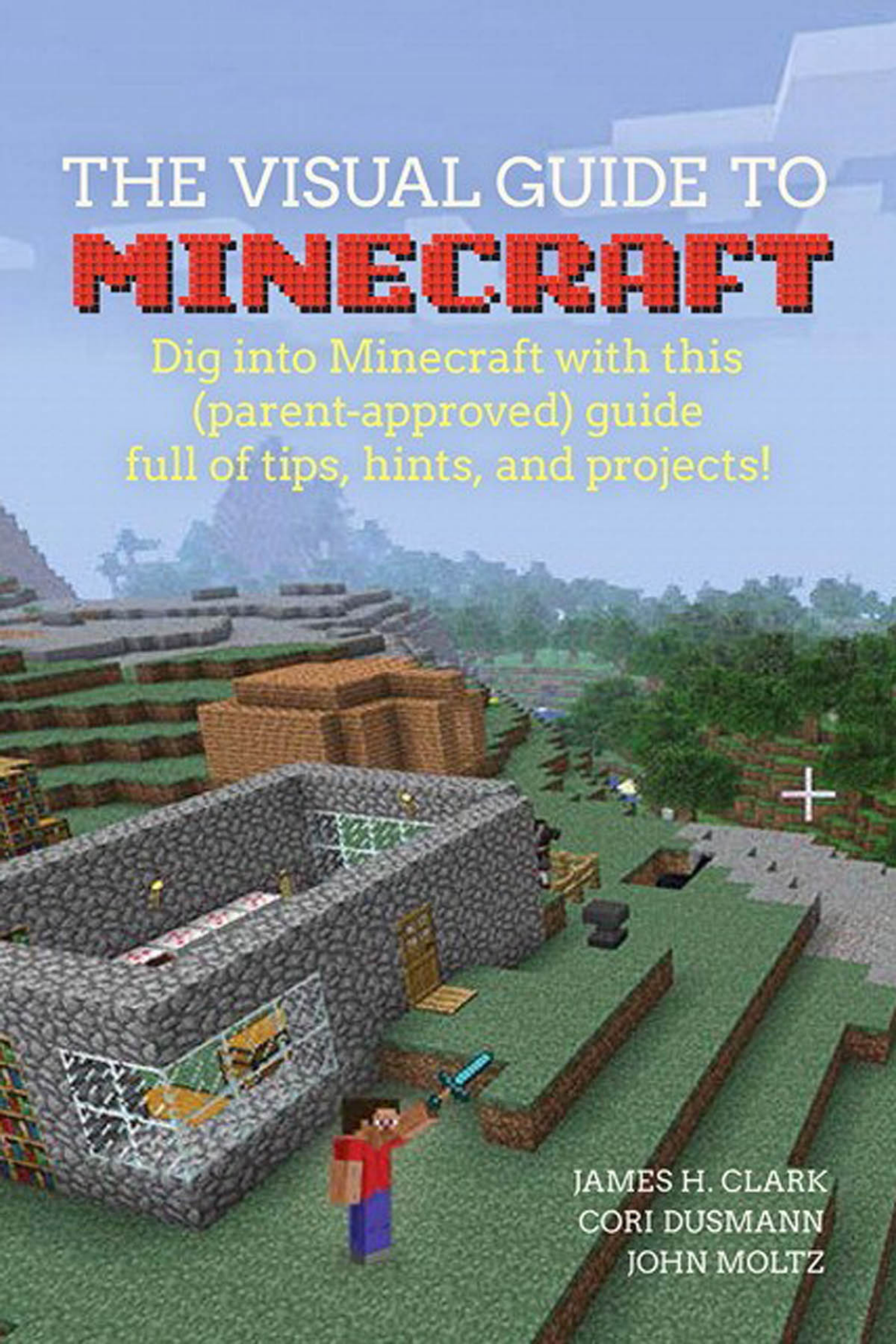
THE VISUAL GUIDE TO MINECRAFT

Dig into Minecraft with this (parent-approved) guide full of tips, hints, and projects!



JAMES H. CLARK
CORI DUSMANN
JOHN MOLTZ

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James H. Clark, Cori Dusmann, and John Moltz

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Dedication

To my pterodactyl and smilodon. Sometimes clichés are suitable: The world is yours. *—James H. Clark*

To all the kids and teens who share their wonder with me—I truly couldn't do this without you. *—Cori Dusmann*

To my son, Hank, who got me into this amazing game. *—John Moltz*

Acknowledgments

Jennifer—my wife, my partner. To say her expertise, excitement, love, and support is nothing short of amazing would be an understatement.

Yes, their names appear on the cover, but it bears repeating: This book wouldn't be what it is without John and Cori. Cori's kindness, wit, wisdom, and encouragement in game and out have made this journey enjoyable. I'm honored to call her a friend.

Robyn, Cliff, and Scout—for their guidance throughout. And just as important as the words are the look and presentation: Thanks to the design and production crew.

—James H. Clark

Thanks to Xander (Lex/wrednax), who has been a silent partner but deserves full billing, not just for redstone expertise and contributions, but for putting up with the insanity that descends when a book is being born. A mom truly couldn't be luckier than I am.

John and James, with their unique voices and experiences, make this book all the better. Thanks to Cliff, Robyn, and all the team for pulling all the strings together.

James, with the insight and wisdom that comes from close friendship, knows when to listen, cheer, joke, or simply set me back on my path—there were many times I would have faltered without his support.

Rawcritics is my amazing Minecraft community, filled with fantastic friends who have contributed in innumerable ways, from edits and project help to being on the receiving end of my crazy more than once. You guys are amazing and always there for me, and I can't thank you enough.

Finally, to my mom, my family, my friends—there's no way I could do this without each and every one of you; thank you.

—Cori Dusmann

My thanks and love to my wife for encouraging me to quit working for The Man so I could pursue a career in writing and ultimate fighting (I'll get to the second one someday). But mostly my work on this book is thanks to my son, Hank, without whom I never would have played Minecraft in the first place. Love ya, bud!

No thanks to our dog, Grant. He just eats things he shouldn't and barfs them up at 5 a.m. BAD DOG! No, that's mean. Here. Have a biscuit.

Thanks to Cliff, Robyn, James, and Cori for putting up with me, the noob.

—John Moltz

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Welcome to the World of Minecraft

Calling all miners, builders, explorers, designers, engineers, crafters, farmers, creators, and anyone with a sense of adventure—untold wonders await!

For over five years, Minecraft has been a source of wonder and adventure for players of all ages. Constantly evolving, with new creatures, blocks, and ways to play, this game that has no rules and no goals has captured the hearts and the imaginations of millions of players around the world.

Whether you have been mining and crafting for years or are just learning what a creeper is, there is always something new to discover and learn. With regular updates that add fresh features and all sorts of mods, Minecraft is a game that is always changing.

One thing that stands out about Minecraft, compared to other games, is that there are no rules, no goals, no storyline that you need to follow. You get to decide how you're going play, set your own goals, and play by your rules. Interested in designing and settling down in your own castle, village, or farm? You can build anything your imagination can conjure. Want to go exploring and find temples, fortresses, and caverns filled with treasure and monsters? Gear up and head out on a quest. Interested in creating automated machines to do some of your work for you? Explore the world of redstone, Minecraft's equivalent to electricity and circuitry. The options and opportunities are endless.

Mining, Crafting, Creating, and Exploring

This book is an exploration of a variety of aspects of Minecraft, from the basics and how to get started to an encyclopedia of items and mobs. In these pages, you'll find detailed instructions on how to survive your first night, design and build an epic home, and the ins and outs of redstone.

You'll find projects, information, tips, and tricks organized into four sections: "Information," Encyclopedia," "Structures," and "Redstone." You can start at the beginning and work your way through, jump to the beginning of any section and start there, or pick and choose what you'd like to learn about.

Computer, Console, Tablet

When Minecraft was designed, it was a game to be played on a computer and ran on the Windows, Mac, and Linux operating systems. Now players can play on Xbox 360 consoles, as well as on tablets and smartphones.

This book focuses on the original Minecraft game as designed for computers. Although the other versions share many components of the full game, there are differences, and those versions are often more limited. At the same time, many of the strategies and basic gameplay are so similar that you'll be able to use what you learn here whether you're playing on Xbox, Xbox One, PlayStation 3 or 4, tablet, smartphone, or computer.

A Note to Parents

(...and grandparents, aunts and uncles, teachers, and all other Minecraftian grown-ups)

If you have a Minecrafter in your life, you are likely already familiar with the all-consuming passion they have for the game. You may be wondering what makes kids so drawn to it, and how to manage their obsession and help them have some balance in their life.

Minecraft by its very nature is an open-ended, creative game that is inviting and liberating. The reality is that many kids now have fewer opportunities to just play freely. Days are long and often filled with extra classes and activities, and even free play can be more restricted than in past generations. Kids don't have the same freedom to go out into the world, explore, take chances, make mistakes—so games like Minecraft are more valuable than ever. This is not at all to say that games should replace outside time, extracurricular activities, family time, sports, crafts, or any of the other awesome ways kids pass time, play, and learn. It does, however, help to explain the allure of Minecraft.

Somewhere in all the rest, we have forgotten that for kids, play is work. It is the most important work of all. Through play, kids can learn much more in terms of larger life skills than they ever do in a classroom—about all sorts of things, social connections, how to get along, cause and effect. And when they use a creative, open game like Minecraft, they are suddenly back to doing what comes naturally: learning through play.

In Minecraft, kids can take those chances and risks and face the consequences. They create worlds that come completely from their imagination, and they, and they alone, are the master of their domain. This gives them pride in their work and a feeling of responsibility, things we want to see and nurture in our children.

On the flip side, because kids are so invested in their Minecraft world, and since they create things that carry personal weight and meaning, they can become fixated on it. This isn't necessarily a bad thing; they are showing responsibility to what is essentially their work. Parents see it as an addiction, particularly when Minecraft is all their children want to talk about, and it can be an issue. Balance is important, setting times to play and times to move on to other activities is vital.

Letting your child share their passion with you is a great way to connect. Have them show you their work, see what they are proud of, and prepare to be amazed at what they've been up to when you think they've been merely playing a game. There is much more to Minecraft than you would guess at first glance, which is why it has been appearing in classrooms around the world, why adults are as swept up in playing as kids, and why it has become a worldwide sensation. Check out Cori Dusmann's book The Minecraft Guide for Parents (Peachpit Press, 2014) for more down-to-earth advice for parents of children playing Minecraft.

Introducing Your Guides

All three of the authors are parents. We've been drawn into the thick of the game not just because we have kids who play (James has been playing since his daughter was born), but because we love and play Minecraft ourselves. We bring varied Minecraft backgrounds, from hosting a family server to being staff on a large public server. Between the three of us, we have vast knowledge and hands-on experience of Minecraft and of other games, gaming culture, online communities, computers, coding, education, and child development. Drawing on this pool of knowledge and expertise, we've collaborated to create a kid-friendly collection of tips, tricks, and strategies that will also help adults who are helping kids navigate this complex and creative game.

James H. Clark is the production coordinator at the Lakeville Journal Co., a group of independently owned community newspapers. In addition to his role at the Journal, he is an independent designer, working in both print and web media. In 2010, James encountered Minecraft in its alpha phase and joined a fledgling online community, where he quickly became an administrator. His sense of humor and his broad knowledge and approachability have earned him the ironic nickname "old man" within the community, and he has become mentor, teacher, and support for many of the players, young and old. James lives in Connecticut with his wife and daughter.

Cori Dusmann, author of *The Minecraft Guide for Parents,* is an educator, writer, and homeschooling gamer parent who lives in Victoria, B.C., with her awesome 15-year-old writer, gamer, and Tumblr addict. With a BA in Child and Youth Care (counseling), Cori has spent over 20 years working with children in

a variety of settings. Working predominantly with children with challenging behaviors, Cori has found games to be a source of common ground, and no game more so than Minecraft. In addition to her child-wrangling skills, Cori is a writer and reviewer. She regularly writes reviews for *Quill & Quire,* the Canadian publishing industry's monthly magazine, and her reviews have been printed in the *Vancouver Sun,* the *Globe and Mail*, and the *National Post.*

John Moltz grew up before the personal computer revolution, so he played with computers made out of cardboard boxes to pass the time until they were commercially available. After working in corporate technology for over 15 years (three of which he actually enjoyed), he quit his job in 2012 to become a freelance writer because money can make you only so happy. Writing, on the other hand—that'll make you miserable forever. John's work has appeared in *Macworld* magazine, *The Magazine, TidBITS,* and other places where fine nerdery is appreciated. He lives in Tacoma, Washington, with his wife, son, and gigantic poodle.

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Minecraft Basics

As its name suggests, Minecraft is a game in which you need to mine for (and otherwise harvest or collect) materials, which you can then craft into other items and materials. These materials largely consist of blocks that can be placed and removed to create pretty much anything you can imagine. Blocks can be made of stone, wood, glass, clay, wool, or fancy ores, and many can be crafted into a variety of forms. Other items include tools, food, books, potions, and so much more. Add to this all the creatures in the game, both friendly and hostile, and there is a lot to learn and discover.

One of the amazing things about Minecraft is that it is constantly changing and being updated. The creators at Mojang regularly release updates that introduce new blocks, items, and mobs. Players can get a glimpse of what is coming with something Mojang calls *snapshots*. Snapshots are pre-release versions of an update that players can download and try out. Because of these updates, books like this sometimes don't have the most up-to-date information. Version 1.8 is being released as this book is being completed, so while we look at some of the newest additions, they may change a bit.

