Minecraft U Sequence 1b: Basic Problem Solving in Gaming

Learn the basics of survival in the Minecraft world, from fending off starvation to defending against skeletons. Solve these problems and more in a fun environment, with help from our instructors. Overcome the challenges that Minecraft has to offer, and have fun doing it.

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Section 1: House Building

When you first enter the game, you are stranded in a mysterious land. To make sure you survive, you need to first make a house. Your house will be shaped like a cube, with a door for an entrance, a roof, glass panes, and different kinds of blocks. Be sure to place torches somewhere in the house, to keep monsters from spawning in your house!

In order to get the materials to build your house, press ‘e’ on your keyboard, and this will open the creative menu. You can go through the tabs at the top and look for what blocks and items you want, or you can click on the compass in the corner of the menu and type in what you want. From there you will want to get two different blocks:

- One block will be the corners of your house (for example, stone bricks)
- The second block will be what the rest of your house will be made of (for example, wood planks)

You might also want to craft:

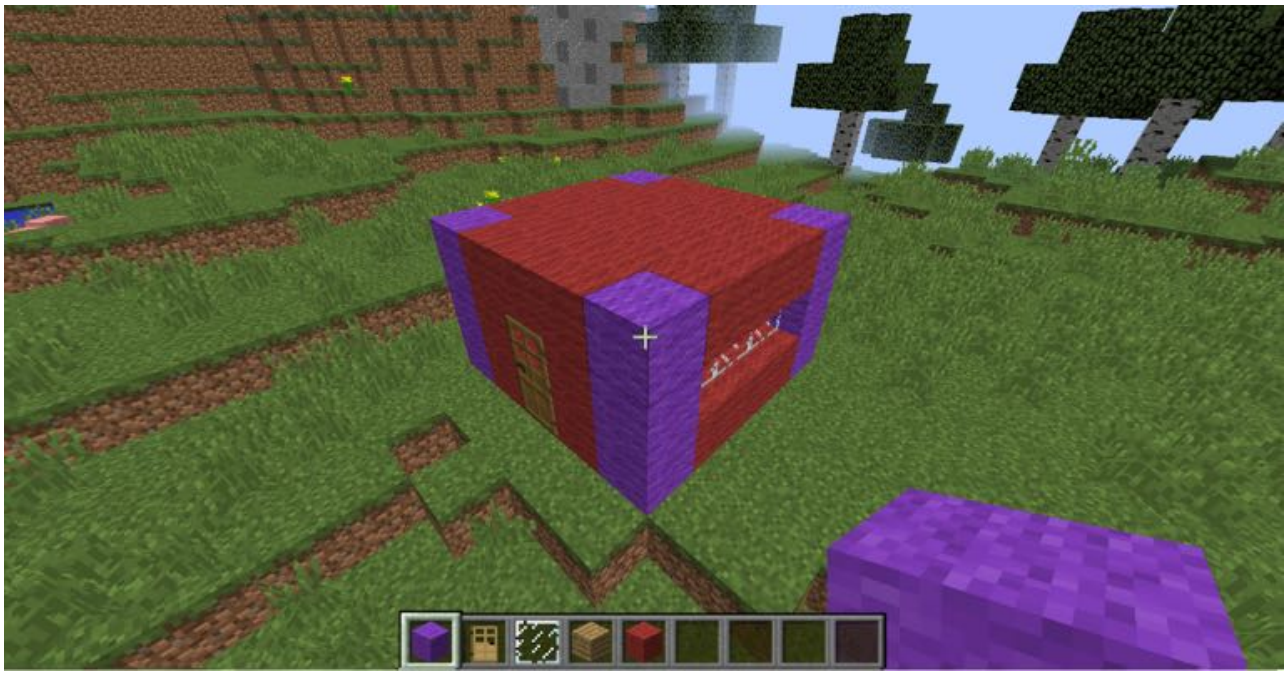
- Doors
- Glass Panes
- Torches

Now that you have all your materials, it’s time to begin construction.

- First, place the cornerstones of your new place, make four columns of your first block.
- Next, connect the four columns with your second block, building up the walls from there.
- Finally, add a door and glass panes in the middle of the house so you can see outside.

Example house before roof is added:

Completed house:



When you have finished your house, you don't have to stop there! Expand your house by making the walls go out further, adding more floors, and adding more things like bedding and a furnace.

Tiny House Competition

See who can build the smallest house that contains all of the following:

- A bed
- A crafting bench
- A chest
- A furnace
- A torch
- At least a single block on which to stand

Section 2: Advanced Survival Strategies

Farming

A Minecraft survivor needs to quickly develop a renewable food source.

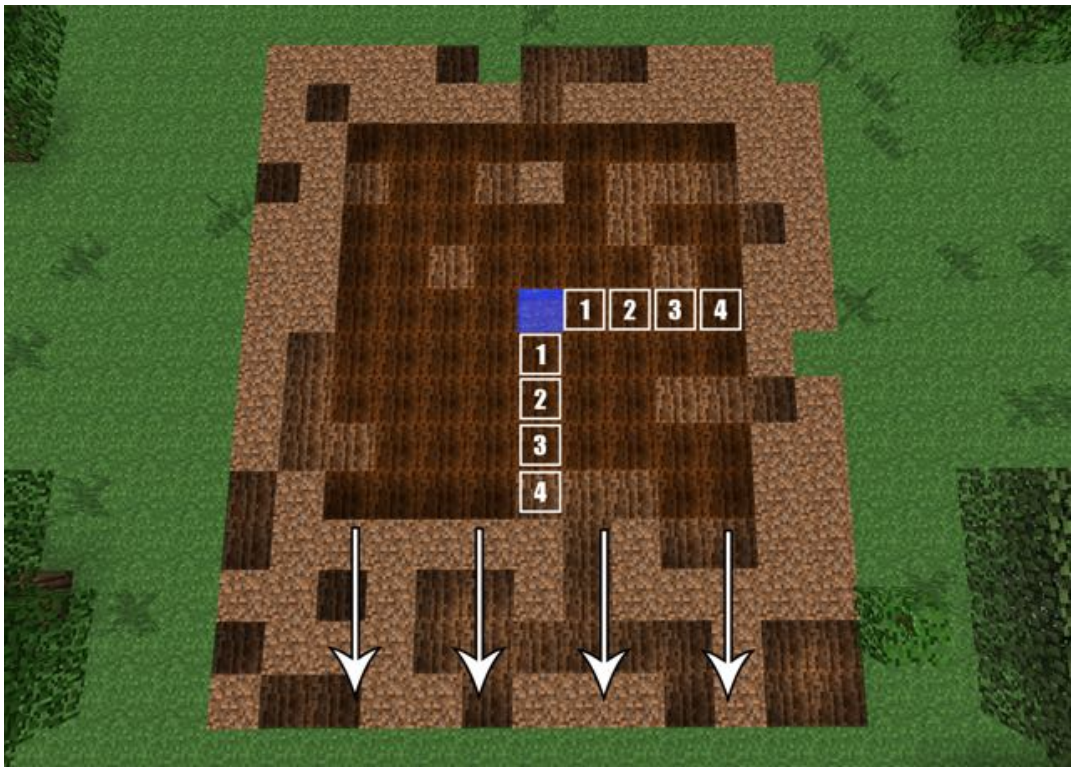
> This section is going to keep you happy and healthy throughout your Minecrafting days

