

Intel® Skills for Innovation

Starter Pack Catalog

Activity Summary and Curriculum Maps



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	Subject	Activity Title	Description	Supporting Technology	Mindset	Skillset	Chrome-book
1	 Language	AI Roleplaying	Experience game-based learning in creative writing using AI Dungeon to simulate text adventures.	Software used: AI Dungeon	 Comp. Thinking: Algorithms	 AI & Machine Learning: Natural Language Processing	✓
2	 Social Studies	Anatomy of Safety	Learn how to use 3D game engines to discover potential danger zones or fall areas for senior citizens.	Software used: Unity	 Design Thinking: Define	 Simulation & Modeling: Problem Definition	
3	 STEM (Physics)	Architecture of Wind	Learn how architects test to see if the tall buildings they are designing will be able to withstand strong winds.	Software used: Ansys 3D, Ansys Virtual, Wind	 Design Thinking: Test	 Programming & Coding: Iterative Refinement	
4	 History	As A Matter of Fake	Learn how to differentiate fake news or deliberate online falsehoods by analyzing texts using natural language processing.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Pattern Recognition	 AI & Machine Learning: Natural Language Processing	✓
5	 STEM (Math)	Benford's Law	Create a computational experiment using the Monte Carlo Method and Markov Chain to solve complex problems.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Abstraction	 Data Science: Data Modeling	✓
6	 STEM (Math)	Big O Notation	Learn about Big O Notation and how it is used in coding to explain the complexity of an algorithm.	Software used: Python	 Comp. Thinking: Algorithms	 Programming & Coding: Iterative Refinement	✓
7	 History	Causes of Genocides	Investigate the causes of genocides through data wrangling to prepare data for trend and correlation analysis.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Decomposition	 Data Science: Data Wrangling	✓
8	 Geography	Clean Water	Investigate the relationship between a lack of access to good sanitation and child mortality using Gapminder.	Software used: Gapminder, Dollarstreet	 Design Thinking: Empathize	 Data Science: Data Visualization	✓
9	 STEM (Physics)	Da Vinci Bridge	Reconstruct the historical Da Vinci Bridge without nails or ropes using laser cutting.	Software used: Inkscape	 Design Thinking: Prototype	 Simulation & Modeling: Model Development	
10	 STEM (Biology)	Diversity of Flowers	Investigate how diversity enables flowers to adapt to their environment and create a machine learning model to classify irises.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Algorithms	 AI & Machine Learning: Learning Models	✓

Subject	Activity Title	Description	Supporting Technology	Mindset	Skillset	Chrome-book
11  Geography	Envisioning Safer Cities	Discover how planners and policymakers can make cities safer through the use of computer vision.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Pattern Recognition	 AI & Machine Learning: Computer Vision	✓
12  Language	Figuratively Speaking	Identify and analyze figurative language in prose and apply story writing skills using AI Dungeon.	Software used: AI Dungeon	 Comp. Thinking: Algorithms	 AI & Machine Learning: Natural Language Processing	✓
13  STEM (Chemistry)	Fire Simulator	Generate fire particle simulations using 3D modelling software.	Software used: Blender 2.8	 Design Thinking: Ideate	 Simulation & Modeling: Model Development	
14  STEM (Physics)	Gears in Motion	Learn about how gears, as a form of rotary machine mechanics, provides mechanical advantages.	Software used: Autodesk Fusion 360	 Comp. Thinking: Decomposition	 Simulation & Modeling: Variable Constraining	
15  Economics	Happy Countries	Investigate the factors behind a country's happiness rating through statistical analysis.	Software used: IBM SPSS	 Design Thinking: Define	 Data Science: Statistical Analysis	
16  STEM (Biology)	Healthy Diet for All	Explore the impact of malnutrition and perform statistical analysis to understand and address the problem of malnutrition in a community.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Decomposition	 Data Science: Statistical Analysis	✓
17  Geography	Internet of Weather	Create a weather detector using a microcontroller to perform advanced weather analysis.	Software used: Arduino Weather Sensor Set, Jupyter Notebook	 Design Thinking: Test	 Data Science: Data Visualization	✓
18  Language	Language of Populism	Learn about features of language used by populist politicians and analyze word length in political speeches.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Decomposition	 Data Science: Statistical Analysis	✓
19  STEM (Math)	Mathematics of Pandemics	Experience how data modeling helps researchers better understand virus behavior and the spread of a pandemic.	Software used: Microsoft Excel, GIS	 Design Thinking: Define	 Data Science: Data Visualization	✓
20  STEM (Physics)	Microcontroller Robot	Learn the basics of robotics and create a functional self-initiated floor cleaner robot.	Software used: Arduino	 Design Thinking: Prototype	 AI & Machine Learning: Robotics	✓

Subject	Activity Title	Description	Supporting Technology	Mindset	Skillset	Chrome-book
21  Language	Pathos, Logos, and Ethos	Analyze persuasion techniques used in advertising and create a chatbot that is able to identify instances of pathos, logos and ethos.	Software used: Chatteron	 Comp. Thinking: Algorithms	 AI & Machine Learning: Natural Language Processing	✓
22  Geography	Plastic, Plastic, Everywhere	Delve deeper into the problem of microplastics and how computer vision can help in creating solutions.	Software used: Python, Jupyter Notebook	 Design Thinking: Test	 AI & Machine Learning: Computer Vision	✓
23  Economics	Pollution: Costs & Causes	Examine the effects of pollution on a community using pattern recognition through a GIS.	Software used: QGIS	 Comp. Thinking: Pattern Recognition	 Data Science: Data Visualization	✓
24  Geography	Safe Transit	Investigate and analyze road safety in cities using scatter plots and correlation coefficients.	Software used: Python, Jupyter Notebook	 Design Thinking: Empathize	 Data Science: Statistical Analysis	✓
25  STEM (Chemistry)	Saucy Viscosity	Students will learn how to generate water simulations through the use of 3D modelling software.	Software used: Blender 2.8	 Comp. Thinking: Decomposition	 Simulation & Modeling: Problem Definition	
26  STEM (Math)	Sensing Motion	Learn how computer vision can be used to emulate how a human being perceives motion of an everyday object.	Software used: YawCam, GIF Maker	 Comp. Thinking: Algorithms	 AI & Machine Learning: Computer Vision	
27  STEM (Physics)	Static Stress Testing	Learn how to stress test models in simulations and identify the weak points of various models.	Software used: Autodesk Fusion 360	 Design Thinking: Test	 Simulation & Modeling: Verification & Optimization	
28  Language	Storyboarding with Data	Build a storyboard using data to convey a point of view in an argumentative essay.	Software used: StoryboardThat!	 Comp. Thinking: Decomposition	 Data Science: Data Visualization	✓
29  Language	Uncovering Cyberbullying	Analyze words using natural language processing to gain insights into cyberbullying.	Software used: Python, Jupyter Notebook	 Design Thinking: Empathize	 AI & Machine Learning: Natural Language Processing	✓
30  Social Studies	Urbanization	Investigate the impact of urbanization and present findings in an interactive 3D space.	Software used: CoSpaces	 Comp. Thinking: Abstraction	 Data Science: Data Visualization	✓