It's always a good idea to check the wiki for the most recent information on things you're interested in. Of course, there is also much that won't change—we take a look at some of those items, mobs, places, and more.

It's a Crafty Business

Although the name of the game is Minecraft, many more ways exist to gather materials than simply mining, but there's just one basic way to craft them. Using a crafting bench and recipes, plus the required materials, you can build almost any item found in the game.

Crafting Basics

Crafting is the act of taking materials (also known as *mats*) and, using the crafting grid in your personal inventory (accessed by pressing E) or a crafting bench, creating something new from those mats. For instance, a player could take eggs, sugar, wheat, and milk, and by placing them in specific places on the grid in their crafting bench, make a cake (**Figure 4.1**). The items needed to craft something and their specific placement are called a *recipe*. A recipe could be for making a food item, such as cake, or a piece of armor, such as an iron chest plate.

FIGURE 4.1 The recipe for a cake, in place on a crafting bench grid.

Crafting a bench is simple. It is likely the first thing you'll make, because you'll need a crafting bench to create almost everything else. You need four planks, which you get by punching a tree; the tree will drop logs. When you open

your inventory (by pressing E), you will see a 2x2 crafting grid on the right. When you place your log in the grid in the left, it will show you planks with the numeral 4 in the box on the right, indicating that one log makes four planks. Pick up those planks by hovering your cursor over them and then clicking. Drag them to the grid again, placing a plank in each of the four grid squares. A crafting bench will show in the square on the right (**Figure 4.2**).

FIGURE 4.2 The crafting grid in your inventory, showing how to make a crafting bench or table using four planks.

To use a crafting bench, you need to place it by holding it in your hand and right-clicking. Right-click it again, and your 3x3 crafting grid will open. Place the recipe items in the correct squares on the grid, and then pick up the item that appears in the single box by clicking.

You can distribute items along the crafting grid by right-clicking and holding the button down as you move over the grid—this will divide the items evenly between the squares you move over. You can also use your right mouse button to divide a pile of the same item in half. If you want to make more than one of an item, simply place that many of each of the items in the recipe grid and pick up all of them at once.

Most recipes require that you put the items needed into specific spots on the grid, such as making a torch by placing a piece of coal or charcoal directly above a wooden stick. These are known as shaped recipes. Some others, like making dye from flowers, are shapeless—it doesn't matter where on the grid you put your items.

Basic Recipes

Many recipes for shaped objects are the same no matter what materials you use. If you're building stairs, you'll place six blocks in the crafting table in a step shape (**Figure 4.3**), although those blocks might be cobblestone, stone brick, sandstone, red sandstone, any of the six types of wooden planks, nether brick, or quartz. When we're looking at recipes that can be crafted with many materials, I'll just show one material and list the others that also could be used.

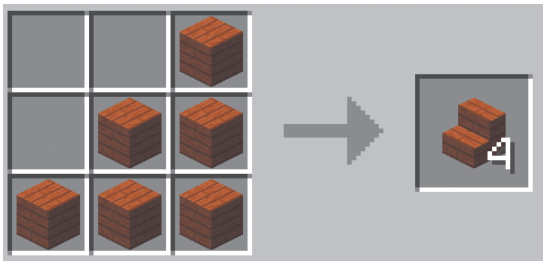

FIGURE 4.3 Stairs recipe: six blocks will give four sets of stairs. Stairs can be made from any of the six types of wood, cobblestone, stone brick, sandstone, red sandstone, nether brick, or quartz.

Types of Basic Block

Minecraft has close to 400 unique items. We can't explore them all here, but we can take a quick look at some of the basic ones.

Wood

One of the main blocks in the game, and one that is vitally important in order to progress, is wood. When you start, you're able to punch trees with your bare hands to collect wood logs. You'll use wood to craft your first tools, a chest and crafting bench, handles for torches, and doors for your house.

You can punch a tree to break it into logs, but once you make a crafting bench, you can craft an axe, which will make the job of chopping trees for wood much easier.

Wood logs can be crafted into planks, which can then be used to make stairs, slabs, fences, and doors. Each wood has its own color and appearance (**Figure4.4**), which is reflected in the planks and the items you craft.

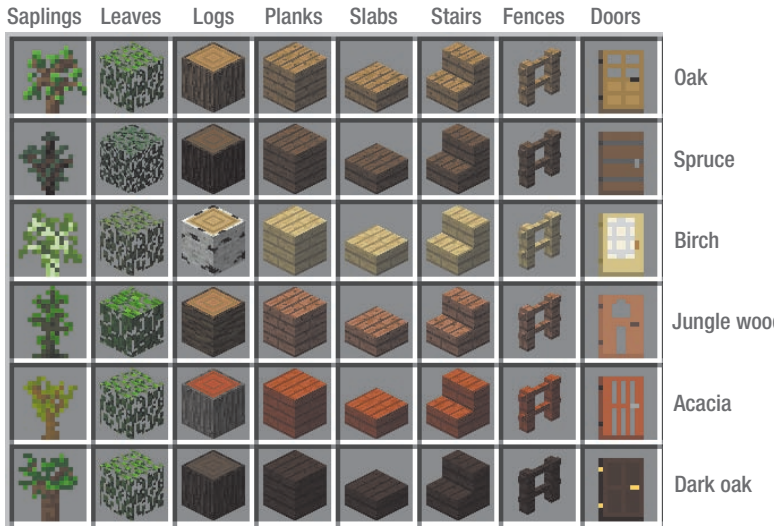

FIGURE 4.4 Types of wood, and how each appears in different forms.

When you cut down a tree, you need only cut the trunk; the leaves will slowly despawn, likely dropping a sapling or two as they do, which you can plant for new trees. Sprinkling bonemeal on planted saplings will help them grow faster. Dark oak trees will grow only if you plant four saplings in a 2x2 square. Spruce and jungle saplings can also be planted in this way for super tall trees.

Stone, Sand, Dirt, and Gravel

You can fairly easily collect dirt, gravel, stone, and sand (**Figure 4.5**).

Dirt and gravel can't be crafted into other forms, although dirt is needed for farming and is quick to dig with a shovel, making it useful for scaffolding. Coarse dirt, recently introduced, is a darker color and is found in the savannah, taiga, and mesa biomes. It can also be crafted with two blocks of gravel and two blocks of dirt, and when it is tilled with a hoe it becomes regular dirt.

Grass blocks, podzol, and mycelium are similar to dirt but with special properties. They all turn into regular dirt when they are dug up, unless you use a shovel that has been enchanted with Silk Touch, a somewhat rare enchant that allows you to harvest materials in their original form.

Row 1: dirt, coarse dirt, grass, podzol, mycelium, gravel

Row 2: cobblestone, smooth stone, stone brick, cracked stone brick, chiseled stone, mossy cobblestone, mossy stone brick

Row 3: granite, polished granite, diorite, polished diroite, andesite, polished andesite

Row 4: sand, sandstone, chiseled sandstone, smooth sandstone, red sand, red sandstone, chiseled red sandstone, smooth red sandstone

FIGURE 4.5 The dirt, gravel, stone, and sand blocks to be found and crafted.

Grass blocks are dirt with grass on the top. When placed, the grass will spread to other dirt blocks (although it won't spread to coarse dirt). Podzol looks more like composted dirt; it is a specialized dirt that can grow mushrooms. You can find mycelium only in the Mooshroom Island biome; it is also used to grow mushrooms. Like grass, and unlike podzol, it will expand to connected dirt blocks.

Gravel and sand (regular and red sand) share the unique property of being affected by gravity, meaning that when they are placed, they will fall until they reach a solid block; other blocks remain suspended where placed. You can smelt sand and red sand in a furnace to create glass (more on glass later) and use it to craft sandstone, smooth sandstone, and chiseled sandstone.

You can craft stone into many forms, which gives it great flexibility as a building material. When you mine stone, it will turn to cobblestone, unless you use a pick that has a Silk Touch enchantment on it that will leave it in its original form. You can return cobblestone to its smooth stone form by smelting it in a furnace, and it can be crafted into slabs, fences, and stairs that have a cobblestone texture.

Smooth stone can be crafted into slabs, and it can also be crafted into stone brick, which in turn can be crafted into stairs and slabs.

As of the version 1.8 update, stone brick can also be combined with vines to make mossy stone brick (previously only found in dungeons). Stone brick slabs can be crafted into chiseled stone, which had only been found in jungle fortresses prior to the update.

Some new types of stone have been added: granite, diorite, and andesite. These stones are found when mining but can also be crafted with specific recipes. All three can be crafted into smooth versions, much like cobblestone, but cannot be crafted into stairs or slabs.

Glass

Glass is made by smelting sand in a furnace. Once you have glass blocks, you can craft panes of glass from them on your crafting bench (**Figure 4.6**). Glass can be dyed one of 16 colors, making stained glass. If you want to have colored panes of glass, you need to dye the blocks first and then make the glass panes.

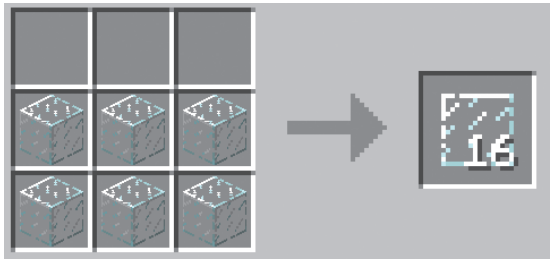

FIGURE 4.6 Glass pane recipe: six glass blocks (of any color).

Clay

Clay (**Figure 4.7**) is found in riverbeds and on the ocean floor. Unless your shovel has a Silk Touch enchant, you will get balls of clay that you can craft back into blocks.

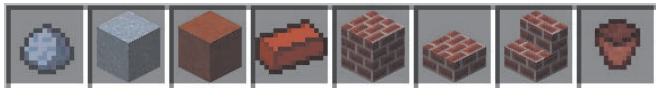

FIGURE 4.7 From left to right: clay ball, clay block, hardened clay, clay brick, brick block, brick slab, brick stairs, and flower pot.

You can smelt clay balls into clay bricks, which you can then craft into brick blocks. Brick blocks can be crafted into stairs and slabs and are often used as a main building material for houses, foundations, roofs, and fireplaces. Clay bricks are also used to make flower pots.

If you use unsmelted clay balls to form clay blocks, the blocks can be hardened in a furnace and then dyed. Because hardened clay has a reddish tone, when it is dyed the result will also be more reddish. For instance, any blue dyes will become more purple when put on hardened clay. We'll look at dyeing clay in the "Dye" section.

Ores

Ores are the minerals in the game, like coal, iron, redstone, and diamond (**Figure 4.8**). There are two types of ore: those that need to be smelted, like iron and gold, and those that shatter into pieces when mined, like coal, redstone, lapis lazuli, emerald, diamond, and nether quartz. When you smelt gold or iron, the bars are called ingots, and they can be crafted into blocks by placing nine ingots on a crafting bench.

FIGURE 4.8 Ores in their raw, mined, smelted, and crafted forms.

When you are mining these ores, you should use the correct pick. Although you can use a stone pick to mine coal, lapis lazuli, iron, and nether quartz, you can't mine redstone, gold, emeralds, and diamonds with anything weaker than an iron pick. A diamond pick is the strongest, and you'll need fewer hits to break the ore. Enchanted tools are the best, as a Silk Touch enchant allows you to mine ores and blocks without altering their original form, and Fortune will cause blocks you mine to drop more of the ores. These can't be applied to the same tool, but they can be enchanted alongside an Unbreaking enchantment, which makes gear last longer, or an Efficiency enchant, which helps you mine more blocks in less time.

Other Building Blocks

Many other types of block exist. Some are found in the Overworld, like wool, obsidian, ice, and packed ice, while others require you to travel to other dimensions. You can find end stone only in the End, and you can find glowstone, soul sand, and netherrack only in the Nether. You can even use some food blocks, like pumpkins and melons, for building.

- Wool is harvested from sheep. You'll get one block of wool when you kill a sheep, whereas shearing them will cause the sheep to drop one to three blocks, and they will regrow their wool if they have grass to eat.

  You can dye blocks of wool or an entire sheep one of 16 colors. It takes one dye per wool block or one dye per sheep, and since sheep can be shorn repeatedly, it makes more sense to dye the sheep than the individual pieces of wool. Sheep and wool can be re-dyed another color as well.

  Dyed wool can be crafted into carpets or used to craft banners.

- Ice is found in snowy biomes and can be harvested with a pick. It is slippery, so when you run on it you can move faster. You can use it to move items more quickly in harvesters. Ice melts when there are torches close by.

- Packed ice is found only in the hard-to-find Ice Plains Spikes biomes. It doesn't melt, making it a better building block than ice.

- Obsidian is a deep black, hard stone that can be mined only with a diamond pick. It is formed when lava and water meet. It can also be found in pillars in the End. Obsidian is the hardest minable block in Minecraft (bedrock can't be mined in survival games) and is useful when making explosive-proof defenses.

  You need obsidian to make Nether portals, which you form by making a minimum 4x5 obsidian frame and lighting the inside.

- Prismarine occurs in ocean monuments, a new structure introduced with the 1.8 version update. Prismarine, prismarine brick, and dark prismarine, along with glowing sea lanterns, are new blocks that you can mine in the monuments. You can also craft them from prismarine shards and crystals, which are dropped by the guardian mob, a fish that lives in and near the ocean monuments.
- Nether blocks occur in the Nether (**Figure 4.9**). Most of the Nether is formed of netherrack, which is easy to mine (and lava, which is easy to fall into). With care, though, you can quickly collect netherrack, which can be smelted to form nether bricks. Nether bricks can be crafted into nether brick blocks, and from there into slabs and stairs.