The easiest source of food is getting meat from animals such as cows, pigs, and chickens. Their meat can be eaten raw or cooked; raw food has a chance of making you sick, while cooked food fills you up more. Animals, however, aren't a renewable resource (at least until you can get a breeding program started). On the other hand, wheat is an easily obtainable and fast-renewing source of food. It only requires seeds, a source of water, and a hoe.

First, you need to acquire some seeds. They are dropped when long grass is destroyed. Try to start out with at least 10 seeds to get a good-sized farm going.

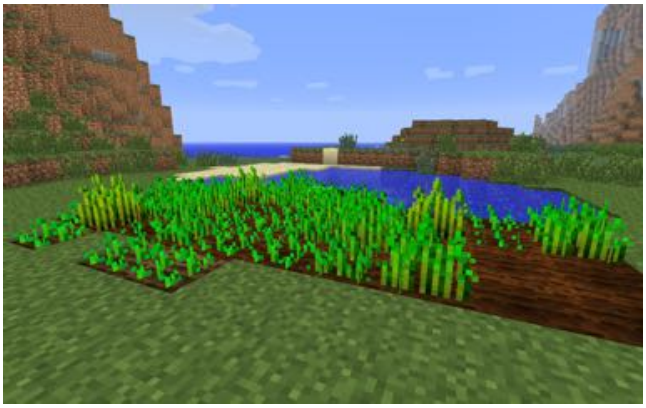
Use the hoe to turn some ordinary dirt blocks into farmland. Farmland needs to be hydrated by nearby water in order to remain farmland; farmland that dries out will convert back to dirt. Take a look at the screenshot below to see how farm away water will hydrate farmland.

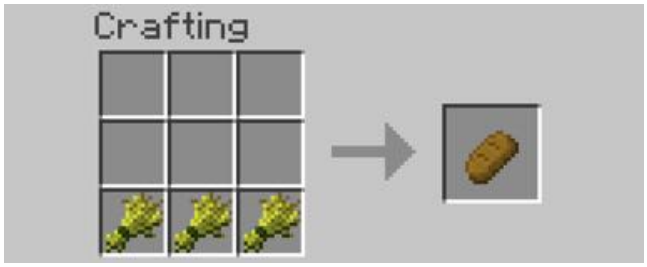
One block of water can hydrate up to 4 blocks away in all directions. Even though I plowed more than that in the picture below, the water can only hydrate the farm land up to 4 blocks away, so some of the plowed land becomes normal dirt and grass.



Plant your seeds by using them on the farmland. As long as they have a lightsource (the sun, torches, or other blocks) these seeds will slowly grow into wheat (the picture below has wheat in several stages of growth). The wheat will turn a yellow color when it is finished growing.

Harvest the fully-grown wheat, which will give you wheat as well as seeds for future crops. On average, each wheat block will drop 1.5 seeds so your crop size will grow faster and faster over time. Make bread using the recipe below. Bread fills you up almost as much as cooked meat but is much more sustainable and faster to harvest.





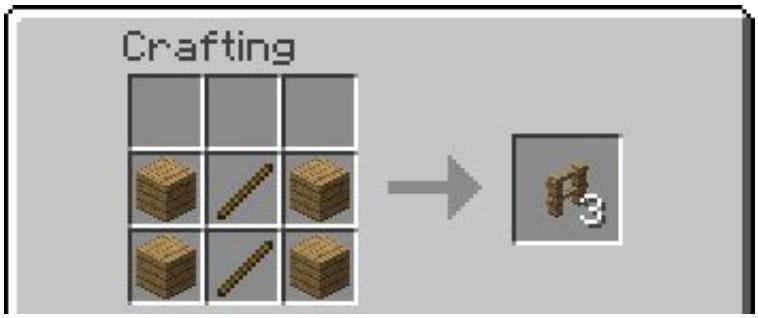
Ranching

As reliable as farms are, ranches offer far more utility (leather, feathers, etc…) as well as a superior source of food in terms of stats. However, they take a bit of time to prepare and often require materials only available through a farm. For this example, we'll be making a ranch for cows.

Fences

You're going to want to fence an area for your cows to keep them from wandering off. The crafting recipes for fences are below.

Fence (you'll need ~8 sets)



Fence Gate (at least one per pen)

You'll want to fence a decent sized area, about 8 sets of fences (24 total) will do the trick. The finished product will look something like this.

Herding Cattle

Now that you have a pen, you need to herd animals into it. Again, for this example we'll use cows, but you can do this with any animal. In order to herd animals, you need to get their attention. We can do this by using different types of "feed." Hold the appropriate feed in your hand and approach the animal; it will turn and look at you like this:

Now the hard part, without losing the animals attention you must lead it into the pen. Once the cow is in the pen, quickly close the gate behind you. You will need a minimum of 2 animals to begin breeding.

List of Feeds

- Chickens - seeds
- Cows, Sheep - wheat
- Pigs - carrots

Note: it is possible to herd more than one cow at a time.

Breeding

Once you have at least 2 cows you're all set! Feed each cow a wheat by right-clicking. You should see hearts appear like so:

…after a short pause, a calf will appear!

You will need to wait 5 minutes before you can repeat this process. Calves take 20 minutes to mature.

