

Orange Public Schools

Office of Curriculum & Instruction
2019-2020 Mathematics Curriculum Guide



7th Grade Mathematics

Illustrative Mathematics - Unit 3: Measuring Circles

October 31, 2019 – November 22, 2019

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From the New Jersey Student Learning Standards:

In **Grade 7**, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

1. Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

2. Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.

3. Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three dimensional objects. In preparation for work on congruence and similarity in Grade 8 they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.

4. Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

Yearlong Pacing Guide Grade 7

| Grade | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN |
|-------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------------|----------------|-----|
| 5 | Unit 1 5.NBT | Unit 2 5.NBT | | Unit 3 5.NF | Unit 4 5.NF | | Unit 5 5.MD | Unit 6 5.OA & 5.G | | |
| 6 | Unit 1 6.G | Unit 2 6.RP | Unit 3 6.RP | Unit 4 6.NS | | Unit 5 6.NS | Unit 6 6.EE | Unit 7 6.NS | Unit 8 6.SP | |
| 7 | Unit 1 7.G | Unit 2 7.RP | Unit 3 7.G | Unit 4 7.RP | Unit 5 7.NS | Unit 6 7.EE | | Unit 7 7.G | Unit 8 7.SP | |
| 8 | Unit 1 8.G | Unit 2 8.G | Unit 3 8.EE | Unit 4 8.EE | Unit 5 8.F | | Unit 6 8.SP | Unit 7 8.EE | Unit 8 8.G | |



Unit 1
Geometry: Scale Drawings



Unit 2
Ratios & Proportional Relationships:
Introducing Proportional Relationships



Unit 3
Geometry: Measuring Circles



Unit 4
Ratios & Proportional Relationships:
Proportional Relationships & Percentages



Unit 5
Number System: Rational Number Arithmetic



Unit 6
Expressions & Equations:
Expressions, Equations &



Unit 7
Geometry: Angles, Triangles, and Prisms



Unit 8
Statistics & Probability:
Probability and Sampling

| 2019-2020 Grade 7 (iM) | | | | | | | |
|------------------------|--|-----------|------------------------|-------------------------------------|--|--|--|
| Quarter 1 | | Quarter 2 | | Quarter 3 | | Quarter 4 | |
| Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 |
| 7.G.1(A) | 7.RP.2a(M) 7.RP.2b(M) 7.RP.2c(M) 7.RP.2d(M) | 7.G.4(A) | 7.RP.1(M) 7.RP.3(M) | 7.NS.1(M) 7.NS.2(M) 7.NS.3(M) | 7.EE.3(M) 7.EE.4(M) 7.EE.2(M) 7.EE.1(M) | 7.G.5(A) 7.G.2(A) 7.G.3(A) 7.G.6(A) | 7.SP.6(S) 7.SP.5(S) 7.SP.7(S) 7.SP.8(S) 7.SP.1(S) 7.SP.2(S) 7.SP.3(S) 7.SP.4(S) |
| 15 Days | 17 Days | 13 Days | 19 Days | 19 Days | 25 Days | 19 Days | 22 Days |
| Oct. 1 | Oct. 30 | Nov. 22 | Jan. 8 | Feb. 7 | Mar. 27 | May 5 | Jun. 9 |

Major Work Supporting Content Additional Content

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References

“Illustrative Mathematics” *Open Up Resources*. 2018
<<https://auth.openupresources.org/register/complete>>

I. Unit Overview

In this unit, students extend their knowledge of circles and geometric measurement, applying their knowledge of proportional relationships to the study of circles. They extend their grade 6 work with perimeters of polygons to circumferences of circles, and recognize that the circumference of a circle is proportional to its diameter, with constant of proportionality π . They encounter informal derivations of the relationship between area, circumference, and radius.