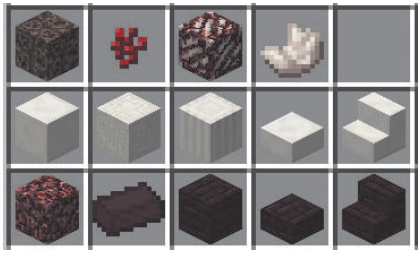

FIGURE 4.9 Blocks, ores, and items found in the Nether.

You will find nether quartz mixed in with the netherrack. It can be collected like the other ores and crafted into quartz blocks, which can be used to make chiseled and pillar quartz blocks as well as slabs and stairs.

Soul sand is found in patches throughout the Nether and has the unique property of slowing you or mobs down when it is walked on. When placed in water or on ice, the effects are magnified, making it useful for traps. It is also the only block that you can grow nether wart on.

Dye

Dyes are crafted from various items found in the game: flowers, squid ink sacs, mined lapis lazuli gems, and harvested cocoa beans and cactus.

Dyes come in 16 colors. You use them to color wool, glass, clay, and leather armor. You also use dye to color firework stars, craft banners, and change the color of a dog's collar.

Crafting Dye

To craft the dye, you simply put the dye ingredient into a crafting grid and collect the dye. These are shapeless recipes—you can place the ingredient anywhere in the grid. Most dyes are craftable with a single ingredient, and may have more than one recipe (**Figure 4.10**), but a few need to be made by combining two dyes (**Figure 4.11**).

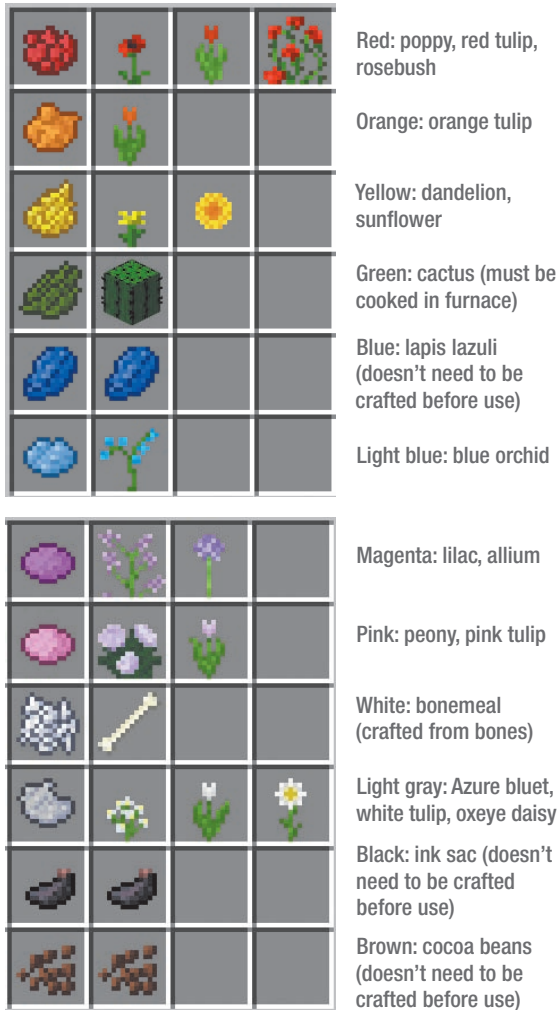

FIGURE 4.10 Many dyes can be crafted from a single ingredient, and often there is more than one way to craft them.

Lime green: combine green dye and bonemeal

Cyan: combine green dye and lapis lazuli

Purple: combine red dye and lapis lazuli

Gray: combine ink sac and bonemeal

FIGURE 4.11 These dyes need to be crafted by combining two dyes on a crafting bench.

Dyeing Wool, Clay, and Glass

When dyeing wool, you need one piece of dye for each block of wool, and you can just drop the dye and wool in the crafting bench. To color carpets, you need to dye the wool blocks before crafting them into carpets.

When you are dyeing (or staining) blocks of glass or hardened clay, however, you place one piece of dye in the center of the crafting grid, surrounded by eight blocks of glass or clay (**Figure 4.12**). As with the wool, if you'd like stained glass panes instead of blocks, you must dye the blocks before crafting the panes.

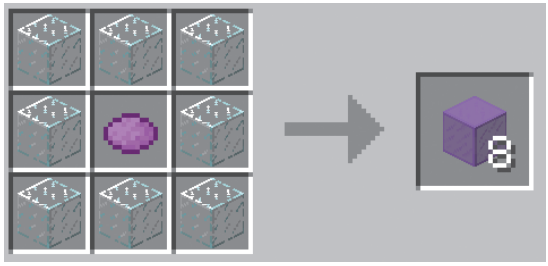

FIGURE 4.12 Stained glass or clay recipe: place 8 blocks around the dye.

Even though the dye is the same, the effects are different for wool, clay, and glass due to the nature of the materials being dyed. The transparency of the glass changes the vibrancy of the colors, and the red tone of hardened clay is blended with the dyes, changing the resulting color (**Figure 4.13**).

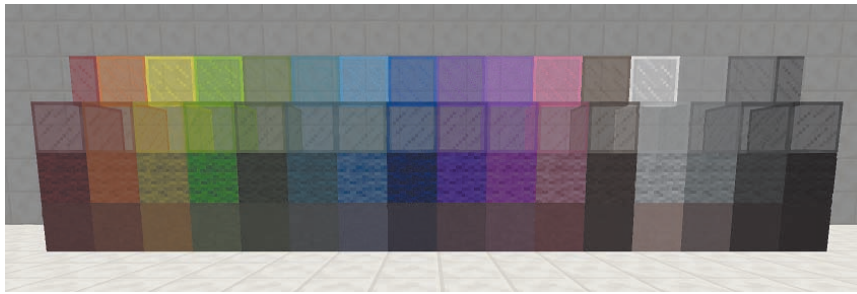

FIGURE 4.13 From top to bottom: Stained glass panes, stained glass blocks, dyed wool, stained clay.

Dyeing Leather Armor

You can dye leather armor, but unlike any of the other methods of dyeing, you can combine dyes, both on the crafting bench or by adding colors to previously dyed armor (**Figure 4.14**). Thanks to the many color choices, you have millions of tones and shades to choose from, and it can be great fun to play with the options.

FIGURE 4.14 When dyeing leather, you can combine dyes to make unique color combinations.

Banners

Crafted from wool and sticks, banners are an exciting new decoration that can be hung on walls or placed on the floor. You can use dyes and items like vines, mob heads, and golden apples to create virtually endless and unique designs.

You can create patterns on a banner by placing the banner and the dye or other items in specific places on a crafting bench. You can layer up to six

designs, wash them off one layer at a time in a cauldron, and copy them using a blank banner.

You can craft lots of patterns, including stripes, borders, shapes, and symbols. Experiment with them and check the wiki for basic recipes. **Figure 4.15** shows you the basic banner pattern with three patterns layered over it.

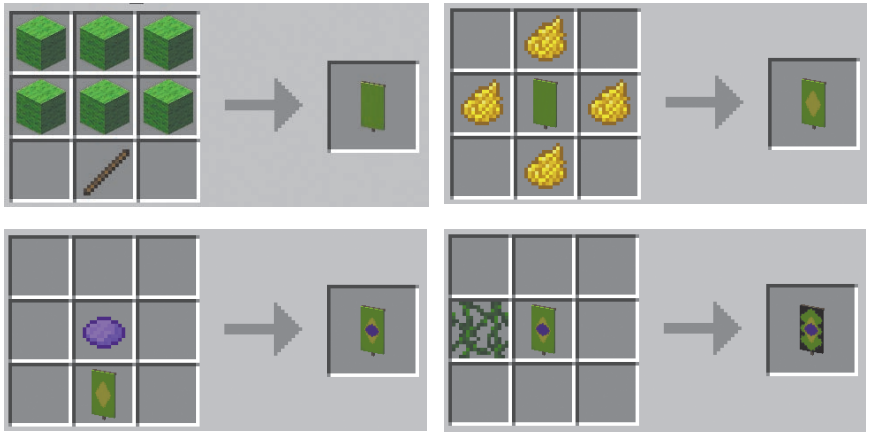

FIGURE 4.15 A basic banner recipe: 6 wool blocks, stick (top left), 4 pieces of dye around the banner for a diamond (top right), a single dye above the banner for a circle (bottom left), and vines beside the banner for a wavy border (bottom right).

Tools and Gear

Basic tools and gear will be some of the first things you'll craft. The main tools are the pickaxe, shovel, hoe, and axe (**Figure 4.16**), but tools like flint and steel, shears, fishing rods, and leads will come in handy as well.

Use your crafting bench to make your tools, using wooden sticks to make the handles and using wood, stone, gold, iron, or diamond for the heads.

The materials you choose (or have available) will affect how well your tool works and how long it will last. Some ores need an iron or diamond tool to be mined. When you start to use a tool (and this applies to armor as well), a meter will appear on the tool in your inventory, showing its durability.

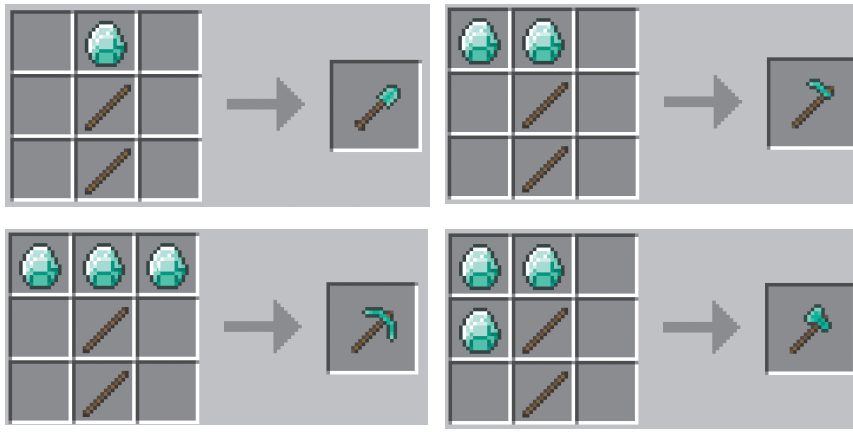

FIGURE 4.16 Basic tools: shovel, hoe, pickaxe, and axe here are made from diamond, although they can be crafted from wood, stone, gold, or iron as well.

Wooden tools are the least durable, diamond tools the most. Stone tools are great for starting out or for quick jobs, but they're not strong enough to mine all blocks. Gold, while pretty, is soft and will wear out quickly. Iron is a strong material that is less costly than diamonds, making it a good choice for basic tools until you've mined enough diamond (which you can only do with iron or diamond tools). If you use a tool on a block that it isn't suited for, such as cutting trees with a pick, it will take you longer and the tool will wear out faster.

Tools can be enchanted on an enchanting table by using experience points or by using an enchanted book with an anvil. They add specific bonus properties to your gear. If you put an Unbreaking enchantment on a tool, for example, it will last longer. You can repair and name tools on an anvil, but this takes both experience points and more of the material you use to craft your tool. When you name items, the name shows in your inventory. Named weapons show in death messages if you use them to kill an opponent. Because of the cost in experience points, you might want to use your enchantments for iron or diamond tools, which have the best endurance.

Tools have varying levels of efficacy, such as how many hits it takes to break a block. Diamond and iron are more efficient than wood, stone, or gold, meaning it takes fewer hits to break the block. You can get an Efficiency enchantment that means it will take fewer hits to break blocks, letting you work faster.

You will likely want to make other tools and items such as buckets, shears, and leads.

- Buckets can be used to carry water, lava, and milk and are incredibly useful tools (**Figure 4.17**). You'll need a bucket to carry water for a farm, though a bucket of water in your hotbar (your main inventory, which shows at the bottom of your screen) can be a lifesaver when you are mining or exploring lava-filled caves. A bucket of milk can save your life if you are attacked by poisonous cave spiders or encounter a potion-throwing witch, because drinking milk is an antidote for their poison.

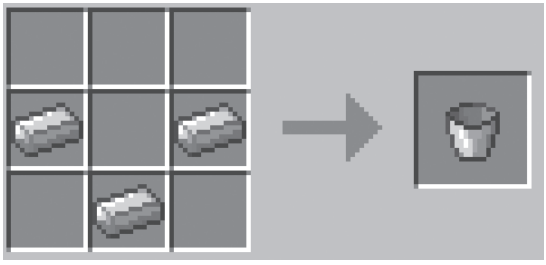

FIGURE 4.17 Bucket recipe: 3 iron ingots.

- Shears are needed to shear sheep, giving you more wool than if you kill the sheep (**Figure 4.18**). You can also use shears on trees, which will give you leaf blocks, as opposed to cutting down the trees, which will result in the leaf blocks disintegrating. Shears are also helpful with cobwebs, turning them to string, and if you put a Silk Touch enchantment on shears with an enchanted book, you can use shears to collect cobwebs without breaking them.