	Subject	Activity Title	Description	Supporting Technology	Mindset	Skillset	Chrome-book
1	 STEM (Physics)	3D Repair	Explore how physics can be applied to 3D models which are printed to repair broken parts in simple machines.	Software used: Autodesk Fusion 360	 Design Thinking: Prototype	 Simulation & Modeling: Model Development	
2	 STEM (Biology)	Beef or Beans	Harness the power of data visualization to meet the world's growing needs for food.	Software used: Python, Jupyter Notebook	 Design Thinking: Define	 Data Science: Data Visualization	✓
3	 Language	Better Sensing Makes Good Sense	Explore how mobile apps can be designed to help translate images to speech to aid the visually impaired.	Software used: Thunkable	 Design Thinking: Prototype	 Programming & Coding: Problem Solving	✓
4	 Geography	Climate Anomalies	Analyze the impact of climate change through the use of GIS.	Software used: QGIS	 Design Thinking: Empathize	 Simulation & Modeling: Variable Constraining	✓
5	 Language	Coding Macbeth	Create a chatbot which is able to respond in the way Lady Macbeth does.	Software used: Pencilcode	 Comp. Thinking: Abstraction	 AI & Machine Learning: Natural Language Processing	✓
6	 STEM (Biology)	Eyes on Wildlife	Create a motion detection algorithm using a webcam and learn how it can be applied to wildlife conservation.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Pattern Recognition	 AI & Machine Learning: Computer Vision	
7	 History	History and Uses of Democracy	Explore how democracy has evolved since ancient times and uncover insights from data derived from the United Kingdom EU referendum results.	Software used: Python, Jupyter Notebook	 Design Thinking: Empathize	 Data Science: Data Wrangling	✓
8	 Social Studies	Income Gap	Use statistical analysis to explore income inequality in a population.	Software used: Python, Jupyter Notebook	 Design Thinking: Empathize	 Data Science: Statistical Analysis	✓
9	 STEM (Chemistry)	Investigating Wildfires	Investigate the conditions that lead to wildfires and use GIS to identify patterns in the location of wildfires in Indonesia.	Software used: Web-based GIS (Global Forest Watch)	 Comp. Thinking: Pattern Recognition	 Data Science: Data Visualization	✓

Subject	Activity Title	Description	Supporting Technology	Mindset	Skillset	Chrome-book
10  Geography	Mapping Foot to Food	Learn how urban planners use variable constraining to reduce food deserts and improve access to farmers' markets using maps.	Software used: QGIS	 Design Thinking: Define	 Simulation & Modeling: Variable Constraining	✓
11  STEM (Biology)	Motion Behavior Robotics	Create step-by-step motion instructions for robots in real time physics simulations.	Software used: Xemo	 Comp. Thinking: Algorithms	 AI & Machine Learning: Robotics	
12  Language	Mining Words	Explore how people leave behind a digital footprint through text mining using Python programming.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Abstraction	 Data Science: Data Modeling	✓
13  STEM (Physics)	Rapid Prototyping	Apply the concept of center of gravity to create a useful tool using 3D modelling software and a 3D printer.	Software used: Autodesk Fusion 360, 3D Printer	 Design Thinking: Prototype	 Simulation & Modeling: Model Development	
14  Geography	Rising Sea	Learn about the threat of forced migration from rising sea levels due to climate change and visualize areas at risk.	Software used: QGIS	 Design Thinking: Empathize	 Data Science: Data Visualization	✓
15  Language	Robotic Conversations	Create a chatbot capable of identifying simple, compound, and complex sentences.	Software used: Chatteron	 Comp. Thinking: Algorithms	 AI & Machine Learning: Natural Language Processing	✓
16  STEM (Physics)	Robotic Simulation	Explore how robotic simulations can be designed in virtual environments to reduce the cost of prototyping.	Software used: Webot	 Comp. Thinking: Algorithms	 AI & Machine Learning: Robotics	
17  STEM (Physics)	Roller Coaster Physics	Create simulations of roller coasters within safety limits for G-forces.	Software used: Roller Coaster Tycoon 2	 Design Thinking: Prototype	 Simulation & Modeling: Model Development	✓
18  STEM (Physics)	Saltwater Circuit	Plan and design a saltwater circuit using Tinkercad to demonstrate how one works.	Software used: TinkerCAD Circuit	 Design Thinking: Test	 Programming & Coding: Iterative Refinement	✓
19  Geography	Terrain Visualization	Generate 3D city models using GIS software to better understand how city planners use data for planning.	Software used: Blender 2.8	 Design Thinking: Prototype	 Data Science: Data Visualization	

	Subject	Activity Title	Description	Supporting Technology	Mindset	Skillset	Chrome-book
20	 Social Studies	Time to Log Out	Combat cyberaddiction by developing a program that can measure how long someone spends in front of a computer.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Pattern Recognition	 AI & Machine Learning: Computer Vision	
21	 STEM (Biology)	Water Pollution	Investigate the effects of water pollution and propose solutions using Scratch to demonstrate your ideas.	Software used: Scratch	 Comp. Thinking: Decomposition	 Data Science: Data Modeling	
22	 STEM (Physics)	Wrecking Ball Physics	Investigate how energy is conserved using 3D Rigidbody simulations of wrecking balls.	Software used: Blender 2.8	 Design Thinking: Test	 Simulation & Modeling: Problem Definition	✓
23	 Language	Writing Braille	Learn to translate written language to Braille which can be etched in wood using a laser cutter.	Software used: Inkscape	 Design Thinking: Empathize	 Simulation & Modeling: Model Development	
24	 Social Studies	Virtual Tourism	Create a virtual reality tour of a local attraction using an online 3D creation tool.	Software used: CoSpaces	 Comp. Thinking: Abstraction	 Simulation & Modeling: Model Development	✓
25	 STEM (Math)	Volume Challenge	Create a virtual game that tests the concept of surface area and volume of 3D figures.	Software used: CoSpaces	 Design Thinking: Ideate	 Simulation & Modeling: Problem Definition	✓