The unit begins with activities designed to help students come to a more precise understanding of the characteristics of a circle (MP6): a “circle” is the set of points that are equally distant from a point called the “center”; the diameter of a circle is a line segment that passes through its center with endpoints on the circle; the radius is a line segment with one endpoint on the circle and one endpoint at the center. Students identify these characteristics in a variety of contexts (MP2). They use compasses to draw circles with given diameters or radii, and to copy designs that involve circles. Using their newly gained familiarity with circumference and diameter, students measure circular objects, investigating the relationship between measurements of circumference and diameter by making tables and graphs.

The second section involves area. Students encounter two informal derivations of the fact that the area of a circle is equal to π times the square of its radius. The first involves dissecting a disk into sectors and rearranging them to form a shape that approximates a parallelogram of height r and width $2\pi r$. A second argument involves considering a disk as formed of concentric rings, “cutting” the rings with a radius, and “opening” the rings to form a shape that approximates an isosceles triangle of height r and base $2\pi \cdot 2r$.

In the third and last section, students select and use formulas for the area and circumference of a circle to solve abstract and real-world problems that involve calculating lengths and areas. They express measurements in terms of π or using appropriate approximations of π to express them numerically. In grade 8, they will use and extend their knowledge of circles and radii at the beginning of a unit on dilations and similarity.

On using the term circle, strictly speaking, a circle is one-dimensional—the boundary of a two-dimensional region rather than the region itself. Because students are not yet expected to make this distinction, these materials refer to both circular regions (i.e., disks) and boundaries of disks as “circles,” using illustrations to eliminate ambiguity.

Essential Questions

- How can one part of a circle help determine the measure of another part?
- How are area and circumference connected?
- How can we determine area, given circumference?
- Can we determine diameter or radius, given area or circumference?

Enduring Understanding

- Recognize that all other dimensions of a circle may be determined given any other dimension.
- Recognize that π is the proportional relationship between the diameter and circumference of a circle.
- Understand how changing the diameter or radius will affect the area and or circumference.
- Understand how a semi-circle relates to a circle.

II. Pacing Guide

| Activity | New Jersey State Learning Standards (NJSLs) | Estimated Time (Blocks) |
|---|---|-------------------------|
| Unit 3 Pre-Unit Assessment (IM) <i>Optional</i> | 6.EE.C.9, 6.RP.A.3, 6.EE.A.2, 4.MD.A.1, 4.MD.A.3, 6.EE.B.7, 6.G.A.1 | ½ |
| Lesson 1: How Well Can You Measure? | 7.RP.A.2.a | 1 |
| Lesson 2: Exploring Circles | 7.G.A, 7.G.A.2 | 1 |
| Lesson 3: Exploring Circumference | 7.G.B.4, 7.RP.A.2, 7.RP.A.2.a | 1 |
| Lesson 4: Applying Circumference | 7.G.B.4 | 1 |
| Lesson 5: Circumference and Wheels | 7.G.B.4 | 1 |
| Lesson 6: Estimating Areas | 7.G.A.1, 7.G.B, 7.G.B.6 | 1 |
| Lesson 7: Exploring the Area of a Circle | 7.G.A, 7.G.B, 7.G.B.4, 7.RP.A.2.a | 1 |
| Lesson 8: Relating Area to Circumference | 7.G.B.4 | 1 |
| Lesson 9: Applying Area of Circles | 7.G.B.4 | 1 |
| Lesson 10: Distinguishing Circumference and Area | 7.G.B.4 | 1 |
| Lesson 11: Stained-Glass Windows (<i>Project Based Learning</i>) | 7.EE.B.3, 7.G.A.1, 7.G.B.4 | 1 |
| Unit 3 Performance Task | 7.G.B.4 | ½ |
| Unit 3 End of Unit Assessment (IM) <i>Optional</i> | 7.G.B.4, 7.RP.A.2.b., 7.RP.A.2, 7.RP.A.3 | 1 |
| Total Time | | 13 Blocks |

Major Work Supporting Content Additional Content

III. Pacing Calendar

| Please complete the pacing calendar based on the suggested pacing (<i>see Pacing Guide on page 2</i>). | | | | | | |
|--|--------|---------|-----------|----------|--------|----------|
| NOVEMBER | | | | | | |
| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |

Please complete the pacing calendar based on the suggested pacing (*see Pacing Guide on page 2*).

