



Topic A:

Networks and Matrices

N-VM.C.6, N-VM.C.7, N-VM.C.8

Focus Standards:	N-VM.C.6	(+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
	N-VM.C.7	(+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
	N-VM.C.8	(+) Add, subtract, and multiply matrices of appropriate dimensions.
Instructional Days:	3	
Lesson 1:	Introduction to Networks (E) ¹	
Lesson 2:	Networks and Matrix Arithmetic (E)	
Lesson 3:	Matrix Arithmetic in Its Own Right (E)	

In Topic A, students are introduced to a second application of matrices, networks, and use public transportation routes to study the usefulness of matrices. In Lesson 1, students discover the value of matrices in counting routes (**N-VM.C.6**). Students see that the arithmetic and properties of matrices is the same regardless of the application. Lesson 2 builds on the work of networks as students study a network of subway lines between four cities and a social network. This work allows students to further explore multiplication by a scalar (**N-VM.C.7**), and matrix addition and subtraction (**N-VM.C.8**). In Lesson 3, students continue their study of public transportation networks. Matrix addition, subtraction, and multiplication as well as multiplication by a scalar is revisited as students work with square and rectangular matrices (**N-VM.C.8**). They begin to see that matrix multiplication is not commutative.

In this topic, students make sense of problems involving transportation networks and matrices (MP.1). Students are asked to relate and explain the connection between real-world situations, such as networks, and their matrix representations (MP.2). Matrices are used as a tool to organize and represent transportation and social network systems (MP.5), and show links between these systems with precise and careful calculations (MP.6).

¹ Lesson Structure Key: **P**-Problem Set Lesson, **M**-Modeling Cycle Lesson, **E**-Exploration Lesson, **S**-Socratic Lesson