

5th Grade Unit 5: Graphing Real World Experience

(based on the 5 day lesson plan with Pixel Press Floors app. for iPad & The Design Thinking Process)

Overview: Students will work through the design cycle to develop a computer game for a partner.

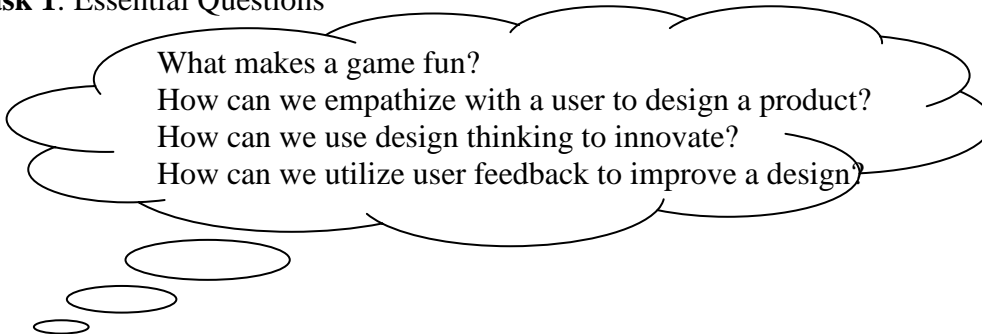
Standards addressed: 5.G.2, 5.MD.2, MP1, MP5, MP6, NGSS: MS-ETS1-1

Students will learn the design thinking process using Pixel Press *Floors* app. for iPad. Design thinking is a user-centered approach for solving everyday problems. *Floors* allows students to experience the entire design thinking process in a short time period. (<http://www.projectpixelpress.com/floors/>)

Objectives:

- Experience the design thinking process
- Apply design thinking to a challenge
- Test a design and observe the user's interaction
- Design a level in the Pixel Press *Floors* app for iPad
- Apply graphing concepts to the real world

Task 1: Essential Questions



What makes a game fun?

How can we empathize with a user to design a product?

How can we use design thinking to innovate?

How can we utilize user feedback to improve a design?

As students walk in, have the following questions displayed on the board to answer ...

1. What is your favorite game to play?
2. Why is this game your favorite?
3. What characteristics make this game fun?

Discuss student responses to the questions. Emphasize that there are multiple characteristics that make a game "fun."

Unveil the design challenge ...



*****These blue boxes are examples of announcements you can make to the class about the upcoming lesson**

"Your challenge is to design the most fun game level. All levels will be submitted and available to players across the world."

Show this 3-minute video (<https://vimeo.com/90266089>) to expose students to Pixel Press *Floors*.

Explain the process to design thinking and the steps that will be taken to make a fun level that meets the design challenge goal.

"To help us design the most fun game level, we will use a process called 'design thinking.' Design thinking is a problem solving process used to develop new products. First you will play three test levels and describe what exactly makes a fun level. From there you will ideate/brainstorm level obstacles, develop a prototype level, and have users test it and give you feedback.





EMPATHIZE

**“To create meaningful innovations,
you need to know your users
and care about their lives.”**

WHAT is the Empathize mode

Empathy is the centerpiece of a human-centered design process. The Empathize mode is the work you do to understand people, within the context of your design challenge. It is your effort to understand the way they do things and why, their physical and emotional needs, how they think about world, and what is meaningful to them.

WHY empathize

As a design thinker, the problems you are trying to solve are rarely your own—they are those of a particular group of people; in order to design for them, you must gain empathy for who they are and what is important to them.

Observing what people do and how they interact with their environment gives you clues about what they think and feel. It also helps you learn about what they need. By watching people, you can capture physical manifestations of their experiences – what they do and say. This will allow you to infer the intangible meaning of those experiences in order to uncover insights. These insights give you direction to create innovative solutions. The best solutions come out of the best insights into human behavior. But learning to recognize those insights is harder than you might think. Why? Because our minds automatically filter out a lot of information without our even realizing it. We need to learn to see things “with a fresh set of eyes,” and empathizing is what gives us those new eyes.

Engaging with people directly reveals a tremendous amount about the way they think and the values they hold. Sometimes these thoughts and values are not obvious to the people who hold them, and a good conversation can surprise both the designer and the subject by the unanticipated insights that are revealed. The stories that people tell and the things that people say they do—even if they are different from what they actually do—are strong indicators of their deeply held beliefs about the way the world is. Good designs are built on a solid understanding of these beliefs and values.



