

The SBI program consists of 21 lessons, focusing on ratio/proportion and percent topics. The following table outlines each lesson and its alignment with the Common Core State Standards for Mathematics (CCSSM)

<http://www.corestandards.org/Math/>

Lesson Objectives	Common Core State Standards for Mathematics
Lesson 1: Ratios Students define a ratio as a multiplicative relationship. They identify the base quantity for comparison of quantities involving part-to-part and part-to-whole. CCSSM: 6.RP.A.1, 6.RP.A.3, 7.NS.A.2, 7.NS.A.2.B, 7.RP.A.2, 7.RP.A.2.A	6.RP.A.1: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. <i>For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”</i> 6.RP.A.3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. 7.NS.A.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 7.NS.A.2.B: Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real world contexts. 7.RP.A.2: Recognize and represent proportional relationships between quantities. 7.RP.A.2.A: Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
Lesson 2: Equivalent Ratios Students use visual diagrams to understand the meaning of equivalent ratios. They identify integer ratios in their lowest or simplest form. They correctly determine if ratios are in simplest form by using division of common factors. CCSSM: 6.NS.B.4, 6.RP.A.3, 7.NS.A.2, 7.NS.A.2.B, 7.RP.A.2, 7.RP.A.2.A	6.NS.B.4: Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. <i>For example, express $36 + 8$ as $4(9 + 2)$.</i> 6.RP.A.3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. 7.NS.A.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 7.NS.A.2.B: Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts. 7.RP.A.2: Recognize and represent proportional relationships between quantities. 7.RP.A.2.A: Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

Lessons 3 and 4: Solving Ratio Word Problems Students apply ratio concepts to solve word problems. They represent information in the problems using a ratio diagram and plan to solve the problem using various solution strategies. CCSSM: 6.RP.A.3, 7.RP.A.2, 7.RP.A.2.A	6.RP.A.3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. 7.RP.A.2: Recognize and represent proportional relationships between quantities. 7.RP.A.2.A: Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
Lesson 5: Rates Students define rate as a comparison of two quantities with different units. They understand and learn how to calculate unit rates. Students learn to solve problems in which they compare two rates. CCSSM: 6.RP.A.2, 6.RP.A.3, 6.RP.A.3.B, 7.RP.A.1, 7.RP.A.2, 7.RP.A.2.B	6.RP.A.2: Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. <i>For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”</i> 6.RP.A.3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. 6.RP.A.3.B: Solve unit rate problems including those involving unit pricing and constant speed. <i>For example, if it took 7 hours to mow 4 lawns then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?</i> 7.RP.A.1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. <i>For example, if a person walks $1/2$ mile in each $1/4$ hour, compute the unit rate as the complex fraction $1/2 \div 1/4$ miles per hour, equivalently 2 miles per hour.</i> 7.RP.A.2: Recognize and represent proportional relationships between quantities. 7.RP.A.2.B: Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Lessons 6 and 7: Solving Proportion Word Problems Students apply ratio/rate concepts to solve proportion word problems. They represent information in the problems using a proportion schematic diagram and plan to solve the problem using various solution strategies (e.g., cross multiplication, equivalent fractions, unit rate). CCSSM: 6.RP.A.2, 6.RP.A.3, 6.RP.A.3.B, 7.RP.A.1, 7.RP.A.2, 7.RP.A.2.B	6.RP.A.2: Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. <i>For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”</i> 6.RP.A.3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. 6.RP.A.3.B: Solve unit rate problems including those involving unit pricing and constant speed. <i>For example, if it took 7 hours to mow 4 lawns then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?</i> 7.RP.A.1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. <i>For example, if a person walks $1/2$ mile in each $1/4$ hour, compute the unit rate as the complex fraction $1/2 \div 1/4$ miles per hour, equivalently 2 miles per hour.</i> 7.RP.A.2: Recognize and represent proportional relationships between quantities. 7.RP.A.2.B: Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
Lesson 8 and 9: Scale Drawing Problems Students will identify a proportional relationship in scale drawings and calculate dimensions in scale drawings using scale factors. They will represent information in the scale drawing problems using a proportion diagram and plan to solve the problem. CCSSM: 6.RP.A.3.B, 7.RP.A.2, 7.RP.A.2.A, 7.G.A.1	6.RP.A.3.B: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. 7.RP.A.2: Recognize and represent proportional relationships between quantities. 7.RP.A.2.A: Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. 7.G.A.1: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
Lesson 10: Project: Recording Studio Students will demonstrate knowledge of material presented in lessons 1-9 in a real-world context. Standards included in lessons 1 – 9.	

Lesson 11: Fractions, Percents and Decimals Students understand that percent is a special type of ratio and that fractions and percents are two ways to compare parts to a whole. They understand the relationship between fractions and percents and display the ability to convert between fractions, percents, and decimals. CCSSM: 6.RP.A.3, 6.RP.A.3.C, 7.EE.B.3	6.RP.A.3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. 6.RP.A.3.C: Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. 7.EE.B.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. <i>For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.</i>
Lesson 12: Solving Percent Word Problems: Part-to-Whole Comparisons Students apply ratio concepts to solve percent problems. They represent information in the word problems using a ratio diagram and plan to solve the problem. CCSSM: 6.RP.A, 6.RP.A.3.C, 7.EE.B.3	6.RP.A.3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. 6.RP.A.3.C: Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. 7.EE.B.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. <i>For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.</i>
Lesson 13 – 16: Solving Percent Word Problems: Percent of Change Students apply ratio concepts to solve percent of change problems. They represent information in the word problems using a ratio diagram and change diagram and solve the problem. CCSSM: 7.RP.A.3, 7.EE.B.3	7.RP.A.3: Use proportional relationships to solve multistep ratio and percent problems. <i>Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.</i> 7.EE.B.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. <i>For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.</i>

Lesson 17: Solving Multistep Percentage Adjustment Problems Students solve problems involving multiple successive discounts and markups. CCSSM: 7.RP.A.3, 7.EE.B.3	7.RP.A.3: Use proportional relationships to solve multistep ratio and percent problems. <i>Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.</i> 7.EE.B.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. <i>For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.</i>
Lesson 18: Simple Interest Students calculate simple interest. CCSSM: 7.RP.A.3, 7.EE.B.3	7.RP.A.3: Use proportional relationships to solve multistep ratio and percent problems. <i>Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.</i> 7.EE.B.3: Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. <i>For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.</i>
Lesson 19: Review: Identifying and Representing Problem Types Standards included in lessons 11 – 18 Students will review material from lessons 11 – 18 by identifying and categorizing word problems into appropriate problem types (e.g. ratio, proportion, percent and percent of change).	
Lesson 20: Review Project: IMAX Planetarium Standards included in lessons 11 – 18 Students will demonstrate knowledge of material presented in Lessons 11 – 18 in a real-world context.	
Lesson 21: Review: Identifying and Representing Problem Types Standards included in lessons 1 – 18 Students will demonstrate understanding of unit content in a standardized test format.	