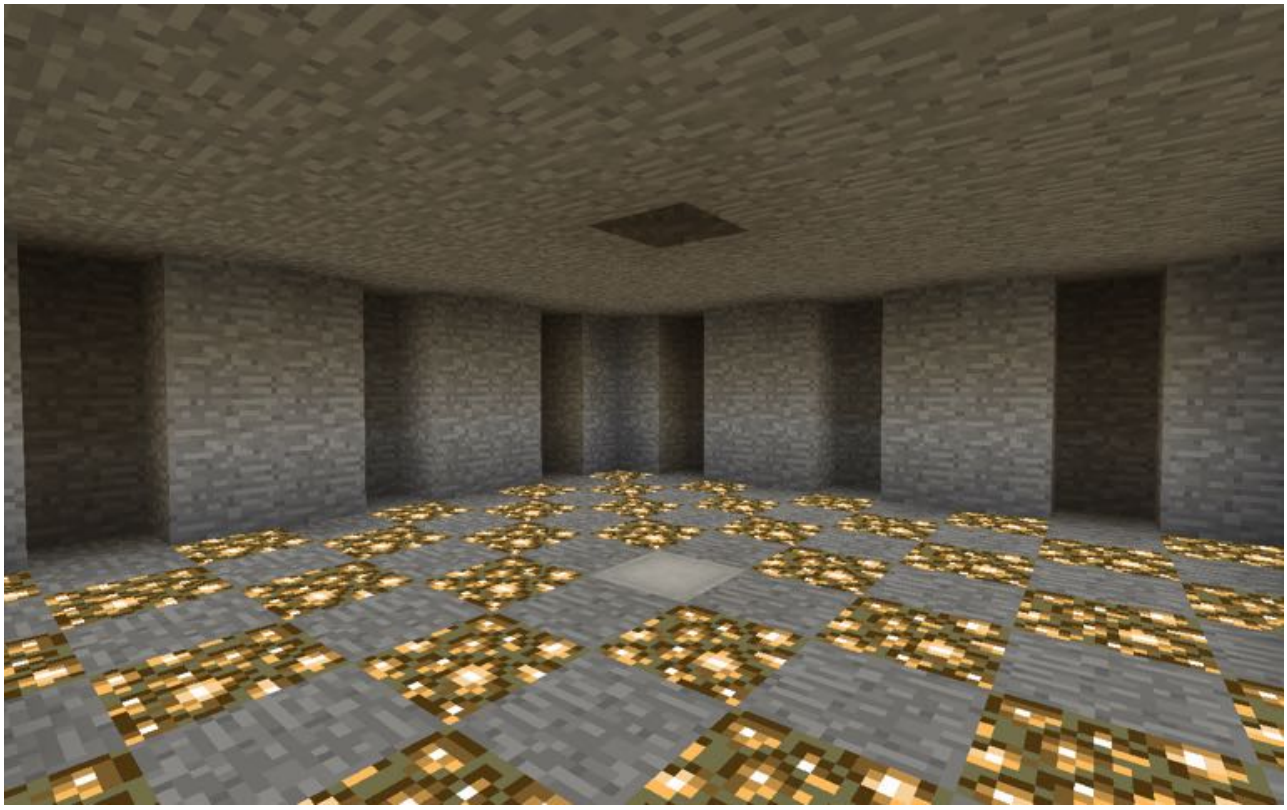
Mining

Basic mining strategies

In Minecraft, ores tend to group together at certain heights and some ores will only occur very far underground. Diamond ore, for example, only spawns at a Y-coordinate of 15 or below. To search for diamonds and other ores most efficiently, we need to mine below that level.

Dig an initial shaft straight down until you hit level 13 (you can check this by pressing F3 to open up the console). We will be mining out levels 13, 14, and 15 so we can find diamond as easily as possible.

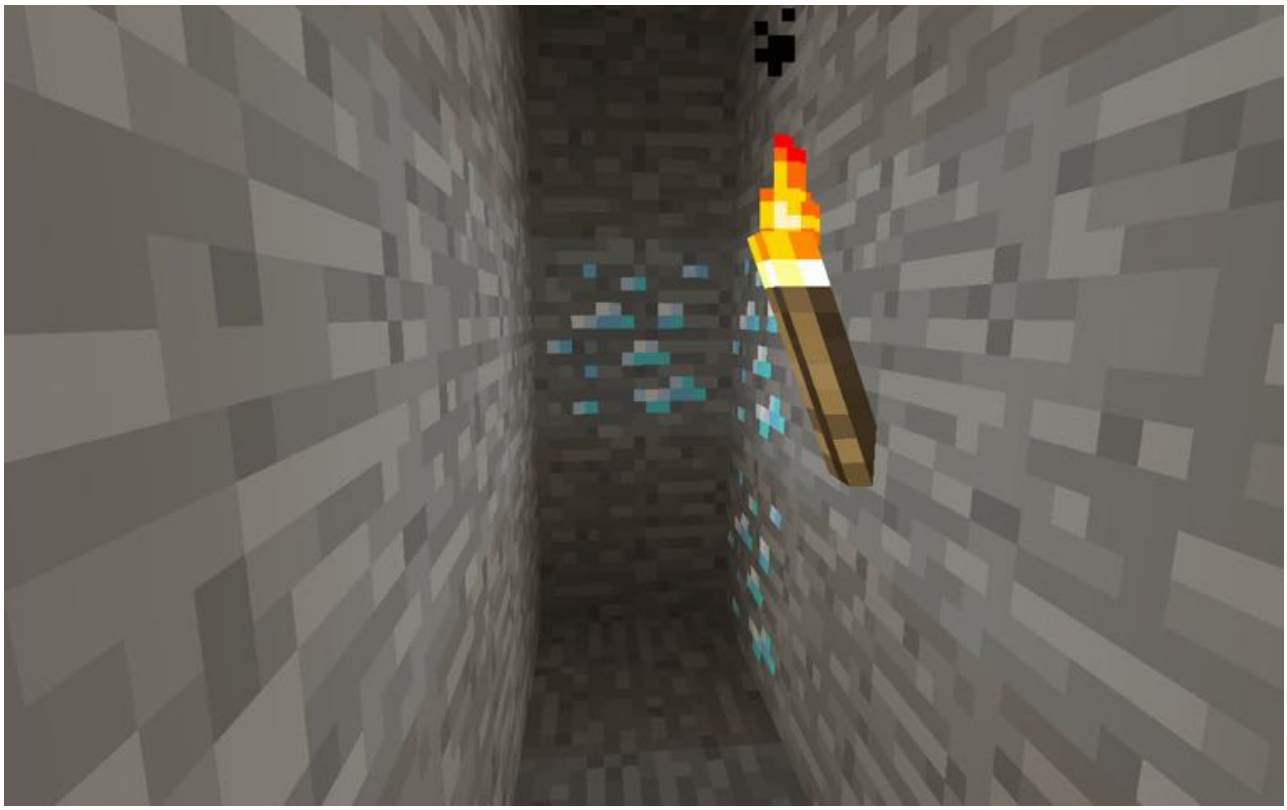
Create an open work area where you can have chests, furnaces, and lighting. This will serve as your underground base for storing supplies and mined ore. Our mine shafts will branch off of this central area.