In empathy work, connect with people and seek stories

HOW to empathize

To empathize, you:

- **Observe.** View users and their behavior in the context of their lives. As much as possible do observations in relevant contexts in addition to interviews. Some of the most powerful realizations come from noticing a disconnect between what someone says and what he does. Others come from a work-around someone has created which may be very surprising to you as the designer, but she may not even think to mention in conversation.
- **Engage.** Sometimes we call this technique 'interviewing' but it should really feel more like a conversation. Prepare some questions you'd like to ask, but expect to let the conversation deviate from them. Keep the conversation only loosely bounded. Elicit stories from the people you talk to, and always ask "Why?" to uncover deeper meaning. Engagement can come through both short 'intercept' encounters and longer scheduled conversations.
- **Watch and Listen.** Certainly you can, and should, combine observation and engagement. Ask someone to show you how they complete a task. Have them physically go through the steps, and talk you through why they are doing what they do. Ask them to vocalize what's going through their mind as they perform a task or interact with an object. Have a conversation in the context of someone's home or workplace - so many stories are embodied in artifacts. Use the environment to prompt deeper questions.

EMPATHIZE

DEFINE

Transition: Empathize >> Define

Unpack: When you move from empathy work to drawing conclusions from that work, you need to process all the things you heard and saw in order to understand the big picture and grasp the takeaways of it all. Unpacking is a chance to start that process - sharing what you found with fellow designers and capturing the important parts in a visual form. Get all the information out of your head and onto a wall where you can start to make connections—post pictures of your user, post-its with quotes, maps of journeys or experiences—anything that captures impressions and information about your user. This is the beginning of the synthesis process, which leads into a 'Define' mode.



DEFINE

“Framing the right problem is the only way to create the right solution.”

WHAT is the Define mode

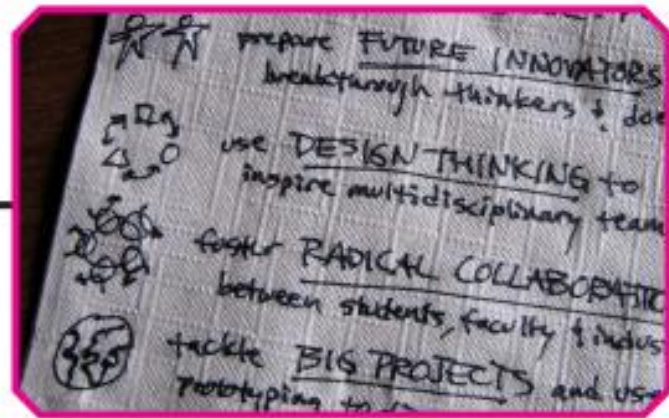
The Define mode of the design process is all about bringing clarity and focus to the design space. It is your chance, and responsibility, as a design thinker to define the challenge you are taking on, based on what you have learned about your user and about the context. After becoming an instant-expert on the subject and gaining invaluable empathy for the person you are designing for, this stage is about making sense of the widespread information you have gathered.

The goal of the Define mode is to craft a meaningful and actionable problem statement – this is what we call a point-of-view. This should be a guiding statement that focuses on insights and needs of a particular user, or composite character. Insights don't often just jump in your lap; rather they emerge from a process of synthesizing information to discover connections and patterns. In a word, the Define mode is sensemaking.

WHY define

The Define mode is critical to the design process because it results in your point-of-view (POV): the explicit expression of the problem you are striving to address. More importantly, your POV defines the RIGHT challenge to address, based on your new understanding of people and the problem space. It may seem counterintuitive but crafting a more narrowly focused problem statement tends to yield both greater quantity and higher quality solutions when you are generating ideas.

The Define mode is also an endeavor to synthesize your scattered findings into powerful insights. It is this synthesis of your empathy work that gives you the advantage that no one else has: discoveries that you can leverage to tackle the design challenge; that is, INSIGHT.



Articulate the meaningful challenge

HOW to define

Consider what stood out to you when talking and observing people. What patterns emerge when you look at the set? If you noticed something interesting ask yourself (and your team) why that might be. In asking why someone had a certain behavior or feeling you are making connections from that person to the larger context. Develop an understanding of the type of person you are designing for - your USER. Synthesize and select a limited set of NEEDS that you think are important to fulfill; you may in fact express a just one single salient need to address. Work to express INSIGHTS you developed through the synthesis of information you have gathered through empathy and research work. Then articulate a point-of-view by combining these three elements - user, need, and insight - as an actionable problem statement that will drive the rest of your design work.