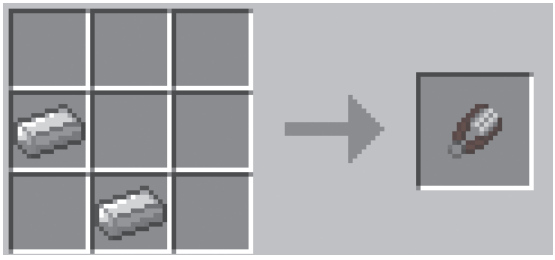

FIGURE 4.18 Shears recipe: 2 iron ingots.

- Leads are great tools for moving and containing mobs (**Figure 4.19**). By right-clicking the animal with the lead in your hand, you'll attach it and be able to pull it along. Right-click again on a fence and the lead will be tied to it. You can lead more than one animal at a time, each on a separate lead. While you're riding a horse or donkey, you can use a lead to bring a second horse or donkey along.

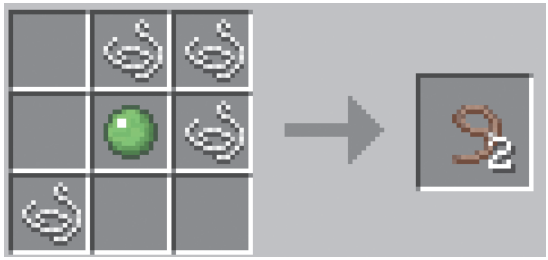

FIGURE 4.19 Lead recipe: 1 green slime ball and 4 pieces of string.

- Flint and steel are used to start fires (**Figure 4.20**), but be careful, because trees and wooden houses are flammable, and it would be sad to see everything go up in flames. This is a handy tool for lighting Nether portals. Flint and steel can also occasionally be found in dungeon and fortress chests.

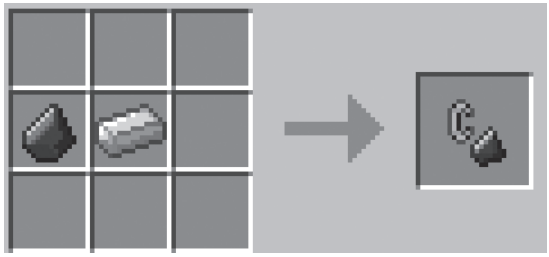

FIGURE 4.20 Flint and steel: flint and iron ingot.

- Fishing rods are useful tools (**Figure 4.21**). Not only can you use them to catch fish (a good food source and needed to tame ocelots into cats), but you can also "catch" other items when you are fishing. The list of items you can catch is lengthy and divided into treasure and junk by Mojang. Some of the treasures include rare, uncraftable saddles and nametags, enchanted books, and fishing rods. Some of the junk includes useful items like leather, bottles, and ink sacs, though you might just catch boots (old,

used, and without enchantments) or rotten flesh. You can enchant fishing rods with Lure or Luck of the Sea enchantments, which will speed up your fishing and increase your odds of getting a good catch.

If you craft a fishing rod with a carrot, you'll get a carrot on a stick, which is needed if you want to saddle up a pig and go for a ride.

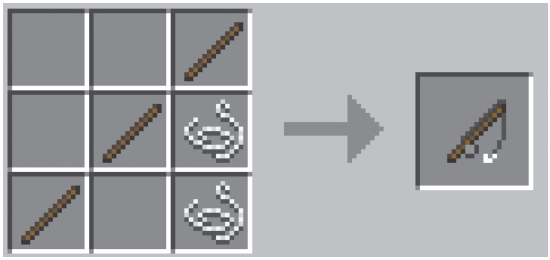

FIGURE 4.21 Fishing rod recipe: three wood sticks and two pieces of string.

Weapons and Armor

Weapons and armor are necessary tools if you're playing a survival game, and fun to play with even in Creative mode.

Weapons

Swords (**Figure 4.22**), needed for defense from hostile mobs and to hunt animals for food, are crafted with a wooden stick for a handle, and wood, stone, gold, iron, or diamond for the blade (Figure 4.22). The properties are the same as for tools—iron and diamond last longer and are better than wood, stone, or gold.

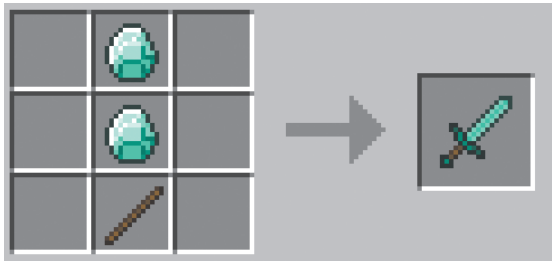

FIGURE 4.22 Sword recipe: one wood stick and two diamonds (also craftable from wood, stone, gold, and iron).

Bows and arrows can be crafted or collected from skeletons (**Figure 4.23**).

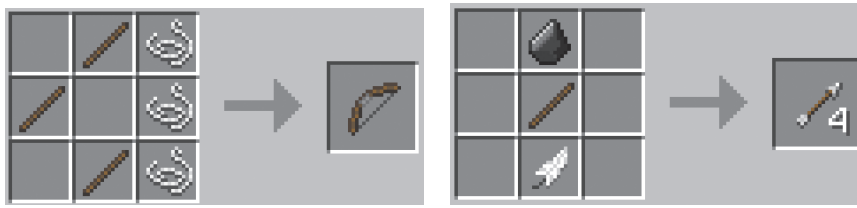

FIGURE 4.23 Bow recipe: three sticks and three pieces of string (left); arrow recipe: flint, stick, feather (right).

Armor

There are four different pieces of armor: helmet, chest or chest plate, leggings, and boots (**Figure 4.24**). You can make armor from leather, gold, iron, and diamond, and they will have the same relative durability as tools made from each material. You can also enchant armor with various enchantments. Like tools, armor wears out and will need to be repaired or replaced. New with the 1.8 update, you also can craft an armor stand to hold your armor, mob heads, and pumpkins.

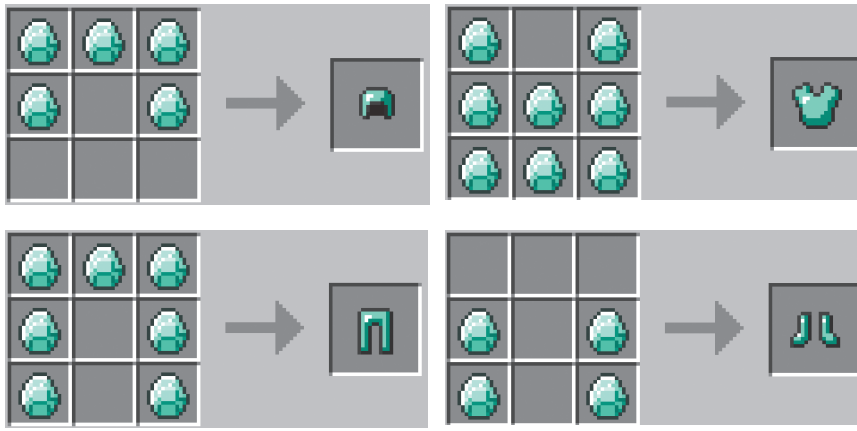

FIGURE 4.24 Helmet recipe: five diamonds; chest plate recipe: eight diamonds; leggings recipe: seven diamonds; boots recipe: four diamonds. Armor can also be crafted with the same recipes using leather, gold, or iron ingots.

Enchanting

Enchanting is a complex part of the game, and one that has changed with the 1.8 update. You can enchant tools, weapons, and books on a specially crafted enchanting table, and different items have different enhancements (**Figure 4.25**). Enchanting will cost you experience points (XP), and as of the 1.8 update, they will also cost you up to three lapis lazuli.

You can enchant books yourself, find them in chests in dungeons, or catch them when fishing. You can also use an anvil to combine enchants, or to add them to an item from an enchanted book. Village priests sometimes exchange enchanted items in trade for emeralds or other goods.

FIGURE 4.25 An enchanting table allows you to place a variety of enchantments on your items.

Enchanting is done on an enchanting table, which you can craft with diamonds, obsidian, and a book (**Figure 4.26**). You can increase the level of enchants that are available by surrounding your enchanting table with bookcases. For instance, at a table without shelves, you may enchant items costing only a couple of experience points, but as you add bookcases (up to 15 within a 5x5 square and not directly touching the enchanting table), your table will become

more powerful, allowing you to use up to 30 experience points on one enchant. You have a higher chance of getting a good enchant when the XP cost is higher.

FIGURE 4.26 Enchanting table recipe: one book, two diamonds, and four obsidian blocks.

The new enchanting system also will cost you lapis lazuli, though it requires fewer XP. You have a choice of three enchants, depending on how many pieces of lapis you use, and you'll get a sneak peek at one of the enchants you'll receive, something that wasn't possible in earlier versions of the game (**Figure 4.27**).

FIGURE 4.27 The enchanting table menu. Here, I'm using two lapis lazuli, so only the top two enchants are available. Hovering over the second shows me I'll get an Unbreaking II enchant at a cost of 12 XP (when I did enchant the sword, the second enchant was a Smite II).

Enchants are specific to the item. For instance, you may get an Infinity enchant on a bow, which allows you to carry only one arrow but never run out, but you wouldn't get it on a pair of boots, on which you might get a Protection or Feather Falling enchant.

Enchanted books often have a combination of enchants that are unique to certain tools or items. You use an anvil to put the enchants on the item of your choice, but only the enchants that fit that item will be applied to it.

Experience Points

You collect experience points by mining ores, smelting items in a furnace, killing mobs (including friendly mobs like cows and pigs), and breeding animals. If you die, you lose your experience points.

You can gain experience points much faster by building a mob grinder, which makes use of one or more mob spawners to collect mobs. Usually a mechanism is created within the grinder that will weaken them so that they are easily killed. They may spawn above water, which will move them toward a chute and cause them to fall and take damage. You can then finish them off easily and collect the experience points. You can easily find designs for spawners online.

Anvil

An anvil is used to repair and name gear, to combine enchants from various tools, and to apply enchants from books to gear. Like the enchanting table, all these actions cost experience points. You craft an anvil with iron bars and blocks (**Figure 4.28**).

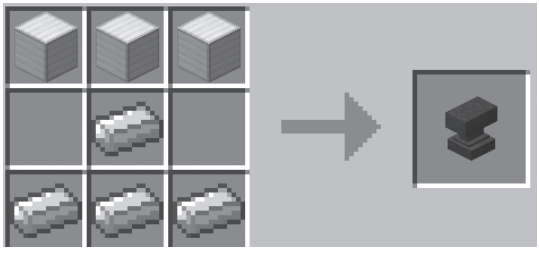

FIGURE 4.28 Anvil recipe: three iron blocks and four iron ingots.

To use an anvil, right-click it, and then place the item to be repaired in the first box. In the second box, place a second one of the same item, an enchanted book (**Figure 4.29**), or raw materials. You will be told how many experience points the repair will cost, and you see from the bar on the item whether it will be fully or partially repaired. The repair is finished when you pick up the item. When you combine two enchanted items, the enchantments are combined on the repaired item. Anvils take damage when used and will eventually break.

FIGURE 4.29 Using an anvil to add an enchant to an item, such as this Luck of the Sea enchant on a fishing rod, costs experience points and will cause the enchanted item to glow. Here, I've renamed the fishing rod while enchanting it.

Transportation

When you start a new map, chances are you'll do a lot of walking, but soon enough you might find that you've run out of land, or just that you'd like to hit the water in your own little boat. Once you've gathered enough materials or stumbled upon an abandoned mineshaft, you may want to set up rail lines too. And let's not forget that you can now travel by horse. There are many more ways to traverse the map than simply on foot. You can find information on horses in the "Mobs" section, but let's take a quick look at boats and rail.

Boats

Traveling by boat is how I prefer to start exploring a map, particularly if I am on a server with others and might want to get away from my spawn point before I settle but don't have many resources yet. I often find friendly mobs along the shore, and sometimes bump into a village. When you're traveling by boat, your hunger bar disappears and you won't need to eat. This is helpful when you're starting out—you can head to the sea at night, avoid mobs, not need food, and explore the coast line.

All you need to make a boat is five planks, which is easy even when you're just starting out (**Figure 4.30**). Boats break exceptionally easily, dropping planks

and sticks—and you. It is wise to make and carry a few boats, or at least carry some extra planks or logs to make more.

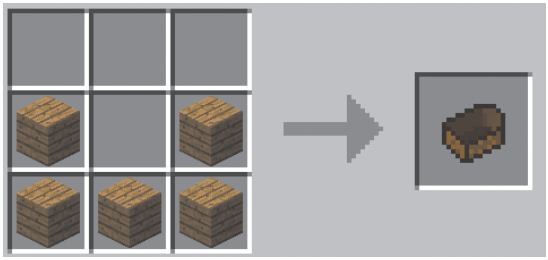

FIGURE 4.30 Boat recipe: five planks.

You place a boat by right-clicking it, then right-clicking again to get in. To move, use W to move forward while steering with your mouse. Move backward with the S key. Be careful to avoid land and obstacles when you're in your boat or it might break. To get out (presuming it didn't break when you arrived ashore), Shift-click.

Minecarts

Minecarts, like boats, can be ridden, and you use the same mechanics for getting in and out of the cart. Although you are restricted to traveling only where rails have been laid, carts are much faster than walking, and they can be used to transport mobs and items (**Figure 4.31**). To get moving in a cart, you need to start your minecart on a slope or get a push, unless you use powered rails and a button to launch you. Once in motion, you will slow down pretty quickly unless you use a powered minecart or powered rails to propel you.

