Grade 6 rich tasks mathematics

Instructional mathematics tasks are accessible to all learners because they invite students to wrestle with a problem. Students share their ideas, ask questions of one another, use and apply multiple representations, and collaborate to develop various solution pathways. Then, teachers use students' solutions to make the math visible, connect prior learning, and forecast new mathematical learning.

Directions: Launch the tasks in a whole group to provide opportunities for students to discuss their understanding of the task and suggest strategies to solve. Organize the students in pairs or groups of four to encourage participation. Provide manipulatives, chart paper, and markers.

1

Topic

Ratios and Proportional Relationships: Use ratio reasoning to solve problems.

Task

Chantelle is making her friend Jasmine a beaded bracelet using their favorite colors, teal and purple. She decides on a repeating pattern of 3 teal beads followed by 2 purple beads. If Chantelle needs 45 total beads to fit Jasmine's wrist, determine how many beads she needs of each color to make her bracelet.

Facilitate

Prompt students to describe the ratio relationship between the given quantities. Encourage students to model the situation. Provide color tiles or other manipulatives for students' use.

Make the Math Visible

Ask students to share solutions and highlight student work that reveals understanding about part-to-part and part-to-whole relationships. Select students to share modeling strategies such as ratio tables and tape diagrams. Sequence student share out to build from repeated reasoning through proportional reasoning.

Notes

2

Topic

The Number System: Solve real-world problems by graphing points in all four quadrants of the coordinate plane.

Task

Myron's favorite basketball courts are at Cherry Blossom Park. He can leave his house and walk 4 blocks straight to get to the park without making any turns. If the coordinates for Myron's house are (3, 2), what could be the coordinates of the location of Cherry Blossom Park?

Facilitate

Elicit from the students that they should model this situation on a coordinate plane. Make available graph paper and rulers for students' use. Ensure that students are taking a direct route/straight path between Myron's house and the park. Encourage students to notice that there are 4 different possible locations for Cherry Blossom Park.

Make the Math Visible

Ask students to share their solutions. Encourage students to share their coordinate plane models with the class. List all the possible locations for Cherry Blossom Park the students discovered. Highlight the relationships between the coordinates of Myron's house and the coordinates of the possible locations of Cherry Blossom Park. Ask students what they notice about the coordinates.

3

Topic

Expressions and Equations: Write expressions in which letters stand for numbers and apply the properties of operations to generate equivalent expressions.

Task

Write an expression that has at least three terms and contains a coefficient of 4. Then write a second expression that is equivalent to the first one you wrote. Explain how you know that your two expressions are equivalent.

Facilitate

Reveal the first part of the task. Prompt students to describe the vocabulary in the problem: expression, terms, coefficient. Elicit from the students that there are infinitely many expressions that can meet the given conditions. After sharing the remaining part of the task, clarify that there are no specific criteria for the second expression. Encourage students to discuss what makes two expressions equivalent.

Make the Math Visible

Ask students to share solutions to the first part of the task. List all of the student-generated expressions. Encourage students to compare and contrast the expressions. Discuss the concept of equivalent expressions. Prompt the class to look for equivalent expressions within the posted list. Allow time for students to share their pairs of equivalent expressions with each other.

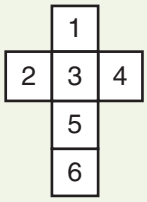
4

Topic

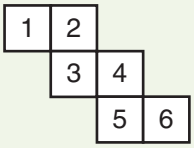
Geometry: Represent three-dimensional figures using nets.

Task

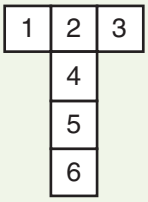
Casey and her friends have been studying nets of cubes. This gave them the idea to create a new version of hopscotch they call "hopsix." They each created a sample court, and their designs are shown below.



Casey's design



Emily's design



Grace's design

Casey likes all of the sample hopsix courts but says they should use hers since it is the only design that is actually a net of a cube. Do you agree with Casey? Explain your reasoning.

Facilitate

Elicit from students how they can determine what three-dimensional figure a net will make. Make available additional copies of the hopsix designs, scissors, and tape if students want to cut and fold the designs. Ensure that students construct a viable argument to support why they do or do not agree with Casey.

Make the Math Visible

Prompt students to share their strategies for determining which hopsix designs are nets of cubes. Ask students to weigh in on whether they agree that Casey's design is the only net of a cube. Select students to share their reasoning.

Notes

5

Topic

Statistics and Probability: Develop understanding of statistical variability and display numerical data in plots.

Task

Stephanie Ye thinks she has the shortest last name in her class.

A. Write a statistical question that would help Stephanie determine if she is correct.
B. Will the data Stephanie collects to answer that question be categorical or numerical? Explain your choice.
C. Stephanie wants to present her findings with a data display. Describe what type of plot would best showcase Stephanie's data.

Facilitate

Reveal Part A of the problem. Encourage students to work together to develop a statistical question.

Show Part B and then elicit from students the difference between categorical and numerical data. After revealing Part C, prompt students to brainstorm a list of data displays. Make available number lines and other materials students may want to use to create a sample data display.

Make the Math Visible

Ask students to share their responses. List all of the possible statistical questions the students developed. Encourage students to describe what a statistical question is and what kind of data Stephanie needs to prove whether she has the shortest last name in her class. Select students to present their ideas and samples of data displays.

Adapt-a-Mathematical TASK Tool

Do you have a task that is not quite right? Use this guide to adapt the task to meet your needs!

How does the task meet your STUDENTS' needs?

ACCESS and EQUITY: Ensure that the task is "responsive to students' backgrounds, experiences, cultural perspectives, traditions, and knowledge" (NCTM, 2014, para. 1, https://www.nctm.org/uploadedFiles/Standards_and_Positions/Position_Statements/Access_and_Equity.pdf). Consider students' language readiness, including access to mathematical vocabulary.

- How can you differentiate the context of the task to support the students' backgrounds, experiences, and cultural needs?
- How can you group students to engage the students' socio-emotional and developmental needs?
- How can you "open up" the task to encourage access to the task for all learners?
- How can you connect the task to the mathematics the students have learned and students' interests?

Notes

How do you PLAN for students to learn from the task?

MATHEMATICAL GOAL: The task should provide students opportunities to access new mathematical knowledge and to solidify, consolidate, or extend knowledge. Tasks can be changed to highlight multiple learning needs and content standards. Ensure that you strategically connect the learning goal to the task.

- What do your students know how to do right now?
- What do you expect your students to understand as a result of this task?
- What do you anticipate students will do? What changes might you make as a result of your anticipation?

FACILITATE: Task facilitation is critical to student success. Consider how you will organize students and **design** purposeful questions to help them discover and connect mathematics concepts and procedures.

- What **questions** are you going to ask? What tools will you provide? How will students be grouped?
- How and when will you provide opportunities for student **discourse**?

Notes

How do you move learning FORWARD?

FORMATIVE ASSESSMENT: Collecting information about student understanding will help you adjust instruction as you conduct the task.

- How will you listen, observe, and identify students' strategies?
- How will you respond to students' understanding?
- How will you provide feedback to students?
- How will you provide opportunities for students to provide feedback to one another?
- How will you provide opportunities for students to persevere and productively struggle through problems?
- How will you make the mathematics visible for your students?

Notes