A good point-of-view is one that:

- Provides focus and frames the problem
- Inspires your team
- Informs criteria for evaluating competing ideas
- Empowers your team to make decisions independently in parallel
- Captures the hearts and minds of people you meet
- Saves you from the impossible task of developing concepts that are all things to all people (i.e. your problem statement should be discrete, not broad.)

Transition: Define >> Ideate



In the Define mode you determine the specific meaningful challenge to take on, and in the Ideate mode you focus on generating solutions to address that challenge. A well-scoped and -articulated point-of-view will lead you into ideation in a very natural way. In fact, it is a great litmus test of your point-of-view to see if brainstorming topics fall out your POV.

A great transition step to take is to create a list of "How-Might-We ...?" brainstorming topics that flow from your problem statement. These brainstorming topics typically are subsets of the entire problem, focusing on different aspects of the challenge. Then when you move into ideation you can select different topics, and try out a few to find the sweet spot of where the group can really churn out a large quantity of compelling ideas.



IDEATE

“It’s not about coming up with the ‘right’ idea, it’s about generating the broadest range of possibilities.”

WHAT is the Ideate mode

Ideate is the mode of the design process in which you concentrate on idea generation. Mentally it represents a process of “going wide” in terms of concepts and outcomes. Ideation provides both the fuel and also the source material for building prototypes and getting innovative solutions into the hands of your users.

WHY ideate

You ideate in order to transition from identifying problems to creating solutions for your users. Ideation is your chance to combine the understanding you have of the problem space and people you are designing for with your imagination to generate solution concepts. Particularly early in a design project, ideation is about pushing for a widest possible range of ideas from which you can select, not simply finding a single, best solution. The determination of the best solution will be discovered later, through user testing and feedback.

Various forms of ideation are leveraged to:

- Step beyond obvious solutions and thus increase the innovation potential of your solution set
- Harness the collective perspectives and strengths of your teams
- Uncover unexpected areas of exploration
- Create fluency (volume) and flexibility (variety) in your innovation options
- Get obvious solutions out of your heads, and drive your team beyond them



Maximize your innovation potential

HOW to ideate

You ideate by combining your conscious and unconscious mind, and rational thoughts with imagination. For example, in a brainstorm you leverage the synergy of the group to reach new ideas by building on others' ideas. Adding constraints, surrounding yourself with inspiring related materials, and embracing misunderstanding all allow you to reach further than you could by simply thinking about a problem.

Another ideation technique is building – that is, prototyping itself can be an ideation technique. In physically making something you come to points where decisions need to be made; this encourages new ideas to come forward.

There are other ideation techniques such as bodystorming, mindmapping, and sketching. But one theme throughout all of them is deferring judgment – that is, separating the generation of ideas from the evaluation of ideas. In doing so, you give your imagination and creativity a voice, while placating your rational side in knowing that you will get to the examination of merits later.

IDEATE

PROTOTYPE

Transition: Ideate >> Prototype

In order to avoid losing all of the innovation potential you have just generated through ideation, we recommend a process of considered selection, by which you bring multiple ideas forward into prototyping, thus maintaining your innovation potential. As a team, designate three voting criteria (we might suggest “the most likely to delight,” “the rational choice,” “the most unexpected” as potential criteria, but they’re really up to you) to use to vote on three different ideas that your team generated during brainstorming. Carry the two or three ideas that receive the most votes forward into prototyping. In this way, you preserve innovation potential by carrying multiple ideas forward—a radically different approach than settling on the single idea that at least the majority of the team can agree upon.



PROTOTYPE

“Build to think and test to learn.”

WHAT is the Prototype mode

The Prototype mode is the iterative generation of artifacts intended to answer questions that get you closer to your final solution. In the early stages of a project that question may be broad – such as “do my users enjoy cooking in a competitive manner?” In these early stages, you should create low-resolution prototypes that are quick and cheap to make (think minutes and cents) but can elicit useful feedback from users and colleagues. In later stages both your prototype and question may get a little more refined. For example, you may create a later stage prototype for the cooking project that aims to find out: “do my users enjoy cooking with voice commands or visual commands”.

A prototype can be anything that a user can interact with – be it a wall of post-it notes, a gadget you put together, a role-playing activity, or even a storyboard. Ideally you bias toward something a user can experience. Walking someone through a scenario with a storyboard is good, but having them role-play through a physical environment that you have created will likely bring out more emotions and responses from that person.

WHY prototype

To ideate and problem-solve. Build to think.

To communicate. If a picture is worth a thousand words, a prototype is worth a thousand pictures.

To start a conversation. Your interactions with users are often richer when centered around a conversation piece. A prototype is an opportunity to have another, directed conversation with a user.