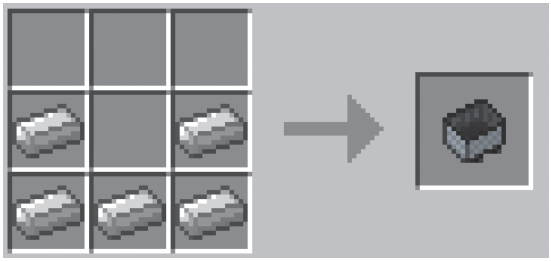

FIGURE 4.31 Minecart recipe: five iron ingots.

Once you make a minecart, you can combine it on a crafting bench with a furnace, a chest, a hopper, TNT, a mob spawner, or a command block to create specialized carts (**Figure 4.32**).

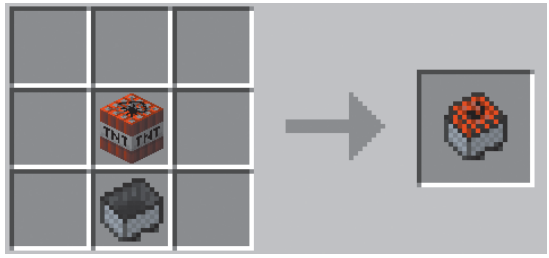

FIGURE 4.32 You can add items to a minecart.

You can make a powered minecart that carries a furnace filled with coal, and this can be placed alongside other minecarts to make a train. Powered minecarts can only push the other cars, not pull them, so you need to place it at the back of the train, or place one at either end. To start your minecart, right-click it with your fuel (coal or charcoal) while facing the direction you'd like it to move.

Adding a chest to a minecart allows you to use it for storage or to transport items. If you put a hopper on a minecart, it will collect items on or just above the track. The amount of material that a chest or hopper is holding will change how far the cart will go using powered tracks; a full cart will need more powered tracks to keep it running.

A TNT minecart will activate and explode just as TNT does. It will explode if it drops more than three blocks at the end of a track, if it crosses an activator rail (there is a delay before it explodes), if it hits lava or water, or if it is hit by something while it is moving. Be careful when you're playing with TNT, because the explosion will cause damage to you and the surrounding area.

Rails

Tracks, or rails, are easily crafted with iron and a stick (**Figure 4.33**). You can also find them in abandoned mineshafts, where they are easy to collect with a pick. Tracks are needed for minecarts, but basic unpowered tracks won't help

the cart move unless you use a powered minecart or add powered rails along the route.

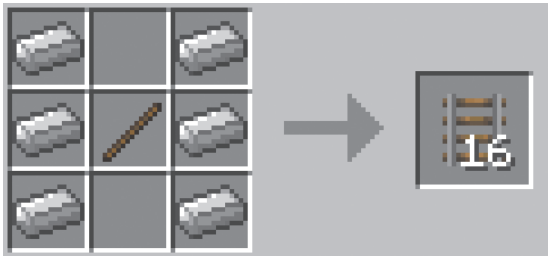

FIGURE 4.33 Minecart tracks or rails recipe: six iron ingots and a stick.

Powered rails (**Figure 4.34**) use redstone power to either propel trains (when they are on) or to stop them (acting as brakes when they are off). They need to be powered, usually with a lever or a redstone torch or block placed beside or under the powered rails, although they can be powered by detector rails as well.

FIGURE 4.34 Powered rails recipe: six gold ingots, a stick, and redstone dust.

You can lay rails on your route in many ways, and there have been all sorts of experiments to see how hills, weight of the cars, number of cars, and other factors affect the speed and length of time the minecart will travel before it loses speed. A fairly agreed upon spacing is to have one powered rail for every 38 regular rails, although often people will place one after 25 or 30 rails. Feel free to experiment and look online to see what others have done. The Minecraft wiki is a great source for more information on rails, including activator rails, which

activate TNT, hoppers, and command block carts, and detector rails, which provide power when weight crosses them.

You can use minecarts and tracks for transportation across distances, to transport many items at once, and for fun. Making elaborate rollercoasters can be a great challenge, and they are fun to ride.

Potions

Once you've been playing for a while and collected many items (and let's face it, Minecraft is a game for hoarders and collectors), you'll be ready to start looking at crafting potions.

Potions come in two forms: a drinkable version, and a splash potion that you can throw at others. Some provide personal benefits, like being able to move faster or become invisible, while others can be used defensively, such as a splash potion that will weaken or slow your enemies.

There are several steps to brewing potions, but before you begin any of them, you need to craft a brewing stand (**Figure 4.35**). A brewing stand is easy to craft, but its recipe needs a blaze rod, which you can only get from hunting a blaze in a Nether fortress—it might take you a while before you can get the blaze rod to craft the brewing station. You can place the brewing station on most block surfaces. Many players have brewing rooms where they gather all the materials they need to brew potions, as well as a cauldron or an endless water supply for filling bottles of water.

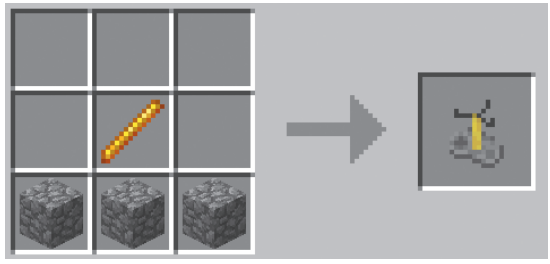

FIGURE 4.35 Brewing stand recipe: one blaze rod and three cobbleston.

Brewing potions requires several steps. We're going to make a Potion of Invisibility to illustrate the steps.

All potions except the Potion of Weakness start with an Awkward Potion for the base. For this we need glass bottles of water and nether wart, a plant that grows only on soul sand and is found in nether fortresses. You can craft the bottles from glass blocks (**Figure 4.36**).

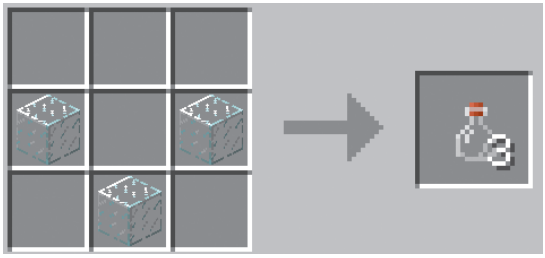

FIGURE 4.36 Glass bottle recipe: three glass blocks.

The brewing stand can brew three bottles of potion at a time, using a single ingredient that is divided between the three bottles, so it makes sense to always make three potions.

To make your Awkward Potion, fill your glass bottles with water by clicking them into an endless water source or a cauldron. Click the brewing stand to open it, and place your bottles of water in it. Add a piece of nether wart to the space at the top, and wait for your potion to brew (**Figure 4.37**).

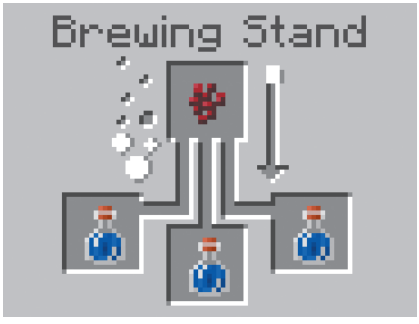

FIGURE 4.37 Adding nether wart to bottles of water in a brewing stand to make an awkward potion.

Once you have your base potion, you will add the next potion ingredient to the brewing stand. For some potions, this might be the final step, but in order to make a Potion of Invisibility, we need to first make a Potion of Night Vision. To do this, leave the bottles of Awkward Potion where they are and add a golden carrot (made by surrounding a carrot with golden nuggets on the crafting bench).

When the brewing is complete, you'll have a Potion of Night Vision that will last for three minutes.

Since we're making the Potion of Invisibility, we need to leave the bottles where they are and add a third ingredient. We need a fermented spider eye, which we craft by combining a brown mushroom, sugar, and a spider's eye on a crafting bench. Add the fermented spider's eye to the brewing stand, and wait for it to process. The wait times are short—you can have several stands brewing at once and by the time you're putting the ingredients in the last one, the first will be ready for the next step.

Once the brewing is complete, you will have three bottles of potion of invisibility, but they will only last for three minutes. For the very low cost of a piece of redstone dust, you can extend that to eight minutes. Leave the potions where they are and add the redstone.

Once you have your potions, remove them from the stand. To drink them, hold one in your inventory and right-click. If you want to turn these potions into splash potions, leave them in the brewing stand and add one final ingredient: gunpowder will turn any potion into a splash potion and can be added at any step.

As you can see, brewing can be a complex and complicated process, both in the ingredients needed and in the steps to take. Once you break the steps down, however, and remember that some things are the same no matter what potion you're brewing, it becomes much easier.

There are more potions than we have room to list here, but you can find the recipes for all of them online. Remember that almost all potions start with an Awkward Potion base. Most can be extended from three to eight minutes with redstone dust, or in some cases made more potent with glowstone dust, though redstone dust will cancel the effects of glowstone dust and vice versa. To make a splash potion, add gunpowder. The rest of the ingredients are unique to the potion, but are easily found online. Have fun brewing!

Fireworks

You can make over 900 different varieties of fireworks. With all those options and a bit of time and energy, you can put on an amazing fireworks show. Because quite a few of the parts are hard to come by, it is good to experiment with fireworks on a creative map, where you can use all the materials you want.

Fireworks are made from a firework rocket and a firework star. If you craft the rocket without adding the star, it will shoot but there won't be any explosives. Firework stars are crafted to contain dye (16 colors to choose from) and special effects items. You then craft your firework rocket, including the firework star (or stars, you can add more than one to a single firework rocket) and one, two, or three pieces of gunpowder, which will determine how high your firework will shoot (**Figure 4.38**).

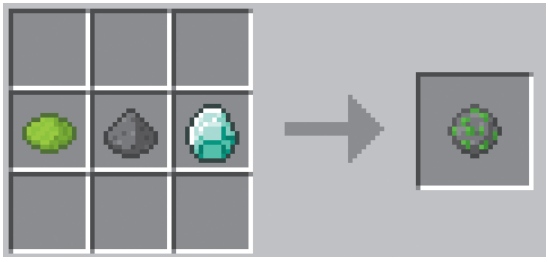

FIGURE 4.38 Lime green small firework star with a trail recipe: lime green dye, gunpowder, and a diamond.

To make a firework star, you need one piece of gunpowder and up to 8 colors of dye.

To design the shape of your firework, you can add one (and only one) of the following: a fire charge to make a large ball, a gold nugget for a star shape, a feather for a burst, or a creeper head for a creeper-head-shaped explosion. In addition, if you add a diamond, your firework will leave a trail, and if you add glowstone dust, it will sparkle.

Once you have made your firework star or stars, it is time to add them to your rockets. To make your firework rocket, you will need a piece of paper, up to three pieces of gunpowder (these determine height, remember), and one or more firework stars (**Figure 4.39**).

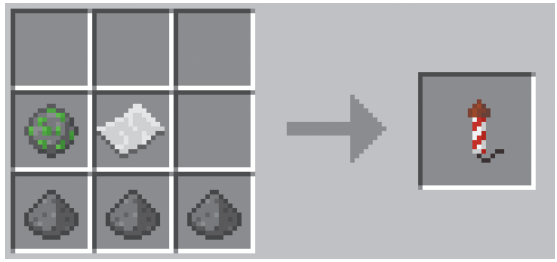

FIGURE 4.39 Recipe to craft a firework rocket: 1 piece of paper; 1, 2, or 3 pieces of gunpowder (to set the height); and up to 7 fireworks stars.

Go Crafting

This should give you a good taste of some of the ways that you craft items in Minecraft. There are many more, from foods to all sorts of blocks for building, and from books you can write in, to furniture for your house. Experiment with the various items, see what recipes you can discover, and devise new designs. Most of all, be creative and have fun!

The Lay of the Land

Just like the real world, Minecraft has many types of land. The different areas are called *biomes*, and each has unique features, such as certain plants, ores, or landscapes. Minecraft biomes are mostly divided by climate (snowy, cold, lush, dry, and so on), and each category has a variety of more specific biomes, for a total of 61 different types.

When you start a new map, the biomes are randomly generated, though in such a way that you won't find a hot desert next to a snowy mountain. They aren't very large, so you can travel from one to the other pretty quickly (**Figure 4.40**). When you're looking for cocoa beans and jungle wood and are in the middle of a desert, you are going to have to go exploring until you find a jungle biome. With relatively small biomes, chances are it won't take you very long.

Sometimes it is hard to tell which biome you are in. Press F3 to display a lot of information, including your coordinates, the direction you are facing, and your current biome.

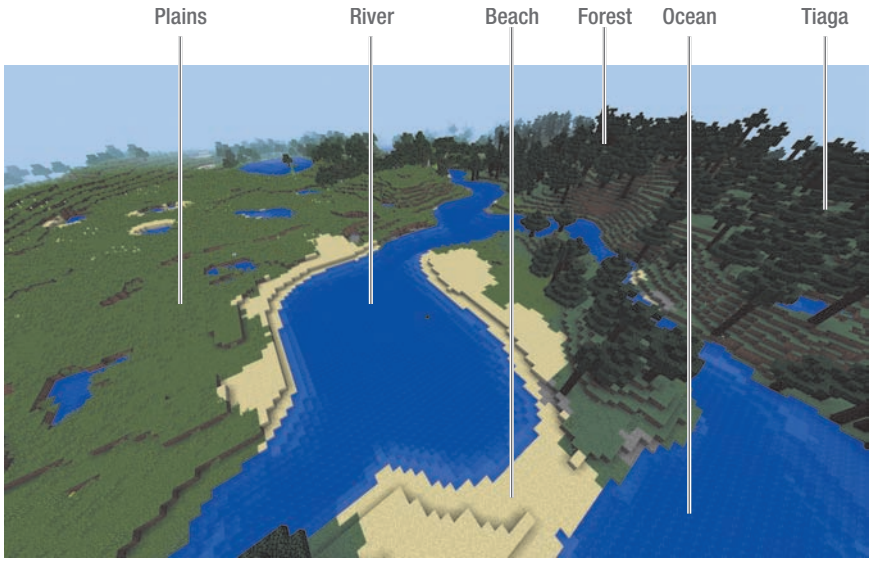

FIGURE 4.40 Here we see how small biomes intersect.

