

2020-2021 Middle School Themes and Problems

Career Prep	1) Architecture and Construction 2) Health Science 3) Law, Public Safety, Corrections, and Security 4) Transportation, Distribution, and Logistics
Challenging Technology Issues	-Cashless Society -Tablets vs Textbooks -Virtual Appointments -Police Body Cameras -Standardized Testing
Children's Stories	Design Challenge: Participants design an interactive book for an elementary school aged student in grades 3-5 on the role of thermal energy in weather related phenomena including thunderstorms and hurricanes.
Coding	<p>To prepare for MS Coding competition, teams should have knowledge of concepts (software development, computer science, and coding topics) that will be on the Coding written test. They also should be familiar and comfortable with using the Scratch programming language.</p> <p>Scratch is a free visual programming language available from the MIT Media Lab (https://scratch.mit.edu/starter_projects/). An offline version of the Scratch tool should be downloaded and available on each team's laptop.</p> <p>Teams that advance to the semifinalist level, based on written test performance, will perform a challenge using the Scratch programming language. Semifinalist teams will receive the challenge on site and will have two hours to complete it. (PLEASE NOTE: Semifinalist teams MUST have a version of this program available for offline use, as there will be no Internet access available during the semifinalist level of the competition.)</p> <p>Examples of the types of challenges students may be asked to complete can be found at this link: http://scratched.gse.harvard.edu/resources/short-scratch-programming-challenges.</p>
Cybersecurity	Problem Challenge: Stark Industries recently had a virus that affected their daily operations. It was discovered that the compromise was related to a virus that created a botnet army of remotely controlled computers capable of stealing financial data. Explain some measures to identify viruses, as well as firm-wide measures that could be implemented in the workplace.
Data Science and Analytics	Problem Challenge: In 2020, the United States government is conducting a national census. Using publicly available data sets, analyze and conduct research on population and demographic trends in your state. Predict the outcomes and how the results could potentially impact your home state.
Digital Photography	Theme: Nature - Four (4) digital photographs are required for the portfolio.

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Essays on Technology	<p>Digital Communication has become a part of all levels of our daily lives. And most recently, an integral part of our socially distant world. Corporations of all sizes use digital communication to conduct business. Educational institutions use digital communication to conduct virtual learning between students and teachers and to communicate with parents. And, digital communication has become a primary tool for staying in touch with friends and family.</p> <p>Participants will be required to write an argumentative essay discussing different forms of digital communication and the positive and negative effects of digital communication on one of the following subtopics:</p> <ul style="list-style-type: none"> • the corporate world • education • personal life
Forensic Technology	<ol style="list-style-type: none"> 1. Handwriting analysis 2. Dusting and lifting fingerprints 3. Crime scene sketching
Inventions and Innovations	Theme: Entertainment
Mass Production	Design Challenge: Create a product to assist with disinfecting or encouraging healthy habits in a classroom.
Mechanical Engineering	<p>Design Challenge: Teams design and build a "Rube Goldberg" mechanical device. This device will contain four (4) subsystems that when combined make up a larger system. Each subsystem will contain only two (2) types of simple machines in a fun and inventive way. Each type of simple machine must be used at least twice in the subsystem in which it is placed. All six (6) simple machines must be represented in the final subsystem. The transfer of energy in the device will travel a specific path from start to finish for a minimum of seven (7) seconds per board. The device must be self-powered utilizing kinetic energy after the initial touch that starts the device. The device must be capable of repeating demonstrations with the reset time for the entire system to be less than three (3) minutes. The size of each sub system must not exceed 12" wide x 12" deep x 18" tall. The entire system must fit within an area of 24" wide x 24" deep x 18" tall. Each subsystem should be self-contained to its own 12"x12" base made from a material of your choice (please refer to the attached diagram for a visual reference)</p>
Microcontroller Design	Design Challenge: Design an interactive platform to promote reading and math to early elementary schoolers.
Off the Grid	Design Challenge: Design a home for a family of five (5) in an economically developing country of your choice. The house must be designed in an area that has no access to the power grid. The house must solve one other problem that is specific to the area that the house is being built other than no power grid access.

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Prepared Speech	Theme: Together Towards Tomorrow
Promotional Marketing	<p>Design Challenge for the TSA Marketing Tool Kit: You should approach your design with the following scenario in mind: You are inviting participants to a fictitious special interest session on solar energy at the National TSA Conference that discusses the effects of solar energy on the earth's surface. You should use fake names for any presenters, speakers or organizations that you have taking part in your special interest session. Your tool kit needs to include the following three items.</p> <ul style="list-style-type: none"> • Printable: Design an 8 ½ by 11 sheet advertising your special interest session to pass out at the conference • Wearable: a T-shirt that incorporates solar energy on the earth's surface • Digital Signage: To be displayed at the Rosen Shingle Creek conference space that promotes this theme
STEM Animation	<p>Theme: The Gaming PC</p> <p>Context: Tech hobbyists, enthusiasts, and casual gamers have turned to building DIY gaming PCs to pass the time, develop skills, and entertain in the midst of recent world events.</p> <p>Challenge: Create a STEM animation that demonstrates what a gaming PC is, its production process, and what its future holds.</p>
Structural Engineering	<p>Please click here for the problem statement. MS Structural Engineering Analysis and Assessment Form MS Structural Engineering Verification form</p>
Website Design	<p>Theme: E-Bikes and Transportation</p> <p>Context: An electric bicycle, also known as an e-bike or booster bike, is a bicycle with an integrated electric motor which can be used for propulsion. Due to recent global events, e-bikes have been seen as an alternative transportation solution within high-density, metropolitan cities.</p> <p>Challenge: Develop a website that advertises a fictitious business specializing in electronic bicycles. Teams should strive to develop a business website that is interactive, engaging, graphically interesting, and easy to understand. Teams are reminded that the point of their solution should be to advertise the business to potential customers, who want to experience or convert to electronic bicycles.</p>