MOVIE MATHS
TEACHING RESOURCE

Using Hagrid's costumes, props and set design, students will examine some of the ways in which Maths is used in filmmaking to bring the magic to life.

LEARNING OBJECTIVES

- To discover the secrets of creating a half-giant by using scale factors and percentages to create props and costumes
- To use scale factors and scale diagrams in filmmaking to understand the importance of mathematical operations in filmmaking
- To understand real-world applications of Maths in the film industry

LESSON FOCUSES

PRE-VISIT:
Students will learn about the practical applications of scale factors and percentages.

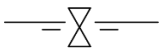
VISIT LESSON:
Students will have the opportunity to understand how mathematic operations support planning in set design and in creating believable characters in the Harry Potter film series.

POST-VISIT:
Students will create their own white card models using scale factors and percentages.

MOVIE MATHS
PRE-VISIT LESSON

Percentages and scale factors are necessary to create a film. Props, costumes and sets are created using mathematical principles which use enlargement and scaling in the planning process. Explain to students that they will see different size props and costumes when they visit the Studio Tour. To prepare for this, ask them to complete the 'Percentages and Scale Factors' worksheet.

Give out the worksheet for students to practice working out percentages and scale factors in preparation for their visit to Warner Bros. Studio Tour London – The Making of Harry Potter.



SUPPORTING DOCUMENTS:

- Percentages and Scale Factors worksheet.

MOVIE MATHS
PRE-VISIT 'PERCENTAGES AND SCALE FACTORS' WORKSHEET

1. You have watched 25% of a film which is 120 minutes long. How many minutes have you watched?

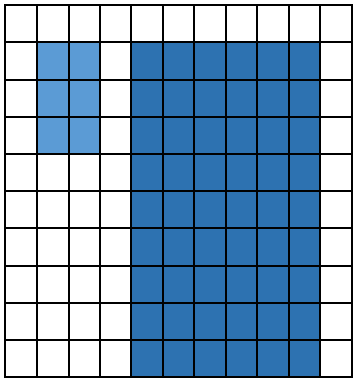
2. Now you watch another 60 minutes. What percentage of the film have you seen now?

3. When filming in the Great Hall, there were four tables each with an even amount of Hogwarts students. If there were 200 extras, how many were sat on one table?

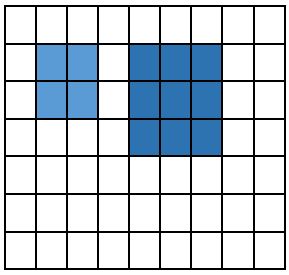
4. In what mathematical terms could you explain the number of students on each table in reference to the whole?

5. At Honeydukes, there are 180 Pepper Imps in a sweet jar. Katie wants to buy 1/3 of the sweets. Dean wants to buy 45% of the sweets. Work out how many sweets each child wants to buy. Who will buy more sweets?

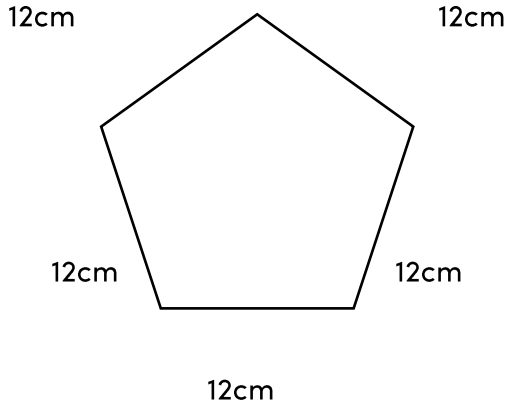
6. The shape below has been enlarged. Can you work out what scale factor it has been enlarged by?



7. What is the Scale Factor of the enlarged shaded space below?



8. A chocolate frog box is a pentagon (shown below). What would the length of each side be if the scale factor is 1/4?



9. If the shape below was enlarged by scale a factor 2, what would the length and width measurements be?

300cm

150

10. Each set for the Harry Potter films was designed by hand, to scale. The scale for Hogwarts castle was 1:24 (1 inch to 2 feet). If a tower in the castle needed to be 96 feet in real life, how many inches would it be on the plan?

MOVIE MATHS
PRE-VISIT WORKSHEET

Answer Sheet

1. 25% of 120 – 30 minutes
2. Another 60 minutes – 75% in total
3. 50 students per table
4. 0.25, 1/4
5. Katie wants to buy 60 sweets. Dean wants to buy 81 sweets
6. Answer – scale factor of 3
7. Answer – scale factor of 1.5
8. 3cm
9. 600cm long, 300cm wide
10. 4 feet/48 inches

MOVIE MATHS
POST-VISIT LESSON

Remind students about their visit to Warner Bros. Studio Tour London – The Making of Harry Potter. Remind them of the white card models they saw in the classroom and in the Art Department (for example Hagrid's hut, the Burrow etc). Ask them to explain why white card models are important. Ask the students to name a sensible ratio in centimetres and metres for a white card model. For example, 1 cm: 1 m. Scale is a way of representing film sets using ratio. Every centimetre on the construction drawings and the white card model represents 1 metre of the finished film set.