DECEMBER

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|--------|--------|---------|-----------|----------|--------|----------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

IV. NJSLA Assessment Evidence Statements

Type I

Type II

Type III

| NJSLS | Evidence Statement | Clarification | Math Practices | Calculator ? |
|-----------------|---|--|-------------------------|--------------|
| <u>7.RP.2a</u> | Recognize and represent proportional relationships between quantities: 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. | i) Tasks may or may not have context | MP. 2 MP. 5 | Yes |
| <u>7.RP.2b</u> | Recognize and represent proportional relationships between quantities: b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. | i) Tasks may or may not have context ii) Tasks sample equally across the listed representations (graphs, equations, diagrams, and verbal descriptions). iii) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality. | MP. 2 MP. 5 MP. 8 | No |
| <u>7.RP.3-1</u> | Use proportional relationships to solve multistep ratio problems | i) Tasks will include proportional relationships that only involve positive numbers. | MP. 1 MP. 2 MP. 6 | Yes |
| <u>7.G.1</u> | 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. | i) Tasks may or may not have context. | MP. 2 MP. 5 | Yes |
| <u>7.G.2</u> | Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. | i) Tasks do not have a context. ii) Most of tasks should focus on the drawing component of this evidence statement. | MP. 3 MP. 5 MP. 6 | Yes |

7th Grade Unit 3: Measuring Circles

| | | | | |
|----------------|--|--|--------------------------------------|-----|
| <u>7.G.4-1</u> | Know the formulas for the area and circumference of a circle and use them to solve problems. | i) Tasks may or may not have context. ii) Tasks may require answers to be written in terms of π | MP. 4 MP. 5 | Yes |
| <u>7.G.4-2</u> | Give an informal derivation of the relationship between the circumference and area of a circle. | i) Tasks require students to identify or produce a logical conclusion about the relationship between the circumference and the area of a circle. | MP. 2 MP. 5 | Yes |
| <u>7.G.6</u> | Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms | i) Tasks may or may not have context. | MP. 1 MP. 5 | Yes |
| <u>7.C.6.1</u> | Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. Content Scope: Knowledge and skills articulated in 7.RP.2 | i) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality | MP.2 MP.3 MP.6 | Yes |
| <u>7.C.7.1</u> | Present solutions to multi-step problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as $1 + 4 = 5 + 7 = 12$, even if the final answer is correct), or identify or describe errors in solutions to multi-step problems and present corrected solutions. Content Scope: Knowledge and skills articulated in 7.RP.3 | i) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality. | MP.1 MP.3 MP.6 MP.7 MP.8 | Yes |

V. Differentiated Instruction

Supporting English Language Learners

The purpose of this document is to nudge the field forward by offering support to the next generation of mathematics learners and by challenging persistent assumptions about how to support and develop students' disciplinary language. The goal is to provide guidance to mathematics teachers for recognizing and supporting students' language development processes in the context of mathematical sense making. UL/SCALE provides a framework for organizing strategies and special considerations to support students in learning mathematics practices, content, and language. The framework is intended to help teachers address the specialized academic language demands in math when planning and delivering lessons, including the demands of reading, writing, speaking, listening, conversing, and representing in math (Aguirre & Bunch, 2012). Therefore, while the framework can and should be used to support all students learning mathematics, it is particularly well-suited to meet the needs of linguistically and culturally diverse students who are simultaneously learning mathematics while acquiring English.

For more information, click the link below:

[Supporting ELL Learners](#)

Supporting Students with Disabilities

The philosophical stance that guided the creation of these materials is the belief that with proper structures, accommodations, and supports, all children can learn mathematics. Lessons are designed to maximize access for all students and include additional suggested supports to meet the varying needs of individual students. While the suggested supports are designed for students with disabilities, they are also appropriate for many children who struggle to access rigorous, grade-level content. Teachers should use their professional judgment about which supports to use and when, based on their knowledge of the individual needs of students in their classroom.

