EVIDENCE OF UNDERSTANDING

7TH GRADE MATHEMATICS

OKLAHOMA
LIBRARY OF DIGITAL RESOURCES

The Oklahoma Library of Digital Resources is an innovative initiative to provide Oklahoma educators with high-quality, interactive teaching resources.
We appreciate our sponsors:

Thank you to the following educators for their work in curating digital resources:

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GETTING TO KNOW OKLDR

WHO IS OSSBA?

The Oklahoma State School Boards Association (OSSBA) works to promote quality public education for the children of Oklahoma through training and information services to school board members. The Association is a leader among leaders in Oklahoma education and a visible presence in the local school districts and throughout the state.

The OSSBA was created in 1944 to provide support for local school board members with a variety of information, assistance, and representation services. OSSBA reaches every school board member through training opportunities. It creates and encouraged effective leaders to promote public education and cultivates productive alliances with governing bodies. OSSBA trains school board members to participate in an effective and supportive manner to provide direction for educational innovation and improves public perception of education in Oklahoma by sharing strategies and tools with our member school districts to focus on the success of Oklahoma public education.

OSSBA works with school boards to demonstrate the impact they have on student achievement. We work to provide meaningful two-way communication of advocacy, services, and training activities to local boards of education and their stakeholders. Other services we provide that have a direct impact on student achievement include strategic planning and superintendent searches. Our legal team provides free legal information to the school districts.

WHY OKLDR?

In the summer of 2016, OSSBA set out on a journey assist teachers in the integration of technology into their classrooms. The Oklahoma Library of Digital Resources (OKLDR) became a collection of digital content resources selected by Oklahoma educators to support the Oklahoma Academic Standards. The resources were curated by teachers from school districts across Oklahoma. Each collection contained a variety of learning resources, such as videos, apps, pdf documents, and websites, and are designed so that teachers can then build their lesson plans. The resources helped bridge the digital equity gap among students while helping schools make the most of limited resources.

After collaborating with educators, school and district leaders for a couple of years, OKLDR has been enhanced in the following ways:
- Resources are now an Open Education Resource (OER) "book" format, making it easier to use and accessible on multiple devices.
- Resources map to ESSA expectations for evidence of student understanding and students' mastery of the academic standards.
- Tools are now agnostic and can be used on multiple devices.
- Lessons are now focused on student engagement through the use of technology. The first OKLDR version focused on teacher resources. **This is a major change**.
- To prioritize student learning, teacher resources are now located at the back of each book.

HOW TO USE THE BOOK

The Oklahoma Academic Standards for this lesson are grouped together by key topics. Sometimes you will see only one standard, but other times you will see a grouping of standards.

Evidence of Understanding is the key. This is the concept you want your students to master that reinforces the standards. Mastery means deeper understanding, not just "skim the surface" learning.

Digital Tools are the recommended applications and/or tools for the lesson. Think of this element as the "supplies box."

In Practice is a suggested activity to engage the students to demonstrate mastery of the standard. You will notice that this is just one suggested lesson, and sometimes there might be a second lesson. The suggested lesson, developed by Oklahoma teachers, is meant to give you a starting point. You might decide to use the lesson or it might give you an idea of something else you could do to teach the concept.

MOVING FORWARD

As you can see the OKLDR book has been designed to inspire educators to have students demonstrate their understanding of the Oklahoma Academic Standards through the use of technology as a productivity tool. While educators have limited time in the day to plan and research high quality content, this book is a jumping off point, with suggested peer-reviewed activities and resources.

While you might encounter extra white space in the book, it is intentional for growth. As you integrate the activities into your lessons, you are encouraged to send us student work samples that might be included in the book, as well as additional activities and resources that could be included in future revisions.

Next Steps:

- We would love to add samples of student work to the activities, so please send the work to: okldr@ossba.org.
- If you would like to be involved in future course creation, or know teachers who would like to be involved, please contact us at: okldr@ossba.org.
- See anything that needs to be changed or enhanced? Contact us at: okldr@ossba.org.