Whenever we mine a straight shaft, we are either digging out or looking at 3 columns of blocks. The column we are digging and then the ones to the left and right. To mine most efficiently, we should locate our shafts every 3 blocks. This lets us see the highest number of blocks with the fewest number of shafts. Torches should be placed every 7 blocks alongside our shaft. Any further

apart, and mobs may spawn in the middle. Any closer, and we would be using more torches than needed. Try to keep all of your torches on one side. If you get lost, the torches will let you know which direction you dug in.

If you keep mining long enough, you're sure to find some good veins of ore!



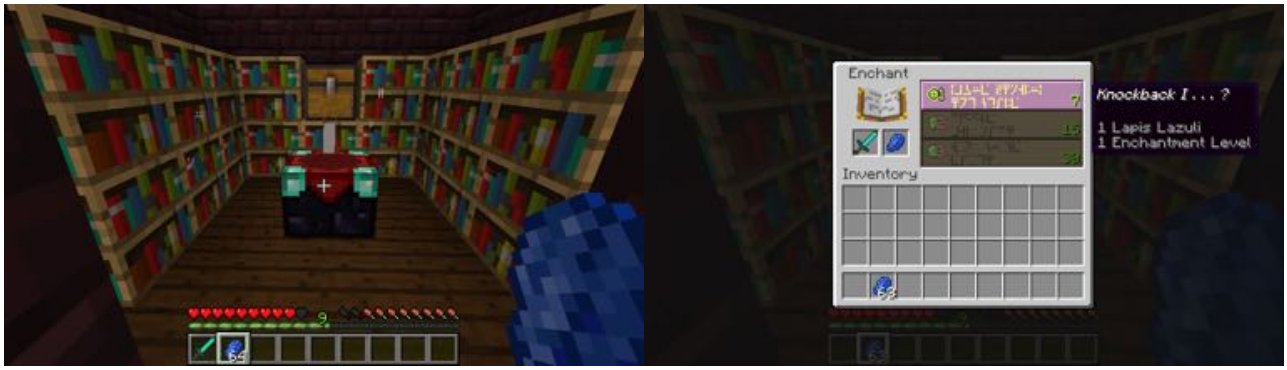
Section 4: More Advanced Survival Techniques

Enchanting

> Enchanting is a mechanic that augments armor, tools, weapons and books with one or more of a variety of enchantments that improve an item's existing abilities or imbue them with additional abilities and uses.

Enchanting is a very important technique in Minecraft. Enchanted tools, armor and weapons make success in your Minecraft adventures much more likely, and are more fun to use as well.

To enchant an item, right-click on an enchanting table and place the item and 1–3 lapis lazuli in the input slots. Options will display on the right hand side of the enchanting display.



To get the maximum enchants, surround the enchanting table with bookshelves. To get to the highest level of enchanting (level 30), you will need 15 bookshelves placed within a 5×5 square centered at the table or the block above. No other blocks can be placed in between the table and the bookshelves.

Tips:

- When first starting out, use only one experience level to enchant as many tools and armor pieces as possible. After that, use an anvil to combine enchantments. Later, do the opposite to try and get as many enchantments as possible on one tool/weapon, then use an anvil again to combine when possible.
- When trying to get a specific enchantment on a tool/weapon that is already enchanted, use books.
- As you progress above level 16, each level requires more XP than the last. Try to enchant using a level as close to yours as possible to make the high XP cost worthwhile.
- Do not enchant anything weaker than iron as the lack of durability makes the cost not worthwhile.
- In 1.7 and later, an enchanted fishing rod can pay off. "Luck of the Sea" lowers chance of "junk" catches by 2.5% per level and increases chance of "treasure" catches by 1% per level. "Treasure" can include enchanted tools. "Lure" decreases wait time until a catch by 5 seconds per level but decreases chances of both "junk" and "treasure" catches by 1% per level, so be careful with that one if your goal is to catch treasure. ("Treasure" and "junk" catches are only available in version 1.7 and up.)
- Place 15 bookshelves around an enchantment table to get the highest level enchantments. If after establishing the 15 bookshelves you *do not* want maximized enchantments, you can block their effect with torches.

Anvils

An anvil can be used to combine the enchantments of two items. The items must be of the same type and material. There are two slots in the anvil, and the item in the second slot is sacrificed to improve the first.

The cost in levels depends on the enchantments. You can also repair and name items with the anvil. In survival mode, there is a limit of 39 levels for any work performed on the anvil.

Enchanting Challenge

In the map provided, enchant a sword to either:

- Two enchantments, one at level 2 or better.

or

- One enchantment, level 3 or better.

Extra credit for enchanting a chest plate as well.

The bottle of enchantment provided is only going to get you so far. You'll have to go get some bad guys for the rest of the XP required (there are plenty of slimes around during the day for this purpose). There are three strategies you can use to achieve the challenge:

- Enchant two swords and combine.
- Enchant books and use the anvil.
- Just go for it with the maximum possible enchant (you'll need to go get some additional XP first).

