Odyssey of the Mind™

Meeting STEM, Common Core, and 21st Century Skills through Creative Problem Solving

www.odysseyofthemind.com

Odyssey of the Mind and Educational Initiatives

PROBLEM 1 (VEHICLE)

Driver's Test

For this problem, teams will design, build, and drive a vehicle that will travel a course where a student driver attempts to complete tasks in order to pass a driver's test. The vehicle will travel using one propulsion system and then travel in reverse using a different propulsion system. The vehicle will encounter a directional signal and have a Global Positioning System (GPS) that talks to the driver. The team will create a theme for the presentation that incorporates the vehicle, a driver's test, a student, and the talking GPS.

STEM Initiative

Science	Technology	Engineering	Mathematics
Understand the properties of objects and materials, and the changes in properties and matter in order to create a ride on vehicle, "GPS," and directional signal. Research/understand energy, its sources, and how it applies to different propulsion systems. Research/understand simple machines, transmissions, leverage, mechanics of motion, inertia, friction, braking. Research/understand the construction and materials in the design of load bearing vehicles.	Use technology tools to enhance learning, increase productivity, and promote creativity. Research different methods of control, steering, and braking in designing and building the vehicle. Research different ways a device could operate and "talk" in such a way that represents an actual GPS device's communication. Research different ways a directional signal could indicate the direction a vehicle must travel.	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. Apply a structured approach to solving problems: define problem, brainstorm ideas, research, identify criteria, explore the possibilities, make a model, evaluate, communicate results, and revise to improve performance. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team. Design, test and build a system, component, or process to meet desired needs within realistic constraints, i.e., design and build an operable a ride-on vehicle with two propulsion systems which allows it to travel forward, reverse and to complete three unusual tasks.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of the vehicle. Utilize estimation, measurement, computational skills, and spatial/geometric relationships in order to: (a) Work within budgetary, time, and space limitations. (b) Analyze scoring criteria to prioritize problem elements such as vehicle's design, propulsion systems, directional signal, GPS, team tasks, etc.

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PROBLEM 2 (TECHNICAL)
The Not-So-Haunted House

The team's problem is to create and present an original performance that includes a "pop-up-style" not-so-haunted "house" where four special effects take place. The intent of the special effects will be to scare others, but they will produce a different result instead. The performance will include at least one character that experiences the special effects and a narrator who relays the experiences to the audience. It will also include a surprise ending. The special effects will be scored for originality and engineering.

STEM Initiative

Science	Technology	Engineering	Mathematics
Understand the properties of objects and materials, and the changes of properties in matter in order to create special effects. Research and develop an understanding of how energy may be used to create special effects. Research and develop an understanding of simple machines, leverage, and laws of motion.	Use technology tools to enhance learning, increase productivity, and promote creativity. Use productivity tools to collaborate in constructing technology-enhanced models that simulate the four special effects and to produce other creative works.	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. Apply a structured approach to solving problems: define problem, brainstorm ideas, research, identify criteria, explore the possibilities, make a model, evaluate, communicate results, and revise to improve performance. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team. Design, create and operate mechanisms to create four special effects.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of special effects Utilize estimation, measurement, computational skills, and spatial relationships in order to: (a) Work within budgetary, time, and space limitations. (b) Analyze scoring criteria to prioritize problem elements such as creativity and engineering of the special effects, quality and creativity of the performance, etc.

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PROBLEM 3 (CLASSICS)
It's How We Rule

In this Classics problem, teams will re-create a King's Court from history and make their own Royal Court set in an original kingdom at a different time and place. The Historic Court will issue a decree that fits in with its history, while the team-created Royal Court will issue a decree that changes an everyday behavior for the people in the kingdom. The Historic court will be composed as the team wishes, but the original Royal Court will be made up of a leader, a minstrel that performs a song while playing a team-created instrument, and a jester that makes fun of the leader. The performance will include puppets and a Peoplet (a person portrayed as a puppet), and will be scored for humor.