NUMBERS AND OPERATIONS

COMPARE AND ORDER RATIONAL NUMBERS

7.N.1.1 Know that every rational number can be written as the ratio of two integers or as a terminating or repeating decimal

7.N.1.2 Compare and order rational numbers expressed in various forms using the symbols <, >, and =.

7.N.1.3 Recognize and generate equivalent representations of rational numbers, including equivalent fractions.

Evidence of Understanding

Students will be able to use a digital tool to distinguish the difference between rational and irrational numbers with examples and definitions in a comparison form by creating a mind map, video, or other design tool.

Students will be able evaluate their ability to compare and order rational numbers.

Digital Tools

- *Mind Mapping Application -*ReadWriteThink, Popplet, Padlet, Simple Mind+ Mind Mapping, Inspiration Maps, Mindomo, iMindMap Kids, Lucidchart, Bubbl.us

- *Video Editor-* Clips, WeVideo, Flipgrid, iMovie, Loom,Clips, Do-Ink, Storyblocks, Majisto, Adobe Spark Video

- *Design tools -* Canva, Web Poster Wizard, Collage Maker

- *QR Code Generator -* QR Code Generator, QR Stuff, Flowcode

In Practice

- Students will use a mind mapping application to create a flowchart using examples, definitions, and visuals. Students will also develop then incorporate voice overs with QR code, links, etc.

- Students will create a catchy rap or song about rules of ordering and comparing positive and negative numbers following a teacher created rubric of requirements.

INTEGERS AND ORDER OF OPERATIONS

7.N.2.1 Estimate solutions to multiplication and division of integers in order to assess the reasonableness of results.

7.N.2.2 Illustrate multiplication and division of integers using a variety of representations.

7.N.2.3 Solve real-world and mathematical problems involving addition, subtraction, multiplication and division of rational numbers; use efficient and generalizable procedures including but not limited to standard algorithms.

7.N.2.4 Raise integers to positive integer exponents.

7.N.2.5 Solve real-world and mathematical problems involving calculations with rational numbers and positive integer exponents.

7.N.2.6 Explain the relationship between the absolute value of a rational number and the distance of that number from zero on a number line. Use the symbol for absolute value.

Evidence of Understanding

Students will be able to understand absolute value and exponents, and their terms, rules, vocabulary by creating games and memes.

Digital Tools

- *Meme Creator* - <u>Kapwing</u>, <u>Meme Generator</u>, <u>Canva</u>, <u>Clideo</u>

- Voice Record Application - <u>Voice Memos, Voice Record Pro</u>

- *Game Board App*- <u>Gamestructor</u>, <u>Flippity</u>

- QR Code Generator - <u>QR Code Generator, QR Stuff</u>, <u>Flowcode</u>

In Practice

- Students will use a game board creator to create a game using exponents, terms, definitions, example problems, etc.

- Students will use a meme creator to create a meme about absolute values using visuals, example problems, and appropriate absolute value symbols. Students will explain their meme by synthesizing a voice over with their meme and create a QR code using a QR code generator.

ALGEBRAIC REASONING AND ALGEBRA

PROPORTIONAL RELATIONSHIPS

7.A.1.1 Describe that the relationship between two variables, x and y, is proportional if it can be expressed in the form y/x=k or y=kx; distinguish proportional relationships from other relationships, including inversely proportional relationships (xy=k or y=k/x).

7.A.1.2 Recognize that the graph of a proportional relationship is a line through the origin and the coordinate (1, r), where both r and the slope are the unit rate (constant of proportionality, k).

7.A.2.1 Represent proportional relationships with tables, verbal descriptions, symbols, and graphs; translate from one representation to another. Determine and compare the unit rate (constant of proportionality, slope, or rate of change) given any of these representations.

7.A.2.2 Solve multi-step problems involving proportional relationships involving distance-time, percent increase or decrease, discounts, tips, unit pricing, similar figures, and other real-world and mathematical situations.