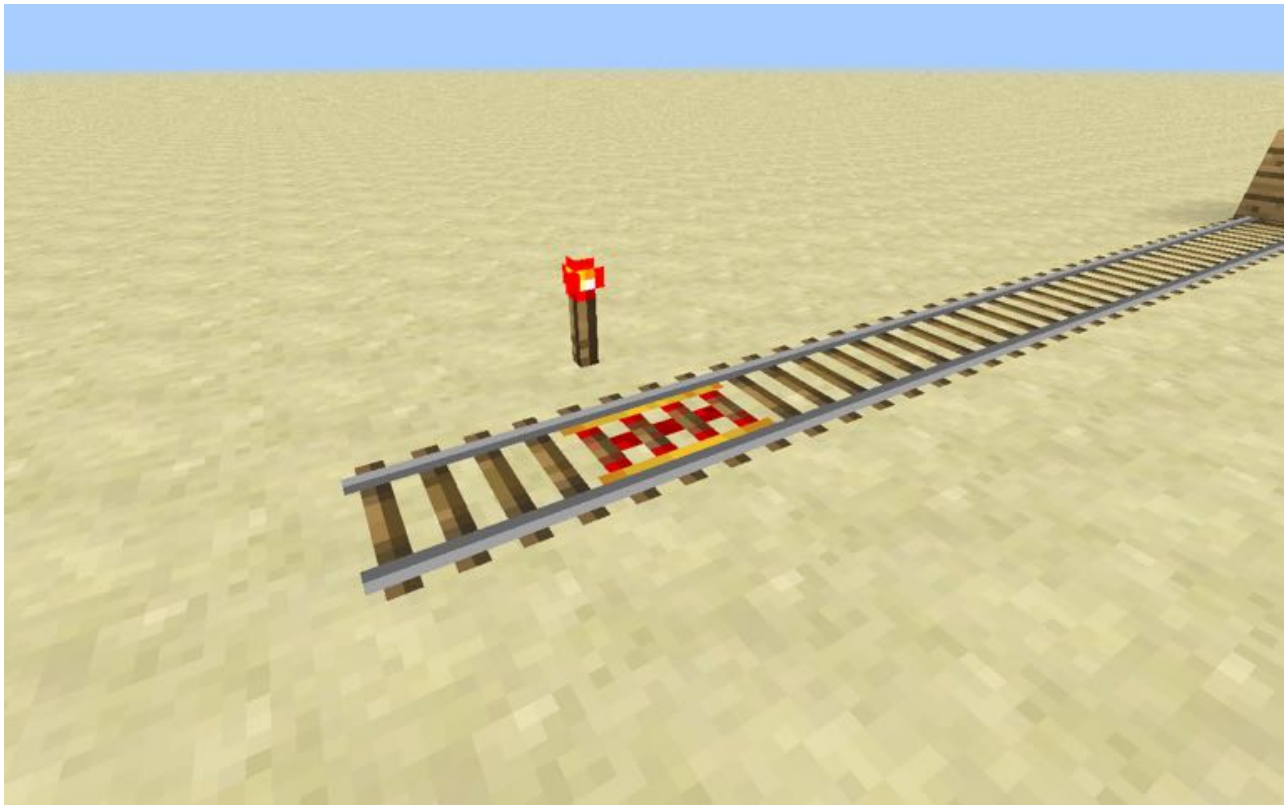
There is a fair amount of luck involved, and no one strategy is necessarily better than another. After everyone has completed the challenge, compare notes.

Minecarts and railway construction

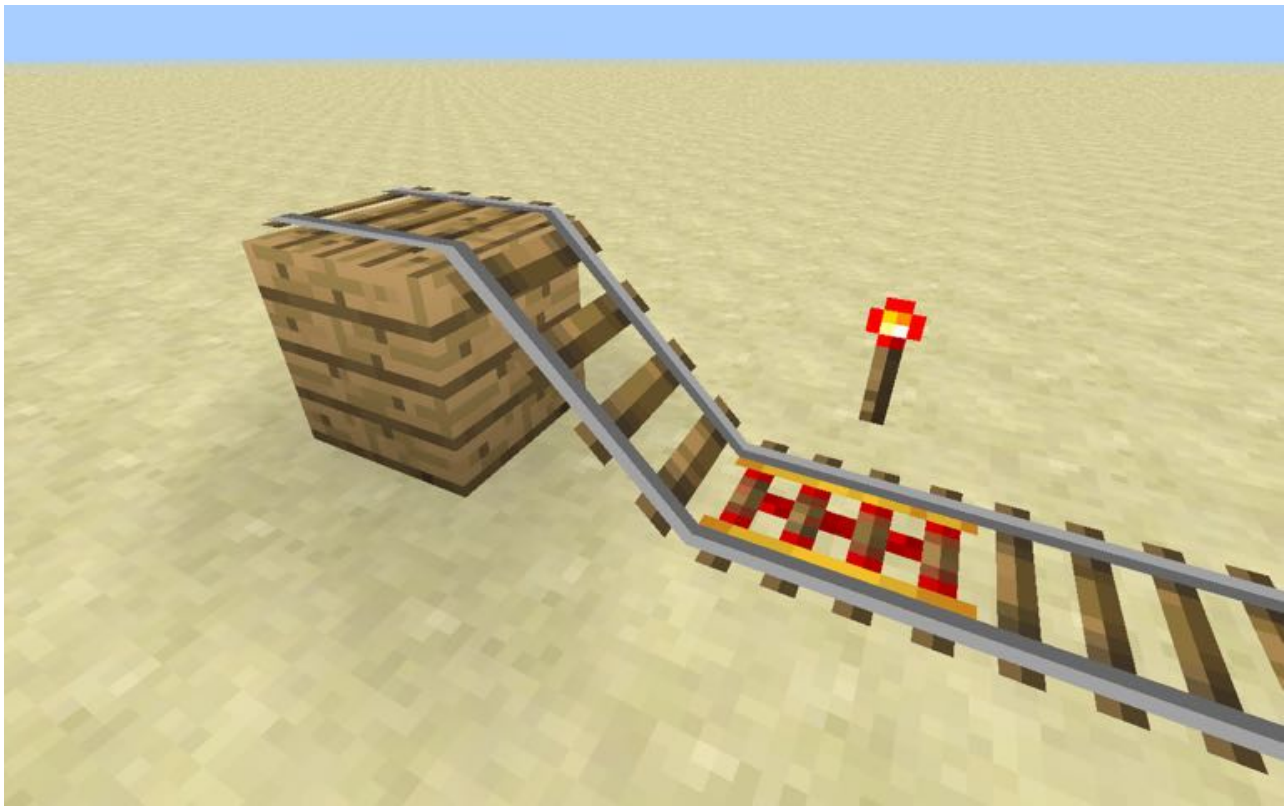
As you expand your living area, you may find that traveling between areas taking up a lot of your time. Running and walking aren't particularly fast, but minecarts can make traveling significantly faster and safer.

After placing down some track, you can place a minecart on top and right-click to enter. Once you're in the cart, pressing W will start moving you forward. Pressing the left SHIFT key will make you dismount the minecart though it will keep going. The wooden block at the end of this track stops the minecart before it goes too far.

