

DAY 1

Lesson

Students study an atlas in groups of three. Students observe difference between an atlas that show topograph and a atlas that shows straight solid lines with time above and driving distance below. At this point there is class discussion on what topography is and how driving times account for the landscape changes. Discuss that routes, roads, paths are all the same. Also observe that a solid line between two cites is referred to as a connection.

In class activity:

Use activity sheet 1 from “ways to go” Britannica math system on pg 117. Student in a groups each have there own planned trip for five days in Arizona. Students record the time and distance for each day.

Conclusion:

As a whole class we discuss some of the road trips. Now there is assessment that is # 10 and #11 page 12 from “Ways to Go”. Assign problems 12 –14

DAY 2

Lesson

As a class discuss # 12 -#14. Discuss another way of looking at distance is called as-the-crow-flies. A crow does not account for topography, the crow’s distance is always a straight line. As a class we will discuss and work at the board with volunteers on # 15 and #16.

Conclusion:

Discuss the three ways to describe the distance between cities: driving distance, driving time, and as-the-crow-flies distance. Reinforce that driving distance accounts for every curve and hill so it may be longer then as-the-crow-flies distance, which is strictly the distance between the two cities. NO HW

DAY 3

Lesson:

Discuss that a map can be drawn to scale in terms of as-the-crow-flies. Pose the question: How does the map change if we use driving distance to draw the map to scale. Student should notice that a path could be shorter then another path but have a greater driving distance, once again due to topography. Ask students: is there a way to make the map of driving distance look realistic? Lead students to as-the-crow-flies, that is strictly the distance from city to city.

In class activity:

Students work on number eighteen and share there answers. Here some may

need help with the concept of using a scale that is simple, like 1cm=20miles. Not all student should use the same scale. Interject the idea if using a compass instead of a ruler. That is open your compass to the desired scale, say from example above, 1 cm implies the compass is open to 20 miles. At this point ask students to look at page 24*. Look at and discuss making arcs. Discuss # 19, #20, # 21, # 22.

Conclusion:

Discuss # 23 , assign #24,#25,#26, and # 27.

DAY4

Lesson:

Open with discussion on homework and specifically #27. Student discover that it is not always possible to make a map in which driving distance are drawn both to scale and as straight lines. Ask the what could be changed, lead students to curved paths or connections. Discuss that curve lines can be drawn as straight lines, but they are not scaled to the distance they represent. When taking the curves and making the straight lines this is streamlining. When a map is streamlined its is called a graph, where the paths between the cites are not to scale. Also discuss each point as a vertex and each path as an edge.

In class activity:

Students pair up and work on #30, # 31. Collectively come back together as a class and discuss there solutions.

Conclusion:

Discuss how you can be given to many edges to make a graph. Observe a good name for the graphs. Ask leading questions like what are the two parts of this graph? Now what could we call this graph? A vertex-edge graph. NO HW

DAY 5

Lesson:

Discuss making a connections chart for an airline's vertex-edge graph. That is, a one is a direct path (means there is a path) and a zero is an indirect path (meaning there is no path which implies two or more routes to get to certain locations. As a class answer the true and false with explanation for #2, page 40.

In class activity:

Student work in pairs (you assign new pairs) on numbers 3-7. Here lead students to different possibilities to making a graph given a situation. Also introduce the idea of a matrix instead of a connection chart.

Conclude: Discuss possibilities and show student solutions: assign: #8-#10

DAY 6

Lesson:

Follow up with #8-#10 and show student solutions. Lead into the number of points or vertices is the number of row and columns of the matrix. Pose the question of a matrix with less row than columns, what does the graph look like? Move on to questions 12 – 14 on page 50. Introduce the idea of maximally and minimally connected graphs. Now with volunteers work through # 15 and # 16.

In class activity: In groups of three answer questions 17 – 19 on page 54.

Conclusion: Have groups present their results to the whole class.

Assign 20-22 page 56.

DAY 7

Lesson:

Open with discussion on # 20-#22 on page 56. Move onto # 23 page 58. Ask students for the reasoning. Lead into current number of edges divided by total possible edges is the degree of connectivity. Do number 24 and 25 on page 58 together.

In class activity:

Student work on 26-28 on page 60, show them a template for how data is recorded. In groups of two students should find general conclusions for minimally and maximally connected graphs.

Conclusion:

Student should reach a consensus on # 26 and # 27, however conclude on number 28 with a chart on the board. Assign #29 - #33

Day 8

Lesson:

Discuss #29 - #33 and students have # 34 as an assessment. Look at the foreign correspondence on page 70. Introduce the idea of arrow graphs. Discuss with students the number of possible routes for the foreign correspondent.

