they can still be balanced while not being very stable. A manual is a prime example of this, whereby the rider has a tiny base of support (the contact point of the rear tire on the ground) but through constant movement and adjustment they can still remain balanced, at least for a short period of time.

Adjusting the body position over the bike as the terrain and conditions dictate is a constant, dynamic process when riding technical terrain. Indeed the mark of an **advanced rider is the ability to constantly move the bike underneath them to maintain balance first, and stability second.**

As the rider negotiates this steep rocky section, he is constantly making small adjustments to stay balanced. Moving off-center in all planes temporarily is necessary to stay balanced at the advanced level.

IMPROVING BALANCE BY INCREASING RANGE OF MOTION

Being able to balance well relies on the range of motion a rider has in the different planes of movement; the more easily and further they can comfortably move away from the center of the bike, the more easily they can;

1. Stay centered - to keep control
2. Balance off-center - to gain further control and perform maneuvers while riding
3. Return to the center of the bike, if away from it - to recover and regain control if knocked off balance

...BY LEARNING MANEUVERS: The first step of improving ROM is to get a rider to physically (and mentally) relax. A relaxed body will automatically move more freely over the bike as the rider reacts to the trail, and works to stay balanced. Other ways to improve ROM includes learning maneuvers that require a rider to find balance points that are way off center of the bike... like front wheel lifts, wheelies, manuals, endos, bunny-hops and so on. Learning many of these maneuvers physically requires a lot of range of motion to be able to execute them successfully; if you don't move far enough back, you cannot manual. If you don't have enough movement up and down in the vertical plane, you will not be able to bunny-hop.

...BY RIDING BMX! The reason why so many BMX riders make great Mountain Bikers is because they are used to balancing on a bike with less stability (BMX bikes have much shorter wheelbases and therefore smaller BOS) *and* often doing all sorts of tricks on them that require them to have lots of movement (ROM) over the bike. Put them on a bike with a much bigger BOS (and therefore more stability) and everything is suddenly quite easy for them as the more stable an object is, the easier it is to balance on it.

...BY EXAGGERATING MOVEMENTS to encourage new body movement patterns. If you only ever stay in the middle of the bike, as soon as you are perhaps 3 inches off center, it will instantly feel weird. However, if you are used to moving on your bike and "letting things go", if you are slightly off-center, then although you will still recognize it, it won't feel so weird. By getting riders to loosen up and move freely over their bike, they will more likely find the "sweet spot" whilst also being able to recover from being knocked off-center better.

This rider has just come off a wallride and his COM is slightly back from center. This is most likely just for a couple seconds as he instinctively re-centers himself before the next wall ride.

With a good range of motion and an ability to relax and react, being off-center is not only less likely, but also easier to deal with and recover from, due to better balance.

This principle can be carried right through to the pro level of riding where it is the same, only they are riding harder terrain at higher speeds.

3. LINE SELECTION

The components of Line Selection include *Trail Scanning* and *Line Choice*. Riders are continually working at this stage to refine their ability to scan the trail to prepare for what's coming up. Consequently they are now beginning to really work on Line Choice, as they experiment with taking different lines along trails, both climbing and descending.

LINE CHOICE

To quickly review, the three main line choices to mountain bikers are;

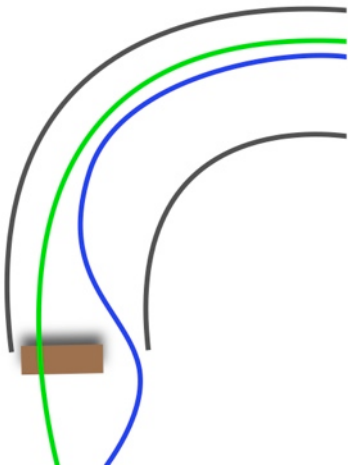
Smoothest - path of least resistance/least bumps and/or risks
Direct - shortest route from one part of the trail to another
Racing - often a combination of the previous two and based on ability and experience

Intermediate to Advanced riders will now begin to change their idea of what each of these lines is to them as their confidence and skills progress. A smooth line on one particular section of trail may change over time to a completely different part of the trail as their idea of what is rough or rocky changes - for example:

SMOOTH LINE: If we take a section of trail that has various rocks on it - a beginner rider would view the "smooth" line as one with no rocks at all, whereas an intermediate rider might view the smooth line as one with fewer or smaller rocks.

In addition to this, the **definition of what a smooth line is can be modified** from the path of least resistance/rocks, **to the path that provides the smoothest ride along the trail, not just in terms of bumps but also with respect to direction and speed change, and general flow** - for example:

A downhill trail with a small drop on the left side into a right hand berm would require a beginner rider to turn right and then left around the drop to then enter the berm on the outside; this will be smooth for them as they will not have to take the drop, but would require a stronger rider to slow down and change direction to avoid the small drop… making it no longer the smooth line for them as their speed, direction and flow is interrupted. Instead, riding over the drop and keeping the more direct line into the berm, is actually the smoothest ride for them.