To fail quickly and cheaply. Committing as few resources as possible to each idea means less time and money invested up front.

To test possibilities. Staying low-res allows you to pursue many different ideas without committing to a direction too early on.

To manage the solution-building process. Identifying a variable also encourages you to break a large problem down into smaller, testable chunks.



You can learn a lot from a very simple prototype

HOW to prototype

Start building. Even if you aren't sure what you're doing, the act of picking up some materials (post-its, tape, and found objects are a good way to start!) will be enough to get you going.

Don't spend too long on one prototype. Let go before you find yourself getting too emotionally attached to any one prototype.

ID a variable. Identify what's being tested with each prototype. A prototype should answer a particular question when tested. That said, don't be blind to the other tangential understanding you can gain as someone responds to a prototype.

Build with the user in mind. What do you hope to test with the user? What sorts of behavior do you expect? Answering these questions will help focus your prototyping and help you receive meaningful feedback in the testing phase.

PROTOTYPE

TEST

Transition: Prototype >> Test

Prototype and Test are modes that you consider in tandem more than you transition between. What you are trying to test and how you are going to test that aspect are critically important to consider before you create a prototype.

Examining these two modes in conjunction brings up the layers of testing a prototype. Though prototyping and testing are sometimes entirely intertwined, it is often the case that planning and executing a successful testing scenario is a considerable additional step after creating a prototype. Don't assume you can simply put a prototype in front of a user to test it; often the most informative results will be a product of careful thinking about *how* to test in a way that will let users give you the most natural and honest feedback.



TEST

“Testing is an opportunity to learn about your solution and your user.”

WHAT is the Test mode

The Test mode is when you solicit feedback, about the prototypes you have created, from your users and have another opportunity to gain empathy for the people you are designing for. Testing is another opportunity to understand your user, but unlike your initial empathy mode, you have now likely done more framing of the problem and created prototypes to test. Both these things tend to focus the interaction with users, but don't reduce your “testing” work to asking whether or not people like your solution. Instead, continue to ask “Why?”, and focus on what you can learn about the person and the problem as well as your potential solutions.

Ideally you can test within a real context of the user's life. For a physical object, ask people to take it with them and use it within their normal routines. For an experience, try to create a scenario in a location that would capture the real situation. If testing a prototype in situ is not possible, frame a more realistic situation by having users take on a role or task when approaching your prototype. A rule of thumb: always prototype as if you know you're right, but test as if you know you're wrong—testing is the chance to refine your solutions and make them better.

WHY test

To refine prototypes and solutions. Testing informs the next iterations of prototypes. Sometimes this means going back to the drawing board.

To learn more about your user. Testing is another opportunity to build empathy through observation and engagement—it often yields unexpected insights.

To refine your POV. Sometimes testing reveals that not only did you not get the solution right, but also that you failed to frame the problem correctly.



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Introduce the rubric to the students.

Name: _____

Scoring Guide for 5th Grade Graphing Unit Real World Experience

MEETING	<p>Accurately labeled, using coordinate plane notation, the corners of at least 5 obstacles</p> <p>Created an accurate line/dot plot for data collected about game skill ability</p> <p>Created an accurate line/dot plot for data collected about how long it takes a player to “die” or finish a game</p> <p>Created an accurate line/dot plot for data collected about the design cycle reflection</p> <p>Clearly explained how you could use data presented in each line/dot plot</p> <p>Provided clear evidence as to how you implemented the math practice of making sense of problems and persevering</p> <p>Provided clear evidence as to how you implemented the math practice of using appropriate tools strategically</p> <p>Provided clear evidence as to how you implemented the math practice of being precise</p> <p>Reflected on use of the design cycle with an explanation of why they would change certain things</p>
DEVELOPING	Meets 7 of 9 of the proficient criteria
BEGINNING	Meets less than 7 of the proficient criteria Task to be repeated after re-teaching
Comments:	

EMPATHY

Design thinking starts by gaining empathy for potential product users. To design an effective product, we must put ourselves in the shoes of the users to identify the scope of the challenge.

Interview your partner using these guiding questions and your own questions to gain insight as to your partner's wants/needs.

- What is your favorite game/video game?
- What makes that game fun?
- What makes the game challenging?
- How do you feel when you encounter a really difficult challenge in a game?
- How do you overcome these really difficult challenges in games that you encounter?
- Your partner's game playing skill level: BEGINNER INTERMEDIATE ADVANCED

Notes from your first interview ...