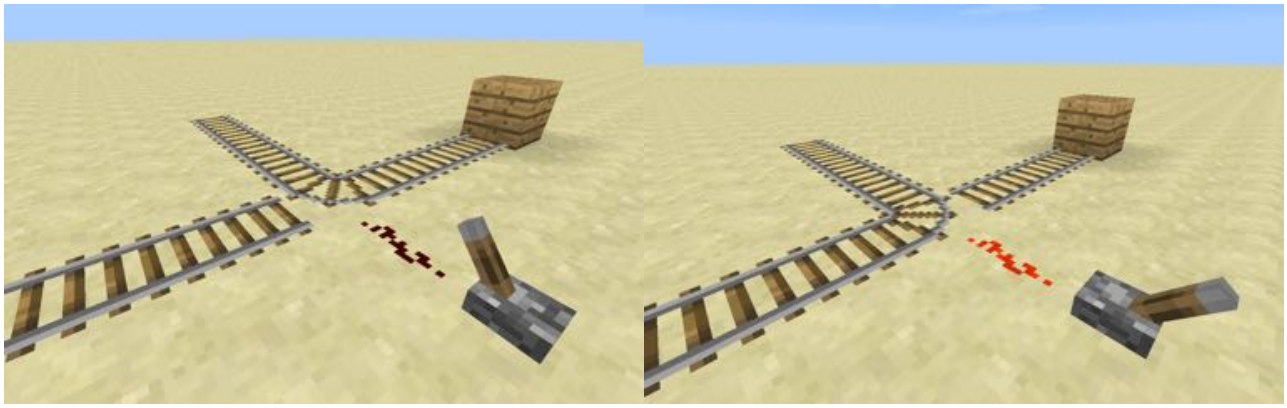
You can use powered rails to keep the minecart going on long tracks, similar to redstone repeaters. They must be powered with redstone to provide any power to the minecart.



By using blocks to create tilted rails, we can make handy locations for starting minecarts without having to move manually.

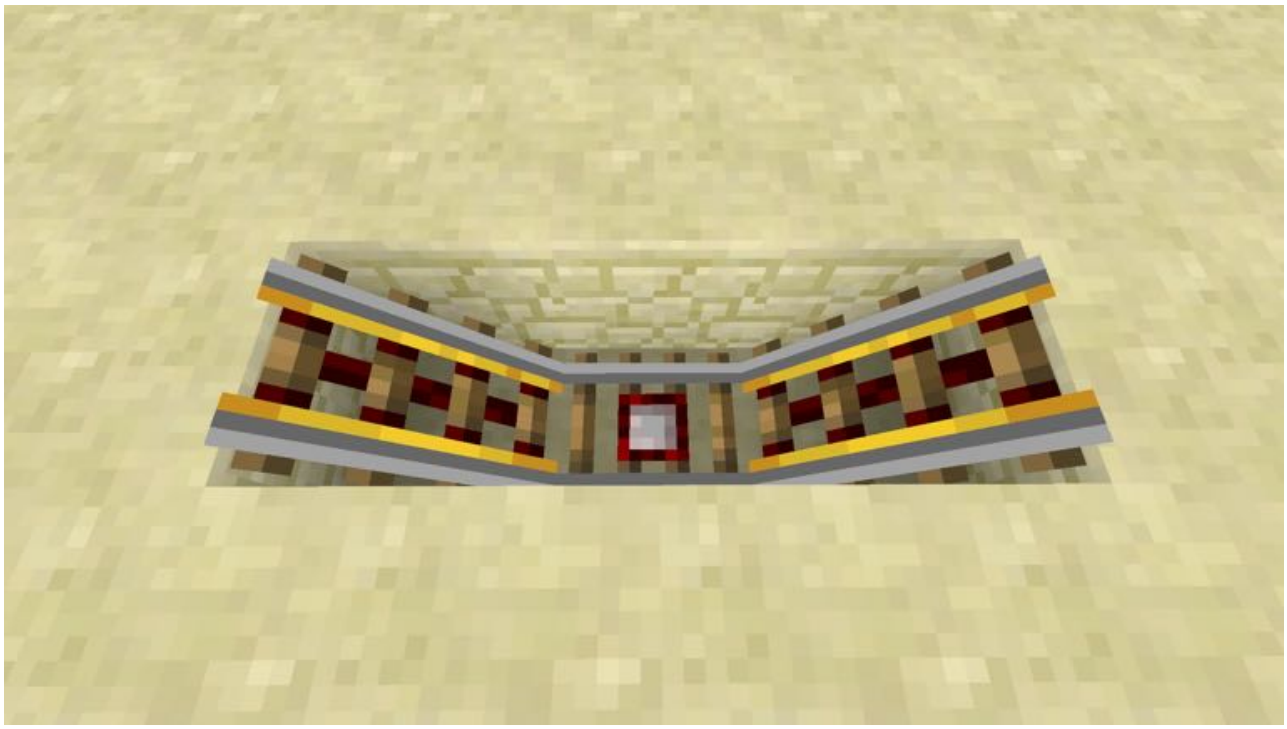


Redstone can also be used to make junctions where you can select which direction the cart will take you. Three-way intersections will flip back and forth as power is supplied or cut off.