STEM Initiative

Science	Technology	Engineering	Mathematics
Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. Understand the properties of objects and materials, and the changes of properties in matter in order to create an instrument. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	Use technology tools to enhance learning, increase productivity, and promote creativity. Use productivity tools to collaborate in constructing a technology-enhanced model of a musical instrument and produce other creative works.	Design, test, and build a system, component, or process to meet desired needs within realistic constraints. Apply the engineering design process, troubleshooting, research and development, invention and innovation, and experimentation in problem solving and engineering design. Use engineering as a vehicle for creative and critical thinking and inquiry. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of a musical instrument Utilize estimation, measurement, computational skills, and spatial/geometric relationships in order to: (a) Work within budgetary, time, and space limitations. (b) Analyze scoring criteria to prioritize problem elements such as the team-created court, the historic royal court, the team created instrument, etc.

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PROBLEM 4 (STRUCTURE)
The Stackable Structure

Teams will design and build a structure made up of separate components stacked on top of one another. The structure components will be made of only balsa wood and glue, and will be tested by balancing and supporting weights after they are stacked. Teams will be scored for the number of components they use in their final structure. Before they are stacked, the separate components will be integrated into an artistic representation of Earth. The team will include the stacking of the components, placement of the weights, and Earth into the theme of its performance.

STEM Initiative

Science	Technology	Engineering	Mathematics
Understand the properties of objects and materials, and the changes in properties and matter in order to create weight-bearing structures. Research and understand material properties of balsa and various adhesives. Understand effects of various environments on materials. Understand how design of a structure affects weight transfer through the structure and how weight placement impacts the ability to hold weight without collapsing. Evaluate safety issues involved with materials being used in construction of the structure, particularly relating to structural collapse.	Use technology tools to enhance learning, increase productivity, and promote creativity. Use productivity tools to collaborate in constructing technology-enhanced models and produce other creative works. Utilize technology in research and design in all aspects of the solution including the component structures and their integration with the artistic representation of the Earth.	Apply a structured approach to solving problems: define problem, brainstorm ideas, research, identify criteria, explore the possibilities, make a model, evaluate, communicate results, revise to improve performance. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team. Apply contemporary engineering tools and technology to define, analyze, model, and build prototype structures made of multiple, separate components. Evaluate structural characteristics of balsa wood and glued connections. Evaluate connections – surface area of joining pieces, geometry of joints.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation a balsa wood structure. Utilize geometry and trigonometry to analyze component structures and how those components will be stacked as the final structure. Utilize estimation, measurement, computational skills, and spatial relationships in order to: (a) Work within budgetary, time, and space limitations. (b) Analyze scoring criteria to prioritize problem elements such as weight held, creativity of the performance, etc.

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PROBLEM 5 (PERFORMANCE)
Seeing is Believing

In this problem teams are to create and present an original performance about a community that feels threatened by something in a location it has never visited. The community townspeople will use a creative method to select one or more Travelers to visit and explore the location. While at the location, a Traveler will use a means of communication to send a message home to convince the community that there is nothing to fear. The performance will also include a narrator character, two rhymes about the travels, and a moving set piece.

STEM Initiative

Science	Technology	Engineering	Mathematics
Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy in order to create a moving set piece. Understand the abilities of technological design. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem	Use technology tools to enhance learning, increase productivity, and promote creativity. Use productivity tools to collaborate in constructing technology-enhanced models and produce other creative works. Employ technology in the development of strategies for solving problems in the real world, including those related to social situations.	Design, test, and build a system, component, or process to meet desired needs within realistic constraints. Apply the engineering design process, troubleshooting, research and development, invention and innovation, and experimentation in problem solving and engineering design. Use engineering as a vehicle for creative and critical thinking and inquiry. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.	Make decisions about units and scales that are appropriate for problem situations involving measurement in order to design a moving set. Utilize estimation, measurement, computational skills, and spatial relationships in order to: (a) Work within budgetary, time, and space limitations. (b) Analyze scoring criteria to prioritize problem elements such as creativity of the moving set piece, the two rhymes, the Traveler, etc.

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PRIMARY PROBLEM
The World's First Art Festival

The team's problem is to create and present an original humorous performance about a prehistoric art festival. The festival will include artwork, dance, music, song, and — of course — a team-created audience to experience it all. The team will also create a backdrop that is a replica of a cave painting.

