Questacon cyber

# CYBER CASTLE CHALLENGE

## Teacher Resource

Australian Government

Questacon
The National Science and Technology Centre

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# The Game

The *Cyber Castle Challenge* game encourages players to explore, discover and set their own priorities. In-game achievements are used to guide players to understand cyber security concepts. The game is open-ended and exciting, encouraging players to solve problems using critical and creative thinking.

The game is played over four seasons, with each season introducing new cyber security concepts.

**Season 1: Defend your assets**
Identify assets and balance resources to defend against predictable waves of fox attacks.

**Season 2: Evolving threats**
Collect intelligence, continue to balance resources and defend against unpredictable waves of foxes.

**Season 3: Kingdom expansion**
Manage and defend a wider network as the Cyber Kingdom expands.

**Season 4: Who can you trust?**
Verify the identity of those accessing the castle and train users to identify strange behaviour.

# How it Works

This program has been created to help educators teach cyber security concepts and the Digital Technologies Australian Curriculum (Version 9). The four seasons of the Cyber Castle Challenge are recommended to be played over four school weeks. The game has been designed to be played in groups of up to four students on individual devices.

**Teacher Resource**
This contains handy hints and learning resources to support the Cyber Castle Challenge. Find weekly lesson plans, discussion points and extension activities which link to success criteria and learning outcomes.

**Student Playbook**
This links in-class discussions and gameplay to learning outcomes. Each season's playbook contains activities for students to complete, both before and after gameplay, to help students solidify their knowledge.

**Supporting Videos**
Four season videos tie in-game concepts to real world examples of cyber careers and skills by introducing students to professionals in the cyber security field. They are designed to promote classroom discussions about cyber security.

## Pre-Game Preparation

Watch promotional video

Read teacher resource

Download world file

Print and distribute student playbook

## Each Season

**Start of Season (30 mins)**

Watch season video

Discuss points suggested in teacher resource

Complete activities in student playbook

**Play the Game (60 mins)**

Students work towards seasonal achievements

**End of Season (30 mins)**

Discuss points suggested in teacher resource

Complete activities in student playbook

# Program Goals

The *Cyber Castle Challenge* aims develop the cyber security awareness and skills of students aged 8-13. It will introduce them to a diverse range of cyber security role models and potential careers. By the end of this program, students will be able to make connections with how cyber security impacts their lives and their futures.

This program strongly links to the Digital Technologies Australian Curriculum, in addition to the General Capabilities of Digital Literacy, and Creative and Critical Thinking.

**Digital Technologies**
Aims to help students develop fundamental skills around the safe use of technologies. There is a focus on privacy and security throughout students' personal use of technologies.

**Digital Literacy**
Aims to provide students with skills to identify and use appropriate technologies, and helps students understand and protect their personal data.

**Critical and Creative Thinking**
Aims to increase student's inquiry skills. There is a focus on collaboration to analyse information and draw logical conclusions, whilst identifying alternative solution possibilities.

# Targeted Curriculum Codes - Digital Technologies

The full Digital Technologies curriculum Version 9.0 is available on the ACARA website.