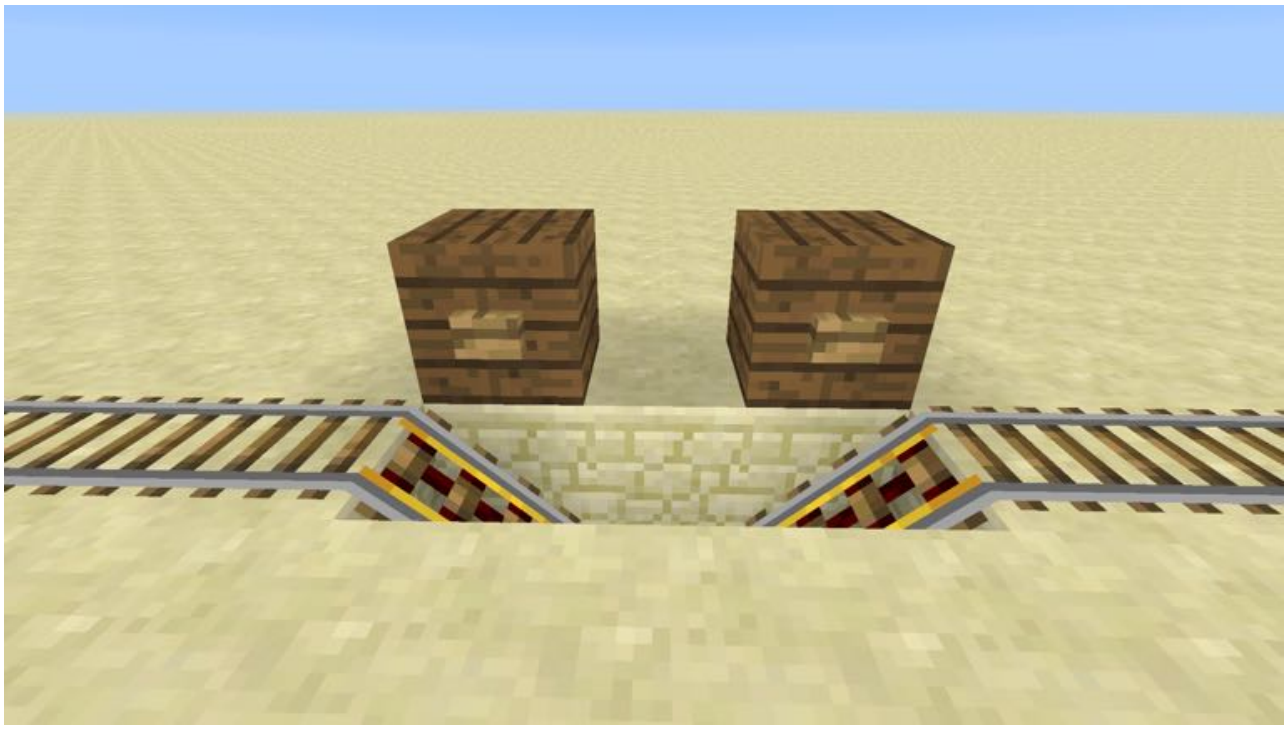


We can also make a two-way minecart station where our minecart will stop until we tell it to continue.

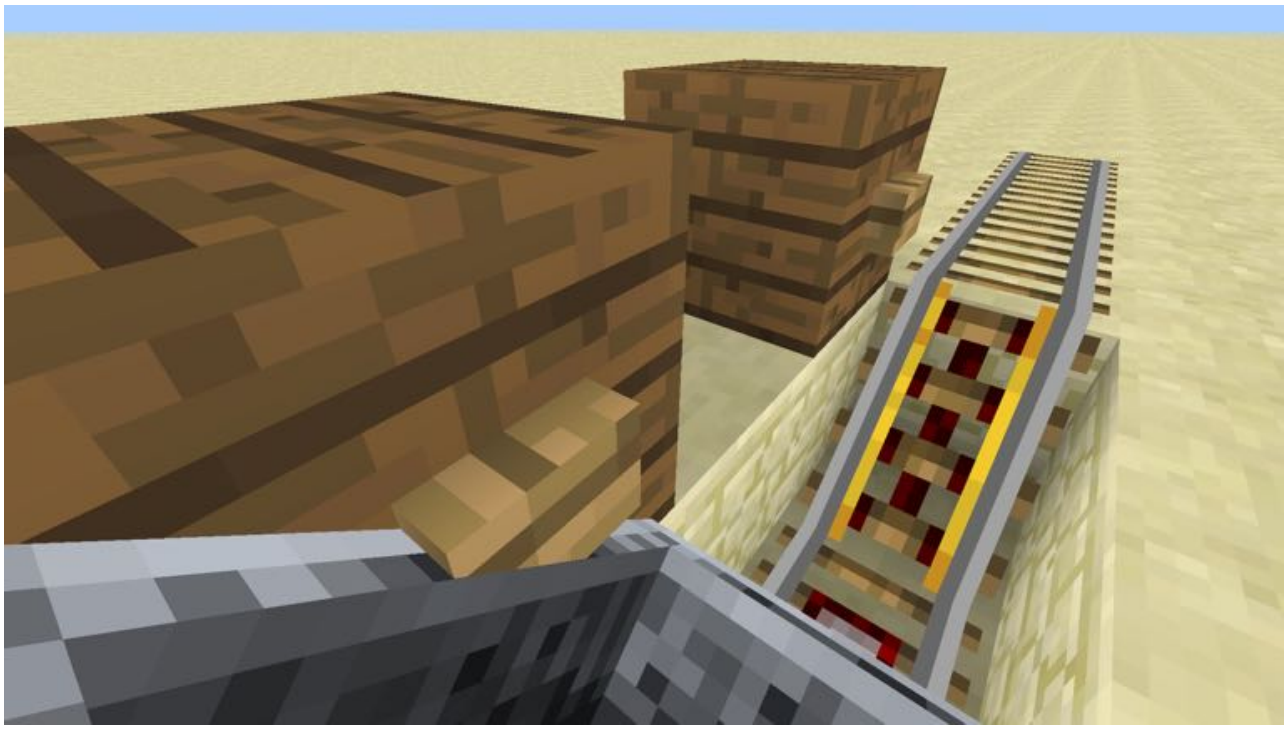
Dig out a 3x1 trench. Put a detector rail in the middle, and two powered rails on either side (powered rails act as brakes when unpowered).