7.A.2.3 Use proportional reasoning to solve real-world and mathematical problems involving ratios.

7.A.2.4 Use proportional reasoning to assess the reasonableness of solutions.

Evidence of Understanding

Students will be able to use digital tools and applications to show understanding of proportional relationships, slope, discount, percent change, tax, unit rate of an item, and distance and time problems.

Digital Tools

- *Design tools* - Canva, Web Poster Wizard, Collage Maker

- *QR Code Generator* - QR Code Generator,, Flowcode

- *Voice Record Application* - Voice Memos, Voice Record Pro

- *Math Content Application*- Geoboard

- *Word Processor* - Pages, Google Docs, Microsoft Word

- *Spreadsheet*- Numbers, Google Sheets, Microsoft Excel

- *Video Editor*- Clips, WeVideo, Flipgrid, iMovie, Loom, PowerDirector,Clips, Do-Ink, Storyblocks, Majisto, Adobe Spark Video

- *Green Screen Application*- WeVideo, Veescope, Doink Green Screen

- Comic Maker - Comic Touch 2, Comic Puppets, Canva Comic Strip Maker, Powtoon, Comic Maker, Make Beliefs Comix, Toontastic, Pixton EDU

In Practice

- Students will use a design tool to create an anchor chart to summarize their understanding of standards 7A11, 7A12, 7A21 with tables, graphs (Geogebra), definitions, and word problems. Students will synthesize their work from the design tools and add voice explanations describing their work with a QR code.

- Students will create a pamphlet using a word processor over different ski resorts including different ski runs and their slope measurements—include positive, negative, undefined, and 0 slope (7A12).

  - Cross curriculum opportunity with Geography and/or English in this project.

In Practice Continued

- Student will create a sale flyer using discount, percent change, and tax using a design tool. Flyer can include but is not limited to—images, original price, sale price, percent off, amount saved, percent decrease, tax etc. Students can also use this flyer to create a commercial using a green screen/video application (7A22).

- Students will design a menu for a restaurant and include a ticket for an order for a family of four. In the ticket students will list item prices, subtotal, tax, and tip (7A22)

  - Cross curriculum opportunity with ELA.

- Students will design and create a comic explaining and finding missing parts in ratios or word problems with ratios (7A22).

- Students will create a visual of charts and/or graphs using a spreadsheet application and images of menu to describe unit rate using online fast food menus as a resource; for example, what is the cost per nugget for a four piece, six, etc. (7A22).

- Students will create a real world problem/scenario involving distance and time to explain how to find missing values using d=rt and missing parts of a ratio (7A22).

EQUATIONS AND INEQUALITIES

7.A.3.1 Write and solve problems leading to linear equations with one variable in the form px+q=r and p(x+q)=r, where p,q, and r are rational numbers.

7.A.3.2 Represent, write, solve, and graph problems leading to linear inequalities with one variable in the form x+p>q and x+p<q, where p, and q are nonnegative rational numbers.

7.A.3.3 Represent real-world or mathematical situations using equations and inequalities involving variables and rational numbers.

7.A.4.1 Use properties of operations (limited to associative, commutative, and distributive) to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents.

7.A.4.2 Apply understanding of order of operations and grouping symbols when using calculators and other technologies.

Evidence of Understanding

Students will be able to demonstrate understanding of order of operations and one and two step equations and inequalities using digital tools.

Digital Tools

- *Interactive Whiteboard Application* -Explain EDU, Jamboard, ShowMe Sketches School, Educreations , Whiteboard: Absolute Board, Google Jamboard, Explain Everything

- *Mind Mapping Application* - ReadWriteThink, Popplet, Padlet, Simple Mind+ Mind Mapping, Inspiration Maps, Mindomo, iMindMap Kids,

- *Video Editor*- Clips, WeVideo, Flipgrid, iMovie, Loom,Clips, Do-Ink, Storyblocks, Majisto, Adobe Spark Video

In Practice

- Students will solve and graph multiple one and two step equations and inequalities using an interactive whiteboard application; Students will then transfer their work in pictures or files to create a video of their teaching demonstration on this topic.