INTERMEDIATE'S smooth line
BEGINNER'S smooth line

DIRECT LINE: Consequently, **new direct lines that were previously thought not worthwhile or even possible to ride, now become increasingly apparent**. A rider whose skill and confidence increases is naturally going to start looking out for more challenging lines as they continue to take their riding to the next stage. A direct line will always be the same as it is less open to interpretation than the other two lines.

The only thing that will therefore happen when stronger riders consider this option when riding a trail, is that they begin to spot new, even more direct lines. if these are rideable and will help with the overall flow, fun and ease of the trail, then riders will begin to try them out. However, if the new direct lines are not yet rideable safely, or do interrupt the flow and fun of the trail, then most likely, riders choose to ignore them. In this case they are now beginning to develop a much better sense of how they want to ride a trail and what are the best ways to do that for their ability and confidence level.

NB: It is important to note here, that some riders unfortunately begin to take this line too seriously to the point where they begin to cut corners, damaging trails and the surrounding terrain. In doing so, sections of existing trail can be ruined by riders not wanting to slow down or change direction, therefore riding off the existing trail. This is not a respectful or responsible way to ride and should never be encouraged.

RACING LINE: This is an ever-evolving choice of route along a trail and solely depends on a riders ability, experience and confidence. A great way of developing an eye for this line is to ride the same trail over and over, but experiment with different line choices between smooth and direct and too see which combination and when helps maintain momentum the most.

Another way of thinking about the racing line, is seeing it as more of an EFFICIENT LINE. As far a line choice goes, the most efficient route down a trail will be a combination of the shortest distance and the path of least resistance - the smoothest line. By viewing a trail and the line options in terms of energy exerted vs. distance travelled over time, a rider will consistently be able to pick the most efficient line according to their ability and experience level. Taking this same approach to racing lines will help racers more easily find the fastest lines down/up the hill.

4. DIRECTION CONTROL

Direction Control at this level involves exploring the principles of steering and leaning; learning when it's best to use one technique over the other according to what type of corner is being ridden. It's best when developing this skills to keep things simple and play with one idea/component of the skill at a time. This will gives students time to develop an understanding for the concept mentally and physically much more easily, before moving on to other techniques.

The key role of the instructor here is to understand what techniques are best to teach when, for what clients. The best way to do this is first **pick a component of cornering** the student needs to work on the most, say, body steering. The next step is to **pick one body part** which they can focus on to achieve this and let them try this for a while as you offer feedback and before you add any other new information. We can then pick another body part to help with body steering to see if that also helps or even further enhances what they are already trying. For example:

1. BODY STEERING - POINT THE BELLY BUTTON INTO THE TURN
practice and feedback until rider begins to feel it without thinking about it too much

2. POINT THE OUTSIDE KNEE INTO THE FRAME
practice and feedback until rider begins to feel it without thinking about it too much

3. MOVE YOUR HIPS TO THE OUTSIDE OF THE BIKE TO HELP 2
practice and feedback until rider begins to feel it without thinking about it too much

4. POINT THE INSIDE KNEE INTO THE APEX/INSIDE OF THE TURN
practice and feedback until rider begins to feel it without thinking about it too much

BANKED CORNERS - BERMS: Whether a rider needs to lean the bike more than they are leaning their body depends on a number of factors, such as speed, corner shape and terrain type. Typically, banked or bermed corners allow riders to lean with the bike because their weight is being pushed directly into/towards the contact point of the tires on the ground, due to the terrain being banked and therefore at (approximately) a 90° angle to the tires.

LEANING THE SAME AS THE BIKE IN A BERM...

As the rider leans against the centrifugal forces, his weight is now being pushed directly into the bike, pushing the bike and therefore the tires *directly* into the ground close to a 90° angle (green arrow).

This provides awesome grip allowing riders to "rail" berms at higher speeds and with minimal braking when compared to flat, non-banked corners.

However, as soon as we lean the bike further - significantly past 90°to the berm surface - our grip now becomes compromised as the forces are no longer pushing the tires *directly* into the ground. This often happens when we approach a berm at a high speed and/or the berm is not steep enough to allow us to lean much *with* the bike. In this case we can use *Bike-Body Separation* to help maintain traction by keeping our body weight more over the contact point of the tires on the ground as we ride the berm:

BIKE-BODY SEPARATION IN A BERM...