	Subject	Activity Title	Description	Supporting Technology	Mindset	Skillset	Chrome -book
1	 Social Studies	Agriculture: Farm to Table	Demonstrate the importance of food production and agriculture in ensuring a sustainable community through game-based learning.	Software used: Minecraft	 Comp. Thinking: Algorithms	 Simulation & Modeling: Model Development	✓
2	 Language	Are You Happy?	Use natural language processing to create a machine that can detect emotion through spoken text.	Software used: Scratch, Machine Learning	 Design Thinking: Empathize	 AI & Machine Learning: Natural Language Processing	✓
3	 STEM (Physics)	Catapult Toss	Create a catapult game which uses projectiles with different properties for launches.	Software used: Unity	 Design Thinking: Test	 Simulation & Modeling: Variable Constraining	
4	 Geography	City building for Sustainability	Build a liveable city with the resources provided in this game-based activity.	Software used: Micropolis	 Design Thinking: Empathize	 Data Science: Statistical Analysis	✓
5	 STEM (Math)	Coding Algorithms	Learn about algorithms and how they can be applied to computer programs such as Python.	Software used: Python	 Comp. Thinking: Algorithms	 Programming & Coding: Problem Solving	✓
6	 Language	Green Screen Newscast	Make use of a green screen and fundamental video editing skills to put together an engaging newscast.	Software used: Sony Vegas	 Comp. Thinking: Abstraction	 AI & Machine Learning: Computer Vision	✓
7	 STEM (Biology)	Invisible Animals	Use computer vision to create a digital octopus that camouflages itself to match its background.	Software used: Python, Jupyter Notebook	 Comp. Thinking: Abstraction	 AI & Machine Learning: Computer Vision	✓
8	 Music	Music Through Coding	Create a music machine by coding a simple score using a coding platform.	Software used: MicroBit	 Comp. Thinking: Algorithms	 Programming & Coding: Teamwork	✓
9	 Geography	My 3D Volcano	Have fun demonstrating the various layers of a volcano by creating a 3D model.	Software used: Makers Empire 3D	 Design Thinking: Prototype	 Simulation & Modeling: Model Development	✓
10	 STEM (Physics)	Orbital Simulation	Gather data about Earth and produce an animation demonstrating planetary movements around the sun.	Software used: Scratch	 Comp. Thinking: Pattern Recognition	 Programming & Coding: Teamwork	✓

	Subject	Activity Title	Description	Supporting Technology	Mindset	Skillset	Chrome-book
11	 STEM (Biology)	Plant Food	Create an animated story using block programming to demonstrate the process of photosynthesis.	Software used: Scratch	 Comp. Thinking: Algorithms	 Programming & Coding: Problem Solving	✓
12	 STEM (Math)	Robot Geometry	Learn how to program a virtual robot which can move in different geometrical shapes.	Software used: Robotiblockly	 Design Thinking: Test	 AI & Machine Learning: Robotics	✓
13	 Language	Storytelling with Scratch	Explore how coding can be used to create an animated story.	Software used: Scratch	 Comp. Thinking: Algorithms	 Programming & Coding: Problem Solving	✓
14	 STEM (Biology)	Water Cycle	Demonstrate the water cycle by animating the process using block programming.	Software used: Scratch	 Comp. Thinking: Decomposition	 Data Science: Data Modeling	✓
15	 STEM (Biology)	VR Science Museum	Create a virtual reality simulation of a science museum featuring the diversity of living things.	Software used: CoSpaces	 Comp. Thinking: Algorithms	 Simulation & Modeling: Problem Definition	✓

US Curriculum Mapping

Subject	Activity Title	Description	Curriculum Standard
1  Language Arts	AI Roleplaying	Experience game-based learning in creative writing using AI Dungeon to simulate text adventures.	CCSS.ELA-LITERACY.W.9-10.3 Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.
2  Humanities (Social Studies)	Anatomy of Safety	Learn how to use 3D game engines to discover potential danger zones or fall areas for senior citizens.	NGSS HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
3  STEM (Physics)	Architecture of Wind	Learn how architects test to see if the tall buildings they are designing will be able to withstand strong winds.	NGSS: HS-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. NGSS: HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects).
4  Humanities (History)	As A Matter of Fake	Learn how to differentiate fake news or deliberate online falsehoods by analyzing texts using natural language processing.	CCSS.ELA-LITERACY.RI.11-12.6 Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness or beauty of the text.
5  STEM (Math/Statistics)	Benford's Law	Create a computational experiment using the Monte Carlo Method and Markov Chain to solve complex problems.	CCSS.MATH.CONTENT.HSS.ID. A.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
6  STEM (Math/Computer Science)	Big O Notation	Learn the Big O Notation and how it is used in coding to explain the complexity of an algorithm.	CCSS.MATH.CONTENT.8.F.A.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
7  Humanities (Studies/History)	Causes of Genocides	Investigate the causes of genocides through data wrangling to prepare data for trend and correlation analysis.	CCSS.ELA-LITERACY.RI.11-12.1: Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.
8  Language Arts	Clean Water	Investigate the relationship between a lack of access to good sanitation and child mortality using Gapminder.	NGSS: HS-ETS1-1 Engineering Design Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Subject	Activity Title	Description	Curriculum Standard
9  STEM (Physics)	Da Vinci Bridge	Reconstruct the historical Da Vinci Bridge without nails or ropes using laser cutting.	NGSS HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. NGSS: HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
10  STEM (Biology)	Diversity of Flowers	Investigate how diversity enables flowers to adapt to their environment and create a machine learning model to classify irises.	NGSS: HS-LS2: Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
11  Humanities (Social Studies/ Geography /Civics)	Envisioning Safer Cities	Discover how planners and policymakers can make cities safer through the use of computer vision.	CCSS.ELA-LITERACY.RI.11-12.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.
12  Language Arts	Figuratively Speaking	Identify and analyze figurative language in prose and apply story writing skills using AI Dungeon.	CCSS.ELA-LITERACY.W.9-10.3 Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. CCSS.ELA-LITERACY.W.9-10.3.C Use a variety of techniques to sequence events so that they build on one another to create a coherent whole. CCSS.ELA-LITERACY.W.9-10.3.D Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.
13  STEM (Chemistry)	Fire Simulator	Generate fire particle simulations using 3D modelling software.	NGSS: HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
14  STEM (Physics)	Gears In Motion	Learn about how gears, as a form of rotary machine mechanics, provides mechanical advantages.	NGSS: HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Subject	Activity Title	Description	Curriculum Standard
15  STEM (Statistics/ Math)	Happy Countries	Investigate the factors behind a country's happiness rating through statistical analysis.	CCSS.MATH.CONTENT.HSS.ID. A.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. CCSS.MATH.CONTENT.HSS.IC. B.6 Evaluate reports based on data.
16  STEM (Biology)	Healthy Diet for All	Explore the impact of malnutrition and perform statistical analysis to understand and address the problem of malnutrition in a community.	CCSS.MATH.CONTENT.HSS.ID. A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots). CCSS.MATH.CONTENT.HSS.ID.A.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
17  STEM (Engineering and Earth Science)	Internet of Weather	Create a weather detector using a microcontroller to perform advanced weather analysis.	NGSS Engineering Design HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. NGSS Earth's Systems HS-ESS2-2 Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.
18  Language Arts	Language of Populism	Learn about features of language used by populist politicians and analyze word length in political speeches.	CCSS.ELA-LITERACY.SL.11-12.3 Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
19  STEM (Math)	Mathematics of Pandemics	Experience how data modeling helps researchers better understand virus behavior and the spread of a pandemic.	CCSS.MATH.CONTENT.HSF.BF. A.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*
20  STEM (Physics)	Microcontroller Robot	Learn the basics of robotics and create a functional self-initiated floor cleaner robot.	NGSS: HS-ETS1-3 Engineering Design Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