For more information, click the link below:

[Supporting Students with Disabilities](#)

VI. Vocabulary

Area of a Circle: The area of a circle whose radius is r units is πr^2 square units.

Circle: A circle of radius r with center O is the set of all points that are a distance r units from O .

To draw a circle of radius 3 and center O , use a compass to draw all the points at a distance 3 from O .

Circumference: The circumference of a circle is the distance around the circle. If you imagine the circle as a piece of string, it is the length of the string. If the circle has radius r then the circumference is $2\pi r$.

Diameter: A line segment that has endpoints on a circle and passes through the center is called a diameter of the circle. The length of this segment is also called the diameter.

Radius: The distance from the center of a circle to any point on the circle as well as, the corresponding line segment from the center to a point on the circle.

Pi (π): The Greek letter π (pronounced "pie") stands for the number that is the constant of proportionality between the circumference of a circle and its diameter. If d is the diameter and C is the circumference, then $C=\pi d$.

VII. Assessment Framework

| Unit 3 Assessment Framework | | | | |
|--|--|-----------------------|---------------|--------------------|
| Assessment | NJSLS | Estimated Time | Format | Graded ? |
| Pre-Unit Diagnostic Assessment (Beginning of Unit – Optional) <i>Illustrative Mathematics</i> | 6.EE.C.9, 6.RP.A.3, 6.EE.A.2, 4.MD.A.1, 4.MD.A.3, 6.EE.B.7, 6.G.A.1 | ½ Block | Individual | Yes (No Weight) |
| End-of-Unit Assessment (End of Unit – Optional) <i>Illustrative Mathematics</i> | 7.G.B.4, 7.RP.A.2.b., 7.RP.A.2, 7.RP.A.3 | 1 Block | Individual | Yes |

| Unit 3 Performance Assessment Framework | | | | |
|--|--|-----------------------|--------------------|----------------------|
| Assessment | NJSLS | Estimated Time | Format | Graded ? |
| Unit 3 Performance Task 1 (Late November) <i>Eight Circles</i> | 7.G.B.4 | ½ Block | Individual | Yes; Rubric |
| Unit 3 Performance Task Option 1 (Optional) <i>Floor Plan 2</i> | 7.G.B.1 , 7.RP.A.3 | Teacher Discretion | Teacher Discretion | Yes, if administered |
| Extended Constructed Response (ECR)* (click here for access) | Dependent on unit of study & month of administration | Up to 30 minutes | Individual | Yes; Rubric |

* Use the following links to access ECR protocol and district assessment scoring documents:

- [Assessment & Data in Mathematics Bulletin](#)
- [Extended Constructed Response Protocol](#)

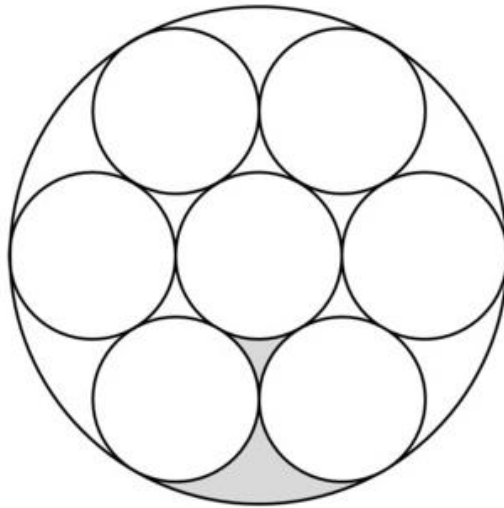
Name _____

Block _____

Date _____

Eight Circles (7.G.B.4)

The figure below is composed of eight circles, seven small circles and one large circle containing them all. Neighboring circles only share one point, and two regions between the smaller circles have been shaded. Each small circle has a radius of 5 cm.