SUPPORTING DOCUMENTS:

- Plan and Elevation of The Weasley Burrow.
- Instructions to make a white card model.

MOVIE MATHS
POST-VISIT LESSON

Attached is a plan and elevation drawing for the Weasley Burrow, along with a blown-up version of the scale information table.

Ask students to examine the drawing and work out the scale and ratio.

Now explain to the students that they are going to work through the process of creating a set, culminating in the production of a white card model.

They will need

Graph paper to create the scale design for their set

Rulers

Calculators

White card

Pencils

PVA glue

Sellotape

Thread for flying elements in the set

Process

1. Ask students to decide on a historical style for the set that they are creating. They will need to research the style, angles and architecture of their chosen historical period. Ask them to create a mathematical reference board.

2. Once the reference board is created, ask the students to develop a size and architecture reference document which may include how to calculate the dimensions, and the angles they wish to create to represent the shape of the set.

3. Ask students to make a rough sketch of their set. This does not need to be to scale.

4. At this point give them some feedback (this can be peer led) about the shapes within the set that they are planning to construct. Encourage them to use pythagoras theorem and the Fibonacci sequence/ golden rule to assess the validity of their structure and the aesthetics of it.

5. Now ask the students to draw their set to scale, this may the same scale as the burrow or a scale of their choice. Provide them with graph paper in order to aid their drawing of their set. Remind them about drawing the plan (birds eye view) as well as the elevation of the building.

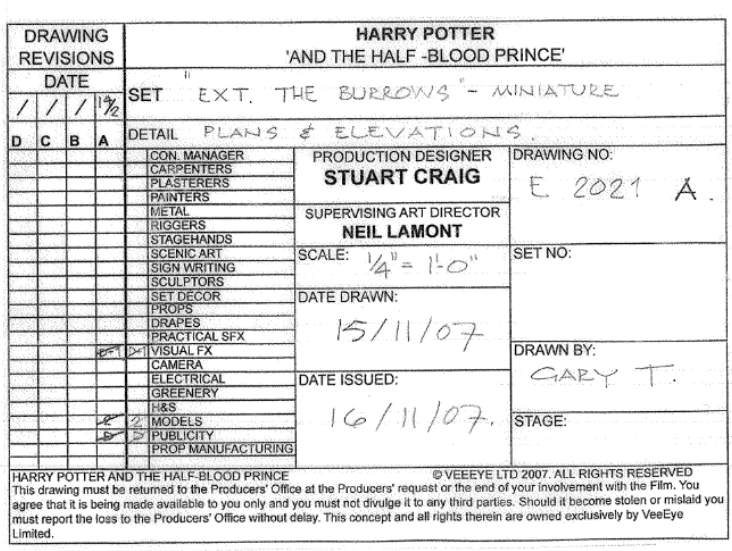
6. Ask students to present their reference documents, sketches and plans and elevations to the rest of the class for comment and feedback.

7. Give them time to make the changes from the feedback before they make their white card models.

8. Ask students to measure out their white card carefully, leaving a lip of card to stick the set together. For student who may struggle with this, use the net below to support their design.

9. Once they have created their white card model designs, they can add design features to show the genre, period and style of their set.

10. Once their scale white card models are complete, they can write a story or script about the character who lives there.



DRAWING REVISIONS

DATE			
/	/	/	11½
D	C	B	A

HARRY POTTER
'AND THE HALF -BLOOD PRINCE'

SET "EXT. THE BURROWS" - MINIATURE

DETAIL PLANS & ELEVATIONS.

CON. MANAGER	
CARPENTERS	
PLASTERERS	
PAINTERS	
METAL	
RIGGERS	
STAGEHANDS	
SCENIC ART	
SIGN WRITING	
SCULPTORS	
SET DECOR	
PROPS	
DRAPES	
PRACTICAL SFX	
VISUAL FX	
CAMERA	
ELECTRICAL	
GREENERY	
H&S	
MODELS	
PUBLICITY	
PROP MANUFACTURING	

PRODUCTION DESIGNER
STUART CRAIG

SUPERVISING ART DIRECTOR
NEIL LAMONT

SCALE: ¼" = 1'-0"

DATE DRAWN: 15/11/07

DATE ISSUED: 16/11/07.