Collect the data about game playing skill level for the whole class and share the results with the students. (Students will use this data to develop line/dot plots as a way to share out the data in Task 5)

Example student responses:

“Gamers play games for a variety of reasons. Most find them entertaining or relaxing. Some like to play games that are shorter in time, but have high replay value (like minesweeper) while others enjoy in depth gaming that has a longer play time (like World of Warcraft). Perseverance is important in gaming, but frustrating obstacles can sometimes cause a gamer to give up and quit the game.”

In a Timed Pair Share structure, have partners open the *Floors* app for iPad and play.

- Partner A plays for 3 mins. while partner B observes
- Partner B plays for 3 mins. while partner A records ideas about the PROS & CONS of this level
- Partner A plays another level for 3 mins. while partner B records ideas about the PROS & CONS of this level
- Partner B plays another level for 3 mins. while partner A records ideas about the PROS & CONS of this level
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(example student responses: PRO: the falling blocks in this level made it really intense and exciting! CON: The spikes were way overdone. It was too difficult to navigate the level, and practice didn't make it easier, just more frustrating)

Note: To have a wide variety of empathy building experiences, have students play a level from “Most Recent”, “Features,” and “Most Popular” categories on the Floors Arcade.

Task 2: DEFINE (3 minutes)

Design is most effective when it is aligned to a short and specific goal that guides the development of a solution. This goal may change throughout the process, but clearly defining an initial challenge will help focus brainstorming of potential solutions.

"Now that we've gained empathy for our users, the players of our levels, let's define what a level needs to be fun. Refer back to our notes from the empathy section. Based on what you learned, you will define the scope of your challenge. We'll use this 'define' step throughout the rest of the design process to guide the design of our level."

"How might I design a game with obstacles that is fun for my partner?"

IDEATE

Ideation is the creative process of generating ideas. Having initial collection of numerous, varying and unbounded solutions to the design challenge leads to innovative thought once constraints are in place.

"Now that we have a challenge defined, let's brainstorm obstacles for the levels. Take 15 minutes to sketch some example level obstacle in your logbook. Refer back to the challenge you defined in the last step to help guide your brainstorm. The goal of this step is to have a high quantity of obstacles sketched. Since you only have 15 minutes, they may not be of the highest quality, but by sketching many ideas, you will have more to choose from when it comes time to design the actual level."

Once students have brainstormed, potential level obstacles, it's time for peer feedback. Effective design requires willingness to show users unfinished work, and feedback during the ideation step will help ensure student designers are working toward their visions of fun levels.

"Designers utilize feedback throughout the design process to ensure that their product is meeting the needs of users. It can be difficult to have others look at work that you know is unfinished, but will help ensure that you are on the right track to making a fun level."



Share your initial ideas for your game design with your partner in a Timed Pair Share structure. Partner B shares ideas about obstacles he/she chose with Partner A for 3 mins. Partner A provides feedback about the PROS and CONS of the obstacles for 2 mins. Then the roles switch. Partner A shares ideas about obstacles he/she chose with Partner B for 3 mins. Partner B provides feedback about the PROS and CONS of the obstacles for 2 mins. be sure to keep notes about the feedback you receive.

(example of student feedback: These two obstacles are quite similar. Could you add spikes or lava to make this one more difficult? Or is there a way to add a 2nd pathway to get through this obstacle? That might make it more fun. Would adding a power-up to this obstacle give something for a player to strive for?)

Task 3: PROTOTYPE

Developing a rapid product prototype allows a designer to quickly get the product into the hands of a user for testing and feedback. Because a prototype is unfinished, the “cost for changing course based on feedback is low.”

Now that the students have received feedback on obstacles that align to the challenge they defined, the next step is to begin forming the ideas into a playable prototype.

Pass out the Pixel Press Level Design Paper, Sketch Guides, and rulers. For the prototype, students will need to draw levels using the glyphs associated with the Floors app. The purpose of the glyphs is that the app can recognize and translate them into a playable level. Sketch Guides will show student the meaning of each glyph.

HOW TO VIDEOS:

[Drawing Terrain](#)

[Coins & Super Coins](#)

[Drawing Ladders](#)

[Drawing Falling Blocks](#)

[Drawing Lava Pits](#)

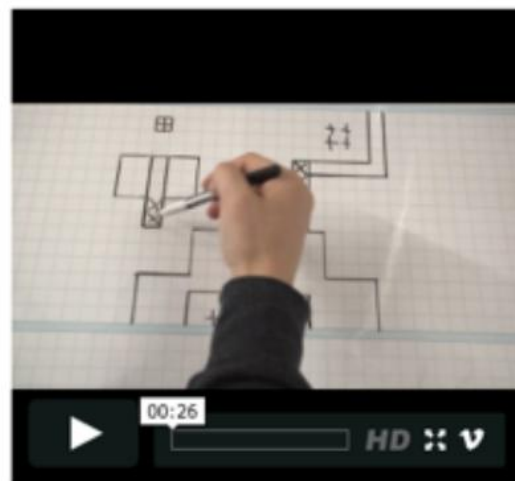
[Drawing Monkey Bars](#)

[Assigning Portals](#)

[Placing Start & End Points](#)

The shorter the tutorial the better! After an overview of the basics, students are able to pick up level design quite quickly, and are able to assist each other.

