

***FlyBy Math™* Alignment to
Utah Mathematics– 6th Grade [2003]
Intended Learning Outcomes, Core Standards and Objectives**

Intended Learning Outcomes: By the end of sixth grade students will be able to:

1. Demonstrate a positive learning attitude toward mathematics

Intended Learning Outcome

b. Pose mathematical questions about objects, events, and processes.

***FlyBy Math™* Activities**

--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.

2. Become mathematical problem solvers.

Intended Learning Outcome

a. Determine the approach, materials, and strategies to be used in setting up a problem.

***FlyBy Math™* Activities**

--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.

b. Model problem situations in a variety of ways.

--Conduct simulation and measurement for several aircraft conflict problems.

--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.

d. Construct and use concrete, pictorial, symbolic, and graphical models to represent problem situations.

--Conduct simulation and measurement for several aircraft conflict problems.

--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.

g. Solve problems in both mathematical and everyday contexts.

--Apply mathematics to predict and analyze aircraft conflicts and validate through experimentation.

h. Recognize that there may be multiple ways to solve a problem.

--Conduct simulation and measurement for several aircraft conflict problems.

--Use tables, graphs, and equations to solve aircraft conflict problems.

3. Reason mathematically.

Intended Learning Outcome

a. Draw logical conclusions and make generalizations.

***FlyBy Math™* Activities**

--Use tables, bar graphs, line graphs, equations, and a Cartesian coordinate system to draw conclusions.

c. Use models, known facts, and relationships to explain reasoning.

--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.

	--Predict outcomes and explain results of mathematical models and experiments.
d. Make precise calculations and check the validity of the results in the context of the problem.	--Use calculations and experimental evidence to predict, describe, and explain several aircraft conflict problems.
e. Make conjectures based on observation and information and test mathematical conjectures and arguments.	--Conduct simulation and measurement for several aircraft conflict problems. --Apply mathematics to predict and analyze aircraft conflicts and validate through experimentation.
g. Analyze mathematical situations by recognizing and using patterns and relationships.	--Represent distance, speed, and time relationships for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system. --Use tables, bar graphs, line graphs, equations, and a Cartesian coordinate system to draw conclusions.
h. Justify answers and solution processes.	--Explain and justify solutions regarding the motion of two airplanes using the results of plotting points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system.
4. Communicate mathematically.	
Intended Learning Outcome	<i>FlyBy Math™</i> Activities
a. Represent mathematical ideas with objects, pictures, and symbols.	--Represent distance, speed, and time relationships for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.
b. Express mathematical ideas to peers, teachers, and others through oral and written language.	--Predict outcomes and explain results of mathematical models and experiments.
d. Explain mathematical work and justify reasoning and conclusions.	--Explain and justify solutions regarding the motion of two airplanes using the results of plotting points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system.
5. Make mathematical connections.	
Intended Learning Outcome	<i>FlyBy Math™</i> Activities
b. Recognize the role of mathematics in the classroom, school, and community.	--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.
c. Explore problems and describe and confirm results using various representations.	--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.

d. Recognize the connections between mathematics and other content areas and apply mathematical thinking and problem solving in those areas.	--Apply mathematics to predict and analyze aircraft conflicts and validate through experimentation.
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6. Represent mathematical situations.

Intended Learning Outcome	<i>FlyBy Math™</i> Activities
a. Create and use representations to organize and communicate mathematical ideas.	--Represent distance, speed, and time relationships for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.

b. Represent mathematical concepts using concrete, pictorial, and symbolic models.	--Conduct simulation and measurement for several aircraft conflict problems. --Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.
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Standard 1
Students will acquire number sense and perform operations with rational numbers.

Objective 5
Solve problems using the four operations with whole numbers, decimals, and fractions.

Objective	<i>FlyBy Math™</i> Activities
g. Solve problems using ratios and proportions.	--Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.

Standard 2
Students will use patterns and relations to represent and analyze mathematical situations using algebraic symbols.

Objective 1
Recognize, analyze, and use multiple representations of patterns and functions and describe their attributes.

Objective	<i>FlyBy Math™</i> Activities
a. Analyze patterns on graphs and tables and write a generalization to predict how the patterns will continue.	--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.

b. Create tables and graphs to represent given patterns and algebraic <i>expressions</i> .	--Represent distance, speed, and time relationships for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.
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d. Draw a graph from a table of values or to represent an equation.	--Represent distance, speed, and time relationships for constant speed cases using linear equations and a Cartesian coordinate system.
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Objective 2

Represent, solve, and analyze mathematical situations using algebraic symbols.

Objective

e. Evaluate *expressions* and formulas, substituting given values for the variables (e.g., $2x+4$; $x=2$; therefore, $2(2+4=8)$).

FlyBy Math™ Activities

--Use the distance-rate-time formula to predict and analyze aircraft conflicts.

Standard 3

Students will use spatial reasoning to recognize, describe, and identify geometric shapes and principles.

Objective 2

Specify locations and describe spatial relationships using coordinate geometry.

Objective

a. Graph points defined by ordered pairs in all four *quadrants*.

FlyBy Math™ Activities

--Plot points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system to describe the motion of two airplanes.

Standard 4

Students will understand and apply measurement tools and techniques.

Objective 2

Determine measurements using appropriate tools and formulas.

Objective

a. Measure length to the nearest one-sixteenth of an inch and to the nearest millimeter.

FlyBy Math™ Activities

--Conduct simulation and measurement for several aircraft conflict problems.

d. Calculate *elapsed time* across a.m. and p.m. time periods.

--Calculate and measure the position and time of simulated aircraft. Represent that motion using tables, graphs, equations, and experimentation.

Standard 5

Students will collect, analyze, and draw conclusions from data and apply basic concepts of probability.

Objective 1

Design investigations to reach conclusions using statistical methods to make inferences based on data.

Objective

a. Design investigations to answer questions by collecting and organizing data in a variety of ways (e.g., bar graphs, line graphs, frequency tables, stem and leaf plots).

FlyBy Math™ Activities

--Conduct simulation and measurement for several aircraft conflict problems.

--Represent distance, rate, and time data using tables, line plots, bar graphs, and line graphs.

<p>b. Collect, compare, and display data using an appropriate format (i.e., bar graphs, line graphs, <i>line plots</i>, circle graphs, scatter plots).</p>	<p>--Conduct simulation and measurement for several aircraft conflict problems.</p> <p>--Represent distance, rate, and time data using tables, line plots, bar graphs, and line graphs.</p>
<p>c. Compare two similar sets of data on the same graph and compare two graphs representing the same set of data.</p>	<p>--Use graphs to compare airspace scenarios for both the same and different starting conditions and the same and different constant (fixed) rates.</p> <p>--Represent distance, rate, and time data using tables, line plots, bar graphs, and line graphs.</p>
<p>e. Develop and evaluate inferences and predictions based on data.</p>	<p>--Explain and justify solutions regarding the motion of two airplanes using the results of plotting points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system.</p>