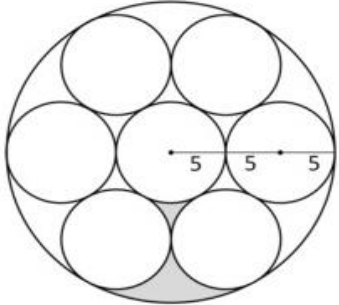


Calculate:

- a. The area of the large circle.

- b. The area of the shaded part of the figure.

| | | | | | |
|---|---|---|--|--|--|
| <p>Task Description</p> | <ul style="list-style-type: none"> • Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams. • Clearly constructs and communicates a complete response by <ul style="list-style-type: none"> ➤ using a logical approach based on a conjecture and/or stated assumptions ➤ providing an efficient and logical progression of steps ➤ using grade-level vocabulary, symbols, and labels ➤ providing a justification of a conclusion with minor computational error ➤ evaluating, interpreting and critiquing the validity and efficiency of others' responses | | | | |
| <p>Command Level Description</p> | <p>Level 5: <i>Distinguished Command</i></p> <p>Perform the task items accurately or with minor computation errors.</p> | <p>Level 4: <i>Strong Command</i></p> <p>Perform the task items with some non-conceptual errors.</p> | <p>Level 3: <i>Moderate Command</i></p> <p>Perform the task items with minor conceptual errors and some computation errors.</p> | <p>Level 2: <i>Partial Command</i></p> <p>Perform the task items with some errors on both math concept and computation.</p> | <p>Level 1: <i>No Command</i></p> <p>Perform the task items with serious errors on both math concept and computation.</p> |
| <p>Score range</p> | <p>6 pts</p> | <p>5 pts</p> | <p>4 pts</p> | <p>2-3 pts</p> | <p>0-1 pt</p> |
| <p>Task Score & PLD Assigned</p> | | | | | |

| # | Answer | Scoring |
|--------|---|--|
| Part A | <p>**** Solutions may vary ***</p> <p>The radius of each of the seven small circles is 5 cm. This makes the radius of the large circle $3 \cdot 5 = 15$ cm.</p>  <p>Area of a Circle = πr^2 The area of the large circle is $\pi(15 \text{ cm})^2 = 225\pi \text{ cm}^2$.</p> | <p>2 points: 1 point for the correct strategy and 1 point for an accurate calculation</p> <p>2 TOTAL POINTS</p> |
| Part B | <p>The area of each small circle is $\pi(5 \text{ cm})^2 = 25\pi \text{ cm}^2$.</p> <p>There are seven small circles in all, so the area of all the small circles together is $7 \times 25\pi \text{ cm}^2 = 175\pi \text{ cm}^2$.</p> <p>If we take the area of the large circle and subtract the area of the seven small circles, we will be left with all of the area contained in the large circle that is not contained in a small circle, that is, the area around the small circles. This area is $225\pi \text{ cm}^2 - 175\pi \text{ cm}^2 = 50\pi \text{ cm}^2$.</p> <p>Notice that the exact shape of the shaded region is repeated six times in the large circle. This makes the shaded region $\frac{1}{6}$ of the area that is contained in the large circle that is not contained in a small circle. Thus the shaded region has an area of $\frac{1}{6} \times 50\pi \text{ cm}^2 = 50\pi/6 \text{ cm}^2 = 25\pi/3 \text{ cm}^2$.</p> | <p>1 point: for correctly calculating the area of each small circle.</p> <p>1 point: for correctly calculating the area of all 7 small circles</p> <p>1 point: for subtracting the total area of the small circles from the area of the large circle.</p> <p>1 point: dividing the remaining area by 6 or multiplying it by $\frac{1}{6}$.</p> <p>4 TOTAL POINTS</p> |

7th Grade: Unit 3 Performance Task Option 1

Name _____

Block _____

Date _____

Floor Plan 2 (7.G.B.1 and 7.RP.A.3)