**Years 3 & 4:**

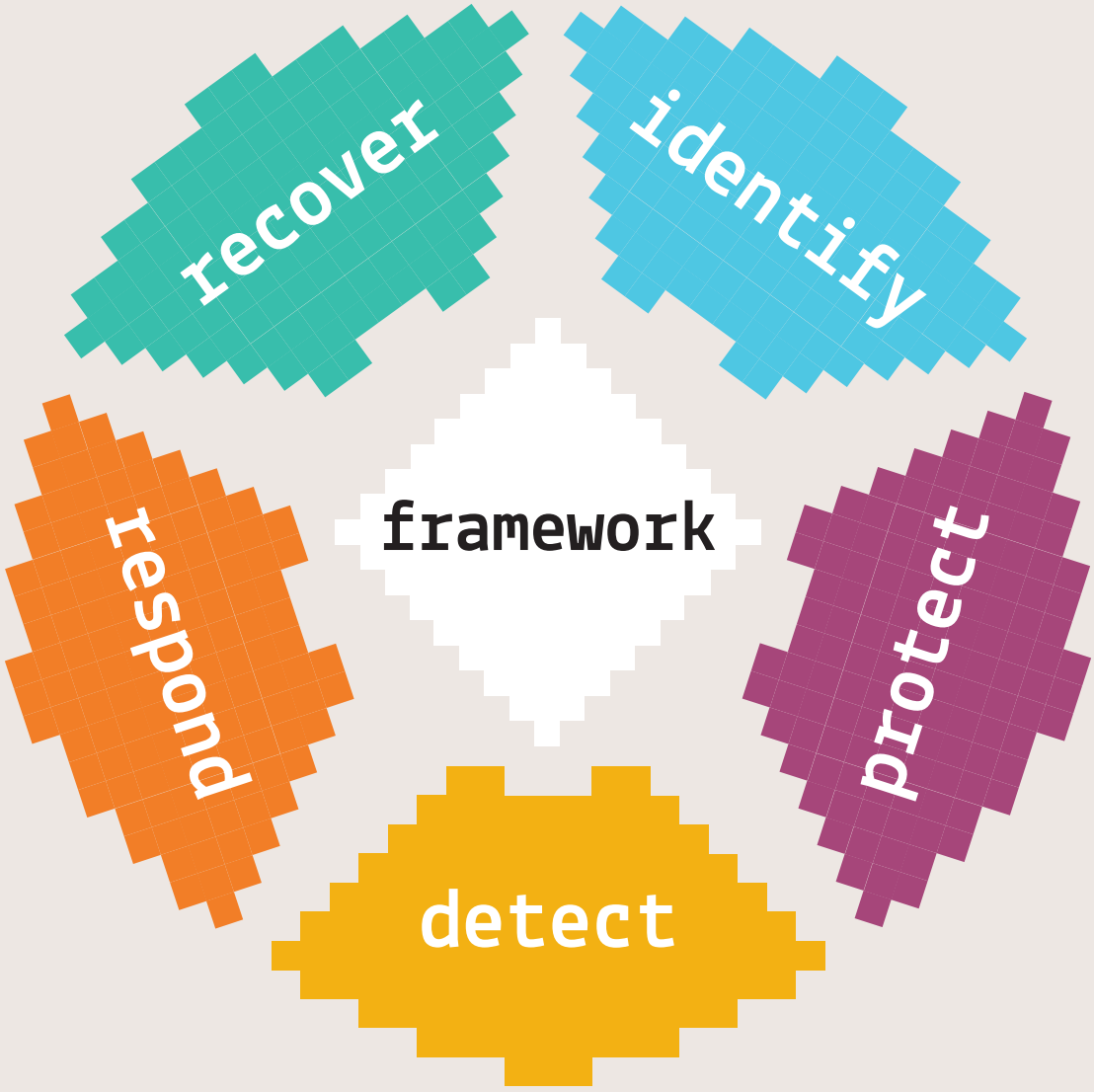
| | |
|---|---|
| AC9TDI4P03 | Generate, communicate and compare designs |
| AC9TDI4P05 | Discuss how existing and student solutions satisfy the design criteria and user stories |
| AC9TDI4P08 | Access their school account using a memorised password and explain why it should be easy to remember, but hard for others to guess |
| AC9TDI4P09 | Identify what personal data is stored and shared in their online accounts and discuss any associated risks |

**Years 5 & 6:**

| | |
|---|---|
| AC9TDI6K02 | Examine how digital systems form networks to transmit data |
| AC9TDI6P04 | Generate, modify, communicate and evaluate designs |
| AC9TDI6P09 | Access multiple personal accounts using unique passphrases and explain the risks of password re-use |

# Cyber Security in Practice

The National Institute of Standards and Technology (NIST), produced a framework to guide organisations seeking to improve cyber security risk management by ensuring a consistent approach to decision making. The framework has five cyclic steps called the Cyber Security Lifecycle: Identify, Protect, Detect, Respond, and Recover.



**Identify**

- Understand the cyber security risk to their systems by identifying users, assets, data and capabilities within the team to overcome threats.

**Protect**

- Develop and implement safeguards to limit or stop potential cyber security events.

**Detect**

- Have structures to identify cyber security attacks before they happen.

**Respond**

- Take appropriate actions when a cyber security event is detected.

**Recover**

- Quickly restore any capabilities or services impaired by a cyber security event.

