

ACT Discussion & Questioning Exemplars

	Science	Technology	Engineering	Arts/Humanities	Mathematics
Knowledge & Comprehension	<ul style="list-style-type: none"> • What is the scientific method, and what are its key steps? • Can you explain the difference between a hypothesis and a theory in science? • Name the four fundamental forces of nature. • How do ecosystems function, and what is the role of biodiversity in maintaining them? • Define Newton's three laws of motion. • Explain how energy is transferred in a food chain, and give an example. 	<ul style="list-style-type: none"> • What is computer programming, and what are some commonly used programming languages? • How does encryption work in cybersecurity, and why is it important? • Knowledge: Describe the components of a computer's central processing unit (CPU). • Explain the concept of cloud computing and its advantages. • What is the Internet of Things (IoT), and how is it transforming various industries? • How do virtual reality (VR) and augmented reality (AR) differ, and what are their applications? 	<ul style="list-style-type: none"> • What is the engineering design process, and what are its key stages? • Explain the difference between civil engineering and electrical engineering. • Define stress and strain in materials and their significance in structural engineering. • How do engineers assess the environmental impact of a construction project? • What are the principles of sustainable design in engineering? • Explain the role of robotics in industrial automation and manufacturing. 	<ul style="list-style-type: none"> • What are the major themes and literary techniques used in Shakespearean plays? • Describe the causes and consequences of the Renaissance in Europe. • Identify key figures and events in the Civil Rights Movement in the United States. • Discuss the impact of globalization on cultural diversity. • Define the concept of social contract theory and its relevance to political philosophy. • How do historians evaluate the reliability of historical sources? • Name different art movements and their notable artists. • Explain the elements of design and how they are used in visual art. • Describe the evolution of photography as an art form. • Discuss the significance of a specific art piece or art movement in shaping contemporary art. • What are the major styles and techniques in dance, theater, or music? • How do various forms of art influence and reflect culture and society? 	<ul style="list-style-type: none"> • Explain the concepts of algebra, geometry, and calculus. • Solve a quadratic equation and explain the steps involved. • Define the fundamental principles of probability and statistics. • How are trigonometric functions used in real-world applications, such as engineering or physics? • Describe different types of numbers, including real, complex, and irrational numbers. • Solve a system of linear equations using matrices and explain the process.
Application & Analysis	<ul style="list-style-type: none"> • Biology: Design an experiment to investigate the effects of different types of soil on plant growth. What variables will you control, and what data will you collect? • Chemistry: Create a chemical reaction equation and explain how it is used in a real-world industrial process, such as the production of fertilizers. • Physics: Develop a practical experiment to determine the acceleration due to gravity. Describe the equipment and procedures you would use. • Earth Science: Analyze climate change data from the past century. What trends and patterns can you identify, and what are the potential consequences for the planet? 	<ul style="list-style-type: none"> • Computer Science: Develop a simple mobile app that solves a specific problem in education. Explain the programming languages and features you would use. • Information Technology: Create a network security plan for a small business. Identify potential vulnerabilities and suggest measures to protect the network. • Robotics: Design a robot that can assist people with disabilities in their daily lives. Describe its features and capabilities. • Software Development: Evaluate the user interface of a popular application (e.g., a social media platform). What design principles have been effectively 	<ul style="list-style-type: none"> • Civil Engineering: Design a sustainable bridge for a remote area with limited resources. Explain the choice of materials and construction techniques. • Mechanical Engineering: Create a prototype of a renewable energy device, like a wind turbine or solar water heater. Describe its components and how it generates energy. • Aerospace Engineering: Develop a plan for a manned mission to Mars. Address the challenges of life support, transportation, and mission duration. • Structural Engineering: Investigate the collapse of a historical building or bridge. Analyze the structural failures 	<ul style="list-style-type: none"> • History: Create a documentary on a specific historical event or figure. What primary sources and narratives will you include to provide a comprehensive view of the topic? • Geography: Design a comprehensive urban planning proposal for a growing city. Consider factors like transportation, housing, and sustainability. • Philosophy: Develop a philosophical argument on a contemporary ethical issue, such as climate change or artificial intelligence. What ethical theories will you draw upon? • Literature: Analyze the themes and symbolism in a classic novel or poem. How do these literary elements contribute to the work's meaning and impact? • Political Science: Examine the current political landscape in a specific region. What are the key political ideologies and movements, and what are their implications for the future? • Cultural Studies: Investigate the impact of a particular cultural phenomenon, such as the globalization of music or the influence of social media on culture. How has it 	<ul style="list-style-type: none"> • Algebra: Model a real-world problem using algebraic equations. Solve the equations to find a practical solution. • Geometry: Create a blueprint for an energy-efficient house, incorporating geometric principles in the design of rooms, windows, and the roof. • Statistics: Analyze survey data on a social issue (e.g., education or healthcare). Use statistical methods to draw meaningful conclusions and make policy recommendations. • Calculus: Investigate the rate of change of a physical phenomenon (e.g., population growth or the spread of a disease). How does calculus help in understanding and predicting such changes?