The berm is not very banked and the entrance speed is quite high as it's downhill and straight... the rider therefore will need to lean the bike a lot to make the turn. Because the berm is not banked enough, he now has to keep his body weight more upright and lean the bike underneath him to maintain grip through the loose corner.

The benefits of this technique are explained below in "Flat Corners"

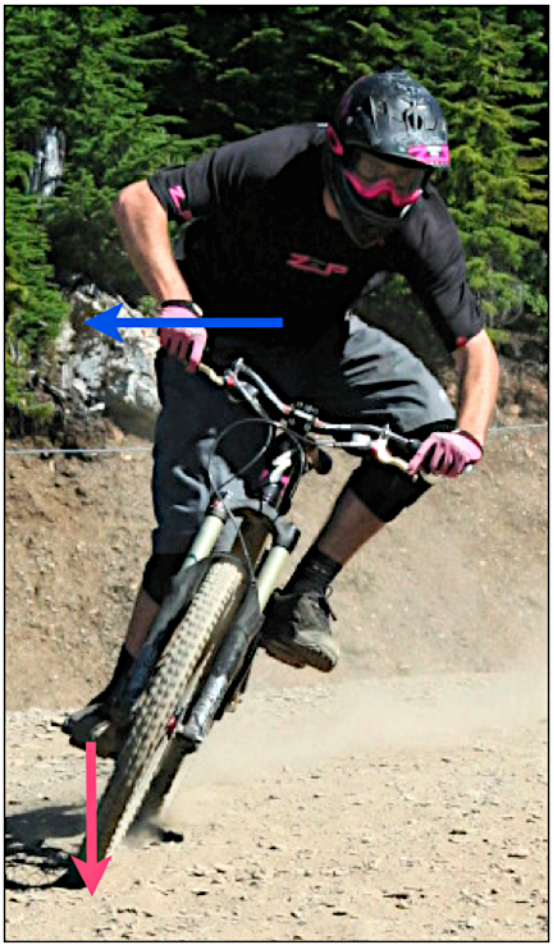
As a rule of thumb, this *Bike-Body Separation* can be applied to any berm where the rider is going fast enough to require the bike to be lean *significantly* past 90° to the surface of the berm. The faster the rider heads into a berm, the more they will need to lean the bike to make it turn quick enough... and they can do this because of the stronger centrifugal forces working in the opposite direction - so riders therefore have a stronger force to lean against which will also push them back upright when they exit the turn.

BIKE-BODY SEPARATION IN A *STEEP* BERM...

Even though this berm is well made and steep, the rider is going at a speed that requires him to lean the bike so much, he has to do this by letting it drop into the turn more than his body does - therefore using *Bike-Body Separation* as he leans.

FLAT CORNERS:

As we have seen above, by separating body movement from bike movement it allows the rider to lean the bike more underneath them, to help corner better. On flat terrain this is very important to help keep your body more upright and therefore over the contact point of the tires, to prevent them from losing grip. It's rather like *Angulation* in skiing where the skier leans/tips the ski on edge and then flexes at the waist to keep the upper-body weight over the edges of the ski. Here, the rider leans the bike and keeps their weight towards the outside of the bike to help drive the wheels down into the ground, and so increasing traction.



BIKE BODY SEPARATION FOR FLAT CORNERS...

By moving the hips (blue arrow) to the outside of the bike (the right-side in this left hand turn) the rider can now place his weight more directly over the tires to help grip in a flat corner.

He can also put the **OUTSIDE PEDAL DOWN** and weight this (pink arrow) to help use it as a lever to further help push the tires into the ground, to aid traction.

The effect of this can be felt by the following exercise:

Standing off the right side of the bike with your belly button facing the end of the handlebars and with two hands on the right grip, put the brake on and try to make the front wheel slide away from you by leaning the bike towards you and pushing it away from you... most likely it will.