# In-Game Achievements

The Cyber Security Lifecycle has been used as a framework when designing the Cyber Castle Challenge. The in-game achievements have been designed to support student's strategy, progress and understanding of the Cyber Security Lifestyle throughout each of the four seasons.

| | Identify | Protect | Detect | Respond | Recover |
|---|---|---|---|---|---|
| **Season 1**<br>Defend your assets | Identify assets<br><br>Identify threats | Construct layered defences<br><br>Minimise attack surface | | | |
| **Season 2**<br>Gather intel about evolving threats | | Manage an evolving perimeter<br><br>Conduct a penetration test | Gather signals intelligence<br><br>Gather human intelligence | | |
| **Season 3**<br>Kingdom expansion | | Access and identity management<br><br>Security awareness training<br><br>Defend your wider network | | Patch a breach | |
| **Season 4**<br>Who can you trust? | | Encrypt your assets | Detect strange behaviour<br><br>Identify fraudulent behaviour | | Recover after a malware attack |

# Season 1 - Defend your assets

The Cyber Kingdom is in ruins with chickens running wild and foxes constantly threatening to attack. Students will need to work together to protect their chickens, and rebuild their castle to defend against the pesky foxes.

## Learning Intentions and Success Criteria:

**Learning Intentions**

Students will:

- Understand the importance of their personal data
- Identify ways their personal data may be compromised

**Success Criteria**

I can:

- Explain why my personal data is important
- Identify risks to my personal data

## In-Game Achievements:

**Identifty Assets**

Bring a tamed chicken into the coop

**Identify Threats**

Spot your first fox!

**Minimise Attack Surface**

Repair all the castle walls

**Construct Layered Defences**

Start building your outer walls

# Educator Lesson Plans - Week 1

**Season Breakdown:**

| | | |
|---|---|---|
| **Preparation** | | Each student will need:<br>1. a device with Minecraft: Education Edition installed<br>2. their log-in for Minecraft: Education Edition<br>3. to be assigned to a group of two to four, with a designated host<br>4. their copy of the Student Playbook and writing equipment<br><br>One student per group will need to be designated as the team's host. They will need to have the Cyber Castle Challenge world file downloaded. More information on connecting to multi-player games can be found on the Minecraft: Education Edition website. See the "Useful Links" page of this guide. |
| **Start of Season** | 30 mins | **Watch the promo video**<br>Discussion prompts:<br>1. What do you think cyber security is?<br>2. What are some skills you need for your own cyber security?<br><br>**Watch the Season 1 video**<br>Discussion prompts:<br>1. How is defending a castle like cyber security?<br>2. How do you think a castle is like cyber security?<br>3. What is the first thing you'll do when entering the game?<br>4. How will you work together as a team?<br><br>**Complete the 'before gameplay' activities of the Season 1 Student Playbook** |

# Educator Lesson Plans - Week 1

| | | |
|---|---|---|
| **Play the Game** | 60 mins | The host student launches the Cyber Castle Challenge game file and provides the join code to other players on their team.<br><br>At the start of the game students will be introduced to the librarian who will take them on a tutorial and explain key gameplay features. After the tutorial, the game becomes free play, with students working towards in-game achievements.<br><br>At the end of the hour, students will need to **save and exit** the game. It is recommended students also **export** the game file as Minecraft: Education Edition saves locally. In the following seasons students will need to re-join the game from the same devices or using the exported game file. |
| **End of Season** | 30 mins | Discussion prompts:<br>- How do 'chickens' and 'foxes' relate to cyber security?<br>- What assets do you have online?<br>- How could a threat use your assets?<br><br>**Complete the 'after gameplay' activities of the Season 1 Student Playbook** |

There are certain aspects of this game that are a different to what students will experience in other Minecraft games. This includes:

- players are set to adventure mode
- blocks cannot be mined
- building is restricted to certain areas
- chickens only lay eggs in the day time and once they are fed wheat.

Encourage students to complete the initial in-game tutorial and problem solve by discussing any other gameplay issues with their teammates.

Technical issues can usually be resolved by having students exit and reloading the Cyber Castle Challenge world. If the host player leaves the world, all players in the team will also need to exit.

For persistent issues, the team host should delete the Cyber Castle Challenge world and reimport the file. This will delete all progress in the game, which is another reason why it is recommended that students export a backup at the end of each season.

# Season 2 - Evolving threats

The foxes are getting smarter and their attack methods are more advanced. Students will need to navigate these new fox attacks,as well as identify and protect new assets.