Subject	Activity Title	Description	Curriculum Standard
21  Language Arts	Pathos, Logos, and Ethos	Analyze persuasion techniques used in advertising and create a chatbot that is able to identify instances of pathos, logos and ethos.	CCSS.ELA-LITERACY.W.9-10.1.A Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence. CCSS.ELA-LITERACY.W.9-10.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.
22  Humanities (Social Studies/ Geography)	Plastic, Plastic, Everywhere	Delve deeper into the problem of microplastics and how computer vision can help in creating solutions.	HS-ESS3-4 Earth and Human Activity Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
23  Humanities (Social Studies/ Economics)	Pollution: Costs & Causes	Examine the effects of pollution on a community using pattern recognition through a GIS.	NGSS: HS-ESS3-3.Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources, the sustainability of human populations, and biodiversity.
24  Humanities (Social Studies)	Safe Transit	Investigate and analyze road safety in cities using scatter plots and correlation coefficients.	CCSS.MATH.CONTENT.HSS.ID. A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots). CCSS.MATH.CONTENT.HSS.ID.A.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. CCSS.MATH.CONTENT.HSS.IC. B.6 Evaluate reports based on data.
25  STEM (Chemistry)	Saucy Viscosity	Students will learn how to generate water simulations through the use of 3D modelling software.	NGSS HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs
26  STEM (Math)	Sensing Motion	Learn how computer vision can be used to emulate how a human being perceives motion of an everyday object.	NGSS: HS-PS2-1 Motion and Stability: Forces and Interactions: Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
27  STEM (Physics)	Static Stress Testing	Learn how to stress test models in simulation and identify the weak points of various models.	NGSS HS-PS2-3. Apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

Subject	Activity Title	Description	Curriculum Standard
28  Language Arts	Storyboarding with Data	Build a storyboard using data to convey a point of view in an argumentative essay.	CCSS.ELA-LITERACY.SL.11-12.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. CCSS.ELA-LITERACY.SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
29  Language Arts	Uncovering Cyberbullying	Analyze words using natural language processing to gain insights into cyberbullying.	CCSS.ELA-LITERACY.RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CCSS.ELA-LITERACY.RST.9-10.9 Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
30  Humanities (Social Studies)	Urbanization	Investigate the impact of urbanization and present findings in an interactive 3D space.	NGSSHS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

Subject	Activity Title	Description	Curriculum Standard
1  STEM (Physics)	3D Repair	Explore how physics can be applied to 3D models which are printed to repair broken parts in simple machines.	NGSS MS-PS2-2. Motion and Stability: Forces and Interactions Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
2  STEM (Biology)	Beef or Beans	Harness the power of data visualization to meet the world's growing needs for food.	NGSS MS-LS1-3 From Molecules to Organisms: Structures and Processes-Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
3  STEM (Life Science)	Better Sensing Makes Good Sense	Explore how mobile apps can be designed to help translate images to speech to aid the visually impaired.	NGSS: MS-LS3 Heredity: Inheritance and Variation of Traits
4  Language Arts	Coding Macbeth	Create a chatbot which is able to respond in the way Lady Macbeth does.	CCSS.ELA-LITERACY.RL.8.1 Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
5  Humanities (Geography)	Climate Anomalies	Analyze the impact of climate change through the use of GIS.	NGSS MS-ESS3-5 Earth and Human Activity: Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
6  STEM (Biology/Earth Science)	Eyes on Wildlife	Create a motion detection algorithm using a webcam and learn how it can be applied to wildlife conservation.	NGSS MS-ESS3-3 ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
7  Humanities (Social Studies)	History and Uses of Democracy	Explore how democracy has evolved since ancient times and uncover insights from data derived from the United Kingdom EU referendum results.	CCSS.ELA-LITERACY.RI.11-12.9 Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance for their themes, purposes, and rhetorical features.
8  Humanities (Social Studies)	Income Gap	Use statistical analysis to explore income inequality in a population.	CCSS.MATH.CONTENT.7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

Subject	Activity Title	Description	Curriculum Standard
9 STEM (Chemistry)	Investigating Wildfires	Investigate the conditions that lead to wildfires and use GIS to identify patterns in the location of wildfires in Indonesia.	NGSS: MS-PS1-2. 2. Chemical Reactions: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
10 Humanities (Social Studies/ Geography)	Mapping Foot to Food	Learn how urban planners use variable constraining to reduce food deserts and improve access to farmers' markets using maps.	NGSS: MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
11 STEM (Biology/ Engineering)	Motion Behavior Robotics	Create step-by-step motion instructions for robots in real time physics simulations.	NGSS: MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
12 Language Arts	Mining Words	Explore how people leave behind a digital footprint through text mining using Python programming.	CCSS.ELA-LITERACY.L.7.5 Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
13 STEM (Physical Science/ Engineering)	Rapid Prototyping	Apply the concept of center of gravity to create a useful tool using 3D modelling software and a 3D printer.	NGSS Engineering MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
14 Humanities (Social Studies/ Geography)	Rising Sea	Learn about the threat of forced migration from rising sea levels due to climate change and visualize areas at risk.	NGSS: HS-ESS3-1: Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
15 Language Arts	Robotic Conversations	Create a chatbot capable of identifying simple, compound, and complex sentences.	CCSS.ELA-LITERACY.L.6.2: Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
16 STEM (Physics/ Engineering)	Robotic Simulation	Explore how robotic simulations can be designed in virtual environments to reduce the cost of prototyping.	NGSS Engineering MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
17 STEM (Physical Science)	Roller Coaster Physics	Create simulations of roller coasters within safety limits for G-forces.	NGSS MS-PS2-4: Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