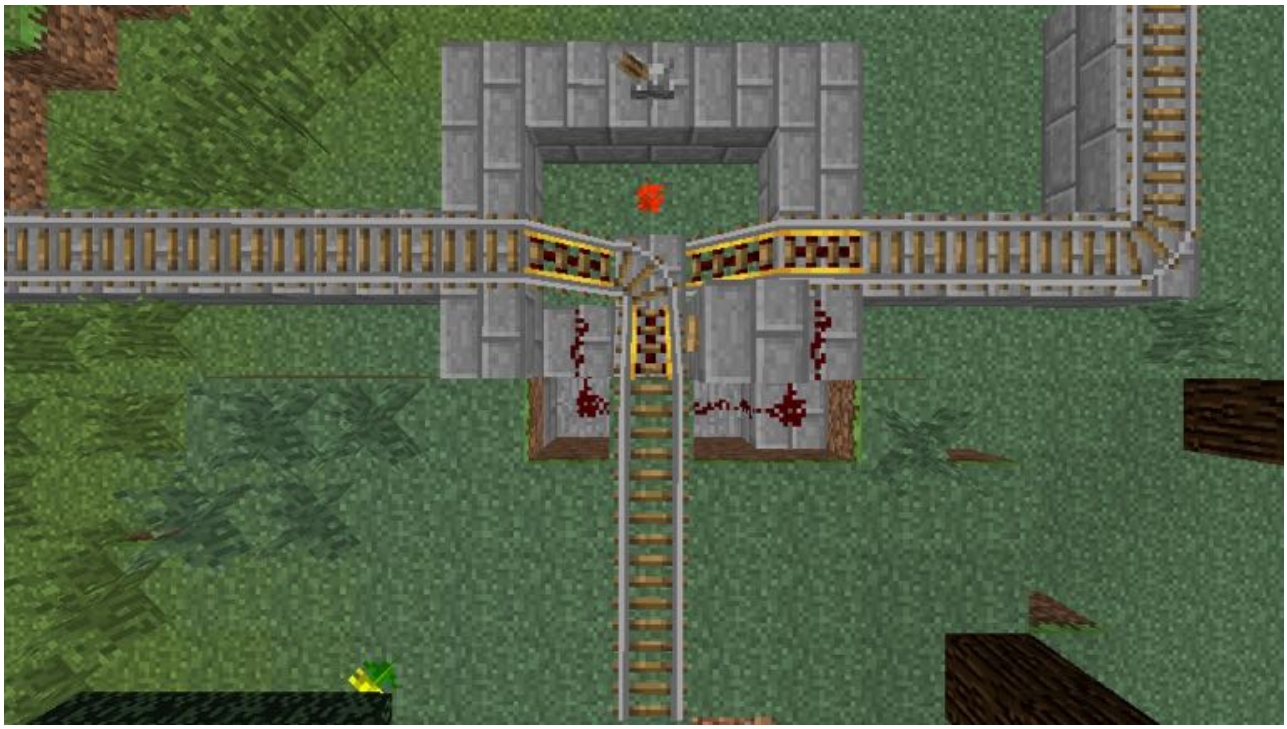
Extend the rails outward to connect to your normal railways. Place two blocks with buttons on them on top of the blocks adjacent to the powered rail segments. When you press the button, the powered rail below it should light up.



When you are on the railway, you will stop right next to one of the buttons. Press the button to power the rail underneath you, pushing you forward. The detector rail will then power the rail on the other side, pushing you along on your journey.



Your assignment is to make a minecart rail that connects three different locations: a house, a farm, and a cave entrance. Make a start-stop point at each of the destinations. Create a stop that allows you to choose your destination (see screenshot below). The map for this exercise is called “Railroad”.



Section 5: Adventure Maps and Nether Portals

Adventure Maps

> Adventure mode is a game mode intended for player-created maps by limiting some of the gameplay in Minecraft, in which the player cannot directly destroy most blocks to avoid spoiling adventure maps or griefing servers. Most blocks cannot be destroyed without the proper tools. However, players can still interact with mobs and craft items. link

Notch, in 2010:

> “But why”, some people ask, “are you making Minecraft programmable?”. The reason is, adventure mode!
>
> I foresee a future where people can design “challenge maps” in creative or survival mode, then share them with people so that they can try to beat them in Adventure mode. Being able to create interesting puzzles or trigger events requires some more advanced programming than the sand and water based stuff we’ve seen so far, yet still I don’t want to introduce real programming into the world. link

This section’s activities involve mostly just playing adventure maps. But as you play, solving the puzzles of the maps, consider how you might have built them differently, what’s fun and challenging about them or what’s simply tedious and boring.

The first map is relatively easy and can be played through in one sitting. It’s called “D&D’s Adventure Map” and was built for twin daughters, Delaney and Delilah. As a single player playing the map, you can snag both of their starting items, although you probably won’t need them all (or maybe you should leave some should you perish and respawn).

> The concept of the map is to find the diamonds hidden in the world in various locations and to obtain extra diamonds by defeating “boss dungeons” and solving the riddles in every dungeon. You “level up” as you play by obtaining better gear which allows you to do the harder dungeons. link

- Play “D&D’s Adventure Map”

After you’re done with “D&D’s” map, try one of the other maps provided. If you don’t like the first one you pick, choose a different one. They vary in plot, types of challenges, difficulty, etc.

Maps provided:

- “Teramia 0.9.1 Beta” is an open-ended map with no clear path or plot. By changing the dynamics of vanilla Minecraft only slightly, the map can still change what skills and problem-solving strategies are of most value.
- “The Evil Doctor’s Castle” is a classic escape-style map. Quickly determining the way through each “level” is of the most importance with this map, but it does have a very clear path to success!
- “Jungle Stream” is a classic story/puzzle/parkour map in the style of the Indiana Jones series.*

Nether Portal

The Nether is an awful place without much to see and a lot to be afraid of; but it also a place one must visit if one is ever to create potions. It is also fairly handy when travelling long distances.

This section is going to focus on placing nether portals for maximum transportation value with maximum safety features.

Going through a nether portal will create a linked portal in the nether. If there is already an active portal within range (about 128 blocks) in the other world, the portal will link to it.

For this exercise we will create two portals to travel between two mountain ranges.

Some friendly reminders regarding traveling through the nether:

- Take flint and steel. Your portal might be damaged by ghasts. In this exercise you'll need it to light a new portal at the 2nd location.
- Take cobble and gravel. The former for building walls to protect from ghasts, the latter for gravel elevators.
- Take a bow and plenty of arrows for fighting ghasts.
- Do not hit zombie pigmen! Be careful when mining around them!
- Use shift/sneak liberally while near precipices and lava, so as not to fall

The advantage of using the nether for long-distance travel is that for every block traveled in the nether, you travel eight blocks in the overworld. Since naturally occuring resources are often far apart in the overworld, you will very likely need to travel long distances with some frequency as you collect and transport those resources.

Placing portals so that they connect is tricky. From the wiki:

> Horizontal coordinates and distances in the Nether are proportional to the Overworld in a 1:8 ratio (1:3 in Xbox 360 & PlayStation 3 version)…This does not apply on the Y-axis…Thus, for a given location X, Y, Z in the Overworld, the corresponding coordinates in the Nether are X ÷ 8, Y, Z ÷ 8. Conversely, for a location X, Y, Z in the Nether, the matching Overworld coordinates are X × 8, Y, Z × 8.

The goal of this exercise is to travel through the nether to another portal to the overworld position 1000 blocks away.

Mobs of all kinds can make their way through portals, so be a little cautious when traveling through no matter which direction. Here an unfortunate sheep has found their way into the nether and a very precarious position. He doesn't look too happy: