**Physics: Music Festival Session 1**

**Learning Objectives/aims**

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| **1.** | **Introduce Ashfield Music Festival project** |
| **2.** | **Get students into groups** |
| **3.** | **Assign and introduce roles** |
| **4.** | **Introduce Isaac Physics and how to sign up** |

**Main Learning Activities** *(starter, main learning activities, plenaries with timings)*

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| **Time** | **Learning Activities** | **Curriculum links** | **Resources** |
| Intro | Music festival promo video as they enter |  | Video on PC/projector |
| 15 mins  **15 mins** | Introduce the project, Isaac Physics, and the format of the project sessions |  | Isaac Physics books |
| 10 mins  **25 mins** | Puzzle solving session |  | Isaac Physics question |
| 5 mins  **30 mins** | Ask the students to suggest all the things involved in a music festival eg stage, food stalls, venue, sound, lighting etc and what jobs are involved in the festival eg project manager, engineers, food stall holders etc then feedback. Collect all the answers on the board. | * explaining everyday and technological applications of science; evaluating associated personal, social, economic and environmental implications; | Greendale Festival booklet |
| 5 mins  **35 mins** | Watch the initial video (should be part of the presentation) and afterwards compare the list of things and jobs to those on the video. Tell the students they are going to create their own music festival and they are going to take on some of the roles in the video |  | Ashfield video |
| 10 mins  **45 mins** | Show key skills slide and ask students to select one person for each skill. Feedback and then reveal who is doing which job. |  |  |
| 5 mins  **50 mins** | Go through the roles and give some information about them |  |  |
| 5 mins  **55 mins** | Together: Consider H&S aspects of music festival | * evaluating risks both in practical science and the wider societal context, including perception of risk |  |
| 5 mins  **60 mins** | Set homework:   * Sign up to Isaac Physics and complete first assignment. * Watch electrical engineer video |  |  |

**Physics: Music Festival Session 2**

**Learning Objectives/aims**

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| **1.** | **Understand the electrical requirements for their music festival** |
| **2.** | **Learn/revise relationships between potential difference, current, resistance, power.** |

**Main Learning Activities** *(starter, main learning activities, plenaries with timings)*

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| **Time** | **Learning Activities** | **Curriculum links** | **Resources** |
| Starter on board | “What are the benefits of renewable energy sources vs. non-renewables?” | * renewable and non-renewable energy sources used on Earth, changes in how these are used. * appreciating the power and limitations of science and considering ethical issues which may arise | Question and space for brainstorm on worksheet |
| 2 mins  **2 mins** | Feedback on starter |  |  |
| 10 mins  **12 mins** | Isaac Physics questions feedback |  |  |
| 3 mins  **15mins** | Together: Get students to suggest what an electrical engineer needs to think about for a music festival. (Feedback from homework) | * explaining everyday and technological applications of science; evaluating associated personal, social, economic and environmental implications; |  |
| 15 mins  **30 mins** | Explain circuit diagrams, components and how to measure voltage/current and calculate power  V=IR  P=IV | * making and recording observations and measurements using a range of apparatus and methods * measuring resistance using p.d. and current measurements * exploring current, resistance and voltage relationships for different circuit elements; including their graphical representations |  |
| 20 mins  **50 mins** | In groups: build circuits from diagrams and measure current/voltage, calculate power | Circuit components:  Motors, LEDs, wires, multimeters, batteries |
| 5 mins  **55 mins** | Do example power calculation for music festival |  | Example on worksheet |
| 5 mins  **60 mins** | Set homework:   * Complete assignment 2 on Isaac Physics * Watch light and sound engineer videos and fill in worksheet |  |  |

**Physics: Music Festival Session 3**

**Learning Objectives/aims**

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| **1.** | **Understand the sound and lighting requirements for their music festival** |
| **2.** | **Learn/revise wave physics: frequency, wavelength, amplitude, interference, reflection, refraction** |

**Main Learning Activities** *(starter, main learning activities, plenaries with timings)*

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| **Time** | **Learning Activities** | **Curriculum links** | **Resources** |
| Starter on board | Special effects and illusions |  |  |
| 2 mins  **2 mins** | Feedback on starter |  |  |
| 10 mins  **12 mins** | Isaac Physics questions feedback |  |  |
| 3 mins  **15mins** | Together: Get students to suggest what sound and lighting engineers need to think about for a music festival. (Feedback from homework)  Invisibility demo? |  | Invisibility demo |
| 15 mins  **30 mins** | Explain waveforms; amplitude, frequency, wavelength, speed (v = f λ); difference/similarity between light and sound waves | amplitude, wavelength, frequency, relating velocity to frequency and wavelength |  |
| 10 mins  **40 mins** | In groups:  Sound: calculate amplitude and frequency from waveforms and convert to real sound using frequency generators, distinguish between pitch and volume (frequency and amplitude) | * making and recording observations and measurements using a range of apparatus and methods * amplitude, wavelength, frequency, relating velocity to frequency and wavelength | Tablets with frequency generator app/website  Sound worksheets |
| 10 mins  **50 mins** | Light: Build smartphone Pepper’s ghost illusion | * velocities differing between media: absorption, reflection, refraction effects | Acetate sheets  Scissors  Tape  Tablets  Light worksheets |
| 5 mins  **55 mins** | Example question for music festival |  |  |
| 5 mins  **60 mins** | Set homework:   * Complete assignment 3 on Isaac Physics * Watch construction engineer video and fill in worksheet |  |  |

**Physics: Music Festival Session 4**

**Learning Objectives/aims**

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| **1.** | **Understand the considerations for constructing a stage for a music festival** |
| **2.** | **Learn/revise forces, Newton’s laws and gravity** |

**Main Learning Activities** *(starter, main learning activities, plenaries with timings)*

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| **Time** | **Learning Activities** | **Curriculum links** | **Resources** |
| Starter on board | Show various bridges/buildings – Which do you suggest is the strongest? |  |  |
| 2 mins  **2 mins** | Feedback on starter |  |  |
| 10 mins  **12 mins** | Isaac Physics questions feedback |  |  |
| 3 mins  **15mins** | Together: Get students to suggest what construction engineers need to think about for a music festival. (Feedback from homework) |  |  |
| 5 mins  **20 mins** | Explain forces as vectors; how to convert between mass and weight | * forces as vectors * calculating work done as force x distance; elastic and inelastic stretching * acceleration caused by forces; Newton’s First Law * weight and gravitational field strength |  |
| 20 mins  **40 mins** | In groups:  Build girder spanning two tables as strong as possible | Building materials:  Paper, paper rollers, tape |
| 10 mins  **50 mins** | Test structures |  | Weights |
| 5 mins  **55 mins** | Example calculation for music festival |  |  |
| 5 mins  **60 mins** | Set homework:   * Complete assignment 4 on Isaac Physics |  |  |

**Physics: Music Festival Session 5**

**Learning Objectives/aims**

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| **1.** | **Consider wider aspects of music festival** |
| **2.** | **Work as team to put together proposal** |

**Main Learning Activities** *(starter, main learning activities, plenaries with timings)*

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| **Time** | **Learning Activities** | **Curriculum links** | **Resources** |
| Starter on board | What bands would you like to see? |  |  |
| 2 mins  **2 mins** | Feedback on starter |  |  |
| 10 mins  **12 mins** | Isaac Physics questions feedback | 10 mins | Isaac Physics questions feedback |
| 3 mins  **15 mins** | Recap what needs to be in proposal |  |  |
| 40 mins  **55 mins** | In groups: Start on deciding on equipment to ‘buy’ and putting together proposal. To be continued next week. |  |  |
| 5 mins  **60 mins** | Set homework:   * Complete assignment 5 on Isaac Physics |  |  |

**Physics: Music Festival Session 6**

**Learning Objectives/aims**

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| **1.** | **Work as team to put together proposal** |
| **2.** | **Prepare presentations** |

**Main Learning Activities** *(starter, main learning activities, plenaries with timings)*

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| **Time** | **Learning Activities** | **Curriculum links** | **Resources** |
| 3 mins | Recap what needs to be in proposal |  |  |
| 20 mins  **23 mins** | In groups: Complete proposal. |  |  |
| 35 mins  **58 mins** | In groups: Prepare a simple presentation based on proposal to present to the ‘council’ |  |  |
| 2 mins  **60 mins** | Give details of presentation times |  |  |

**Physics: Music Festival Presentations**

**Learning Objectives/aims**

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| **1.** | **Build presentation skills** |

**Main Learning Activities** *(starter, main learning activities, plenaries with timings)*

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| **Time** | **Learning Activities** | **Curriculum links** | **Resources** |
| 5 mins per group | Students present to the ‘council’ |  |  |
|  | Council consider which proposal is most suitable and award prize |  |  |