Juan wants to know the cross-sectional area of a circular pipe. He measures the diameter which he finds, to the nearest millimeter, to be 5 centimeters.

a. How large is the possible error in Juan's measurement of the diameter of the circle? Explain.

b. As a percentage of the diameter, how large is the possible error in Juan's measurement?

c. To find the area of the circle, Juan uses the formula $A = \pi r^2$ where A is the area of the circle and r is its radius. He uses 3.14 for π . What value does Juan get for the area of the circle?

d. As a percentage, how large is the possible error in Juan's measurement for the area of the circle?

IX. Modifications

| Special Education/ 504: | English Language Learners: |
|--|--|
| <ul style="list-style-type: none"> -Adhere to all modifications and health concerns stated in each IEP. -Give students a MENU options, allowing students to pick assignments from different levels based on difficulty. -Accommodate Instructional Strategies: reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), handouts, definition list with visuals, extended time -Allow students to demonstrate understanding of a problem by drawing the picture of the answer and then explaining the reasoning orally and/or writing , such as Read-Draw-Write -Provide breaks between tasks, use positive reinforcement, use proximity -Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum by using manipulatives -Implement supports for students with disabilities (click here) - Make use of strategies imbedded within lessons -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 17-18) - Strategies for students with 504 plans | <ul style="list-style-type: none"> - Use manipulatives to promote conceptual understanding and enhance vocabulary usage - Provide graphic representations, gestures, drawings, equations, realia, and pictures during all segments of instruction - During i-Ready lessons, click on “Español” to hear specific words in Spanish - Utilize graphic organizers which are concrete, pictorial ways of constructing knowledge and organizing information - Use sentence frames and questioning strategies so that students will explain their thinking/ process of how to solve word problems - Utilize program translations (if available) for L1/ L2 students - Reword questions in simpler language - Make use of the ELL Mathematical Language Routines (click here for additional information) -Scaffolding instruction for ELL Learners -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 16-17) |
| Gifted and Talented: | Students at Risk for Failure: |
| <ul style="list-style-type: none"> - Elevated contextual complexity - Inquiry based or open ended assignments and projects - More time to study concepts with greater depth - Promote the synthesis of concepts and making real world connections - Provide students with enrichment practice that are imbedded in the curriculum such as: <ul style="list-style-type: none"> ● Application / Conceptual Development ● Are you ready for more? - Provide opportunities for math competitions - Alternative instruction pathways available - Common Core Approach to Differentiate Instruction: Students with Disabilities (pg. 20) | <ul style="list-style-type: none"> - Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum - Modify Instructional Strategies, reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), inclusion of more visuals and manipulatives, Peer Support - Constant parental/ guardian contact - Provide academic contracts to students & guardians - Create an interactive notebook with samples, key vocabulary words, student goals/ objectives. - Plan to address students at risk in your learning tasks, instructions, and directions. Anticipate where the needs will be, then address them prior to lessons. -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 19) |

21st Century Life and Career Skills:

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

<https://www.state.nj.us/education/cccs/2014/career/9.pdf>

- | | |
|--|--|
| <ul style="list-style-type: none">● CRP1. Act as a responsible and contributing citizen and employee.● CRP2. Apply appropriate academic and technical skills.● CRP3. Attend to personal health and financial well-being.● CRP4. Communicate clearly and effectively and with reason.● CRP5. Consider the environmental, social and economic impacts of decisions.● CRP6. Demonstrate creativity and innovation. | <ul style="list-style-type: none">● CRP7. Employ valid and reliable research strategies.● CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.● CRP9. Model integrity, ethical leadership and effective management.● CRP10. Plan education and career paths aligned to personal goals.● CRP11. Use technology to enhance productivity.● CRP12. Work productively in teams while using cultural global competence. |
|--|--|

Students are given an opportunity to communicate with peers effectively, clearly, and with the use of technical language. They are encouraged to reason through experiences that promote critical thinking and emphasize the importance of perseverance. Students are exposed to various mediums of technology, such as digital learning, calculators, and educational websites.