We'll look at the main features of each biome (**Figures 4.41** and **4.42**), but if you'd like more information, see the biomes page on the Minecraft wiki.

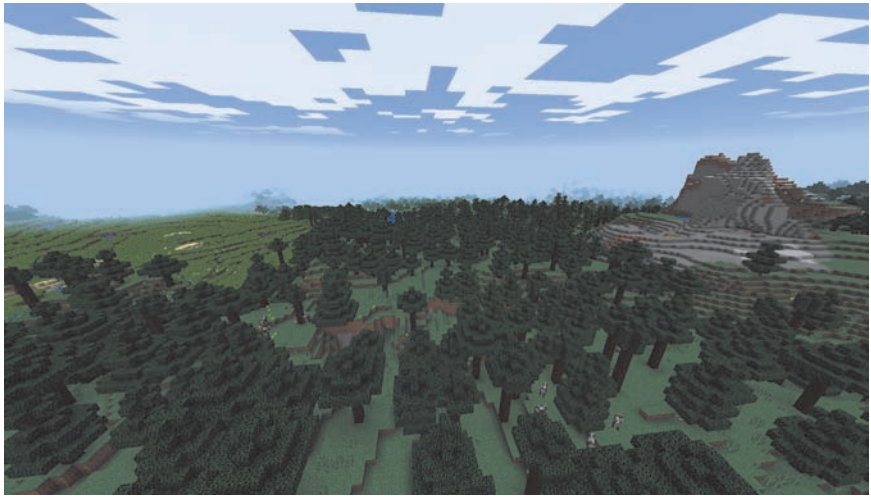

FIGURE 4.41 Three neighboring biomes. From left to right: plains, taiga, extreme hills.

FIGURE 4.42 Three more biomes: roofed forest, swamp, extreme hills.

Plains and Sunflower Plains

Plains are grassy flatlands, with small hills, scattered flowers, and the occasional tree. Many animals spawn on plains, including cows, sheep, and pigs. You'll also find horses and donkeys here. Sunflower plains are simply plains that also contain sunflowers.

You can find villages here that contain NPC (non-playable characters) that you can trade with.

Savannah

The savannah is rather like a dry, rain-free version of plains, although there is also the very mountainous Savannah M biome. The same animals, including horses and donkeys, spawn here, but the grass is more brown and dry. You can also find acacia trees in these biomes.

Forest

Many types of forest biomes exist. Although they share similar traits, the most obvious being that they are filled with trees, they have a lot of variety. In some,

like regular and birch forests, you will find slight hills, a lot of grass, and many trees. Others are more hilly, have larger or taller trees, or in the case of roofed forests with dark oak, are much darker and more difficult to navigate. Hostile mobs can be common in forests, even during the day, because they may not be exposed to the sunlight that will cause them to despawn.

Flower forests have a higher number of flowers, including some that can't be found elsewhere.

Swamp

Swamps are wetlands that are found along the shore. They are often made of many small islands in shallow water and are a good place to collect sand, clay, and reeds. Slime spawns here, and you'll find witches' huts as well, so be careful!

Jungle

Jungle biomes are divided into two types: flat and more mountainous. Jungle edges are considered to be their own biome as well, with fewer trees. All jungle biomes feature thick forests with tall jungle wood trees (which produce cocoa beans) and vines. You can find jungle temples here. Jungles are the only place you'll be able to find ocelots, which you can tame to become pet cats by using fish.

Desert

Deserts are relatively large sand and sandstone biomes, filled with cactus, villages, and the occasional desert temple. You won't find friendly mobs like cows or pigs here, and most hostile mobs don't last once the sun rises, because there is no shade.

Mesa

Mesa and the Bryce mesa are less common biomes. They are hot and dry, made of layers of clay, and have red sand instead of regular sand. You'll find tall formations and columns in the Bryce mesa (**Figure 4.43**).

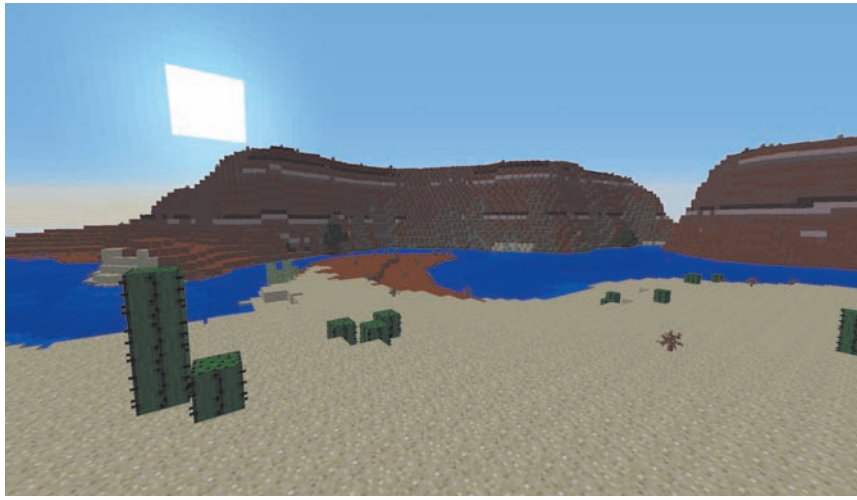

FIGURE 4.43 Desert biome in the foreground with mesa behind.

Taiga

Much like a forest but filled with spruce trees, ponds, and rivers, taiga biomes can be warm or frozen, and flat or mountainous. Common features are spruce trees and ferns. These are the only biomes that contain wolves, which can be tamed to become pet dogs.

Extreme Hills

Much like the name suggests, extreme hills biomes feature high and steep hills, mountains, and cliffs. Extreme hills biomes have snow at high elevations and are the only place to find emeralds.

Mushroom Island

Extremely rare, mushroom island biomes are covered in giant mushrooms. You'll find mycelium blocks in this biome. Mooshrooms (mushroom-covered red cows) spawn here, but no other mobs spawn naturally.

Ice Plains and Ice Plains Spikes

Another uncommon biome is the ice plains—large plains covered with snow and packed ice and little else. Ice Plains Spikes is a related biome that is very similar and has spikes of packed ice rising from the ground (**Figure 4.44**)

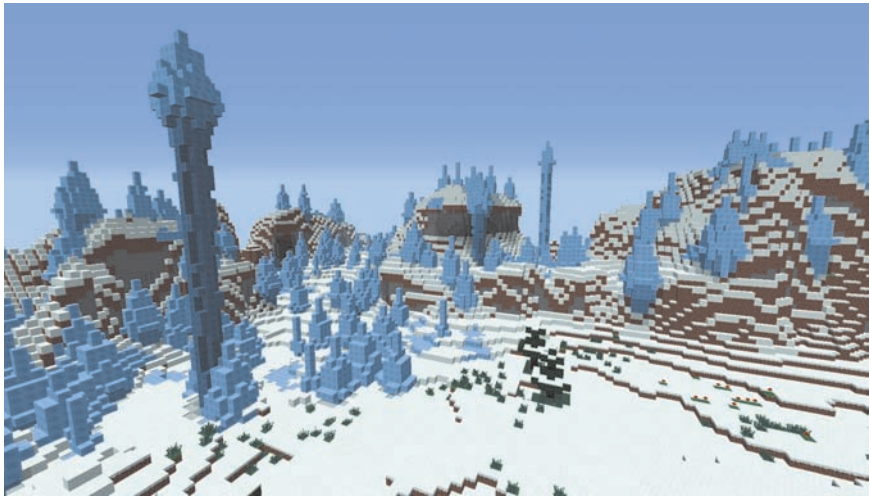

FIGURE 4.44 Ice Plains Spikes biome.

Rivers, Hills, Plateaus, Beaches, and Oceans

Many biomes don't have any distinctive features, but form a border between other biomes; they are a variation of major biomes.

Beaches and stone beaches occur along oceans and deep oceans. River biomes are simply rivers, often cutting between other biomes. Like swamps, they are a good place to collect clay and sand.

Biome Variations

Many biomes have several similar variations. Some are in hill or plateau form, which are exactly as they sound. You can find hilly savannah or mesa plateau, for instance.

One other variation in biomes is the climate—many biomes occur in warm, snowy, or icy versions. For example, you'll find regular plains and snow plains.

Combining all these variations along with the biomes results in 61 different biomes.

Nether

The Nether is more than simply another biome—it's more of a world-sized dimension. You can access it only through a Nether portal. The Nether has its own map and is completely underground, with no sky, no night and day, and no weather. Water evaporates here, but there are many seas formed of lava (**Figure 4.45**).

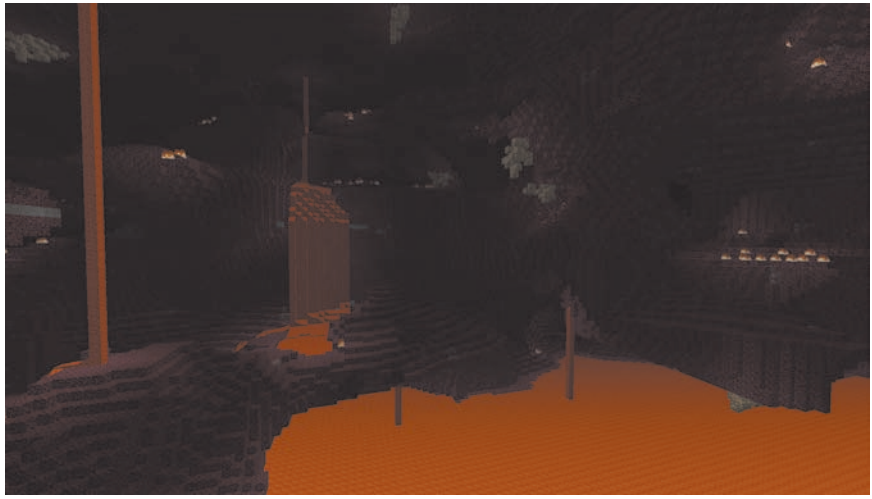

FIGURE 4.45 The lava-full Nether.

Many blocks and mobs are unique to the Nether. The blocks include netherrack, quartz, glowstone, and soul sand. Mobs that are unique to the Nether include magma cubes, ghasts, blazes, wither skeletons, and zombie pigmen. Nether fortresses, which are large dungeons, are located here.

To access the Nether, you will need to build a Nether portal by making a frame out of obsidian (though the corners can be any material). Your frame needs to be at least four blocks wide and five blocks high, but it can be as large as 23

blocks on each side. To activate the portal, light the inside of the frame with lava, flint and steel, or by using a fire charge. The center will fill with swirling purple light. Step into the opening and you'll be transported to the Nether (**Figure 4.46**).

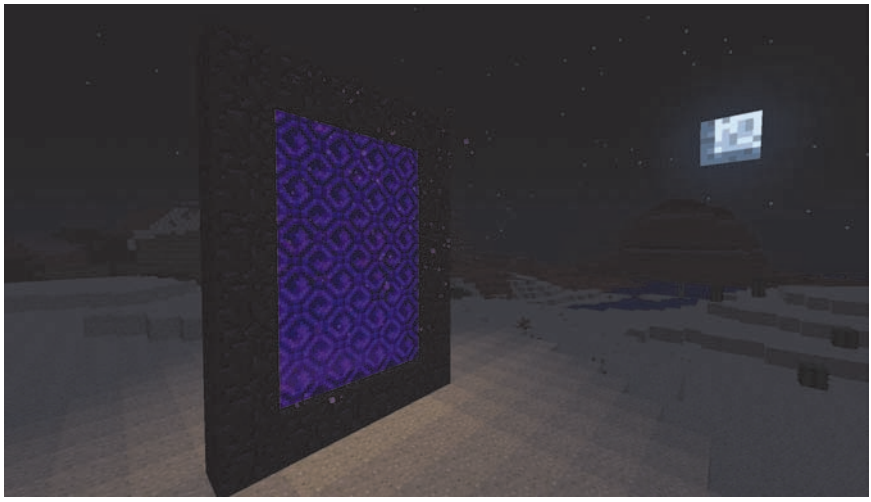

FIGURE 4.46 A nether portal.

Nether portals, also known as gates, can be complicated, as moving one block in the Nether is the same as moving eight blocks in the Overworld. This means that portals can sometimes overlap—while you take one portal to get to the Nether, you may end up somewhere different on the trip home, but it also means that you can make and use Nether portals to help you travel great distances in less time.

Sky/End

The Sky, or End, is a dark, bare dimension that you can access only through an end portal, which occurs only in a rare, difficult-to-find stronghold. The End is the only place to find and fight the Ender Dragon, the main (and pretty much only) boss fight in Minecraft. You'll also find End stone here, as well as many, many endermen (**Figure 4.47**).

