

APPENDIX E: LESSONS BY MATHEMATICS ESSENTIAL CONCEPTS, SOCIAL JUSTICE OUTCOMES, AND SOCIAL JUSTICE TOPICS

Lessons by Mathematics Essential Concepts

EC Code	Mathematics Essential Concepts	Lesson Title
N	Number	
N.2	Quantitative reasoning includes, and mathematical modeling requires, attention to units of measurement.	5.1 The Mathematics of Transformational Resistance 5.2 Do Just Some Students Take Honors Courses? 5.3 Listen to GLSEN 5.4 Estimated Wealth Distribution in the United States and the World
AF	Algebra and Functions	
A	Focus 1: Algebra	
A.3	The structure of an equation or inequality (including, but not limited to, one-variable linear and quadratic equations, inequalities, and systems of linear equations in two variables) can be purposefully analyzed (with and without technology) to determine an efficient strategy to find a solution, if one exists, and then to justify the solution.	6.6 What's a Fair Living Wage?
A.4	Expressions, equations, and inequalities can be used to analyze and make predictions, both within mathematics and as mathematics is applied in different contexts—in particular, contexts that arise in relation to linear, quadratic, and exponential situations.	6.5 Literacy: What Matters and Why?
F	Focus 3: Functions	
F.2	Functions that are members of the same family have distinguishing attributes (structure) common to all functions within that family.	6.7 What's the Cost of Globalization?
F.3	Functions can be represented graphically, and key features of the graphs, including zeros, intercepts, and, when relevant, rate of change, and maximum/minimum values, can be associated with and interpreted in terms of the equivalent symbolic representation.	6.1 Children at the Border: Looking at the Numbers 6.3 Culturally Relevant Income Inequality 6.4 Intersectionality and the Wage Gap

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EC Code	Mathematics Essential Concepts	Lesson Title
F.4	Functions model a wide variety of real situations and can help students understand the processes of making and changing assumptions, assigning variables, and finding solutions to contextual problems.	6.1 Children at the Border: Looking at the Numbers 6.4 Intersectionality and the Wage Gap
SP	Statistics and Probability	
QL	Focus 1: Quantitative Literacy	
QL.1	Mathematical and statistical reasoning about data can be used to evaluate conclusions and assess risks.	7.1 A False Positive
QL.2	Making and defending informed data-based decisions is a characteristic of a quantitatively literate person.	8.1 Bringing Healthy Food Choices to the Desert
VSD	Focus 2: Visualizing and Summarizing Data	
VSD.2	Distributions of quantitative data (continuous or discrete) in one variable should be described in the context of the data with respect to what is typical (the shape, with appropriate measures of center and variability, including standard deviation) and what is not (outliers), and these characteristics can be used to compare two or more subgroups with respect to a variable.	5.4 Estimated Wealth Distribution in the United States and the World 7.2 Are You a Citizen? 2020 Census 7.5 Humanizing the Immigration Debate
VSD.3	The association between two categorical variables is typically represented by using two-way tables and segmented bar graphs.	7.3 “BBQ Becky,” Policing, and Racial Justice 7.5 Humanizing the Immigration Debate
VSD.4	Scatterplots, including plots over time, can reveal patterns, trends, clusters, and gaps that are useful in analyzing the association between two contextual variables.	6.2 Climate Change in Alaska 7.5 Humanizing the Immigration Debate 7.4 Do Postal Codes Predict Test Scores?
VSD.5	Analyzing the association between two quantitative variables should involve statistical procedures, such as examining (with technology) the sum of squared deviations in fitting a linear model, analyzing residuals for patterns, generating a least-squares regression line and finding a correlation coefficient, and differentiating between correlation and causation.	6.2 Climate Change in Alaska 7.4 Do Postal Codes Predict Test Scores? 7.6 Prison Population
VSD.6	Data-analysis techniques can be used to develop models of contextual situations and to generate and evaluate possible solutions to real problems involving those contexts.	6.3 Culturally Relevant Income Inequality 7.6 Prison Population
SI	Focus 3: Statistical Inference	
SI.1	Study designs are of three main types: sample survey, experiment, and observational study.	7.7 Sampling Disaster
SI.4	Bias, such as sampling, response, or nonresponse bias, may occur in surveys, yielding results that are not representative of the population of interest.	7.2 Are You a Citizen? 2020 Census

EC Code	Mathematics Essential Concepts	Lesson Title
SI.6	The sampling distribution of a sample statistic formed from repeated samples for a given sample size drawn from a population can be used to identify typical behavior for that statistic. Examining several such sampling distributions leads to estimating a set of plausible values for the population parameter, using the margin of error as a measure that describes the sampling variability.	5.2 Do Just Some Students Take Honors Courses? 7.7 Sampling Disaster
P	Focus 4: Probability	
P.1	Two events are independent if the occurrence of one event does not affect the probability of the other event. Determining whether two events are independent can be used for finding and understanding probabilities.	7.1 A False Positive
P.2	Conditional probabilities—that is, those probabilities that are “conditioned” by some known information—can be computed from data organized in contingency tables. Conditions or assumptions may affect the computation of a probability.	7.1 A False Positive
GM	Geometry and Measurement	
T	Focus 2: Transformations	
T.3	Showing that two figures are similar involves finding a similarity transformation (dilation or composite of a dilation with a rigid motion) or, equivalently, a sequence of similarity transformations that maps one figure onto the other.	8.4 Paralympics
GARP	Focus 3: Geometric Arguments, Reasoning, and Proof	
GARP.2	Using technology to construct and explore figures with constraints provides an opportunity to explore the independence and dependence of assumptions and conjectures.	8.1 Bringing Healthy Food Choices to the Desert
SAPM	Focus 4: Solving Applied Problems and Modeling in Geometry	
SAPM.1	Recognizing congruence, similarity, symmetry, measurement opportunities, and other geometric ideas, including right triangle trigonometry in real-world contexts, provides a means of building understanding of these concepts and is a powerful tool for solving problems related to the physical world in which we live.	8.1 Bringing Healthy Food Choices to the Desert 8.2 Gerrymandering 8.3 Making Mathematical Sense of Food Justice
SAPM.2	Experiencing the mathematical modeling cycle in problems involving geometric concepts, from the simplification of the real problem through the solving of the simplified problem, the interpretation of its solution, and the checking of the solution’s feasibility, introduces geometric techniques, tools, and points of view that are valuable to problem solving.	8.3 Making Mathematical Sense of Food Justice