- Students will use a mind mapping or flowchart application to create an anchor chart visual showing steps of an equation using order of operations. Students will include labeling using GEMS or PEMDAS with matching the category with each step.

GEOMETRY AND MEASUREMENT

RECTANGULAR PRIMS

7.GM.1.1 Using a variety of tools and strategies, develop the concept that surface area of a rectangular prism with rational-valued edge lengths can be found by wrapping the figure with same-sized square units without gaps or overlap. Use appropriate measurements such as cm2.

7.GM.1.2 Using a variety of tools and strategies, develop the concept that the volume of rectangular prisms with rational-valued edge lengths can be found by counting the total number of same-sized unit cubes that fill a shape without gaps or overlaps. Use appropriate measurements such as cm3.

Evidence of Understanding

Students will be able to use digital tools to create a replica of a 3D candy container (rectangular prism or cube) and enlarge it and find scale, volume, surface area, and the net. Students will then transfer their design to a presentation and explaining their process.

Digital Tools

- *Video Editor*- Clips, WeVideo, Flipgrid, iMovie, Loom,Clips, Do-Ink, Storyblocks, Majisto, Adobe Spark Video

- *Design tools* - Canva, Web Poster Wizard, Collage Maker

- *Word Processor* - Pages, Google Docs, Microsoft Word,Notes

- *Presentation* - Keynote, Microsoft Powerpoint, Google Slides

In Practice

- Students will create a poster of an enlarged candy (gum, starbursts, nerds, etc.) in the shape of a rectangular prism. The poster will include the work for and answer solutions of the scale factor, volume, surface area and a drawing of the net of the 3D object. Students can also use a design application to make the poster digital or video editor explaining their work in a presentation application.

TWO-DIMENSIONAL FIGURES

7.GM.2.1 Develop and use the formula to determine the area of a trapezoid to solve problems.

7.GM.2.2 Find the area and perimeter of composite figures to solve real-world and mathematical problems.

7.GM.3.1 Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is π and can be approximated by rational numbers such as 22/7 and 3.14.

7.GM.3.2 Calculate the circumference and area of circles to solve problems in various contexts, in terms of π and using approximations for π.

7.GM.4.2 Apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles.

Evidence of Understanding

Students will be able to collaboratively design a park using design tools; and then independently create park features using their knowledge of area, perimeter, scale factors and circumference of two dimensional objects. Students will also use a 3D Design Tool to create their designs.

Digital Tools

- *Comic Maker* - Comic Touch 2, Comic Puppets, Canva Comic Strip Maker, Powtoon, Comic Maker, Make Beliefs Comix, Toontastic, Pixton EDU

- *Sketch Application-* Sketches School, Notes, ibis, Absolute Board, Google Draw, Auto Draw, Do-Ink, Paper by 53,

- *Presentation* - Keynote, Microsoft Powerpoint, Google Slides

- *3D Design Tool-* Tinkercad, Floor Plan Creator

In Practice

- Students will work in small groups to design a park—use Scissortail park for an example if needed. Students will incorporate angles, composite figures, trapezoids, etc. with walking paths, water feature, seating, etc.

- Students will create at least two park features like a trapezoid; they must show how they calculate area of those objects (7GM21).

- Students will create at least two park features shaped as a composite figure; they must show how they calculate area and perimeter (border, fence, etc.) of those objects (7GM22).

- Students will create at least two park features shaped as circles; they must show how they calculate area and perimeter (border, fence, etc.) of those objects (7GM31 & 7GM32).

- Each student will use a sketch application to design/create their own composite shaped building (tiny restaurant, tiny home, etc.) based off of teacher rubric (shapes included, angles, bathroom, sink, etc.) to go in their park. Using a 3D design tool, students will create their building finding area, perimeter, and angle measures of requires shapes.