## Learning Intentions and Success Criteria:

### Learning Intentions

Students will:

- Apply the Cyber Security Lifecycle to a real life situation
- Identify different ways to keep their personal data safe online

### Success Criteria

I can:

- Use the Cyber Security Lifecycle to work through a real life situation
- Identify and compare different methods of keeping my personal data safe online

## In-Game Achievements:

**Gather Signals Intellegence**

Observe your first alert on the virtual castle

**Gather Human Intellegence**

Get information from the castle farmer

**Manage an Evolving Perimeter**

Place a scare-a-sauraus on an outer farm

**Penetration Test for Vulnerabilities**

Use a cyber fox to test your defences

# Educator Lesson Plans - Week 2

**Season Breakdown:**

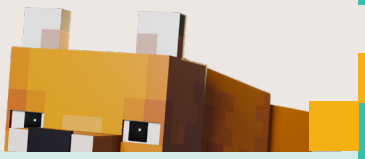
| | | |
|---|---|---|
| **Preparation** | | Each student will need:<br>1. a device with Minecraft: Education Edition installed<br>2. their log-in for Minecraft: Education Edition<br>3. to be assigned to a group of two to four, with a designated host<br>4. their copy of the Student Playbook and writing equipment<br>5. (optional) one set of Clued Up activity cards printed and cut out for the suggested extension activity |
| **Start of Season** | 30 mins | **Watch the Season 2 video**<br>Discussion prompts:<br>1. What is the Cyber Security Lifecycle?<br>2. How can you use the steps of the Cyber Security Lifecycle while playing the game?<br>3. What are some ways you can protect your assets online?<br>4. What is your team's strategy this season?<br>**Complete the 'before gameplay' activities of the Season 2 Student Playbook** |
| **Play the Game** | 60 mins | The host will start multiplayer and provide the join code for other team members. The host will also need to enter the following code into the chat to start Season 2: **/tag @s add tXR4i8ivsG**<br><br>The chat is opened by typing 'T'.<br><br>Season 2 starts with another tutorial from the librarian, who gives information about the changes this season. After completing the tutorial, students will be free to explore the world and work towards new achievements. |

# Educator Lesson Plans - Week 2

| | | |
|---|---|---|
| **End of Season** | 30 mins | Discussion prompt:<br>1. Who spoke to a NPC this season? What information did they give you and how did you use it?<br>2. How do the in game achievements relate to the Cyber Security Lifecycle?<br>3. How did your defences change this season with the new fox attacks?<br><br>**Complete Season 2 - Student after gameplay activities** |
| **Extension Activity** | | **Clued Up**<br><br>This is an extension of Activity 4 – Human Intelligence in the Student Playbook.<br>- Hand each student a Clued Up character card. Tell students to keep their character a secret.<br>- Students are tasked with finding their matching partner who has the same character. They must do this by passing along information about that character, but without using that character's name.<br>- You can impose extra limitations on what they share to play multiple rounds of increasing difficulty.<br>After the game, lead a discussion to understand which information helped students match their cards quickly, and unpack why accurate information sharing is important in everything we do. |

# Season 3 - Kingdom expansion

Villagers are returning to the Cyber Kingdom, but they need protecting. Students will need to defend their castle base, whilst also defending networks further from home.



## Learning Intentions and Success Criteria:

### Learning Intentions

Students will:

- Understand the importance of creating strong passwords
- Define digital systems and identify them in the classroom

### Success Criteria

I can:

- Describe and create a strong password
- Identify and describe what digital systems exist in my classroom

## In-Game Achievements:

**Access and Identify Management**

Install a scanner

**Defend your wider network**

Give a travelling trader a cyber fox

**Security Awareness Training**

Teach the passcode to a travelling trader

**Patch a Breach**

Fill a tunnel created by a fox

# Educator Lesson Plans - Week 3

**Season Breakdown:**

| | | |
|---|---|---|
| **Preparation** | | Each student will need:<br>1. a device with Minecraft: Education Edition installed<br>2. their log-in for Minecraft: Education Edition<br>3. to be assigned to a group of two to four, with a designated host<br>4. their copy of the Student Playbook and writing equipment<br>5. (optional) one set of Clued Up activity cards printed and cut out for the suggested extension activity |
| **Start of Season** | 30 mins | **Watch the Season 3 video**<br>Discussion prompts:<br>1. What is a network and why are they useful?<br>2. What is a supply chain? Can you describe the supply chain for creating a computer?<br>3. What will your team do differently this season?<br>**Complete the 'before gameplay' activities of the Season 3 Student Playbook** |
| **Play the game** | 60 mins | The host will start multiplayer and provide the join code for other team members. The host will also need to enter the following code into the chat to start Season 3: **/tag @s add PNst51uDa9**<br>The chat is opened by typing 'T'.<br>Students will be free to explore the world and new achievements. |