(Emphasizing precision drawing will help the app capture process go more smoothly in the later steps. MP1)



Once they have a prototype, go through the feedback loop again with the prototype in a Timed Pair Share structure for the amount of time you choose. (What worked/didn't work; how can I make it more fun?) Afterwards, students can revise prototypes as necessary.



1 print blank sketch sheet

Print in color or black and white, or you can buy our sketch kit from projectpixelpress.com. For the best results we recommend using a pencil with an eraser and a small ruler.



sketch sheet



pencil and eraser



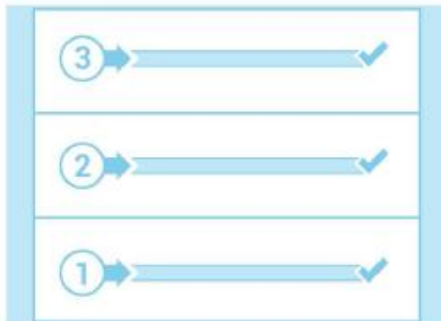
ruler

2 sketch your 3-floor-level following these instructions

Follow this instruction sheet to learn the creator elements used to create levels. Don't be afraid to practice. Start with terrain and then add challenges like coins and ladders.

3 FLOOR LEVELS

Levels are made of up to three floors. Starting at the bottom, the player will navigate from left to right. You can create levels with one to three floors.



WHAT CAN THE PLAYER DO?

The player can walk, run, jump, double jump, and use power-ups. The guide below will show you the player's capabilities.

character height

1 square



walk and run

Reach full run speed after 3 squares



vertical jump

3 squares, up to 6 with double jump



running jump

4 squares, up to 8 with double jump



3 capture a picture of your finished level with the Floors™ app

Use the Floors™ app to capture your level design by tapping the "capture" button. Your drawing will be turned into a playable game right before your eyes! Watch for shadows or uneven lighting – they can affect the quality of your capture.

For the best results, stand directly over your drawing and make sure you hold the device flat (not tilted). Align the border on the screen with the border on your sketch sheet. The camera will automatically take the picture when you have it aligned correctly. If you have problems try moving the camera a bit closer or farther away from the sketch sheet.

4 design, edit and test your level

Once you've captured your level, use Floors™ to design it, test it, and even edit and enhance it using our draw-in-app tool. Remember, you're creating a video game so be sure to test it a lot. Don't be afraid to experiment and take your time to get it right.

5 play and share

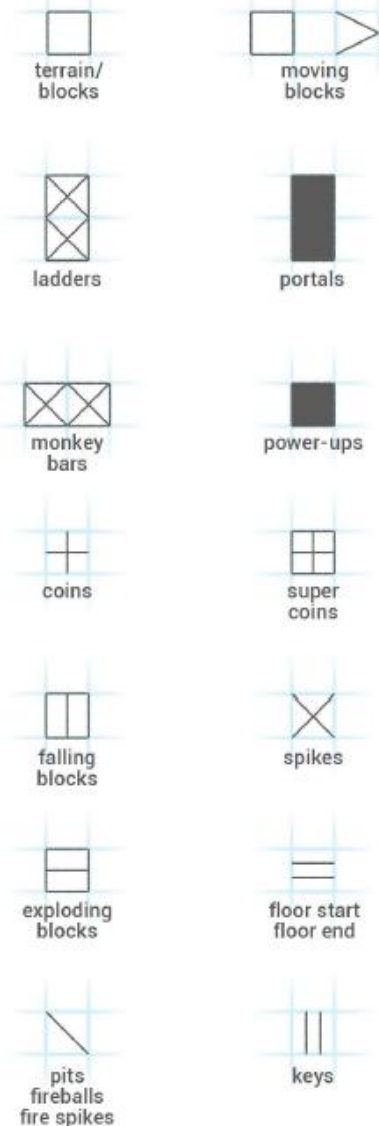
Finished creating your level? Save it to your device to play it whenever you want, and publish to the Floors™ Arcade where others can play it too. Every time it's played by someone in the Arcade your play count goes up. You'll know exactly how many people have played your level.