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Lessons by Social Justice Standards: Grades 9–12 Outcomes

Social Justice Outcome, Grades 9–12 (Teaching Tolerance, 2016)	Lesson Title
Identity	
3 I know that all my group identities and the intersection of those identities create unique aspects of who I am and that this is true for other people too.	5.3 Listen to GLSEN
5 I recognize traits of the dominant culture, my home culture and other cultures, and I am conscious of how I express my identity as I move between those spaces.	6.5 Literacy: What Matters and Why?
Diversity	
8 I respectfully express curiosity about the history and lived experiences of others and exchange ideas and beliefs in an open-minded way.	5.1 The Mathematics of Transformational Resistance 7.4 Do Postal Codes Predict Test Scores? 8.2 Gerrymandering
9 I relate to and build connections with other people by showing them empathy, respect and understanding, regardless of our similarities or differences.	5.1 The Mathematics of Transformational Resistance 5.3 Listen to GLSEN 8.4 Paralympics
10 I understand that diversity includes the impact of unequal power relations on the development of group identities and cultures.	5.4 Estimated Wealth Distribution in the United States and the World 6.1 Children at the Border: Looking at the Numbers 7.5 Humanizing the Immigration Debate
Justice	
12 I can recognize, describe and distinguish unfairness and injustice at different levels of society.	5.2 Do Just Some Students Take Honors Courses? 6.2 Climate Change in Alaska 6.3 Culturally Relevant Income Inequality 6.4 Intersectionality and the Wage Gap 6.5 Literacy: What Matters and Why? 6.6 What's a Fair Living Wage? 6.7 What's the Cost of Globalization? 7.1 A False Positive 7.3 "BBQ Becky," Policing, and Racial Justice 7.6 Prison Population 7.7 Sampling Disaster 8.1 Bringing Healthy Food Choices to the Desert 8.4 Paralympics

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Social Justice Outcome, Grades 9–12 (Teaching Tolerance, 2016)	Lesson Title
13 I can explain the short and long-term impact of biased words and behaviors and unjust practices, laws and institutions that limit the rights and freedoms of people based on their identity groups.	5.2 Do Just Some Students Take Honors Courses? 6.4 Intersectionality and the Wage Gap 8.3 Making Mathematical Sense of Food Justice
14 I am aware of the advantages and disadvantages I have in society because of my membership in different identity groups, and I know how this has affected my life.	5.4 Estimated Wealth Distribution in the United States and the World 6.1 Children at the Border: Looking at the Numbers 7.5 Humanizing the Immigration Debate
15 I can identify figures, groups, events and a variety of strategies and philosophies relevant to the history of social justice around the world.	6.3 Culturally Relevant Income Inequality 7.2 Are You a Citizen? 2020 Census
Action	
16 I express empathy when people are excluded or mistreated because of their identities and concern when I personally experience bias.	7.7 Sampling Disaster
17 I take responsibility for standing up to exclusion, prejudice and injustice.	7.6 Prison Population
18 I have the courage to speak up to people when their words, actions or views are biased and hurtful, and I will communicate with respect even when we disagree.	6.2 Climate Change in Alaska
19 I stand up to exclusion, prejudice and discrimination, even when it's not popular or easy or when no one else does.	5.3 Listen to GLSEN 7.4 Do Postal Codes Predict Test Scores?
20 I will join with diverse people to plan and carry out collective action against exclusion, prejudice and discrimination, and we will be thoughtful and creative in our actions in order to achieve our goals.	5.1 The Mathematics of Transformational Resistance 8.1 Bringing Healthy Food Choices to the Desert 8.2 Gerrymandering 8.3 Making Mathematical Sense of Food Justice

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Lessons by Social Justice Topic

Social Justice Topic	Lesson Title
Ability	8.4 Paralympics
Civil Rights and Governmental Laws	8.2 Gerrymandering
Class	6.4 Intersectionality and the Wage Gap
Economic Inequality	5.4 Estimated Wealth Distribution in the United States and the World 6.3 Culturally Relevant Income Inequality 6.6 What's a Fair Living Wage?
Environmental Issues	6.2 Climate Change in Alaska 6.7 What's the Cost of Globalization? 7.7 Sampling Disaster
Gender and Sexual Identity	5.3 Listen to GLSEN
Health Inequality	7.1 A False Positive 8.1 Bringing Healthy Food Choices to the Desert 8.3 Making Mathematical Sense of Food Justice
Immigration	6.1 Children at the Border: Looking at the Numbers 7.2 Are You a Citizen? 2020 Census 7.5 Humanizing the Immigration Debate
Opportunity	5.2 Do Just Some Students Take Honors Courses? 7.4 Do Postal Codes Predict Test Scores?
Race and Ethnicity	7.3 "BBQ Becky," Policing, and Racial Justice
Resistance and Oppression	5.1 The Mathematics of Transformational Resistance
Rights and Activism	6.1 Children at the Border: Looking at the Numbers 6.5 Literacy: What Matters and Why? 7.6 Prison Population