Subject	Activity Title	Description	Curriculum Standard
18  STEM (Physical Science)	Saltwater Circuit	Plan and design a saltwater circuit using Tinkercad to demonstrate how one works.	NGSS: MS-PS2 Motion and Stability: Forces and Interactions Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
19  Humanities (Social Studies/ Geography)	Terrain Visualization	Generate 3D city models using GIS software to better understand how city planners use data for planning.	NGSS: MS-ESS2-2 Earth's Systems: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
20  Humanities (Social Studies)	Time To Log Out	Combat cyberaddiction by developing a program that can measure how long someone spends in front of a computer.	CCSS.MATH.CONTENT.HSS.IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
21  STEM (Biology/ Earth Science)	Water Pollution	Investigate the effects of water pollution and propose solutions using Scratch to demonstrate your ideas.	NGSS: MS-ESS3-3. ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
22  STEM (Physics)	Wrecking Ball Physics	Investigate how energy is conserved using 3D Rigidbody simulations of wrecking balls.	NGSS Engineering MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
23  Language Arts	Writing Braille	Learn to translate written language to Braille which can be etched in wood using a laser cutter.	CCSS.ELA-LITERACY.RI.7.1 Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
24  Humanities (Social Studies)	Virtual Tourism	Create a virtual reality tour of a local attraction using an online 3D creation tool.	CCSS.ELA-LITERACY.W.6.7: Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
25  STEM (Math)	Volume Challenge	Create a virtual game that tests the concept of surface area and volume of 3D figures.	CCSS.MATH.CONTENT.6.G.A.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Subject	Activity Title	Description	Curriculum Standard
1  Humanities (Social Studies)	Agriculture: Farm to Table	Demonstrate the importance of food production and agriculture in ensuring a sustainable community through game-based learning.	NGSS: 5-ESS3-1: Earth's Systems: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment NGSS: ESS.3.C: Human Impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)
2  Language Arts	Are You Happy?	Use natural language processing to create a machine that can detect emotion through spoken text.	CCSS.ELA-LITERACY.SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on topics and texts, building on others' ideas and expressing their own clearly.
3  STEM (Physics)	Catapult Toss	Create a catapult game which uses projectiles with different properties for launches.	NGSS 3-PS2-2. Motion and Stability: Forces and Interactions. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. NGSS: 3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object
4  Humanities (Geography)	City building for Sustainability	Build a liveable city with the resources provided in this game-based activity.	NSS-G.K-12.2 Places and Regions As a result of their activities in grades K-12, all students should -Understand the physical and human characteristics of places. -Understand that people create regions to interpret Earth's complexity. -Understand how culture and experience influence people's perceptions of places and regions.
5  STEM (Math)	Coding Algorithms	Learn about algorithms and how they can be applied to computer programs such as Python.	CCSS.MATH.CONTENT.4.OA.5: Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
6  Language Arts	Green Screen Newscast	Make use of a green screen and fundamental video editing skills to put together an engaging newscast.	CCSS.ELA-LITERACY.SL.3.4: Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

Subject	Activity Title	Description	Curriculum Standard
7  STEM (Life Science)	Invisible Animals	Use computer vision to create a digital octopus that camouflages itself to match its background.	NGSS 3-LS4-2.: To demonstrate understanding can: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. NGSS: LS4.B: Natural Selection: Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.
8  Humanities (Music)	Music Through Coding	Create a music machine by coding a simple score using a coding platform.	CCSS.MATH.CONTENT.4.OA.5: Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
9  STEM (Earth Science)	My 3D Volcano	Have fun demonstrating the various layers of a volcano by creating a 3D model.	NGSS: 4-ESS2 Earth's Systems Plate Tectonics and Large Scale Systems Interactions
10  STEM (Physics)	Orbital Simulation	Gather data about Earth and produce an animation demonstrating planetary movements around the sun.	NGSS: ESS1.B: Earth and the Solar System: The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.
11  STEM (Biology)	Plant Food	Create an animated story using block programming to demonstrate the process of photosynthesis.	NGSS LS1.C: Food provides animals with the materials and energy they need for body repair, growth, warmth, and motion. Plants acquire material for growth chiefly from air, water, and process matter and obtain energy from sunlight, which is used to maintain conditions necessary for survival.
12  STEM (Physics)	Robot Geometry	Learn how to program a virtual robot which can move in different geometrical shapes.	CCSS.MATH.CONTENT.3.G.A.1: Reason with shapes and their attributes.
13  Language Arts	Storytelling with Scratch	Explore how coding can be used to create an animated story.	CCSS.ELA-LITERACY.SL.2.4 Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences.
14  STEM (Biology)	Water Cycle	Demonstrate the water cycle by animating the process using block programming.	NGSS: 2-ESS2-3.C: Water on Earth: Obtain information to identify where water is found on Earth and that it can be solid or liquid. (Patterns)
15  STEM (Life Science)	VR Science Museum	Create a virtual reality simulation of a science museum featuring the diversity of living things.	NGSS 2-LS4-1: Interdependent Relationships in Ecosystems - Make observations - Make observations (firsthand or from media) to collect data which can be used to make comparisons. of plants and animals to compare the diversity of life in different habitats.