	<ul style="list-style-type: none"> ● Astronomy: Examine the lifecycle of a star, from its formation to its eventual fate. How do different star sizes lead to different outcomes? ● Environmental Science: Investigate a local ecosystem and discuss the impact of human activities on its biodiversity. What measures can be taken to preserve it? 	<p>applied, and what improvements could be made?</p> <ul style="list-style-type: none"> ● Cybersecurity: Investigate a recent cyberattack on a major organization. Analyze the attack vector, methods, and potential consequences. How could the organization have prevented this attack? ● Artificial Intelligence: Examine the ethical implications of using AI in decision-making processes, such as autonomous vehicles or hiring algorithms. What biases may arise, and how can they be mitigated? 	<p>and the engineering principles that could have prevented it.</p> <ul style="list-style-type: none"> ● Environmental Engineering: Assess the environmental impact of a proposed construction project in a sensitive ecosystem. What mitigation strategies should be implemented? ● Biomedical Engineering: Examine recent advancements in medical technology, such as prosthetic limbs or artificial organs. How do these innovations improve quality of life and patient outcomes? 	<p>changed society and identity?</p> <ul style="list-style-type: none"> ● History: Create a documentary on a specific historical event or figure. What primary sources and narratives will you include to provide a comprehensive view of the topic? ● Geography: Design a comprehensive urban planning proposal for a growing city. Consider factors like transportation, housing, and sustainability. ● Philosophy: Develop a philosophical argument on a contemporary ethical issue, such as climate change or artificial intelligence. What ethical theories will you draw upon? ● Visual Arts: Create an original artwork inspired by a specific art movement (e.g., Impressionism or Cubism). Explain the artistic techniques and ideas that influenced your piece. ● Performing Arts: Choreograph a dance routine or script a short play. Describe the themes and emotions you aim to convey through the performance. ● Music: Compose an original piece of music in a chosen genre (e.g., classical, jazz, or electronic). Discuss the musical elements and inspiration behind your composition. ● Art History: Analyze a famous painting or sculpture. How does the artwork reflect the historical and cultural context in which it was created? ● Theater Studies: Critique a recent theater production. Assess the performances, direction, and set design, and discuss how they contributed to the overall impact of the play. ● Musicology: Investigate a specific music genre's evolution over time. How has it influenced other musical styles, and what cultural or social movements are associated with it? ● Creative Writing: Compose a short story or poem that explores the theme of identity. How does your use of narrative techniques or poetic devices contribute to the story's impact? ● Expository Writing: Write a persuasive essay on a current social or political issue. How can you effectively use evidence and rhetorical appeals to convince your audience of your perspective? ● Journalism: Create a news article covering a recent local or global event. Explain how you choose and present information to engage and inform your readers. ● Literary Analysis: Analyze the symbolism and character development in a classic novel (e.g., "To Kill a Mockingbird" or "The Great Gatsby"). How do these elements contribute to the overall theme and message of the book? ● Poetry Analysis: Examine a famous poem (e.g., Robert Frost's "The Road Not Taken" or Langston Hughes' 	<ul style="list-style-type: none"> ● Number Theory: Explore a famous mathematical theorem (e.g., the Pythagorean Theorem or Fermat's Last Theorem). Explain its historical context and significance in mathematics. ● Linear Algebra: Analyze the applications of linear transformations in computer graphics or data analysis. How do they simplify complex calculations and visual representations?
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				<p>"Harlem"). How do the poem's structure, figurative language, and tone shape its meaning and impact?</p> <ul style="list-style-type: none"> ● Drama Analysis: Critique a play or film adaptation of a well-known Shakespearean tragedy (e.g., "Hamlet" or "Macbeth"). How do the actors' performances, direction, and set design influence the interpretation of the work? 	
Creation & Evaluation	<ul style="list-style-type: none"> ● Design an original experiment to investigate a scientific phenomenon of your choice. Explain the research question, hypothesis, methodology, and expected outcomes. ● Evaluate a scientific research paper's methodology and findings. What strengths and weaknesses can you identify, and how could the study be improved? 	<ul style="list-style-type: none"> ● Develop a concept for a new mobile app that addresses a specific problem in society or industry. Describe its features, functionality, and potential impact. ● Critically assess the usability and user experience of a popular website or app. What design elements enhance or hinder the user's experience, and what recommendations would you make? 	<ul style="list-style-type: none"> ● Invent a novel solution to a real-world engineering challenge, such as renewable energy or transportation. Provide detailed plans and explanations. ● Evaluate the safety and sustainability aspects of a proposed infrastructure project. What environmental and societal concerns need to be considered, and how can they be addressed? 	<ul style="list-style-type: none"> ● Create an original historical fiction short story set in a specific time period or event. How will you incorporate historical accuracy and authentic character development? ● Analyze a documentary film about a historical event. How effectively does the film convey historical facts and provide a nuanced understanding of the subject matter? ● Produce an original art piece, performance, or composition that combines elements from different artistic movements. Explain your artistic choices and how they reflect your creative vision. ● Evaluate a contemporary art exhibit or musical performance. How does it challenge or conform to traditional artistic norms, and how does it engage the audience? ● Write a multimedia presentation that persuasively argues for a change in a local, national, or global issue. How will you combine written, visual, and oral elements to convey your message? ● Assess a series of persuasive essays or speeches on a specific topic. How effectively do the writers or speakers use evidence and rhetorical strategies to influence their audience? 	<ul style="list-style-type: none"> ● Invent a new mathematical model for a real-world problem, such as optimizing traffic flow in a city or predicting financial market trends. Explain the mathematical concepts and data sources involved. ● Critique a mathematical proof or theorem in a published research paper. What is the clarity of the argument, and what improvements or further insights can be suggested?

★ Creation and evaluation questions encourage students to synthesize their knowledge and skills, fostering creativity and critical thinking across various content areas. They also emphasize the importance of real-world applications and the ability to assess the quality of work in their chosen discipline.