# Educator Lesson Plans - Week 3

| | | |
|---|---|---|
| **End of Season** | 30 mins | Discussion prompt:<br>1. Why do we use passwords?<br>2. What makes a strong password?<br>3. What digital systems are there in the classroom?<br>4. How are these digital systems connected?<br><br>**Complete the 'after gameplay' activities of the Season 3 Student Playbook** |
| **Extension Activity** | | **Physical Networks**<br><br>This is an extension of Activity 1 - Networks in the student playbook.<br>Divide your deck of Clued Up character cards into two, with each pile containing one card of each character.<br>- Form two groups, giving each student a Clued Up character card from half of the deck.<br>- Using string or similar, have students to physically represent the linkages between the in-game entities within their group.<br>- Ask each team to explain how each entity is connected and if there are differences between their two networks.<br>- Start cutting strings. Ask a student to explain what happens to each network if a certain entity was no longer connected to the network.<br><br>**Paper Supply Chains**<br><br>This is an extension of Activity 2 - Supply Chains in the student playbook.<br>- Students are to write out the steps of the supply chain from Activity 2 - Supply Chains on strips of paper. Sticking or stapling these together, students can form a paper chain.<br>- Encourage them to pull (hard!) on either end of the paper supply chain until a link breaks. Ask the students to describe the impacts of this break on their supply chain and the steps they would take to fix it.<br>This activity can be repeated using different a different supply chain, such as how a computer is produced.<br><br>**How strong is your password?**<br>This is an extension of Activity 3 - Passwords and Passphrases in the student playbook.<br>Students are able to test the strength of their unique passwords or passphrases at https://howsecureismypassword.net/ and compare with their *classmates*. |

# Season 4 - Who can you trust?

This season everything is in disguise, from the chickens to the foxes to the travelling trader! Students will need to work together to determine: who can you trust?

## Learning Intentions and Success Criteria:

### Learning Intentions

Students will:

- Understand how to assess the trustworthiness of online information
- Create ways to teach others how to be safe online

### Success Criteria

I can:

- Identify trustworthy information online
- Teach others how to be safe online

## In-Game Achievements:

**Encrypt your assets**

Give your chickens disguises

**Detect strange behaviour**

Teach your farmers to recognise strange trades

**Indetify Fraudulent Behaviour**

Teach a farmer to recognise the fox merchant

**Rebild after a Malware Attack**

Rebuild your castle walls after a malware attack

# Educator Lesson Plans - Week 4

**Season Breakdown:**

| | | |
|---|---|---|
| **Preparation** | | Each student will need:<br>1. a device with Minecraft: Education Edition installed<br>2. their log-in for Minecraft: Education Edition<br>3. to be assigned to a group of two to four, with a designated host<br>4. their copy of the Student Playbook and writing equipment |
| **Start of Season** | 30 mins | **Watch the Season 4 video**<br>Discussion prompts:<br>1. What is user behaviour?<br>2. What are some examples of trickery that you might find online?<br>3. How can we use zero trust to keep us safe?<br>**Complete the 'before gameplay' activities of the Season 4 Student Playbook** |
| **Play the game** | 60 mins | The host will start multiplayer and provide the join code for other team members. The host will also need to enter the following code into the chat to start Season 4: **/tag @s add 3acqesntuo**<br><br>The chat is opened by typing 'T'.<br><br>Students will be free to explore the world and new achievements. |
| **End of Season** | 30 mins | Discussion prompt:<br>1. What are some ways you can be safe online?<br>2. How can you help others be safe online?<br>3. How do you know who you can trust online?<br>4. Why do you think cyber security is an important career?<br><br>**Complete the 'after gameplay' activities of the Season 4 Student Playbook** |

| | | |
|---|---|---|
| **Extension Activity** | | This is an extension of Activity 1 – Let's go Phishing! in the Student Playbook.<br>- Challenge your students to create their own phishing campaigns. These phishing campaigns could be spoofed websites, social media post, or emails.<br>- Get students to test their phishing campaigns on each other. Can their classmates identify what makes a fake?<br>- You could even get parents involved by having students create a phishing campaign to fool adults. Follow this phishing campaign up with a student created educational showcase to help adults be more cyber aware.<br><br>This is an extension of Activity 3 – Can you teach cyber security? in the Student Playbook.<br>- Have students show case their educational creations to other classrooms or their parents and guardians. |

# Acknowledgements

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Lily Ryan, Digital Rights Watch

Dilshan Perera, Palo Alto

Edward Farrell, Mercury ISS

# Glossary

**Assets:** An individual's information, accounts, data or images that can be found online. Assets can also refer to physical devices that hold identifying information or accounts.