You can draw it, but can you beat it?



Creator Elements

Below are the 14 creator elements you'll use to build your levels in Pixel Press Floors™.



Creator Elements: How-to

Here's a more in-depth look at each creator element and how to use them.

terrain / blocks

terrain / blocks / platforms are the general environment you create for the player to navigate on and through. Terrain can be many shapes and sizes but must follow along the blue grid lines.



ladders can be used to reach areas above or below. Can be drawn through terrain and platforms.



monkey bars allow the player to "hang" from the ceiling and move. These are useful to avoid hazards.



coins can be placed anywhere in your level and players will be challenged to collect them all. Place as many as you like.



falling blocks can be added to any terrain and will fall after the player touches the top of the block.

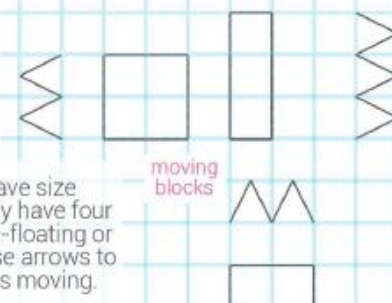


exploding blocks can be added to any terrain and are destroyed by the bomb power-up. Connected blocks explode together.

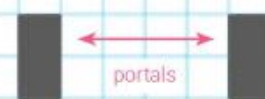


pits / fireballs / fire spikes Falling in a pit will result in the loss of one life and the player will start the floor over. Fireballs and fire spikes can be added to pits. Pits can only be placed between terrain.

moving blocks don't have size restrictions but can only have four sides. They can be free-floating or connected to a wall. Use arrows to show where the block is moving.



portals let players teleport from one point to another. A portal can only be connected to another portal on the same floor.



power-ups can be strategically placed to help the player. You can set power-ups to be a bomb, a jet pack, coin magnet, an more!

New power-ups can be unlocked through the Pixel Press Floors™ store.



super coins are unique coins, and only one can be placed per floor.



spikes cause health-loss when touched. Spikes can be connected to terrain or free-floating.



floor start and end points (optional) are used to define where the player starts and finishes each of the three floors.

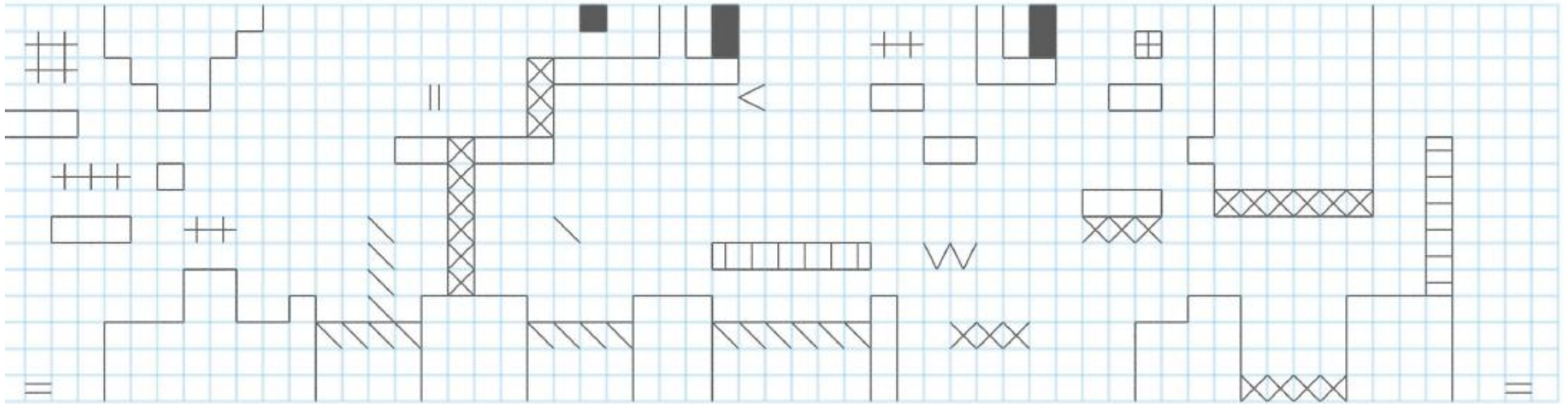
When these are not placed the start and finish are placed at the far left and right, respectively.



keys (optional) when a key is placed, the floor end point will stay locked until the key is collected. Only one key can be placed per floor.