Technology Standards:

All students will be prepared to meet the challenge of a dynamic global society in which they participate, contribute, achieve, and flourish through universal access to people, information, and ideas.

<https://www.state.nj.us/education/cccs/2014/tech/>

8.1 Educational Technology:

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

- A. **Technology Operations and Concepts:** Students demonstrate a sound understanding of technology concepts, systems and operations.
- B. **Creativity and Innovation:** Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
- C. **Communication and Collaboration:** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
- D. **Digital Citizenship:** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
- E. **Research and Information Fluency:** Students apply digital tools to gather, evaluate, and use of information.
- F. **Critical thinking, problem solving, and decision making:** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

- A. **The Nature of Technology: Creativity and Innovation-** Technology systems impact every aspect of the world in which we live.
- B. **Technology and Society:** Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.
- C. **Design:** The design process is a systematic approach to solving problems.
- D. **Abilities in a Technological World:** The designed world in a product of a design process that provides the means to convert resources into products and systems.
- E. **Computational Thinking: Programming-** Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Interdisciplinary Connections:

English Language Arts:

| | |
|--------|---|
| L.7.3 | Use knowledge of language and its conventions when writing, speaking, reading, or listening. |
| SL.7.1 | Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. |
| W.7.1 | Write arguments to support claims with clear reasons and relevant evidence. |

X. Core Instruction & Supplemental Resources

Core Instruction

ILLUSTRATIVE MATHEMATICS v. 2019

(OPEN UP RESOURCES)

| GRADE | TEACHER RESOURCES | STUDENT RESOURCES |
|-------|---|--|
| 6 | <ul style="list-style-type: none">• Teacher Edition: Unit 1-9• Online Course Guide | <ul style="list-style-type: none">• Student Workbook Set: Unit 1-9• Online Student Access (Digital Applets) |
| 7 | <ul style="list-style-type: none">• Teacher Edition: Unit 1-9• Online Course Guide | <ul style="list-style-type: none">• Student Workbook Set: Unit 1-9• Online Student Access (Digital Applets) |
| 8 | <ul style="list-style-type: none">• Teacher Edition: Unit 1-9• Online Course Guide | <ul style="list-style-type: none">• Student Workbook Set: Unit 1-9• Online Student Access (Digital Applets) |

5 Practices for Orchestrating Productive Mathematics Discussions

Anticipate

Consider how students might mathematically interpret a problem, the array of strategies—both correct and incorrect—that they might use to tackle it, and how those strategies and interpretations might relate to the mathematical concepts, representations, procedures, and practices that you would like the students to learn.

- Solve the problem yourself first. If possible work with colleagues.
- Ask yourself the following questions:
 - What strategies have students used in the past?
 - What representations are students most likely to use?
 - What incorrect or unproductive strategies are students likely to try?
 - What things might get in the way of students being able to engage with the problem? How can you remove those barriers?
 - What questions will you ask those who struggle?

Monitor

Pay close attention to students' mathematical thinking and solution strategies as they work on the task.

- Create a list of strategies the students may produce.
- Circulate the room. Watch and listen to students as they work.
- If any students use strategies you anticipated, write their name or group number on your list.
- Ask questions that will help students make their thinking visible.
- Ask questions that will help students clarify their thinking.
- Press students to consider aspects of the task to which they need to attend.

Select

Select particular students to share their work with the rest of the class to get specific mathematics into the open for discussion. The selection of particular students and their solutions is guided by the previously anticipated strategies and your assessment of how each approach will contribute to that goal.

- Based on the previously anticipated strategies and the mathematical goal of the activity, decide which student strategies to highlight.
- Select students who will share their work with the class.

Sequence


Make purposeful choices about the order in which students' work is shared to maximize the chances of achieving the mathematical goals for the discussion.