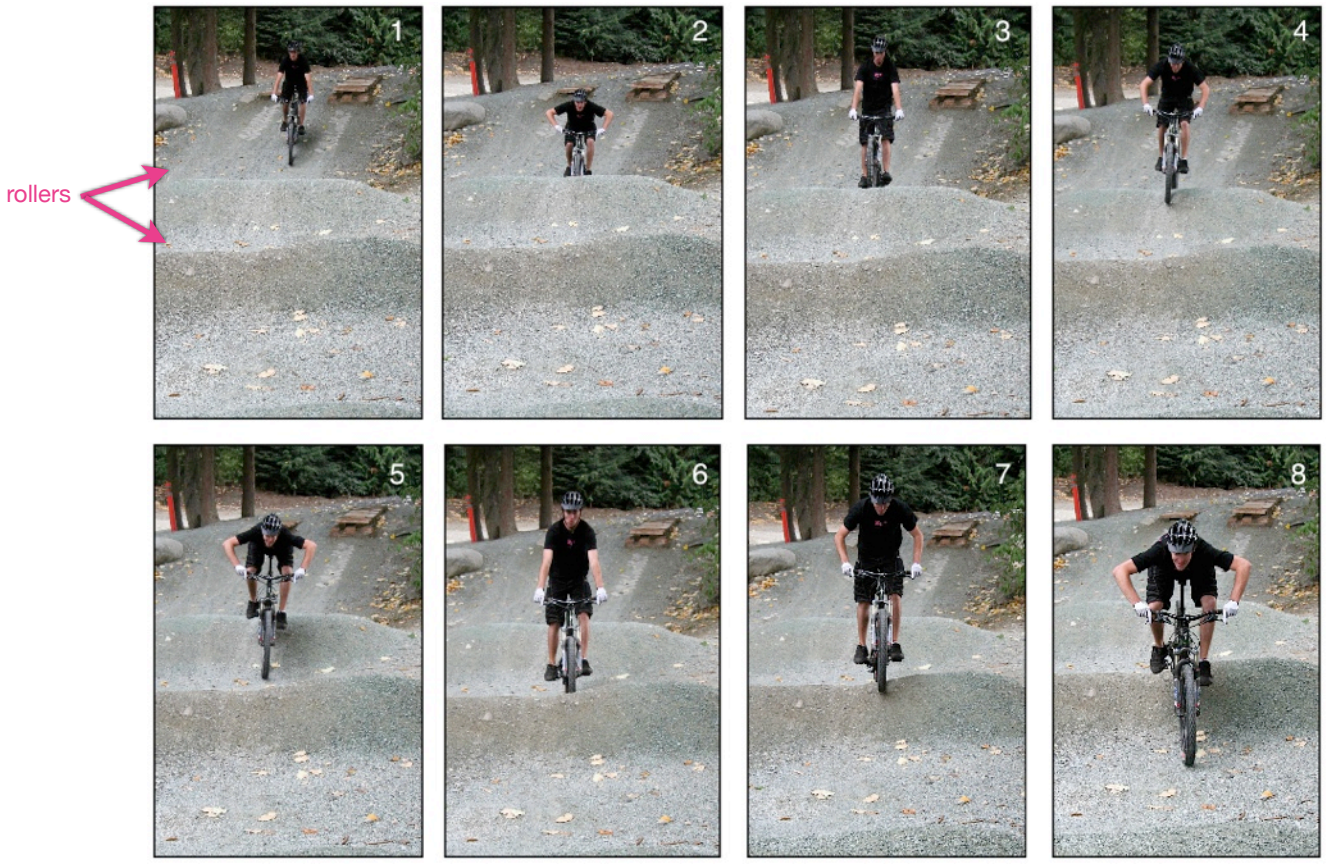
Now do the same in the same position but with both your hands on the left grip (so you are reaching over the other side of the bars)... the front wheel will not slide away because the handlebars are being used as a lever that is pushing the frame, and therefore wheels, *into* the ground. The same principle happens when you weight the outside pedal when it's at the "6 o'clock" position.

5. PRESSURE CONTROL

Whilst generally more of an intermediate to advanced skill, we can however begin to feel and use *Active Pressure Control* from the Intermediate stage, onwards. The first step is to be relaxed on the bike; PASSIVE PRESSURE CONTROL. Only relaxed riders can move and therefore begin to push and pull on the bike to make it do different things (specific results): ACTIVE PRESSURE CONTROL. Being able to do this can help you become more comfortable and balanced so you can feel more like you're "driving" the bike instead of just being a passenger on it; this is key to progressing from the intermediate stage of riding.

PUSHING/INCREASING FORCES = WEIGHTING THE BIKE - 2, 5, 8: Pushing down (weighting) on the bike can increase tire grip and help the bike increase in speed down a slope, like the backside of a bump or roller. We do this by first bending our arms and legs and "compressing" ourselves onto the bike. At the point where we reach maximum compression (we've bent our arms and legs as much as we want to or can) and *begin* to extend, this is where the bike becomes weighted and pushed down into the ground; this is called **pre-loading, or loading.**

PULLING/DECREASING FORCES = UN-WEIGHTING THE BIKE - 3, 4, 6 & 7: Un-weighting involves taking weight off the bike, or even lifting it off the ground, making it easier to roll over things and absorb larger bumps, for example. As you extend (straighten) your arms and legs to push the bike into the ground you will ultimately reach *full extension* (3, 6) at which point the bike becomes light and you can even flex your arms and legs again (4, 7) to pull on the bike and un-weight it even further - perhaps even lifting it.



