Unit 10: Mindstorms - Grade 4 Puzzles for Problem Solving

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **FY**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math Section

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media LiteracyNew Section

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale
Unit Rationale The purpose of this unit…

Meaning

Essential Questions

Essential Questions

What are some strategies that will help me solve problems?

How can games and puzzles help me develop and practice problem solving skills?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

Critical thinking often includes problem solving.

There are several different strategies useful for problem solving, including logical reasoning, lateral thinking, spatial awareness, and number and word play.

Puzzles can help develop problem solving skills.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know…

1.There are several different types of strategies for problem solving, including logical reasoning, lateral thinking, spatial awareness, and number and word play.

2. Logic is step by step reasoning, or thinking, toward a conclusion.

3. Lateral thinking is considering ideas different from the conventional or obvious - or thinking "outside the box",

4. Spatial awareness is visual thinking.

5. Math and word play involves manipulation of numbers and number concepts or words and letters

logical reasoning

Skills

Skills

Student will be skilled at …

Solve logic problems using a grid

Use lateral thinking to propose solutions to a problem

Use spatial awareness to solve puzzles or a visual challenge

Manipulate numbers and/or words/letters to solve puzzles

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

Family letter

Several "How to Solve..." web sites

Multiple websites for a variety of puzzle types

family letter - puzzles&teasers
variety of puzzle types for problem solving
Links to a large variety of puzzles and brian teasers
Logic Puzzles

How to solve sudoku puzzles
Easy Sudoku puzzles
Written directions for solving KenKen puzzles
How to Solve KenKen puzzles
KenKen puzzles to try
Traditional Games that develop logical thinking
Easy Picross puzzles
Various free thinking games - must create an account
Braingle - variety of games

Formative Assessment Strategies

Formative Assessment Strategies

Learning Activities/Unit of Study

Learning Activities/Unit of Study

1. Introduce various concepts of critical thinking/problem solving, and practice some activities (see Links)

a. logical reasoning (see Links - logic puzzles)

b. lateral thinking (see Links)

c. spatial awareness (see links- Tangrams & picross puzzles)

d. math and word play (sudoku, KenKen puzzles, crosswords, jumbles, etc.)

2. Practice various types of puzzles and problems to develop these skills (see Resources Links). After each type of puzzle or activity is experienced, discuss which problem solving strategy was practiced or developed.

3. Targeting one or more specific strategies, create puzzles or problems that use this strategy to find solution.

4. Write directions for how to complete the puzzle or activity, and provide answer key.

5. Present to peers in appropriate format

several types of puzzles, according to problem solving skills
great website for puzzle challenges
lateral thinking problems
tangram puzzles
How to solve picross puzzles
Easy Picross puzzles (griddlers)
How to solve soduko
easy sudoku puzzles for math play
Tutorial - How to Solve KenKen Puzzles
puzzles

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, GIfted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs

students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.