In class activity:

Now adding more places for the foreign correspondent to go, have students come up with possible arrow graphs. Now student can look at # 5 on page 74 with the city of Odessa. Students show different routes in the city that are the same number of blocks using arrow notation.

Conclusion:

Discuss student solution to number five and assign number 6 – 9 on page 78.

Day 9

Lesson:

Discuss answers to 6- 9. Discuss # 11 and #12 as a class. Review super even numbers with students. Discuss possibilities as trees-you can take different paths. Trees

work great with super even numbers-lead to this with students. As a class discuss # 13 - #15.

Conclude: go over some points like the counting principle-which is a prerequisite to this lesson. Assign number #17.

Day 10

Lesson:

Discuss and have a student write the solution to # 17 on the board. As an assessment have students do # 18 and # 19 with trees.

Conclusion: Have students work on 22a and 22b in class and as homework.

Day 11

Lesson:

Open with discussion On 22a and 22b from day 10. lead into Traffic Data on page 92. Looking at traffic patterns and the reasoning of the number of cars going in a direction. Look at ratios and probability. Discuss questions 1-4. Now introduce the idea of a traffic flow diagram. And discuss 5 through 9 on pages 94-96.

In class activity:

Student apply probability to each branch. Students should be in groups of two. Start with a city map of the local school and have student choose a number of paths. Now student draw a traffic flow diagram and estimate the number of cars to start and how many go left or right at each location as they go through the tree. Using calculators students figure out their probability of each branch. Now discuss different approaches and why they are not the same.

Conclusion:

Discuss the idea that all answers are correct. Assign extra credit # 12 on page 100, which deals with double elimination.

PERFORMANCE PACKAGE TASK 1 (TRIP AROUND THE WORLD)

Content Standard: 1: GEOMETRY (NCTM) 2: ALGEBRA (NCTM) **Level:** 7th

Specific Statement(s) from the Standard:
1: Use visualization, spatial reasoning, and geometric modeling to solve problems

2: Use mathematical models to represent and understand quantitative relationships

Product(s):

Student will turn in a portfolio. The portfolio will encompass your results.

Task Description:

You have just heard bad news. Your great Uncle Rupert has passed. Uncle Rupert has left a generous amount of wealth for you. However, this wealth is only given if you complete your trip around the world. Each task in your task list gives you a clue as to what you'll receive upon completion of the trip. Good Luck!

A: list of five cities in five different countries that student wants to fly to.

B: choose an airline that goes to those cities.

C: Record a connection chart showing the direct and indirect paths(need research Time)

D: Make a vertex-edge graph of the matrix or Connection chart you have in c

E: record how many rows and columns your Matrix has.

F: Make a maximally connected graph for your Matrix: how many edges?

G: Make a minimally connected graph for your

Matrix: how many edges?

H: What is the Degree of Connectivity for F? G?

***I: Record the Degree of Connectivity for F and G
As a percent, decimal, and a fraction.***

***J: Compare your trip A-I steps with one other
Person. List each difference for A-I. Write a
paragraph explanation on the differences.***

***Special Notes: For student who miss you need to really
contact the parents and principle. Arrange outside time.***

PERFORMANCE PACKAGE TASK 1

(Trip around the world)

FEEDBACK CHECKLIST FOR TASK 1

The purpose of the checklist is to provide feedback to the student about his/her work relative to the content standard. Have the standard available for reference.

Y=Yes

N=Needs Improvement

<u>Student</u>	<u>Teacher</u>
_____ Student has record of five cities in different countries and Their flight distances and times.	_____
_____ Student has a connected chart (matrix) correct.	_____
_____ Student has Minimally and Maximally graphs correct.	_____
_____ Student has Degree of connectivity listed for each graph As a percent, decimal, and fraction.	_____
_____ Student has a contrasting report with one other student.	_____

Overall Comments (information about student progress, quality of the work, next steps for teacher and student, needed adjustments in the teaching and learning processes, and problems to be addressed):

I. Students should have had number sense topics for changing from decimals to fractions to percents

II. Help students recognize in their contrast summary that graphs are the same if their connections are the

same, even if their points are in different places.

III. Students should realize if a graph is maximally connected its degree of connectivity is 100%

IV. Students should also observe a minimally connected graph has just enough edges so that you can get from any point to any other through indirect paths.

V. The next step is to add more cities and see how the matrix and graph change.

VI. The next sequential step from this unit is using arrow notation to look at the number of possible routes. Eventually leading into probability tree and traffic flow diagrams.

Note: This unit is from BRITANNICA "Mathematics in context" 7th grade series "Ways to Go"
However, the performance package is unique and use what I feel are the most important aspects of the unit "Ways to Go"