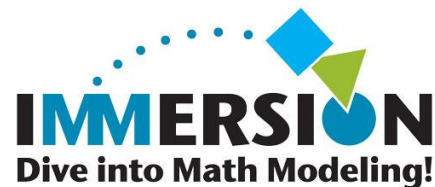


Design A Zoo

Learning Goals



Grade Band	3 – 5
Possible Math Tools	<ul style="list-style-type: none"> • Multiplication • Data Analysis • Linear Functions
Real-World Context	<p>Students divide into groups, and each group designs a zoo: it must have more than one exhibit, and students must consider multiple sources of cost. Students may brainstorm one of many different modeling problems:</p> <ul style="list-style-type: none"> • How much should we charge for admittance? • How could we reduce an outstanding cost? • How can we design a profitable zoo with limited space? • If we went on a field trip to the zoo, could we learn which exhibits are popular? • Which one is the best investment?
Cross-Curricular Connections	This lesson goes well with a field trip to the zoo, encouraging students to think quantitatively during the trip

Relevant Common Core Standards:

CCSS.MATH.CONTENT.3.OA.A.1

Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5×7 .*

Task: Use grid paper to plan several exhibits of different sizes, and find their area using rectangles.

CCSS.MATH.CONTENT.3.OA.A.3

Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Task: Build a space-efficient zoo, given minima for the dimensions of each exhibit.

CCSS.MATH.CONTENT.3.OA.D.8

Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Task: Design a zoo within some initial budget, including the cost of land.

CCSS.MATH.CONTENT.3.NBT.A.2

Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Task: Calculate the cost of a zoo with several different exhibits.

CCSS.MATH.CONTENT.3.MD.B.3

Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one-

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and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*

Task: Weigh the costs of different exhibits at different times.

CCSS.MATH.CONTENT.3.MD.C.6

Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).

Task: Plan out a zoo with grid paper—define units which make sense, and note the area of each exhibit.

CCSS.MATH.CONTENT.3.MD.D.8

Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

Task: Put together several exhibits, first minimizing total area, then minimizing perimeter. Remember to leave walking paths.

CCSS.MATH.CONTENT.5.NBT.B.7

Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Task: Analyze the costs of a zoo exhibit, as well as how often they come up. Resolve daily, weekly, and yearly costs to a single formula.

CCSS.MATH.CONTENT.5.MD.C.5

Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

Task: Represent an exhibit with 3-dimensional shapes, and find its cost (e.g. building an indoor display, digging a tiger moat)

CCSS.MATH.CONTENT.5.G.A.2

Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Task: Represent each exhibit on the coordinate plane, and find important values such as walking distance.