STEM Initiative

Science	Technology	Engineering	Mathematics
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	Use technology tools to enhance learning, increase productivity, and promote creativity. Use productivity tools to collaborate in constructing technology-enhanced models of various backdrops and produce other creative works. Employ technology in the development of strategies for solving problems in the real world.	Design, test, and build a system, component, or process to meet desired needs within realistic constraints. Apply the engineering design process, troubleshooting, research and development, invention and innovation, and experimentation in problem solving and engineering design. Use engineering as a vehicle for creative and critical thinking and inquiry. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of a backdrop. Utilize estimation, measurement, computational skills, and spatial relationships in order to: (a) Work within budgetary, time, and space limitations. (b) Analyze scoring criteria to prioritize problem elements such as the three works of art, the dance, etc.

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SPONTANEOUS

Spontaneous is the "short term" portion of Odyssey of the Mind, in which students are given a problem and must solve it in a given amount of time. Some spontaneous problems build verbal skills, some build mechanical skills, and some build both; all help improve problem solving skills. Spontaneous problems vary from hands-on problems (ex., use materials to build/design/change an item), to verbal problems (ex., name types of trees).

STEM Initiative

Science	Technology	Engineering	Mathematics
Use innovation to solve problems. Apply an intuitive understanding of gravity, motion, force and other physics concepts. Apply an understanding of the composition, properties, and creative use of materials. (ex., what can we use to support the structure, what can we use to make it taller, etc.) Test alternate hypotheses. (ex., what is another way to build this?) Evaluate results.	Utilize innovation in the creative use of everyday objects (ex., toothpicks, clay, paper plates) as tools and materials to solve problems. Implement nontraditional communication methods (gestures, tapping on table) to brainstorm and solve problems.	Apply knowledge of science, technology, engineering, and mathematics to define, analyze, and solve problems Utilize engineering design process to define roles of team members (who will build, who will keep track of time), brainstorm (what materials will be used, how will solution be presented), and communicate possible solutions, and to reflect upon outcomes. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.	Utilize estimation, measurement, computational skills, and spatial relationships in order to: (a) Work within time and space limitations outlined in the problem. (b) Analyze scoring criteria (what is worth the most points) to prioritize problem elements (what should we do first to get a higher score?)

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COMMON CORE

Common Core is:

- Aligned with college and work expectations.
- Includes rigorous content and application of knowledge through higher-order skills.
- Built upon strengths and lessons of current state standards.
- Informed by top-performing countries, so that all students are prepared to succeed in our global economy.
- Evidence and/or research-based.

English/Language Arts	Odyssey Teams
Key Ideas and Details	All problems require team members to read closely to determine what the text says explicitly and to make logical inferences from it. Cite specific textual evidence when writing or speaking to support conclusions drawn from the text. Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
Craft and Structure	Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. Analyze the structure of texts. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
Integrations of Knowledge and Ideas	Team members analyze how two or more texts address similar themes or topics in order to build knowledge. Delineate and evaluate the argument and specific claims in a text. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.
Range of Reading and Level of Text Complexity	Each problem requires students to read and comprehend complex literary and informational texts independently and proficiently in order to solve the problems.

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Math	Odyssey Teams
Make sense of problems and persevere in solving them	Team members start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt.
Reason abstractly and quantitatively	Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; consider the unit/parts involved; attend to the meaning
Construct viable arguments and critique the reasoning of others	The student must understand and use stated assumptions, definitions, and previously established results in constructing arguments.
Model with mathematics	Utilizing problems arising in everyday life, society, and the workplace, students model mathematics in many phases of the problems.
Use appropriate tools strategically	These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations solving the problem they choose.
Attend to precision	Students, as team members, try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.

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Math Cont'd	Odyssey Teams
Look for and make use of structure	Students look closely to discern a pattern or structure within a given problem. They also can step back for an overview and shift perspective. They can see complicated things as single objects or as being composed of several objects.
Look for and express regularity in repeated reasoning	Students notice if calculations are repeated, and look both for general methods and for shortcuts.

Writing Standards For Literacy in History/Social Studies, Science, and Technical Subjects	Odyssey Teams
Write arguments focused on a discipline-specific content	Many teams write a script to address the specifics of their solution.
Produce clear and coherent writing appropriate to task, purpose, and audience	Teams are encouraged to focus their script and their performance on a specific task, purpose, and audience.
Conduct short as well as sustained research projects to answer a question	Many aspects of Odyssey of the Mind require teams to conduct research to answer specific questions.
Gather relevant information from multiple sources	Odyssey teams gather material from multiple sources.