- Based on the mathematical goal, decide on the purpose for the sequence of work. For example: least efficient to most efficient, concrete to abstract, misconceptions to conceptions, or building representations.
- Decide in which order students will present their work.

Connect

Help students draw connections between their solutions and other students' solutions as well as the key mathematical ideas in the lesson. Help students to make judgments about the consequences of different approaches for the range of problems that can be solved, one's likely accuracy and efficiency in solving them, and the kinds of mathematical patterns that can be most easily discerned. Know where you want the discussion to "land" and make choices that are likely to get you there. If necessary, you may have to demonstrate an approach that students didn't come up with themselves.

- As students share, ask questions to elicit and clarify student thinking.
- After each student shares, ask questions to connect it to previously shared work or ask a student to summarize what another student said in their own words.
- Ask students to compare and contrast strategies or representations during the discussion.
- If students did not come up with an approach that you need them to see in order for the discussion to "land," demonstrate this approach and connect it to the work that students did.

| IDEAL MATH BLOCK | | | | |
|---|----------------|---|--|---|
| Whole Group Instruction | 55min | <p>INSTRUCTION (Grades 3 – 8) Daily Routine: Mathematical Content or Language Routine (7 – 10 min)</p> <p>Anchor Task: Anticipate, Monitor, Select, Sequence, Connect Tech Integration: Digital applets embedded within lessons designed to enhance student learning</p> <p>Collaborative Work* Guided Learning/Guided Practice</p> <p>Independent Work (Demonstration of Student Thinking) Additional Activities / Let's Practice</p> | | |
| Rotation Stations (Student Notebooks & Chromebooks Needed) | 1-2X 30 min | <p>STATION 1: Focus on current Grade Level Content</p> <p>STUDENT EXPLORATION* Independent or groups of 2-3 Emphasis on MP's 3, 6 (Reasoning and Precision) And MP's 1 & 4 (Problem Solving and Application)</p> <p>TOOLS/RESOURCES Practice Problems Extra Practice/Enrichment Are you ready for more? Put Your Thinking Cap On</p> | <p>STATION 2: Focus on Student Needs</p> <p>TECH STATION Independent</p> <p>TECH INTEGRATION iReady - <i>i-Ready</i> delivers online lessons driven by student data to provide tailored instruction that meets students where they are in their learning trajectory.</p> <p>Dreambox (ELL) – Adaptive online learning platform.</p> | <p>TEACHER STATION: Focus on Grade Level Content; heavily scaffolded to connect deficiencies</p> <p>TARGETED INSTRUCTION 4 – 5 Students</p> <p>TOOLS/ RESOURCES Homework Manipulatives Reteach Workbook Transition Guide *all students seen in 2 weeks</p> |
| Closure | 5 min | <p>INSTRUCTION Exit Ticket (Demonstration of Student Thinking)</p> <p>TOOLS/RESOURCES Notebooks or Exit Ticket Slips</p> | | <p>* Promotes discourse and collaboration</p>  |

Supplemental Resources

Achieve the Core

Tasks - <https://achievethecore.org/category/416/mathematics-tasks>

Coherence Map - <https://achievethecore.org/page/1118/coherence-map>

Embarc

<https://embarc.online/>

Engage NY

https://www.engageny.org/ccss-library/?f%5B0%5D=field_subject%253Aparents_all%3A13601

iReady Digital Platform

<https://login.i-ready.com/>

Illustrative Mathematics

Content Standard Tasks - <https://tasks.illustrativemathematics.org/content-standards>

Practice Standard Tasks - <https://tasks.illustrativemathematics.org/practice-standards>

Open Up Resources - https://access.openupresources.org/sign_in

iM Additional Resources - <https://bit.ly/imshare>

Khan Academy

<https://www.khanacademy.org/math/illustrative-math>

NJDOE Digital Item Library

<https://nj.digitalitemlibrary.com/home?subject=Math>

Ready Teacher Toolbox

<https://teacher-toolbox.com/>