

Probability, Statistics & Trigonometry: Matrices

ESTABLISHED GOALS:

Competencies:

- Students will demonstrate accuracy and clarity using correct mathematical terminology, specifying units of measure, and calculating with the degree of precision appropriate for the problem context.
- Students will demonstrate structural awareness by discerning patterns and functional relationships within complex mathematical concepts to simplify and solve problems.
- Students will demonstrate the ability to notice repetitive calculations or patterns, evaluate the reasonableness of results, and formulate general methods, formulas, or shortcuts while maintaining oversight of the process.
- Students will demonstrate the ability to analyze and summarize text and integrate knowledge to make meaning of discipline-specific materials.
- Students will demonstrate the ability to produce coherent and supported writing in order to communicate effectively for a range of discipline-specific tasks, purposes, and audiences.
- Students will demonstrate the ability to speak purposefully and effectively by strategically making decisions about content, language use, and discourse style.

Content Standards:

- HSN.VM.C.6 (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
- HSN.VM.C.7 (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
- HSN.VM.C.8 (+) Add, subtract, and multiply matrices of appropriate dimensions.
- HSN.VM.C.9 (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.
- HSN.VM.C.10 (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.
- MP4 Model with mathematics.
- MP5 Use appropriate tools strategically.
- MP7 Look for and make use of structure.
- MP8 Look for and express regularity in repeated reasoning.

Transfer

*Students will be able to independently use their learning to **maximize or minimize a problem's solution given a set of restrictions.***

Meaning

ENDURING UNDERSTANDINGS

Students will understand that...

- matrices allow them to find solutions to problems without using variables.

ESSENTIAL QUESTIONS

- How can we make the best decisions given a restrictive situation?

Acquisition

Students will know...

- systems with no solution can always be detected by the presence of a matrix row of the form $[0 \ 0 \dots a]$, where a is a nonzero number
- in order to add or subtract matrices, they must have the same dimensions
- in order to multiply matrices, the columns of the first must be the same as the rows of the second
- multiplication of matrices is not commutative
- not all square matrices have inverses
- an input-output matrix is summarized the interdependence among the industries of the economy

vocabulary: elementary row operations, matrix, pivoting; row, column, & square matrices; entries, coefficient matrix, scalar product, identity matrix, inverse of a matrix, final demand, production amounts, linear programming, optimal point, transpose

Students will be skilled at...

- solve systems of equations using the Gauss-Jordan elimination method.
- using a graphing calculator to solve systems using matrices.
- pivoting a matrix around a given nonzero entry.
- adding, multiplying, and subtracting matrices by hand and with a graphing calculator.
- performing scalar multiplication.
- finding the inverse of a matrix using Gauss-Jordan and with a calculator.
- solving a matrix equation.
- using a matrix inverse to solve a system of equations.
- performing input-output analysis using matrix.

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● RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. ● RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9-10 texts and topics</i>. ● RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	● <i>reason effectively</i> ● <i>use systems thinking</i> ● <i>solve problems</i> ● <i>access and evaluate information</i> ● <i>use and manage information</i> ● <i>be self-directed learners</i>
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<i>Evaluative Criteria</i>	<i>Assessment Evidence</i>
	PERFORMANCE TASK(S):
	OTHER EVIDENCE:

<i>Summary of Key Learning Events and Instruction</i>		
<i>Science Integration</i>	<i>College, Career, and Civic Life Integration</i>	<i>Technology Integration</i>
<i>District Materials</i>	<i>Distance Learning/Field Trips</i>	<i>Technology Resources</i>