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Reading Standards for Literacy in Science and Technical Subjects (RST)	Odyssey Teams
Follow precisely a multistep procedure when carrying out experiments or performing technical tasks	Teams follow many multistep procedures as they test and retest possible solutions.
Translate quantitative or technical information expressed in words in a text into a visual form	Odyssey teams take quantitative and technical information and transform it into a creative visual expression.
Compare and contrast findings presented, noting when findings support or contradict previous explanations	Students work as a team to compare and contrast findings as they develop their solutions.
Integrate and evaluate multiple sources of information presented in diverse formats and media	Students use multiple sources of information including a diversity of formats and media in their quest for solutions.
Evaluate the hypothesis, data, analysis, and conclusions found in science, verifying the data when possible and corroborating or challenging conclusions	Students naturally use the scientific method as they work through their long term solutions.
Synthesize information from a range of sources into a coherent understanding	The synthesis of information from a range of sources comes together in a coherent presentation of the team's solution.

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Reading Standards for Literacy in History/Social Studies (RH)	**Odyssey Teams**
Determine the central ideas or information of a primary or secondary source	Team members work together to analyze both primary and secondary sources as they work with the problem and access resources as they search for a solution.
Determine the meaning of words and phrases as they are used in a text	The meaning of words and phrases in the Odyssey of the Mind problems has an impact on each solution.
Integrate visual information	Visual information can become an integral part of an Odyssey solution.
Distinguish among fact, opinion, and reasoned judgment	As teams search for a solution, the ability to distinguish between fact, opinion, and reasoned judgment can be critical.
Integrate and evaluate multiple sources of information presented in diverse formats and media in order to address a question or solve a problem	Teams integrate information from a wide variety of sources into their solutions.

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Next Generation Science Standards Science and Engineering Practices	**Odyssey Teams**
Asking Questions and Defining Problems	Questioning and defining problems is an integral part of the problem solving process.
Developing and Using Models	Students develop, design, and use models to predict, explain, or collect data to test ideas and develop solutions.
Planning and Carrying out Investigations	Students plan and carry out investigations that use multiple variables and provide evidence to support solutions.
Analyzing and Interpreting Data	Throughout the problem solving process teams continuously review, analyze, and interpret data as they develop their solutions building on past experiences and knowledge and seeking new information.
Using Mathematics and Computational Thinking	Teams use mathematical and computational thinking to support solutions.
Constructing Explanations and Defining Problems	Odyssey teams collaborate to define problems and construct and often reconstruct explanations supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.
Engaging in Argument from Evidence	Using both oral and written arguments, teams use empirical evidence and data to design and support their solutions.
Obtaining, Evaluating, and Communicating Information	Odyssey teams generate, synthesis, communicate, and critique methods and designs as they seek solutions.

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21st CENTURY SKILLS

21st Century Skills	Odyssey Teams
Global Awareness	Global competitiveness and understanding. Teams meet other teams from around the world at the annual World Finals.
Intellectual curiosity	Research to find information needed to solve the problem. Choosing a problem and idea that is personally exciting.
Interpersonal and Collaborative Skills Communication	Teamwork: consensus, collaboration, communication. Understanding and valuing the power of diversity within the team. Understanding personal strengths and weaknesses. Practicing active listening skills. Learning to value other team member's ideas and contributions.
Problem Solving & Creative and Critical Thinking	Analyze complex open-ended real world problems. Identifying challenges within the problem. Brainstorm possible technical solutions. Brainstorm possible thematic and artistic solutions. Evaluate potential solutions – How creative is this solution? Will other teams have thought of this? Spontaneous: training your mind to generate creative solutions by analyzing and evaluation your ideas and learning to use targeted thinking strategies.
Self-Direction	No outside assistance rule: teams generated research, solutions and decision making. Select potential solutions using scoring criteria. Planning for tournaments.
Authentic Assessment Accountability and Adaptability	Team reflection of effectiveness during spontaneous practice. Team reflection of tournament results. Planning and refining for future tournaments. Create-test-improve-retest best solutions.