**Threats:** Any incident that can negatively impact an asset. This could be the asset being accessed by an unauthorised source, a physical asset being lost or a server room losing power.

**Host:** The student or device that downloads and launches the world. The host will need to start and share the multiplayer code with other players to allow them to join.

**NPC:** Non-playable character.

**Network:** A collection of devices that are physically or digitally connected together.

**Digital systems:** Digital systems process data in binary and are made up of hardware and controlled by software. When digital systems are connected, they form a network.

**User behaviour:** The way people behave, access and use technology.

**Zero trust:** A security model in which all users are never trusted and always verified.

# Useful Links

Find out how Minecraft can be used to teach the Australian Curriculum: https://education.minecraft.net/en-us/australia

Minecraft: Education Edition homepage for educators: https://education.minecraft.net/en-us/get-started/educators

Educator resources: https://education.minecraft.net/en-us/resources

Multiplayer guide: Minecraft-Education-Edition-Multiplayer-Guide-1.pdf

Importing, exporting and managing Minecraft worlds: https://educommunity.minecraft.net/hc/en-us/articles/360047555391-Import-Export-and-Manage-Worlds

# Clued Up activity cards

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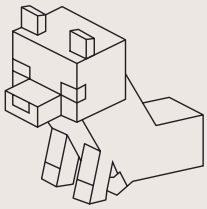
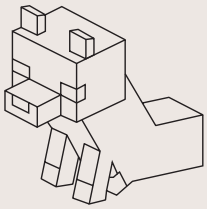
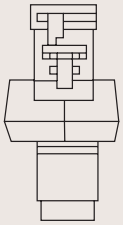
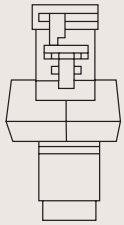
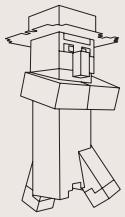
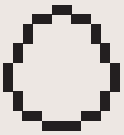
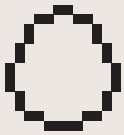
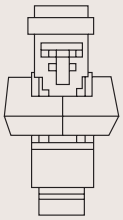
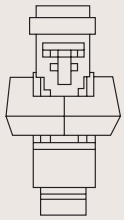
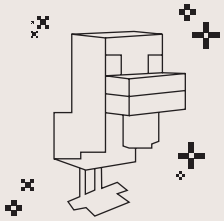
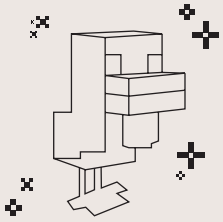
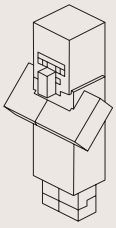
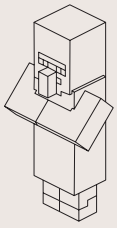
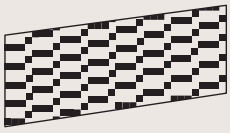
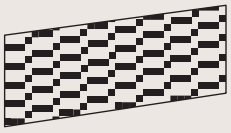
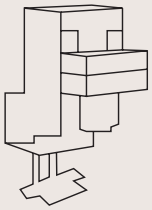
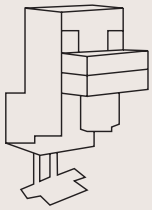
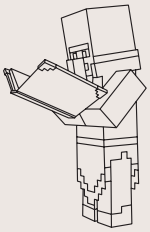
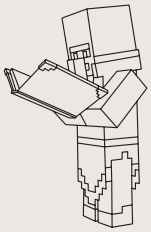
|---|---|---|---|
|  Fox |  Fox |  Castle Trader |  Castle Trader |
|  Castle Farmer |  Castle Farmer |  Egg |  Egg |
|  Wheat |  Wheat |  Outer Farmer |  Outer Farmer |
|  Pogo Fox |  Pogo Fox |  Golden Chicken |  Golden Chicken |
|  Villager |  Villager |  Traps |  Traps |
|  Chicken |  Chicken |  Librarian |  Librarian |

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