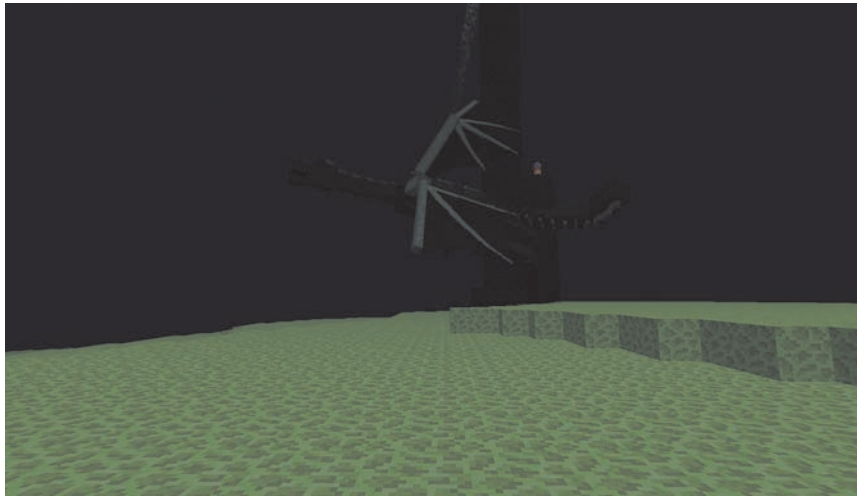

FIGURE 4.47 The End, complete with Ender Dragon.

World-Generated Structures

Landscapes on Minecraft maps are formed with world-generated structures, from lakes and ravines to villages and dungeons (**Figure 4.48**). These structures shape and add detail to the world.

Many don't require any discussion, but it is interesting to think that even something as simple as trees, glowstone, a spring of water, a lava pool, or the ores you mine are programmed to generate at certain locations and with specific frequency. Ravines and caverns are great for caving, a mining technique that takes advantage of the open walls that expose ores. Features such as ice spikes, mossy stone boulders, and giant mushrooms offer a decorative touch.

Other world-generated structures, however, are much larger and add to the gameplay. Villages, fortresses, and abandoned mineshafts fall into this category and deserve a closer look.

FIGURE 4.48 World-generated structures, clockwise from upper left: abandoned mineshaft in a ravine, blaze spawner in a Nether fortress, jungle temple, End portal in a stronghold, village and desert temple, ocean monument.

Villages

Villages are collections of houses and gardens populated by villagers. They occur in plains, savannah, and desert biomes. They can make a great home base or provide materials in the form of food from the gardens, treasure from a chest (usually found in the blacksmith's house), and items in the houses themselves, such as bookshelves and furnaces. Villagers are non-player characters (NPCs) that will trade with players, using emeralds and other items for currency.

Dungeons

Encased in mossy cobblestone, dungeons often occur in abandoned mineshafts and are scattered underground across the map. They contain a monster spawner (skeleton, zombie, or spider) and chests with treasure. You can stop the monsters from spawning by placing a torch on the spawner (or, if you're as paranoid as me, many torches).

Desert and Jungle Temples

Temples in deserts and jungles offer treasures—and traps. Desert temples have a hidden pit in the middle, filled with chests... and also with a pressure plate that will set off TNT if touched. Jungle temples have a puzzle of levers as well as a tripwire passageway to navigate.

Temples are worth exploring—not only do they provide a fun challenge, but they are among the few places you can find treasures that can't be crafted, such as iron, gold, and diamond horse armor.

Ocean Monument

One of the newest additions to Minecraft is the ocean monument. While it's not a source of treasure chests, you can find special new blocks like prismarine and sea lanterns in these deep ocean structures, as well as new mobs like guardians and elder guardians.

Abandoned Mineshafts

Deep underground you'll occasionally discover abandoned mineshafts, usually cutting through ravines and caverns. These multi-story maze-like constructions are made from wood, with rail tracks running through them. Here, you'll find chests and minecart chests with treasures, and also venomous, deadly cave spider spawners.

Abandoned mineshafts are great for gathering wood, fence posts, treasure, ore from the walls, and rails, but they are also easy to get lost in and can be deadly. It is important to mark your path or use a map marker, and to explore them only when you are well prepared.

Strongholds

Strongholds are special fortresses that hold the End portal. No more than three spawn on a world, and they are underground and hard to find. You can craft an Eye of Ender from ender pearls and use it to locate strongholds by throwing it and following its path. Strongholds are much more designed than other structures, with prison cells, storage rooms, libraries, scattered chests of treasure, and of course the End portal.

Nether Fortresses

Deep in the Nether are fortresses made of netherbrick. You can find chests with semi-rare treasure tucked throughout the fortress. Only in Nether fortresses will you find blaze spawners and the nether wart plants. Nether fortresses are populated by wither skeletons and zombie pigmen.

Critters and Creatures

One of the most important parts of Minecraft is the mobs. From taking down exploding creepers to riding horses across the plains, mobs are a huge part of the game.

Types of Mobs

Mob is short for "mobile entity," meaning creatures that can move around the game. Each mob in Minecraft has specific characteristics. Some spawn in specific biomes or areas, or only at night or in a dark place, for instance.

Friendly mobs like cows, sheep, and horses are sometimes called *critters*. We use them for our farms and even keep some as pets. Other mobs, like endermen and creepers, we call *monsters* or *hostile mobs*. A few mobs are considered neutral. They won't hurt you unless you attack them, or even hit them accidentally. Then they become hostile mobs and will attack. Wolves are a great example of a mob that can go from neutral to friendly (if you tame them) or to hostile (if you hit them).

Villagers spawn only in villages, and you can trade items or emeralds with them for other items. They are susceptible to zombies, and they can become hostile zombie villagers when attacked.

Mob Spawning

Spawning is the word used to describe what happens when mobs pop into existence in the game. Friendly mobs can spawn at any time of day or night, but most hostile mobs spawn only at night or in places with low light. Some mobs have special spawning rules; when you kill a zombie, more will spawn immediately in the area, for example.

Light an area to stop mobs from spawning. Torches or lamps prevent the monsters from showing up. When daylight comes, most hostile mobs will catch fire and burn up, though they are still hostile and will attack even while they're on fire. Spiders stick around even during the day, but they attack only at night or in the dark.

Not only do mobs spawn randomly, but there are mob spawners in the game, often in dungeons and abandoned mineshafts; they cause a specific type of mob to spawn. These can be deactivated by placing torches on or beside the spawner, or they can be broken. Spawners can be used to make *grinders*, a place where mob spawns are controlled so that players can kill many in a safe manner in order to get experience points in a relatively short time (known as *grinding*).

Mob Drops

When mobs are killed, they leave behind items: meat, leather, or wool in the case of friendly mobs, and spider webs, rotten flesh, or weapons in the case of hostile monsters. These are known as *mob drops*, and each mob has specific drops. Many drop two or three different items, though not at the same time.

All mobs can be killed, but some are harder to kill than others. Use a sword or a bow and arrow for hunting or self-defense. Iron and diamond make the strongest swords, and enchanted weapons are even more effective, such as using a sword with a Looting enchantment, which will cause the mob to drop more

items. When killed, mobs also leave behind green orbs, which are experience points that you can collect and are needed for enchantments.

Taming Mobs

Friendly mobs are very helpful in the game. Raising them in farms means you can have an easy supply of chicken, beef, pork, or wool. Most mobs are passive—you can lead them with food or on a lead and you can breed them, but that is the extent of interactions with them.

When you feed fish to ocelots or bones to wolves, you can tame them, turning them into pet cats and dogs. Sometimes this takes patience and a few tries, but once tamed the animals will follow you.

Horses can also be trained and ridden. You tame a horse by riding it. It might kick you off a few times, but keep trying—eventually it will show hearts and will be tamed. Unlike cats and dogs, horses aren't connected to one player after being tamed—others can ride them too.

Most of the friendly mobs can be bred to make babies by feeding two of them a certain item, such as wheat or carrots. The two animals will touch each other, and when they part there will be a baby between them; the player gets experience points. This is a good way to raise animals to farm.

Friendly Mobs

You will find friendly mobs in various biomes—most farm animals are found in plains, forests, taiga, and mountainous areas. If you want to put them in a pen or barn to farm them, they can be led with a lead or will follow food.

Cows

Drops: Leather; raw beef; milk (when touched with an empty bucket; doesn't kill the cow)

Breeding: Wheat

Cows spawn in plains and other grassy areas. They are very versatile and great to have in a farm. You can cook the beef they drop (or eat it raw, but you won't get as many hunger bars filled), and you can use the leather for making armor, books, and item frames.

Mooshrooms

Drops: Leather; raw beef; milk (when touched with an empty bucket; doesn't kill the mooshroom); mushroom stew (when tapped with a wooden bowl; doesn't harm the creature); mushrooms when sheared, although this turns them into a cow

Breeding: Wheat

Mooshrooms are hard to find, spawning only on the rare Mooshroom Island biome. They are even more versatile than cows, as they also provide stew.

Sheep

Drops: Wool, 1 block when killed, 1–3 when sheared, which grows back; mutton (version 1.8 and higher)

Breeding: Wheat

Sheep are useful as a source of wool and, as of version 1.8, as a source of food in the form of raw mutton. They are found in grassy areas such as plains and forests.

If you shear a sheep, it will drop up to three blocks of wool, which will grow back when they eat grass. They spawn in white, brown, black, gray, light gray, and occasionally pink, but they can be dyed any of the 16 colors by clicking them with a dye (the dye is then used up). See the section "Dye" for more information.

Pigs

Drops: Raw pork

Breed: Carrots

Pigs, found in grassy areas, are a source of pork but otherwise aren't very useful. They can be ridden by placing a saddle on them and then guiding them with a carrot on a stick, which you make by adding a carrot to a fishing rod on a crafting bench.

Pigs can be hit by lightning, turning them into zombie pigmen, although this is a rare occurrence.

Chickens

Drops: Eggs; raw chicken and feathers when killed

Breeding: Seeds. You can also hatch chicks by throwing eggs, although it can take many eggs to hatch a single chick.

Chickens are versatile farm animals. They lay eggs and drop raw chicken and feathers when they are killed, and you can use their eggs to make cakes and pies and their feathers to craft arrows and quill pens.

Rabbits

Drops: Hide; meat; rabbit's foot (rare)

Breeding: Carrots; golden carrots; dandelions

New as of version 1.8, rabbits come in six colors. They appear in almost all the biomes, and are, for the most part, a passive mob. A rabbit's foot can be used in potions.

Every so often, the very rare Killer Bunny will spawn. It is not shy like its brethren, and will attack players and cause a fair amount of damage. It will also attack wolves and pet dogs, so be careful!

Horses, Donkeys, and Mules

Drops: Leather, though horses are not typically bred for drops

Breeding: Golden carrots; golden apples (craft by surrounding a carrot or apple with gold nuggets in a crafting bench). You can breed two horses, two donkeys, or a horse and a donkey, which will produce a mule (mules cannot be bred).

Horses, donkeys, and mules spawn on the plains. Horses appear in many colors and patterns, which are combined to a total of 35 different versions. They each have specific characteristics in terms of jumping height and speed. They can be ridden, but only if you have a saddle, which cannot be crafted. You must find a saddle in dungeons and temple chests or by trading with villagers. You can also find iron, gold, and diamond horse armor; diamond horse armor cannot be crafted—you must find it.

You can ride donkeys and mules, and they will also carry a chest, something a horse cannot do. If you use a lead, you can ride a horse and pull a donkey carrying a chest behind you.

To tame a horse, you need to ride it (right-click to mount; Shift-click to dismount). This can take a few tries because you will likely be thrown and will need to remount. When you see floating hearts around the horse and it has calmed, it is tamed. Now you can ride and breed your horse.

Horses can eat many foods, including sugar, apples, carrots, bread, wheat, and hay. Unlike other mobs, they have inventory slots for their armor and saddle, and their own health meter.

Squid

Drops: Ink sacs

Breeding: Cannot be bred

Squid spawn in bodies of water. They provide ink sacs, which are used as a dye source and for writing books, making them valuable. They have no other purpose.

Ocelots/cats

Drops: None

Breeding: Raw fish

Ocelots are shy wild cats that spawn only in jungles. They don't like people, so it can take a bit of time and patience and a large supply of raw fish to tame them. Once tamed they turn into tabby, Siamese, or black and white tuxedo cats, which will follow you and teleport to be with you.

You can make your tamed cats stay safe by right-clicking them, which will seat them until you release them; this will keep from walking into fire, lava, or cactus and dying. On the other hand, since creepers avoid cats, it's not a bad idea to have some around when you're working at night or in dark spaces.

Cats are mischievous and like to sit on your furniture and sometimes run through your crops (kittens especially will do this). This can be frustrating if they're on your chests, preventing you from opening them, but you can lure them away with fish.

Bats

Drops: None

Breeding: Cannot be bred

Bats spawn in caves, and while they are cute, they have nothing to offer. They don't drop anything, but they won't attack either.

Villagers

Drops: None

Breeding: Villagers breed on their own, as long as they have enough buildings with doors

NPC villagers (sometimes called *testificates*) appear in villages. You can trade with them for goods. Villagers wear clothes that identify their job, such as priest, farmer, and librarian. Each villager starts out with one item they will trade, and when you make a trade, a new item is added to the options. Some trades may not seem fair, but you won't be able to open other trade options without making the exchange.

Villagers are favorite targets of zombies, and can become zombie villagers if they are attacked. They hide in their houses at night, and need doors so that they can seek safety and protect themselves.