The movements, or bio-mechanics, to push and unweight a bike are exactly the same as those used when you jump from two feet, into the air; bend your legs to compress your body down so you can push off the ground by extending your legs (increasing the forces on/weighting your feet). As your legs reach maximum extension (assuming you've pushed off the ground hard enough) you will end up unweighting your feet to the point where they will leave the ground as your body continues to move up into the air. The following exercise will help you feel this and explore these ideas on a mountain bike; to improve your overall comfort, balance and control of the bike at this stage. Increasing performance with these principles comes later.

TRAMPOLINE EXERCISE: Learning how to push and pull on the bike to keep momentum when riding - without pedaling. The goal is to feel confident pushing and pulling on the bike so we can begin to feel and explore this principle of *Force Application* and how we can use it to make the bike do different things.

PREPARATION

- Find a trail that is almost flat, but with a slight downhill gradient, is open and free from other trail users
- Roll along at a slow pace in the *Ready Position*
- Your goal here is to simply pick up speed by "bouncing" on the bike - pretending it is a trampoline

EXERCISE

- Compress onto the bike by bending your arms and legs to pre-load it - as you would on a trampoline if you were on "all fours"
- Push off the bike by extending you arms and legs
- At the point where you have pushed as much as you can as your arms and legs become straight, your goal here is to feel "light" as if you, and therefore the bike, have become unweighted - like you would after pushing off from a small trampoline. By using your arms and legs in this way, you can begin to feel comfortable moving over the bike, and pushing off it to the point where you feel "light"
- Keep practicing to try and get it to feel natural - it should not feel forced; imagining what it feels like on a trampoline will help as it can be a very similar, "flowy" feeling.
- See if when you push off on the bike, whether that helps to increase its speed on the downhill - the steeper the gradient, the more easily you will notice this effect.

LEVEL 2 MANEUVERS

The three main maneuvers discussed for intermediate riders are **wall-rides, drops** and **jumps**; each one requiring a specific set of rules, pre-requisites and bullet points to learn, teach and progress with safely. As soon as the bike leaves the ground, the potential risk for injury is exponentially increased thereby making these not only the most dangerous maneuvers to teach, but to also perform. As such, when teaching them to clients, SAFETY IS PARAMOUNT and all possible safety considerations, guiding protocols and teaching techniques and methodologies must be followed flawlessly to minimize the risk of injury as much as possible.

Please review the information on Maneuver-based teaching at the end of parts A and B of the PMBI Manual. A good base for learning to teach these Level 2 maneuvers properly and safely is to master teaching and demonstrating all of the Level 1 maneuvers.

POINT OF COMMITMENT: Every feature like a jump or drop has a point of commitment - a point on the approach that after you pass, you must have your speed and balance set and be 100% committed. Any hesitation after this point is an automatic bail out, and you do not ride the feature. This avoids riders going off drops or jumps who aren't 100% ready, balanced and set to ride the bike properly.

WALL RIDES *Skills: Direction Control, Riding Position & Balance*

Wall-rides are pretty common these days as Bike-Park style trails and their features are becoming more popular throughout the mountain bike world, regardless of if you're actually in a Bike Park. They are a really fun feature to ride and teach and can be learnt relatively easily with less consequence, when compared to jumps and drops.

The main tips to riding walls is **speed, approach angle and committing to the movement to lean the body** and bike away from the wall. Riders who approach the wall at a too slower speed, shallow angle and/or do not lean away from the wall enough, nearly always end up losing control as the bike loses grip and slides down the wall.

A good way to warm up to wall-rides is to find one with a progressive bank up to it that you can treat it like a berm. In doing this you can practice riding towards the wall, getting the angle and speed right as you practice leaning away from it by simply riding along the bank at the bottom as if it were a berm. Do this a few times and then gradually allow the wheel to go further and further up and until you are riding the wall.

1. **Approach the wall-ride in the *Ready Position* with a DECENT SPEED** so you don't have to pedal onto, along and off the wall... similar to the speed of a fast berm that would be a similar size to the wall.

2. **Treat the wall-ride like a berm and COMMIT TO LEANING AWAY FROM IT**, keeping centered over the wheels - head over handlebars.

3. Try to **draw a SMOOTH ARC with your tires** as you approach, ride onto, along and off the wall.

4. To **help traction on the wall, pre-load the bike before the wall** to then unweight the bike as you ride onto and along the wall.

SOME FURTHER TIPS:

PINK LINE: Use the bank at the bottom to warm up to the wall-ride. Ride it like a berm getting used to the approach speed, angle and leaning away from the wall - to the inside of the “turn”.

BLUE LINE: Riding towards the wall on a more direct approach (as the rider in the picture has done) will result in the bike slowing down at the top of the arc. This makes it even more important to lean away from the wall at this point and to actively steer the bike back, down off the wall.

GREEN LINE: Riding towards the wall more from the side, so as to create a wider arc, will require more speed and a definite commitment to leaning away from the wall - note the rider is approximately 90° to the wall and therefore far from vertical... he has leaned about 45° away from vertical. See the pictures below to get an idea of the approach speed, angle and lean when riding a wall-ride like this.

DROP-OFFS

Skills: Riding Position & Balance, Pressure Control, Timing

PRE-REQUISITES - To be able to perform a Front Wheel Lift as you ride over a stick, so you can keep the front wheel up over the stick until the rear wheel rolls over it. DO NOT attempt a drop off with air until you can confidently and consistently do this. DO NOT attempt drops no larger than 1 foot bigger than the previous height of drop you have previously mastered.

There are a few different techniques a rider can use to be able to ride off drop offs. Each have their merits and disadvantages but the ones we focus on in the PMBI Instructor Training Courses are chosen for their ability to keep clients as safe as possible when learning drop off techniques, whilst allowing them to progress with their riding.

The first and safest technique is learning to ride small drops with a front wheel lift, whilst the second involves moving back over the bike - the same movement that is used when you roll down drops.

ROLLING DROPS - ADVANCED

1. Start by riding along in the *Ready Position,* approaching the drop at an appropriate speed to roll down.
2. As the front wheel approaches the drop, allow your hips to move back and down over the rear wheel while pushing the bars (and bike) ahead with your arms. (A,B and C below). You may have the brakes on as you start to roll into the steep terrain.
3. Once rolling on the drop it will mostly likely be too steep to safely and effectively brake, so release the brakes!
4. Then begin to re-center your weight so you can ride the rest of the drop and away from it, balanced and in control (D). Slow down during the run out (after the drop) as needed.

DROP-OFF: USING FRONT WHEEL LIFT

slower speeds/more air time/flat landings

This technique is best suited to drops where you need to lift the front wheel off the end of the drop. This is often the case when the rider has a slower speed (novice riders perhaps) and so needs to keep the wheel up until the rear wheel leaves the drop, so as to prevent the front wheel from "nose-diving". It's also useful when a rider wants to get more air - perhaps to be able to make a landing that is a little distance away from the drop. Advanced riders will perfect the front wheel lift where a slight pre-load of the fork, will be enough to prevent the front wheel from dropping early.

1. In the *Ready Position,* approach the drop at an appropriate speed for the size of drop and surrounding terrain. Start on small drops and get the technique dialed before trying anything bigger.

2. About **1ft before** the drop (this distance increases as speed increases and vice versa), **push off the pedals** with your legs to **explode your weight up,** and allow your body to move slightly backwards as you do this. (Remember to lift the front wheel by moving your weight up and back and *not by pulling with your arms*.)

3. **Cover the rear brake** in case the front wheel becomes too high and you need to avoid falling off the back of the bike by putting on the rear brake.

4. **Re-center your weight** before you land to help both wheels land together and absorb the impact by flexing your arms and legs.

DROP-OFF: LUNGE STYLE

higher speeds/less air time/steeper landings

This technique is used primarily by advanced riders where they leave the drop at a faster speed and so need to minimize the air time; effectively reducing the size of the drop. This is used when the landings of drops offs are steep, forcing the rider to land quickly before they get too much air or when a rider might be racing and so want to minimize air time; bikes move quicker on the ground.

1. **Approach the drop in the *Ready Position*,** at a reasonable speed so that you don't feel like you need to lift the front wheel. Start on smaller drops and get the technique dialed before trying anything bigger. **Stay relaxed** and committed to the drop

2. Just before the front wheel goes off the edge, **allow the bike to go ahead of you by dropping your hips back** over the rear wheel as your **push the bars ahead** as you extend your arms.

3. As you are in the air, **re-center your weight** by bringing the bike back underneath you to re-center your body (COM) over the bike.

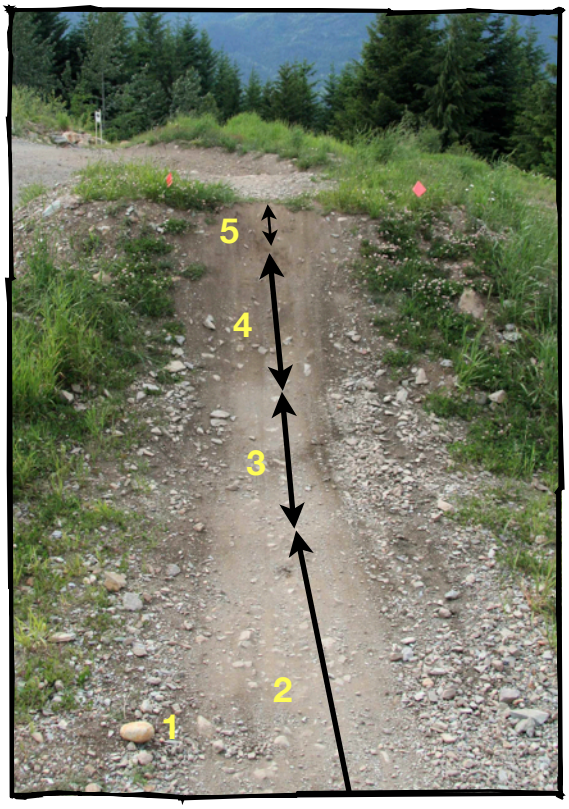
4. **Extend your arms and legs and absorb the landing** - try to land as "quietly" as you can (try not "kick" the bike into the landing).

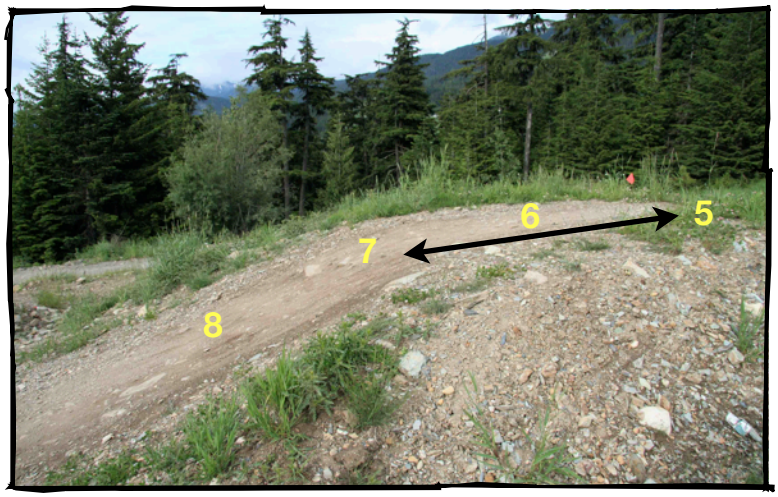
JUMPING

Skills: Body Position & Balance, Pressure Control, Timing

PRE-REQUISITE - DO NOT attempt jumping until you can confidently and consistently land drop-offs with air up to 3 feet high and have mastered all the Front Wheel Lifts.

Jumping is one of the most fun maneuvers to learn on a bike, but is also one of the most dangerous. Therefore, we must take extra special care when teaching this to clients. The first step is to know the anatomy of a jump:





1. The pale rock acts as the POINT OF COMMITMENT
2. The APPROACH
3. The TRANSITION - the curve section of ground that transitions from the approach to the ramp
4. The RAMP - the part of jump from the transition to the lip
5. The LIP - the end of the ramp
6. The TABLE - the flat top to the jump
7. The KNUCKLE - the start of the landing
8. The LANDING - where riders should aim to land both wheels

STEP ONE: PASSIVE JUMPING MANDATORY FIRST STEP TO JUMPING

This is the first stage to jumping, whereby a rider learns to “feel out” the shape, size and feelings of riding over a jump for the first time. The jump has to be a small tabletop that they can comfortably ride over, in control.

- Approach in the *Ready Position* at a **slow pace so you can roll-over (no jumping!**) the tabletop and feel the take-off, landing and overall size, shape and feel of the jump.
- **GRADUALLY increase your speed** until the bike starts to get air - but only a very small amount. A couple of inches is all that is needed at this stage.
- **Relax and stay centered (eyes over handlebars**) on take off and in the air so you can be balanced for landing. Absorb by flexing your arms and legs - try to think about landing as “quietly” as you can.
- Approach at the same speed but try getting a little air by **slightly “resisting the terrain” with your arms and legs so they don’t become compressed** as you ride up the ramp. This will allow the jump to “push” you in the air - instead of you partly absorbing the jump with lose arms and legs.

STEP TWO: PUSH & RELEASE JUMPING FOR STABILITY & SAFETY

This second stage is the start to true jumping technique; learning to push against the ramp to control the trajectory of both wheels off the lip, to become more stable off the lip and in the air. The simple laws of physics states that every action has an opposite and equal reaction... if you push against an immoveable with enough force, you will be pushed with the same force in the opposite direction. We use this basic principle in jumping to create stability off the jump and into the air.

WHY PUSHING THROUGH THE BIKE IS REQUIRED FOR SAFE JUMPING

1. BIKE TRAJECTORY: By pushing both wheels into the ramp of a jump equally, they will both follow a similar trajectory into the air, thus giving bike/rider stability. Without pushing/loading the bike into the jump, the front wheel trajectory will be much lower and more perpendicular to the ground (less up, more forward) than the rear wheel trajectory. In simple terms, the bike will rotate forwards sending the rider over the bars.

This is because of the time difference between the front and rear wheels leaving the jump. Once the front wheel leaves the jump, the rear wheel will suddenly be weighted with the entire body weight of the rider. This inadvertently causes the rear wheel to be pushed into the jump, therefore sending it on a much higher trajectory than the front wheel (which was never pushed into the jump, at least to the same degree).

2. MAINTAINING A GOOD BODY POSiTION & BALANCE: When a rider approaches any large immoveable object with speed, like a jump, the combination of rider speed and the terrain not moving will inevitably cause the bike and rider to be "pushed" into the jump. If a rider stays loose and doesn't resist this "push", he/she will be compressed into the bike much like the suspension on the bike will be compressed as well. Indeed, this is often the reason why many people crash off jumps. By not resisting this "push" from the terrain, they can easily be knocked off balance causing them to lose control of the bike. Actively pushing against or resisting this "push" from the jump is therefore critical, not just to ensure the correct bike trajectory (as explained above), but also to ensure the rider stays in a good body position and so balanced over the jump.

WHY RELEASING THE "PUSH" IS ALSO REQUIRED FOR SAFE JUMPING

1. JUMPS ARE RARELY PERFECT OBSTACLES. Often the lip of a jump can be mis-shaped or damaged somehow causing the wheels the be stalled/knocked/affected, if only very slightly, as the rider leaves the jump. Any slight affect at this crucial stage in the jump can easily affect the balance of the rider and trajectory of the bike/rider into the air. Simply releasing the "push/resist" the rider has against the jump, thereby effectively absorbing the last 6-12inches of the ramp including the lip, will avoid this scenario all together.

2. BECAUSE THE WHEELS WILL ALWAYS LEAVE THE RAMP AT DIFFERENT TIMES and because there is a very real risk of human error when it comes to timing the "push" against the jump at the correct moment, and pushing through the bike equally from front to rear and left to right. Thus, absorbing the lip is another way of ensuring stability and correct trajectory into the air. Absorbing the lip will help avoid any unwanted affects from the rear wheel being weighted suddenly (and lately) and will further act to help keep the rider lower in the air, thereby minimizing the consequences regardless.

HOW TO PUSH (LOAD) A BIKE SAFELY WHEN JUMPING

1. Approach the jump in the *Ready Position* with reasonable speed. Note the Point of Commitment and have your speed, body position and direction set before you pass this - otherwise miss out the jump and go again.

2A. **RESISTING**: Ride into the jump centered in the DH Body Position with an appropriate speed gaged from step one of jumping (see above). “Resist” the push from the jump by tensing the arms and legs. Your legs and arms should work like stiff suspension... still able to react to bumps and flex a little, but ultimately not being compressed by the terrain significantly. Most of your weight should be through your feet.

OR

2B. **LOADING**: Just before the ramp, flex your arms and legs to get low. In the transition (at the bottom of the ramp) begin to extend and push (load) the bike into the ramp. Keep the soles of your feet parallel to the ramp so you push directly (perpendicular to) against the terrain and not vertically down.

3. **RELEASE!** About a foot before the lip, “release” the resist/load and absorb the lip by allowing your arms and legs to relax and compress/bend as the bike continues up the ramp, off the lip and “up” into you.

TIMING NOTE: The earlier you release, the more of the ramp you will absorb, reducing air time and increasing stability. Adjusting the timing of the release is a great way of controlling how much air time a rider gets. However, releasing too late or too early can cause a poor bike trajectory and/or body position over the jump, so TIMING IS CRUCIAL!

4. Stay small in the air for better balance and control in the air. Extend your arms and legs and absorb the landing - try to land as “quietly” as you can (try not “kick” your bike into the landing).

STEP THREE: PUSH JUMPING FOR EXPERT JUMPERS *ONLY* TO GAIN MORE HEIGHT IN THE AIR

The last stage to jumping is the same as step two without the release before the lip. This **should only be attempted by riders who are confident and consistent with step two** and ready to move on to the next stage. By not releasing the preload before the lip, this allows riders to get more air for the same speed into, and the same shape and size of jump.

1. Approach the jump in the ***Ready Position*** with reasonable speed. **Note the Point of Commitment and have your speed, body position and direction set before you pass this** - otherwise miss out the jump and go again.

2. Just **before the transition, flex** the legs and arms to then begin extending (pushing) as you ride through the transition onto the ramp. Keep the soles of your feet parallel to the ramp so you push directly (perpendicular to) against the terrain and not vertically down.

4. As the bike leaves the lip, bring it up underneath you by flexing your arms and legs so you are **small in the air** for better stability and control.

5. **Extend your arms and legs and absorb the landing** - try to land as “quietly” as you can (try not “kick” your bike into the landing).