

Area of a dream place

Primary: (ages 7-11)

Maths

This activity invites students to consider what area is and where we use it in the real world. Students engage in a number of activities using their creativity and building their knowledge of how to calculate area, including the area of large or unusual spaces, and their awareness of how area is relevant to the school environment and their own life. The activity culminates with students creating a map of a “dream place” of their choice and calculating the area of each section.

Time allocation 2-3 lesson periods

Subject content Recognize area as an attribute of plane figures and understand concepts of measurement and how to calculate and estimate area
Relate area to the operations of multiplication and addition and recognise area as additive.

Creativity and critical thinking This unit has a **creativity** focus:

- Generate unusual ideas for imagined dream places
- Envision how to solve maths problems in personally novel ways
- Make new connections and reflect on steps taken

Other skills Communication, Collaboration

Key words area; perimeter; distributive property; unusual shapes; multiplication; division; addition; measurement; shapes; estimate

Products and processes to assess

Visible products and processes include labelled student diagrams and calculations of area, a collaborative classroom poster, and contributions to the driving question board and class discussions. At the highest levels of achievement, student products are imaginative with a high level of personal features and their work process demonstrates a willingness to explore a variety of ideas and perspectives, to see connections between the concept of area, the school environment, and their own lives, and to challenge or push ideas to their limits whilst being open to the critique and feedback of others.

Teaching and Learning plan

This plan suggests potential steps for implementing the activity. Teachers can introduce as many modifications as they see fit to adapt the activity to their teaching context.

| Step | Duration | Teacher and student roles | Subject content | Creativity and critical thinking |
|------|-----------------|---|--|---|
| 1 | Lesson period 1 | <p>Introduction, dream places, and driving questions:</p> <p>The teacher explains that students are later going to draw and label sections of a “dream place” on graph paper. Each section will be a square or rectangle and they will need to label the length and width, then find the area. As appropriate, the teacher can remind students of how to calculate area of a rectangle at this point.</p> <p>The lesson begins with the whole class brainstorming ideas for “dream places” e.g. party, park, zoo, house, school, city, amusement park etc.</p> <p>As appropriate to context, students can be asked to close their eyes and imagine their dream place and what it looks like. The teacher could also encourage students to think of really interesting and unusual dream places or ask them to take on the perspective of different people/animals and consider what their ‘dream places’ might be.</p> <p>Students then make an independent choice about their own dream place and the teacher introduces the driving questions for the lesson:</p> <ul style="list-style-type: none"> • What is area and what do we know about it? • Where do we use area in the real world and why is it important? • Why do we use square units (e.g. sq. in., sq. cm, sq. ft, sq. yard, sq. miles)? <p>These can be written on a question board and students can be encouraged to write notes or illustrations on post-it notes to record their initial thoughts on the questions. They can be given regular opportunities to add to this throughout the activities</p> | <p>Introduction to the lesson content and reminder of how to calculate area of rectangle</p> <p>Considering a number of questions about area, how to calculate it, the role it plays in the real world, and the use of square units</p> <p>Reflecting on and communicating existing mathematical knowledge of area</p> | <p>Understanding the context and boundaries of the problem</p> <p>Seeking and generating unusual ideas for imagined dream places to calculate area</p> <p>Considering several perspectives on the problem</p> <p>Reflecting on existing knowledge and connecting it to the task</p> |
| 2 | Lesson period 1 | <p>Building fascination:</p> <p>Students now explore the classroom/school to find examples of places where they could calculate area. The class goes on an exploration walk through the</p> | | |