Neutral Mobs

There are a few mobs that are friendly until they've been attacked, but which then turn fiercely hostile. Use care around these neutral mobs.

Wolves/dogs

Drops: None

Breeding: Meat (puppies from tamed dogs will be born tame)

Wolves spawn primarily in the taiga (snowy forest) and occasionally in forests, usually in packs. They attack sheep and rabbits, but will remain neutral unless they are hit, in which case they become hostile mobs and will fiercely attack, eyes glowing red.

You can tame a wolf, creating a dog, by feeding it bones until its hearts appear and a collar appears around its neck (collars are red, but can be dyed by right-clicking with dye in your hand).

Dogs are similar to cats, in that they will follow you unless you make them sit by right-clicking them. They will protect you from monsters, and are handy to travel with, though they do get too close to lava and fire sometimes. Still, they make good companions, at home and while adventuring.

Endermen

Drops: Ender pearls

Endermen are mobs that come from the End, but they can also spawn in the Overworld. They are not hostile unless you look them directly in the face, at which point they will attack. They teleport away from you and then back, making fighting a challenge. They are powerful and fierce and can teleport behind you when attacking, so be careful.

Unlike most hostile mobs, endermen aren't harmed by sunlight, but water (like rain) damages them. You can wear a pumpkin on your head and be safe to look at them, but your vision will be restricted if you do.

Ender pearls, dropped by endermen, are needed to craft Eyes of Ender to complete the End portal (you can also use an Eye of Ender to find the stronghold by throwing it in the air and following it). Otherwise, they can be used for swift transport, as you'll be teleported to the spot the ender pearl lands when thrown.

Although endermen are peaceful (unless you look at them), they can be frustrating because they like to pick up and move blocks, even ones that are part of your build.

Zombie pigmen

Drops: Rotten flesh, golden ingots, golden bars, and golden swords

Zombie pigmen spawn in the Nether, though they can cross through nether portals, and they are created when lightning strikes a pig, though this is rare.

Zombie pigmen are peaceful unless they are hit, but even one accidental bump will set them to attack—and they will call in their friends. They are ferocious fighters and will continue to fight you even if you die and respawn. They are happy to arm themselves in your gear as well, adding insult to injury. There are also baby zombie pigmen, which are faster and fiercer than their grown-up counterparts.

Hostile Mobs

Hostile mobs, or monsters, are the ones that you need to watch for (unless you play with your game set to peaceful, when they are harmless). Hostile mobs spawn only at night or in low light, and most catch fire when the sun comes up. Their drops can be useful—skeleton bones can be turned into bonemeal, used to help plants grow, and zombies and skeletons both drop armor and weapons.

Zombies, baby zombies, and zombie villagers

Drops: Raw flesh, and occasionally carrots, potatoes, iron bars, a piece of armor, shovels, or swords

Zombies spawn at night or in dark places. During the day, they will catch fire if they are in the sun, but they might be lurking in shady areas, such as under trees. If they attack you while on fire, you'll end up burning too, so be careful.

They are generally slow-moving (except for their babies) and are fairly easy to defeat if you are prepared. But if you don't have a good weapon or armor, they can still kill you. And even if you manage to kill one, it will summon other zombies to spawn in the area.

Zombies often wear armor, sometimes armor with minor enchantments, and some may carry a shovel or sword, making them a little harder to fight. On the bright side, they may also drop some of their weapons or gear when they die.

Baby zombies are a smaller, scarier version. They can fit into one-block openings, are super speedy, and can appear in daylight.

Zombie villagers are villagers that a zombie has attacked, so they still look like villagers—green, zombified ones. They can be turned back into villagers once you are able to make potions, but it is quite a process.

Skeletons

Drops: Bones, arrows, a bow, and armor

Skeletons in many ways are very similar to zombies; they spawn in the dark and burn in daylight, and are often wearing armor. Unlike zombies, they are able to attack from a distance with a bow and arrow, and they can shoot fast, knocking you back. For this reason, it is helpful to use a bow yourself.

Spiders, cave spiders, and spider jockeys

Drops: String and spider eyes

Spiders come in several varieties. The most common are large. Very occasionally they are ridden by skeleton jockeys, making them more dangerous at a distance. Spiders are faster than other mobs and can climb and jump, and they can fit through openings one block high and two blocks wide.

Cave spiders are even smaller and fit through small spaces. Even worse, they're venomous and their bite will make you sick (drinking milk from a pail will help heal you). They're found only in dungeons and abandoned mineshafts, where they come from spawners (surrounded by cobwebs), but they are vicious foes (a bucket of lava is a good weapon for destroying their nest and spawner).

Creepers

Drops: Gunpowder; if killed by a skeleton, a music disc

Creepers, the hissing, walking bushes that explode, have become one of the symbols of the game, as well as a source of frustration to anyone who has ever built on a survival map. Creepers attack by moving in close, hissing, and then exploding, destroying many blocks in the area when they do.

It is especially frustrating to have part of your house, your redstone wiring, or some other important work destroyed, so it is important to keep the area well lit. A few cats can help keep them away. It is possible, if you're alert, to catch them before they explode and at the very least lead them away, if not slay them outright.

Slimes

Drops: Slime balls

Bouncing green blocks that come in a variety of sizes, slimes spawn in swamps at night and sometimes in deep caves. They aren't hard to fight, because they move slowly, but once you hit one it will divide into two slimes, and those two will each divide, and so on until you find yourself surrounded by small slimes, which can't hurt you and are easy enough to defeat.

Each small slime drops a slime ball. Slime balls are needed to craft sticky pistons, leads, and fire charges.

Silverfish

Drops: None

Silverfish are small critters that hide in strongholds and the Extreme Hills biome. They are in blocks that look just like regular blocks—until you break them and silverfish appear. If you attack a silverfish, it will call others. They can start to do some damage as their numbers increase, to both you and the area. They will break blocks too (potentially releasing even more silverfish). They can't climb, so standing on a block and pouring lava is a quick way to deal with them.

Endermites

Drops: None

A newly introduced mob with the 1.8 update, endermites occasionally spawn instead of an enderman or when you throw an ender pearl. They are small purple bugs that emit particles, attack, and do more damage than silverfish, but they are easily defeated.

Witches

Drops: Bottles, glowstone dust, redstone, gunpowder, spider eyes, sugar, and sticks (except for sticks, all are potion ingredients)

Witches look like villagers garbed in witch gear. They can spawn anywhere at night and don't burn in the sun. They are quiet, can sneak up on you, and attack by throwing potions from a distance. They are also able to use potions to help themselves; if they are on fire or in

lava they will drink a fire resist potion, for instance, and they are quick to heal themselves. Your best bet is to get some distance and use a bow and arrow, or just stay clear.

Guardian

Drops: Fish, prismarine crystal, prismarine shard

Guardians are a new mob, introduced with the 1.8 update. The first hostile ocean mob in the game, they are swift and fierce hunters usually found in and around ocean monuments. They can attack with spikes that they can extend and pull in (though the damage is minimal), but they also use a far more powerful beam of light to attack from a distance. They need to "charge" this beam before they can fire and will take a short period of time to recover before they can shoot again. They are formidable foes.

Guardians don't die when they are on land, but they will flop around and head for the closest body of water. If they are in shallow water, you can use a fishing rod to pull them to land and attack them there, which is far easier than fighting them in water.

Nether Mobs

Some mobs spawn only in the Nether. These mobs drop items that you can't get in the Overworld, such as wither skulls (needed to summon a wither) and blaze rods (used as fuel and needed in some recipes).

Wither skeletons

Drops: Bones, coal, stone swords, and wither skulls

Wither skeletons are found in nether fortresses and are more challenging to fight than their Overworld cousins, as they can cause the *wither effect*, which weakens you considerably for 10 seconds after being hit.

Every so often, a wither skeleton will drop its skull, which you will need in order to call the wither (see the "Bosses" section).

Wither skeletons often spawn near blaze spawners, leaving you open to a double attack. If you have a bow, you can fight from a distance, possibly from the shelter of the fortress, but you may knock them into the lava below the fortress,

which means you won't be able to collect drops. They are best not faced up close unless you have good gear.

Blaze

Drops: Blaze rods (an alternative fuel for furnaces and an ingredient in potions)

Blaze are spinning, flying mobs that hover near their spawner in nether fortresses. They are creatures made of and armed with fire, and can be a challenge because they shoot fire at you from a distance. They are vulnerable to water, which can't be used in the Nether—unless you bring it in snowball form. Snowballs make a good distance weapon, though you're best off ensuring you also have fire resist enchants on your armor, or a heat-protecting potion on hand.

Ghasts

Drops: Ghast tears and gunpowder

A large, floating, tentacled mob that will shoot fireballs at you. Because they float out of sword range, a bow is your best weapon, though you can lure them to the ground to attack with a sword too. Just be careful on the uneven, lava-covered terrain to not fall to your death or trip into a pool of lava while dodging fireballs! Ghast tears are a rare potion ingredient, making fighting ghasts worthwhile.

Magma cubes

Drops: Magma cream

Magma cubes are very similar to slimes from the Overworld. They stretch like springs when they bounce and drop magma cream, needed for heat-resist potions. They will divide into smaller cubes as they are attacked, and the smallest have the possibility of dropping magma cream.

Player-Created Mobs

There are a couple of mobs that you can create as well; they can be used for defense and company.

Snow golems

Drops: Snowballs

Snow golems look like pumpkin-headed snowmen, and they leave a trail of snow when they move. They are easily crafted by stacking two blocks of snow and then putting a pumpkin on top (not on a crafting bench; you need to build the snowman). While they will throw snowballs at hostile mobs, this won't do much to slow them down; they're more useful for harvesting snow and snowballs or to create a snowy landscape.

Iron golems

Drops: Iron ingots and roses

Also craftable, iron golems are far more powerful than snow golems. While they occasionally spawn around NPC villages, you can also make them. Iron golems are not made on a crafting bench but rather built with four blocks of iron (two stacked and one on each side of the upper block, like a "T") and a pumpkin head.

Iron golems protect villagers before players, and won't leave the area if there are villagers to defend. They have a fierce attack, swinging their long arms and flinging enemies away. If you damage a villager, even if you created the golem, it will turn on you as well. Iron golems will sometimes offer a rose to a villager.

Bosses

Three larger, more powerful mobs, known as *bosses*, exist: Elder Guardians are considered mini-bosses, harder to fight than regular mobs; Withers can be summoned after collecting three wither skeleton heads and are a tougher foe than Elder Guardians; and the final, ultimate boss is the Ender Dragon, which spawns in the End.

Elder Guardian

Drops: Fish, prismarine crystal, prismarine shard, wet sponge

New to the game and considered a mini-boss, Elder Guardians are a larger, more dangerous version of guardians and are found inside ocean monuments.

They give a mining fatigue effect to all players within 50 blocks, which will slow you down considerably if you are trying to mine for treasure within the ocean monument. Like guardians, they use a beam to attack, as well as having spikes, but they are far more powerful and will even attack players in boats. They are incredibly hard to fight, and you will need your best gear, as well as water potions or enchants on your armor. Again, as with guardians, it is possible to draw them to dry land with a fishing rod, where you can attack more easily, but they will immediately try to get back into the water.

Withers

Drops: Nether star

A Wither is a strong boss that must be summoned using a soul sand cross and three wither skeleton skulls. You need to place the sand and skulls in a specific pattern and order (the last block placed must be a skull) for a Wither to appear.

A three-headed flying creature, the Wither shoots exploding skulls from all three of its heads. It also blasts the wither effect, which weakens all players hit by it. Some of the skulls will also damage nearby blocks (reducing places you might find to hide), and if a player is directly hit by a skull, the Wither will regain some health points.

Fighting a Wither is a big challenge, one best done with several players if you are on a multiplayer server. If you're on your own, try to summon it in a contained space with places to hide, have plenty of good gear and health potions, and take your time.

The Wither drops a Nether star, which is needed to light a beacon, a special beam of light that extends to the sky and provides a special effect (such as haste, which makes you mine faster) to all the players in an area.

Ender dragon

Drops: Dragon egg

The Ender Dragon is the ultimate boss in Minecraft. Only found in the End, which is also populated by endermen, the Ender Dragon is a huge monster that flies in to attack players and can do damage with its head, wings, and body.

The Ender Dragon has a health bar so that you can track the damage you do. You'll also note that it regains health from the crystals on obsidian towers scattered about the End. It's a good plan to destroy the crystals so that the dragon can't heal as you're fighting it. The dragon can also explode blocks as it passes, so be careful of falling debris when you fight. You can use a bow and arrow or wait for it to swoop low (this is more risky). Its head is the most vulnerable place for players to strike.

When you defeat the Ender Dragon, you will get a dragon egg and lots of experience points, and the game credits will roll. This is, of course, not the end of the game, as there is no end point in Minecraft, so you'll be able to return to your world and continue your adventures wealthier and with more experience.

Unlimited Possibilities

This has just been the barest peek at some of what Minecraft has to offer. Hopefully you have a good taste of some of the possibilities that await you. What we can't discuss here is what you yourself bring to the game—creativity, fresh ideas, innovative designs, and ground-breaking strategies. Whether you play on your own or with others, whether you like to explore and discover or would rather look things up and learn from others, the game you play will be unique to you, something of your own creation.

Minecraft is the perfect opportunity to take risks, experiment, try new things, and see what you can do. You can share your creations and work with others, or keep it just for yourself. The opportunities are unlimited—have fun exploring them!

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