**How big is the table, how small is the White Rabbit’s house?**

How can we use ratio & proportion when building sets & props?

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| Year Group | 8 | Subject | Maths | Employer Link | Pinewood Studios |

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| Curriculum Objective(s) | * To solve ratio and proportion problems to find missing values using scaling and multipliers
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| Careers Objective(s) | * To highlight the relevance of Maths to future career paths
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| Essential Skills Development | * Listening, Speaking, Teamwork, Creativity (build these skills [here](http://skillsbuilder.org/hub))
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| Task Overview and Connection to Employer | The objective of this lesson is for students to create and interpret 2D drawings (plan view and elevation view) as the first stage in the process of designing and creating a 3D set for a film. Students will explore the process that a set designer would undertake when designing a set to be built at Pinewood Studios.  |

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| Essential Prior Learning Checklist | * Students will be able to write quantities in a ratio
* Students will be able to calculate multipliers and scalers Checklist
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| Context: Where might this task be sequenced within the learning journey?  | This lesson could be placed at the end of a Mathematics unit on Proportional Reasoning. |

Lesson Structure

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| Phases (with indicative times) | Main Activities | Key Questions | Teacher Notes (inc suggestions for support & challenge) | Resources Required |
| 1. Introduction: (10 mins) | Play Video 1: Meet the Prop Master!  | * What does the role of a prop master involve?
* How do they use proportional reasoning in their work?
 | Students do not need to know the role before; but by the end of the introduction students need to understand the role of a prop master and the importance of this first stage; and how this links to Pinewood Studios.Support: facilitate a whole class discussion to support students understand the role. Challenge: Ask students key questions prior to showing them the video and encourage students to work individually for key questions.  | Slides 4 - 14  |
| 2. Exploring the Context (10 mins) | Play Video 2: Importance of sets and props when filming!  | * How can you create illusions with props?
 | Students need to understand the importance of proportion when creating props and sets. | Slides 6 - 7  |
| 3. Setting the Brief (15 mins) | A new TV adaptation of Alice in Wonderland: talk through the concept and play video (slide 10). Explore the challenges of making Alice ‘appear’ miniature and then gigantic. Work through the process of identifying the dimensions of the different props when Alice is miniature.  | * How did they make Alice look miniature? Did they shrink the actress? How did they make it seem realistic? What’s happening to the props and set around her?
* If she has 1 sip, how much smaller is she now? What is the ratio of her ‘normal’ to ‘miniature’ height?
* If the ratio is 4 : 1. How many times smaller has she become? So, how many times bigger will all the props need to become around her?
* How much smaller is she now? What is the ratio of her ‘normal’ to scene 2 ‘miniature’ height? What is the ratio of scene 1 to scene 2?
 | Students need to understand that in order to make Alice appear to change size; the props and the set around her will change size - it’s all about perspective and proportion! Support: Work through the Mad Hatter’s Tea Party scenes as a class. Challenge: Give students a short time frame to complete work independently and check in with their progress at each stage. (Facilitate through use of think.pair.share) | Slides 9 - 24 Print the table on slide 21  |
| 4. Working on the Task (30 mins) | Students work individually or in small groups to calculate the different size props needed for the scenes filmed in the White Rabbit’s House. Students can be creative and add in additional props to help bring the scene to life. They will need to research the ‘normal’ size of each of these props.  | * How tall is she for scene 1?
* What’s the ratio of ‘normal’ to ‘gigantic scene 1’?
* How tall is she for scene 2?
* What’s the ratio of ‘normal’ to ‘gigantic scene 2’?
* By how many times smaller will each prop need to be for scene 1 and scene 2?
 | Students to complete the table on slide 26Support: Provide students with 3D shapes so they are able to move the shapes and accurately draw the plan and elevation views of these (Eg. cubes/cuboids/cylinders/hexagonal prisms)Challenge: Encourage students to use more complex 3D shapes. | Slides 24 - 28Print the table on slide 26 |
| 5. Sharing Outcomes (5-10 mins) | Class Discussion centred around key questions on slide 30. Compare students' answers and methods. Did all students use the same method? Change of Plan: pose the problem to students and ask them how this will affect their calculations. See teacher notes for the depth by which this could be explored. | * What dimensions did you need to use for the new props in scene 1 and 2 at White Rabbit’s House?
* When calculating these for scene 2 what methods did you use? Did you calculate this from the “normal” dimensions or from scene 1 dimensions?
* What additional props did you decide to add in?
* What dimensions would you need to use to create these new props?
 | Pose key questions to students to discuss on tables/in pairs before leading a class discussion. Challenge: Complete the ‘change of plan’ task on slide 31 and ask students to recalculate the size of all the props and the maximum size Alice could be for this scene. | Slides 30 - 32 |
| 6. Feedback and Celebration (5mins) | Reflect on the task as a class and discuss aspects students particularly enjoyed and if any aspects of the role surprised them.  | * What did you enjoy most about this task?
* Did you know that prop masters would use proportional reasoning in such a creative industry?
 | Facilitate short class discussion. |   |