- Students will put all of the above projects together in groups using a presentation application to describe the project. (Optional, groups could build actual models of one of the above.)

FIGURES ON THE COORDINATE PLANE

7.GM.4.3 Graph and describe translations and reflections of figures on a coordinate plane and determine the coordinates of the vertices of the figure after the transformation.

Evidence of Understanding

Students will be able to use the content application to display their understanding of transformations on a coordinate grid.

Digital Tools

- *Content Application*- Geoboard, Geogabra, Desmos

- *Sketch Application*- Sketches School, Notes, ibis

- Story Telling Application - ChatterPix Kids, Shadow Puppets EDU, Book Creator, Seesaw, Pages, Write About This, Google Docs, Google Story Builder, Toontastic

In Practice

- Student will transform composite figures and other shapes by using a combination of translations, reflections, rotations and dilations to have the shape appear in each quadrant for practice.

- Students will use the content application to create the different types of transformations and identify the ordered pair of each vertex. Using a screen shot of their results, students will use a sketch application or word processor to label each of the types of transformations—translations, reflections, rotations and dilations. Students will use a story telling application to integrate their creations to create a book on transformations and the coordinate plane.

DATA AND PROBABILITY

CIRCLE GRAPHS AND HISTOGRAMS

7.D.1.1 Design simple experiments, collect data and calculate measures of central tendency (mean, median, and mode) and spread (range). Use these quantities to draw conclusions about the data collected and make predictions.

7.D.1.2 Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using a spreadsheet or other graphing technology.

Evidence of Understanding

Students will be able to use a polling application and spreadsheet to poll classmates and display the data in different formats from a simple questionnaire.

Digital Tools

- *Spreadsheet*- <u>Numbers</u>, <u>Google Sheets</u>, <u>Microsoft Excel</u>

- *Polling Application*- <u>Plickers</u>, <u>Poll Everywhere</u>

- *Word Processor* - <u>Pages</u>, <u>Google Docs</u>, <u>Microsoft Word</u>

In Practice

- Students will conduct a simple classroom poll using a polling application.

- Students will transfer the results into spreadsheet using a spreadsheet application and create a circle graph to display their information.

- Students will then use a word processor to work through proportions to show their circle graph data in fraction, percent, and degrees form.

SIMPLE PROBABILITY

7.D.2.1 Determine the theoretical probability of an event using the ratio between the size of the event and the size of the sample space; represent probabilities as percents, fractions and decimals between 0 and 1.

7.D.2.2 Calculate probability as a fraction of sample space or as a fraction of area. Express probabilities as percents, decimals and fractions.

7.D.2.3 Use proportional reasoning to draw conclusions about and predict relative frequencies of outcomes based on probabilities.

Evidence of Understanding

Student will be able to use digital tools to correctly find theoretical and experimental probability.

Digital Tools

- *Podcast Application -* Anchor, Voice Record Pro App, Podbean

- *Word Processor -* Pages, Google Docs, Microsoft Word

- *Mind Mapping Application -*, ReadWriteThink, Popplet, Padlet, Simple Mind+ Mind Mapping, Inspiration Maps, Mindomo, iMindMap Kids,

- Content Application - Tree Diagram Probability Examples

In Practice

- Students will work with a partner to research and find five real world scenarios (sports predictions, lottery, etc.) that they can use to describe finding theoretical probability. Students will document their process using a word processor.

- Students and their partner will use a podcast application to discuss their five real world scenarios (sports predictions, lottery, etc.) using theoretical probability and link it into their word processing application used. Students will use research as supporting evidence (7D21 & 7D23).

- Students will use a sample of colored candy to create a tree diagram using a mind mapping application and find different scenario combinations, students will show their answers using percents, fractions, and decimals (7D22).

RESOURCES

TEACHER

- Connected Mathematics Project

- Desmos

- Khan Academy

- Math Ed Podcast

- National Council of Teachers of Mathematics

- OER Commons

- The Secrets of Mathematics