Here's an example of a level using all 14 creator elements



And here's what that level looks like after it's been designed.



FLOOR 3 START

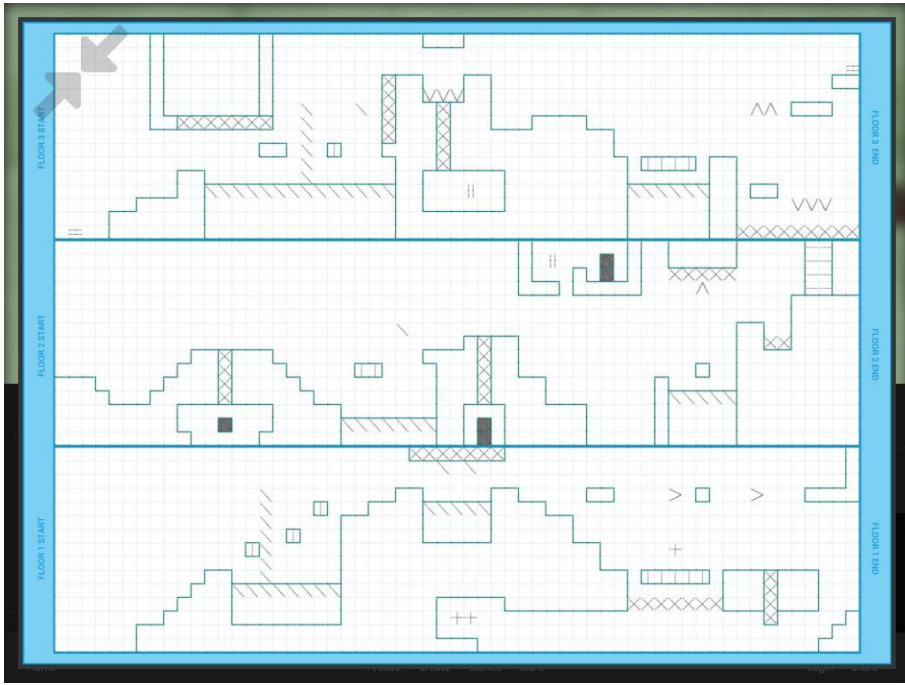
FLOOR 2 START

FLOOR 1 START

FLOOR 3 END

FLOOR 2 END

FLOOR 1 END



Task 4: TEST

Effective design requires a willingness to show users unfinished work. Observing users interact with the product helps a designer see if the product is meeting its goal. In the software development industry, this practice is referred to as “beta testing.”

Once students have their levels to a playable point, they should have other students play test and provide feedback. Many students may feel like their level is unfinished. They can be reminded that the level is just a prototype and getting feedback on unfinished work is an important part of the design process. Remind students that the best feedback is often not that coming from the tester’s opinion, but rather just by observing the tester play. Much can be learned from the process of watching a user use or even break a design.

CLASS DATA COLLECTION

Have students time to the nearest, quarter minute, their test players for how long it takes for the test player to “die” or finish a game.

Collect the data for the whole class and share the results with the students.

(Students will use this data to develop line/dot plots as a way to share out the data in Task 5)

ITERATE

A good design is never finished. User demand and interest is continuously changing. Successful designers stay ahead of the curve and continually tweak their products.

(If additional time is available, students will likely feel inspired to continue designing the rest of the level. Additional *Floors* time can be a good motivator to finish other work.)

CLASS DATA COLLECTION

Ask everyone in the class this question:

If you had 5 additional minutes during this process, would you spend it:

- A. Gaining more empathy
- B. Re-defining your challenge
- C. Ideating
- D. Continuing to develop the prototype
- E. Observing a play tester

Collect the data for the whole class and share the results with the students.

(Students will use this data to develop line/dot plots as a way to share out the data in Task 5)

Task 5: ASSESSMENT

In order to help a novice game player, you will develop a cheat code sheet showing the location of various obstacles such as power ups, portals, monkey bars, ladders etc.

(Part 1) When looking at your plan on the design template, label the X and Y axis on each level. On the sheet below, record, in a list, the name and location of the corners of at least five obstacles. Be sure to use coordinate plane notation when labeling the corners' locations.

(Part 2) In three different line/dot plots, share the class data collected throughout the Real World Experience. (game play levels, time to play a game, design cycle reflection)

(Part 3) Reflection:

Explain how could you use the data represented in the dot plots?

Explain and provide evidence as to how you implemented the Mathematical Practices of making sense of problems and persevering in solving them, using appropriate tools strategically, and being precise along with any math practices that applied.

If you could do this design cycle again, what would you do differently and why?