| | | | | |
|----------|---|--|---|---|
| | | <p>playground and school garden and students are asked to observe their environment carefully to come up with examples of area (e.g. grass area for sports, carpet area in the classroom, lunch area, garden area, etc.). Students draw pictures of these areas in their notebook, measure their width and length, and label their drawings. When students return to the class, they can be asked to find the areas. Finally, they are asked to reflect on what they've done today and add any notes to the driving question board.</p> | <p>Recognizing areas where it would be possible to calculate area</p> <p>Drawing shapes, labelling, and measuring length and width</p> | <p>Making connections between shapes in the real world and the concept of area</p> <p>Reflecting on steps taken so far</p> |
| 3 | <p>Lesson period 2</p> | <p>Teacher can gather the class at the driving question board so that students can begin this period by familiarising themselves with what has been added to the board so far. They will then build on the step 2 to hold a brainstorming session (in pairs, groups, or whole class) about the different ways area is or could be used in their lives.</p> <p>The class is then given a set time (depending on time available but not too long to keep students working quickly) to produce a classroom poster of collective observations about how and why area is divided, organised or measured outside of the school environment and why this is important.</p> <p>The teacher can then facilitate a discussion around the poster, building on this to ask students why do we sometimes need to know the area of a place? Students brainstorm ideas for when it would be important to know the area of a place and add any additional ideas, words, or illustrations to the driving question board. The poster is also added to the board.</p> | <p>Thinking about area in the real world and in student's own lives</p> <p>Producing a classroom poster on the use and calculation of area outside the classroom</p> | <p>Generating ideas for when it is important to know the area of a place</p> <p>Considering why we might need to calculate area</p> |
| 4 | <p>Lesson period 2, Perhaps stretching into a third lesson period</p> | <p>In the second half of the lesson, students create a floor plan of the dream place they choose in step one and calculate the area. Depending on context and local curriculum, the teacher can introduce the idea of using the break apart/distributive property to calculate the area of large spaces and ask students to use this technique, as well as further discussing the importance of square units.</p> <p>In the middle of the production period, students can be asked to pair share their work so far and explain how they are going to calculate the area. Students give each other feedback on the strengths of their work and what they could do to make it better. Students can then share the final product with a group of</p> | <p>Using the distributive property to calculate the area of large spaces and building knowledge of square units</p> <p>Sharing and communicating their work on calculating area</p> | <p>Producing a representation of an imagined dream place using mathematical concepts</p> <p>Posing and envisioning how to solve a maths problem (how to calculate the area of unusual shapes) in a personally novel way</p> |

other students, including the entire dream place, each section, and how to find the area of each section.

The teacher may also choose to develop this activity by asking students to come up with ideas for additional dream places with different or more unusual shapes and ways of estimating the area of those shapes. Students can then be asked to compare estimates with each other and consider the relative merits of different methods.

Next Steps:

As appropriate to context and if further time is available, students can be introduced to perimeter and then be asked to go back and find the perimeter of sections of their dream place/s.

The activity can end with a reflective discussion (or some written work) with students reflecting on what they have learned about the driving questions and what questions they still have, as well as identifying at least one occasion that they used creativity to help them learn about area.

Estimating the area of unusual shapes

Considering different perspectives on a problem and explaining both strengths and limitations of possible solutions

Introduction to perimeter and calculating perimeter

Reflecting on steps taken to post and solve a maths problem

Resources and examples for inspiration

Web and print

- Videos about the distributive property could be used to support teaching. For example, <https://www.khanacademy.org/math/cc-third-grade-math/3rd-geometry/cc-third-grade-area-distributive-property/v/area-of-rectangles-and-the-distributive-property>
- Two useful books are Murphy, J., (2012) *Bigger, Better, Best (Area)* Holiday House and Adler, David A. (2012) *Perimeter, area, and volume: A Monster Book of Dimensions* Holiday House

Other

- Graph Paper, pencil, crayons, markers, colour pencils, rulers, measuring tape/rulers
- A driving question board set up somewhere in the classroom
- Post it notes or paper and pins to post ideas to the driving question board

Opportunities to adapt, extend, and enrich

- This activity could be extended into literacy and language, music, drama or visual arts by asking students to write stories/music/plays or create art about area or using their knowledge of area (e.g. imagine a world where we didn't know how to work out the area of a place and write a story that shows some of the problems we would have) or about a particular event when it was important to be able to calculate the area (e.g. an argument over who has the biggest bedroom)

Creativity and critical thinking rubric for mathematics

• Mapping of the different steps of the lesson plan against the OECD rubric to identify the creative and/or critical thinking skills the different parts of the lesson aim to develop

| | CREATIVITY Coming up with new ideas and solutions | Steps | CRITICAL THINKING Questioning and evaluating ideas and solutions | Steps |
|-------------------|---|-------|---|-------|
| INQUIRING | Make connections to other maths concepts or to ideas from other disciplines | 1,2,3 | Identify and question assumptions and generally accepted ways to pose or solve a maths problem | 1 |
| IMAGINING | Generate and play with several approaches to pose or solve a maths problem | 1,3 | Consider several perspectives on approaching a maths problem | 1,4 |
| DOING | Pose and envision how to solve meaningfully a maths problem in a personally novel way | 3,4 | Explain both strengths and limitations of different ways of posing or solving a math problem based on logical and possibly other criteria | 4 |
| REFLECTING | Reflect on steps taken to pose and solve a maths problem | 1,2,4 | Reflect on the chosen maths approach and solution relative to possible alternatives | |