Singapore Curriculum Mapping

Subject	Activity Title	Description	Curriculum Standard
1  Language Arts (English Language/ General Paper/ Literature)	AI Roleplaying	Experience game-based learning in creative writing using AI Dungeon to simulate text adventures.	Upper Secondary – Area of Language Learning: Writing and Representing LO3: Generate, select and organise ideas for writing and representing creatively and critically for a variety of purposes, audiences, contexts and cultures. Pre-University – H1 LO3: Demonstrate the use of language for communication. H1/2/3: LO1: Students will be able to analyse and evaluate critically the construction of a text.
2  Humanities (Social Studies)	Anatomy of Safety	Learn how to use 3D game engines to discover potential danger zones or fall areas for senior citizens.	Upper Secondary – Issue 1: Exploring Citizenship and Governance
3  STEM (Physics/ Design & Technology)	Architecture of Wind	Learn how architects test to see if the tall buildings they are designing will be able to withstand strong winds.	Upper Secondary – (D&T section 1 No. 16): Test and evaluate feasibility of ideas. (D&T section 2, No.26): Analyse everyday product in relation to forces. Pre-University – H2 Physics Kinematics: Rectilinear Motion
4  Humanities (History)	As A Matter of Fake	Learn how to differentiate fake news or deliberate online falsehoods by analyzing texts using natural language processing.	Pre-University – H2 Shaping the International Order Theme III – Safeguarding International Peace and Security Pre-University – H2: Theme I – Search for Political Stability
5  STEM (Math/ Physics)	Benford's Law	Create a computational experiment using the Monte Carlo Method and Markov Chain to solve complex problems.	Pre-University – H2 Further Mathematics Pre-University – H3 Mathematics
6  STEM (Math)	Big O Notation	Learn the Big O Notation and how it is used in coding to explain the complexity of an algorithm.	Pre-University – H2 Mathematics Pre-University – H2 Further Mathematics Pre-University – H3 Mathematics
7  Humanities (History)	Causes of Genocides	Investigate the causes of genocides through data wrangling to prepare data for trend and correlation analysis.	Upper Secondary – Unit 2: The World In Crisis Rise of authoritarian regimes and its impact in the interwar years

Subject	Activity Title	Description	Curriculum Standard
8 Humanities (Geography)	Clean Water	Investigate the relationship between a lack of access to good sanitation and child mortality using Gapminder.	Pre-University – H2 Theme 2 – Development, Economy and Environment Theme 4 – Geographical Investigation
9 STEM (Physics/ Design & Technology)	Da Vinci Bridge	Reconstruct the historical Da Vinci Bridge without nails or ropes using laser cutting.	Pre-University – H1 Physics Pre-University – H2 Physics 4. Forces: Equilibrium of Forces
10 STEM (Biology)	Diversity of Flowers	Investigate how diversity enables flowers to adapt to their environment and create a machine learning model to classify irises.	Lower Secondary – Theme: Diversity 5. Understanding Diversity of Living Things. Upper Secondary – Theme: Continuity of Life 12. Reproduction
11 Humanities (Geography)	Envisioning Safer Cities	Discover how planners and policymakers can make cities safer through the use of computer vision.	Pre-University – H1 Theme 2: Urban Change
12 Language Arts (General Paper)	Figuratively Speaking	Identify and analyze figurative language in prose and apply story writing skills using AI Dungeon.	Pre-University – H1 LO2: Demonstrate skills and processes.
13 STEM (Chemistry)	Fire Simulator	Generate fire particle simulations using 3D modelling software.	Pre-University – H2 Core Idea 2: Transformation Chemical Energetics: Thermochemistry Pre-University – H3 Core Idea 3: Transformation Chemical Energetics: Thermochemistry and Thermodynamics
14 STEM (Physics/ Design & Technology)	Gears in Motion	Learn about how gears, as a form of rotary machine mechanics, provides mechanical advantages.	Upper Secondary – (D&T section 2 No.31): Adapt simple mechanisms involving motion, transmission, conversion and control for practical application Pre-University – H1 Physics Pre-University – H2 Physics 4. Forces: Turning Effect of Forces

Subject	Activity Title	Description	Curriculum Standard
15  Humanities (Geography)	Happy Countries	Investigate the factors behind a country's happiness rating through statistical analysis.	Pre-University - H2 Topic 2.1: Development and the Global Economy
16  STEM (Biology)	Healthy Diet for All	Explore the impact of malnutrition and perform statistical analysis to understand and address the problem of malnutrition in a community.	Pre-University – H2 Core Idea 3: Energy and Equilibrium Energy is needed to drive biochemical processes in organisms.
17  STEM (Engineering and Earth Science)	Internet of Weather	Create a weather detector using a microcontroller to perform advanced weather analysis.	Pre-University - H2 Theme 1 - Tropical Environment Theme 4 - Geographical Investigation
18  Language Arts (General Paper)	Language of Populism	Learn about features of language used by populist politicians and analyze word length in political speeches.	Pre-University – H1 LO3: Demonstrate the use of language for communication.
 Humanities (History)			Pre-University – H1 LO: key individuals, groups, forces, events and ideas that shaped the development of the social, economic, cultural and political contexts of our world today (Historical Knowledge as well as Historical Agency). Pre-University – H3 Historical Inquiry: AO2: Demonstrate a critical awareness of the range of differing historical viewpoints by establishing connections, making comparisons and interpreting them in the context of historical events or issues.
19  STEM (Math)	Mathematics of Pandemics	Experience how data modeling helps researchers better understand virus behavior and the spread of a pandemic.	Pre-University – H2 Mathematics
20  STEM (Design & Technology)	Microcontroller Robot	Learn the basics of robotics and create a functional self-initiated floor cleaner robot.	Upper Secondary – Design Thinking and Prototyping
21  Language Arts (General Paper)	Pathos, Logos, and Ethos	Analyze persuasion techniques used in advertising and create a chatbot that is able to identify instances of pathos, logos and ethos.	Pre-University – H1 LO1: Demonstrate knowledge and understanding. LO3: Demonstrate the use of language for communication.

Subject	Activity Title	Description	Curriculum Standard
22  Humanities (Geography)	Plastic, Plastic, Everywhere	Delve deeper into the problem of microplastics and how computer vision can help in creating solutions.	Pre-University - H2 Theme 3 - Sustainable Development Theme 4 - Geographical Investigation
23  Humanities (Geography)	Pollution: Costs & Causes	Examine the effects of pollution on a community using pattern recognition through a GIS.	Pre-University – H1 Theme 1: Climate Change
24  Humanities (Social Studies)	Safe Transit	Investigate and analyze road safety in cities using scatter plots and correlation coefficients.	Upper Secondary – Issue 3: Being Part of a Globalised World
25  STEM (Chemistry)	Saucy Viscosity	Students will learn how to generate water simulations through the use of 3D modelling software.	Pre-University – H2 Core Idea 2: Structure and Properties
26  STEM (Math)	Sensing Motion	Learn how computer vision can be used to emulate how a human being perceives motion of an everyday object.	Pre-University – H2 Mathematics Pre-University – H2 Further Mathematics
27  STEM (Physics/ Design & Technology)	Static Stress Testing	Learn how to stress test models in simulation and identify the weak points of various models.	Secondary School – Design & Technology Pre-University – H1 Physics Pre-University – H2 Physics Newtonian Mechanics - 4. Forces
28  Language Arts (Project Work)	Storyboarding with Data	Build a storyboard using data to convey a point of view in an argumentative essay.	Pre-University – H1 LO: Knowledge application, Communication
29  Language Arts (General Paper)	Uncovering Cyberbullying	Analyze words using natural language processing to gain insights into cyberbullying.	Pre-University – H1 LO1: Demonstrate knowledge and understanding.
30  Humanities (Social Studies)	Urbanization	Investigate the impact of urbanization and present findings in an interactive 3D space.	Upper Secondary – Issue 3: Being Part of a Globalised World