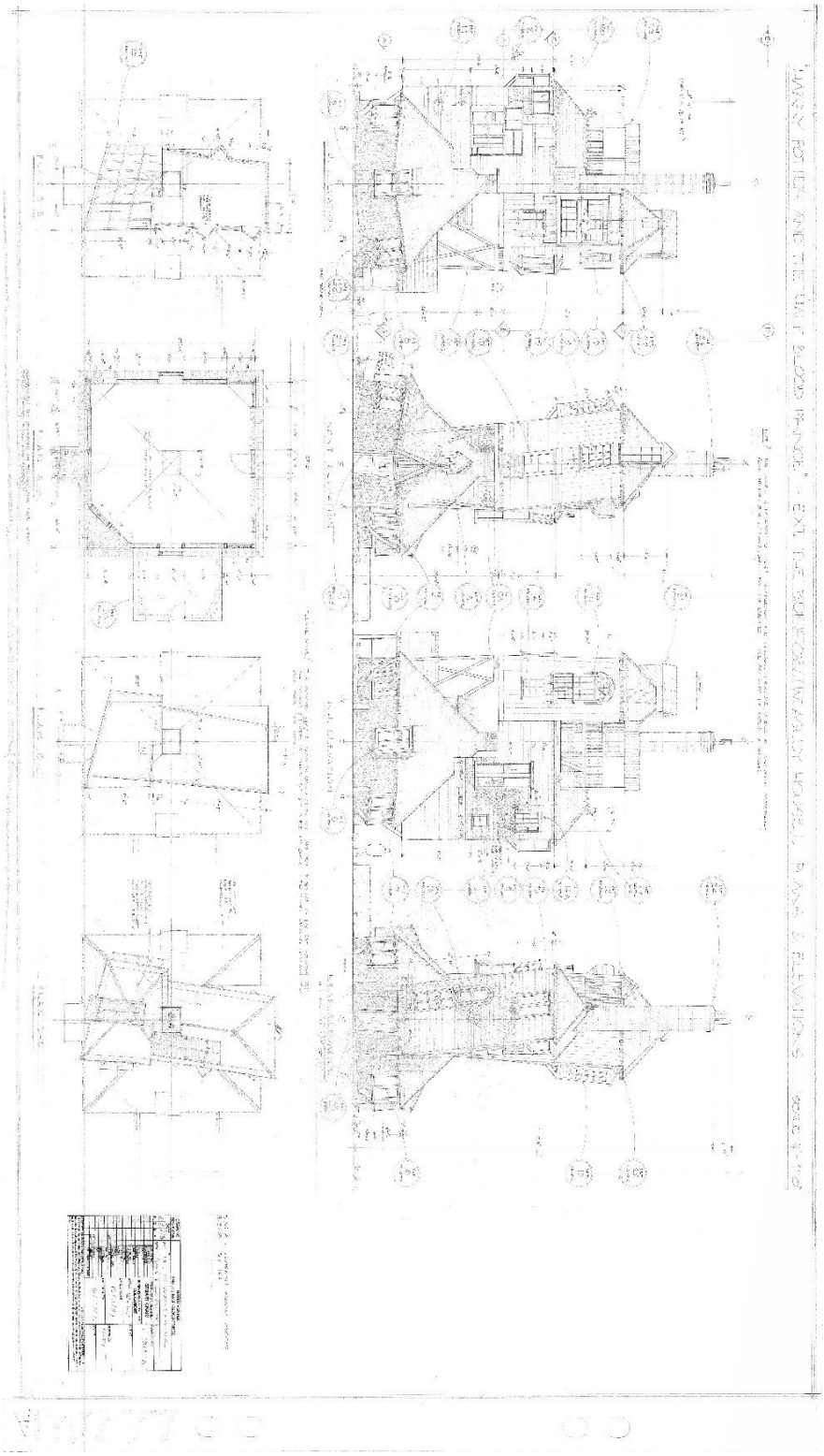
DRAWING NO: E. 2021 A.

SET NO:

DRAWN BY: GARY T.

STAGE:

HARRY POTTER AND THE HALF-BLOOD PRINCE



NATIONAL CURRICULUM/EXAM BOARD LINKS

Maths

KS2

Pupils should consolidate their understanding of ratio when comparing quantities, sizes and scale drawings by solving a variety of problems.

Pupils can solve problems by applying their mathematical skills to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

KS3/KS4

Pupils should be taught to apply arithmetic fluently to problems, understand and use measures, make estimates and sense check their work

define percentage as 'number of parts per hundred', interpret percentages and percentage changes as a fraction or a decimal, interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100%

use scale factors, scale diagrams and maps

They should be taught to apply their mathematics to both routine and non-routine problems, including breaking down more complex problems into a series of simpler steps.