Subject	Activity Title	Description	Curriculum Standard
1  STEM (Physics/ Design & Technology)	3D Repair	Explore how physics can be applied to 3D models which are printed to repair broken parts in simple machines.	Upper Secondary – Newtonian Mechanics: Turning Effect of Forces
2  STEM (Biology)	Beef or Beans	Harness the power of data visualization to meet the world's growing needs for food.	Lower Secondary – Theme: System 11. Human Digestive System Upper Secondary – Theme: Maintenance and Regulation of Life Processes 4. Nutrition in Humans The Cell and Biomolecules of Life: Proteins
 Humanities (Geography)			Lower Secondary – Theme 2: Our Changing World Topic 5: Food Resources - Is technology a panacea for food shortage?
3  Humanities (Social Studies)	Better Sensing Makes Good Sense	Explore how mobile apps can be designed to help translate images to speech to aid the visually impaired.	Upper Secondary – Issue 1: Exploring Citizenship and Governance
4  Humanities (Geography)	Climate Anomalies	Analyze the impact of climate change through the use of GIS.	Upper Secondary – Theme 1: Our Dynamic Planet Topic 3: Variable Weather and Changing Climate - A continuing challenge?
5  Language Arts (English Language/ English Literature)	Coding Macbeth	Create a chatbot which is able to respond in the way Lady Macbeth does.	Secondary – LO2.1 Appreciating Writer's Craft across Areas of Study LO2.2 Appreciating Plot LO2.3 Appreciating Character LO2.4 Appreciating Setting and Atmosphere
6  STEM (Biology)	Eyes on Wildlife	Create a motion detection algorithm using a webcam and learn how it can be applied to wildlife conservation.	Lower Secondary – Theme: Interactions 19. Interactions within Ecosystems

Subject	Activity Title	Description	Curriculum Standard
7 Humanities (History)	History and Uses of Democracy	Explore how democracy has evolved since ancient times and uncover insights from data derived from the United Kingdom EU referendum results.	Lower Secondary – Unit 4 – Singapore's First Decade (1965-1975): How Did Life Change?
8 Humanities (Social Studies)	Income Gap	Use statistical analysis to explore income inequality in a population.	Upper Secondary – Issue 2: Living in a Diverse Society
9 STEM (Chemistry)	Investigating Wildfires	Investigate the conditions that lead to wildfires and use GIS to identify patterns in the location of wildfires in Indonesia.	Lower Secondary – Theme: Interactions 18. Chemical Changes Upper Secondary – Chemistry of Reactions - 6. Chemical Reactions
10 Humanities (Geography)	Mapping Foot to Food	Learn how urban planners use variable constraining to reduce food deserts and improve access to farmers' markets using maps.	Lower Secondary – Issue 4: Housing: How to Provide Homes for All? Upper Secondary – Theme 2: Our Changing World Topic 5: Food Resources - Is technology a panacea for food shortage?
11 STEM (Biology)	Motion Behavior Robotics	Create step-by-step motion instructions for robots in real time physics simulations.	Upper Secondary – Theme: Maintenance and Regulation of Life Processes 11. Co-ordination and Response in Humans
12 Language Arts (English Language)	Mining Words	Explore how people leave behind a digital footprint through text mining using Python programming.	Secondary – Area of Language Learning: Reading and Viewing LO4: Respond to a wide and extensive range of texts for enjoyment and understanding how grammatical/lexical items and semiotic modes are used in diverse contexts.
13 STEM (Physics/ Design & Technology)	Rapid Prototyping	Apply the concept of center of gravity to create a useful tool using 3D modelling software and a 3D printer.	Upper Secondary – Newtonian Mechanics: Turning Effect of Forces

Subject	Activity Title	Description	Curriculum Standard
14  Humanities (Geography/ Env. Science)	Rising Sea	Learn about the threat of forced migration from rising sea levels due to climate change and visualize areas at risk.	Lower Secondary – Issue 6: Floods: How can Cities Prepare for Floods Upper Secondary – Theme 1: Our Dynamic Planet Topic 1: Coasts - Should coastal environments matter? Topic 3: Variable Weather and Changing Climate - A continuing challenge?
15  Language Arts (English Language)	Robotic Conversations	Create a chatbot capable of identifying simple, compound, and complex sentences.	Lower Secondary – Area of Language Learning: Grammar LO3: Apply knowledge of grammatical rules at sentence level. LO4: Show understanding of how the purposeful use of language shapes meaning in texts.
16  STEM (Design & Technology)	Robotic Simulation	Explore how robotic simulations can be designed in virtual environments to reduce the cost of prototyping.	Upper Secondary – Describe the use of mechanisms in conversion and transmission of motion in everyday products.
17  STEM (Physics)	Roller Coaster Physics	Create simulations of roller coasters within safety limits for G-forces.	Lower Secondary – Theme: Interactions 12. Interactions through the application of forces Upper Secondary – Newtonian Mechanics: Kinematics, Dynamics
18  STEM (Chemistry)	Saltwater Circuit	Plan and design a saltwater circuit using Tinkercad to demonstrate how one works.	Upper Secondary – Pure Chemistry: Electrolysis, Science chemistry on bonding - properties
19  Humanities (Geography)	Terrain Visualization	Generate 3D city models using GIS software to better understand how city planners use data for planning.	Lower Secondary – Issue 4: Housing: How to Provide Homes for All? Upper Secondary – Theme 3: Geographical Skills and Investigations Topic 7: Topographical Map Reading Skills Topic 8: Geographical Data and Techniques
20  Humanities (Social Studies)	Time To Log Out	Combat cyberaddiction by developing a program that can measure how long someone spends in front of a computer.	Upper Secondary – Issue 2: Living in a Diverse Society

Subject	Activity Title	Description	Curriculum Standard
21  STEM (Biology)	Water Pollution	Investigate the effects of water pollution and propose solutions using Scratch to demonstrate your ideas.	Lower Secondary – Theme: Diversity Understanding Diversity of Living Things Theme: Interactions 19. Interactions within Ecosystems Upper Secondary – Theme: Man and His Environment 16. Organisms and Their Environment
22  STEM (Physics)	Wrecking Ball Physics	Investigate how energy is conserved using 3D Rigidbody simulations of wrecking balls.	Upper Secondary – Newtonian Mechanics: Energy, Work, Power
23  Language Arts (English Language)	Writing Braille	Learn to translate written language to Braille which can be etched in wood using a laser cutter.	Lower Secondary – Area of Language Learning: Writing and Representing LO3: Generate, select and organise ideas for writing and representing creatively and critically for a variety of purposes, audiences, contexts and cultures.
24  Humanities (Social Studies)	Virtual Tourism	Create a virtual reality tour of a local attraction using an online 3D creation tool.	Upper Secondary – Issue 3: Being Part of a Globalised World
25  STEM (Math)	Volume Challenge	Create a virtual game that tests the concept of surface area and volume of 3D figures.	Secondary – Geometry and Measurement: G5: Mensuration

Subject	Activity Title	Description	Curriculum Standard
1  Humanities (Social Studies)	Agriculture: Farm to Table	Demonstrate the importance of food production and agriculture in ensuring a sustainable community through game-based learning.	Primary 3 – Cluster 2: Understanding Singapore in the Past and Present Primary 3: Understanding Singapore's Environment and Challenges
2  Language Arts (English Language)	Are You Happy?	Use natural language processing to create a machine that can detect emotion through spoken text.	Primary 2 – 4 Area of Language Learning: Grammar LO: Apply grammatical knowledge at the word, phrase and sentence levels to convey ideas accurately in different social contexts. Understand that by varying the forms of construction, different meanings are conveyed in different contexts. Recommended Topic: Feelings and Emotions
3  STEM (Science)	Catapult Toss	Create a catapult game which uses projectiles with different properties for launches.	Primary 5 – 6 Theme: Interactions Interaction of Forces Recognise and give examples of the different types of forces.
4  Humanities (Social Studies)	City building for Sustainability	Build a liveable city with the resources provided in this game-based activity.	Primary 3 – Cluster 2: Understanding Singapore in the Past and Present Primary 3: Understanding Singapore's Environment and Challenges Primary 4 – Cluster 3: Appreciating Singapore, the Region and the World We Live in Primary 5: Understanding Southeast Asia's Diversity and Interconnectedness Primary 6: Understanding Features and Legacies of Civilisations
5  STEM (Math)	Coding Algorithms	Learn about algorithms and how they can be applied to computer programs such as Python.	Primary 5 – 6 Mathematical Process MP2: Applications - Apply mathematics concepts and skills to solve problems in a variety of contexts within or outside mathematics, including: - identifying the appropriate mathematical representations for a problem, - Using appropriate mathematical concepts, skills (including tools and algorithm) to solve a problem, - Interpreting the mathematical solution in the context of the problem and making sense of the solution.

Subject	Activity Title	Description	Curriculum Standard
6  Language Arts (English Language)	Green Screen Newscast	Make use of a green screen and fundamental video editing skills to put together an engaging newscast.	Primary 3 – 6 Area of Language Learning: Writing and Representing LO: Create a variety of texts for different purposes, using an appropriate tone and register. Understand how the skills and knowledge of writing and representing specific types of texts can inform and be applied to the creation of other increasingly sophisticated texts of different types and/or forms.
7  STEM (Science)	Invisible Animals	Use computer vision to create a digital octopus that camouflages itself to match its background.	Primary 5 – 6 Theme: Interactions Interactions within the Environment Recognise that adaptations serve to enhance survival and can be structural or behavioural.
8  Humanities (Music)	Music Through Coding	Create a music machine by coding a simple score using a coding platform.	Primary 3 – 4 LO2: Create Music in both instrumental and vocal settings, individually and in groups LO5: Understand Musical Elements and Concepts at Stage 2 Primary 5 – 6 LO2: Create Music in both instrumental and vocal settings, individually and in groups.
9  Language Arts (English Language)	My 3D Volcano	Have fun demonstrating the various layers of a volcano by creating a 3D model.	Primary 4 – 6 Area of Language Learning: Writing and Representing LO: Apply skills for idea generation, selection, organisation, development, expression and revision so as to address the writer's purpose, needs of the audience, context and culture in writing and representing. Pay increasing attention to the use of semiotic modes in text creation.
10  STEM (Science)	Orbital Simulation	Gather data about Earth and produce an animation demonstrating planetary movements around the sun.	Primary 3 – 6 Science Enrichment: Solar System
11  STEM (Science)	Plant Food	Create an animated story using block programming to demonstrate the process of photosynthesis.	Primary 3 – 4 Theme: Systems Plant System - Identify the different parts of plants and state their functions. Primary 5 – 6 Theme: Energy Energy Forms and Uses - Investigate the requirements (water, light energy and carbon dioxide) for photosynthesis (production of sugar and oxygen) and communicate findings.

Subject	Activity Title	Description	Curriculum Standard
12  STEM (Math)	Robot Geometry	Learn how to program a virtual robot which can move in different geometrical shapes.	Primary 4 – Sub-strand: Geometry Topic: Line Symmetry 3.1 Identifying symmetric figures. 3.2 Determining whether a straight line is a line of symmetry of a symmetric figure. 3.3 Completing a symmetric figure with respect to a given line of symmetry on square grid.
13  Language Arts (English Language)	Storytelling with Scratch	Explore how coding can be used to create an animated story.	Primary 2 – 4 Area of Language Learning: Writing and Representing LO: Write and represent with an explicit awareness of the appropriate organisational structures and language features of texts for different purposes.
14  STEM (Science)	Water Cycle	Demonstrate the water cycle by animating the process using block programming.	Primary 5 – 6 Theme: Cycles Cycles in Matter and Water LO: - Show an understanding of the terms melting point of ice (or freezing point of water) and boiling point of water. - Show an understanding of the roles of evaporation and condensation in the water cycle. - Recognise the importance of the water cycle. - Recognise the importance of water to life processes.
15  STEM (Science)	VR Science Museum	Create a virtual reality simulation of a science museum featuring the diversity of living things.	Primary 3 – 4 Theme: Diversity Diversity of Living and Non-Living Things LO: - Recognise and classify some broad groups of living things. - Show curiosity in exploring the surrounding living and non-living things by asking questions.