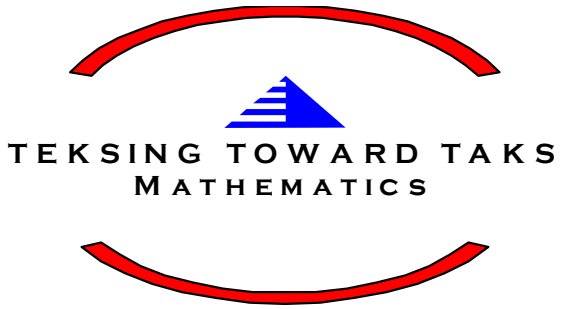

MATHEMATICS
Grade 8

TEKS/TAKS
Open-Ended Problem Sets

Organized by TEKS

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GRADE 8 OPEN-ENDED

AUTHORS' VISION FOR IMPLEMENTATION

- The Open-Ended problem sets are designed for whole class instruction. Teachers may choose to use an Open Ended as an introduction to a TEKS concept, to increase student understanding of a TEKS concept, to close instruction for a TEKS concept before an assessment in given, etc.

- The smaller font page is the student page. Make one copy per student. .

- The larger font page is a transparency master of problems at the top of the student page. Make 1 copy of each transparency page.

- The teacher sets a time limit prior to students' beginning the Open-Ended. Partner pairs are given specific "share" portions of the Open-Ended. The process that should be followed by all partner pairs is to complete the questions at the bottom of the page first (except for the **Extension)**, then complete the solution(s) to the problem(s) at the top of the page, then complete the **Extension** at the bottom of the page. (NOTE: the **Extension** is designed to spiral into the same TEKS or to spiral into a closely related TEKS.)

- Students work in partner pairs to complete the Open Ended problem set and record on their individual copies.

- Assign parts of the Open Ended to various partner pairs. These partner pairs become "share pairs" and share their responses to their assigned part. Partner pairs use a blank transparency and an overhead pen to record responses for the parts they are assigned to share. The share pairs must SHOW all work on the transparency – the teacher should monitor the share pairs closely and answer any questions they have about the problem.

- The teacher calls time and the partner pairs guide class discussion on their "share pair" assignments. Students who did not complete the Open-Ended prior to the time limit may record on their individual papers during the discussion time but must record in a different color.

- The Open-Ended is designed to be recorded as a portion of a classwork grade. A holistic score should be recorded for each student. A scale of 1-4 is appropriate as follows:
    - 1 = no understanding evident
    - 2 = minimal understanding evident
    - 3 = mostly understood or slight mathematical errors
    - 4 = complete understanding evident and no mathematical errors

  Scores may be recorded and periodically combined and recorded as a classwork grade in a gradebook.

SUGGESTION: Record overall class success with each Open Ended (TEKS are indicated at the bottom of each page) in a Class Profile Booklet for later reference as a guide to decision-making regarding instructional time later in the school year – especially prior to TAKS testing date.

GRADE 8 TEKS/TAKS OPEN ENDED PROBLEM SETS
Table of Contents and TEKS/TAKS Correlation

TAKS OBJ	OPEN-ENDED PROBLEM SET-TEKS	STUDENT EXPECTATION
1	02-8.1A 03-8.1A 04-8.1A 05-8.1A 06-8.1A 07-8.1A	Compare and order rational numbers in various forms including integers, percents, and positive and negative fractions and decimals
1	08-8.1B 09-8.1B	Select and use appropriate forms of rational numbers to solve real-life problems including those involving proportional relationships
1	10-8.1C 11-8.1C	Approximate (mentally and with calculators) the value of irrational numbers as they arise from problem situations (such as π, √2)
1	12-8.1D 13-8.1D	Express numbers in scientific notation, including negative exponents, in appropriate problem situations
1	14-8.2A 15-8.2A 16-8.2A	Select appropriate operations to solve problems involving rational numbers and justify the selections
1	17-8.2B 18-8.2B 19-8.2B	Use appropriate operations to solve problems involving rational numbers in problem situations
1	20-8.2C 21-8.2C 22-8.2C	Evaluate a solution for reasonableness
1	23-8.2D 24-8.2D	Use multiplication by a constant factor (unit rate) to represent proportional relationships
2	01-8.3A 02-8.3A	Compare and contrast proportional and non-proportional linear relationships
2	03-8.3B 04-8.3B 05-8.3B 06-8.3B 07-8.3B	Estimate and find solutions to application problems involving percents and other proportional relationships such as similarity and rates
2	08-8.4 09-8.4 10-8.4 11-8.4 12-8.4	Generate a different representation of data given another representation of data (such as a table, graph, equation, or verbal description).
2	13-8.5A 14-8.5A 15-8.5A 16-8.5A	Predict, find, and justify solutions to application problems using appropriate tables, graphs, and algebraic equations
2	17-8.5B 18-8.5B	Find and evaluate an algebraic expression to determine any term in an arithmetic sequence (with a constant rate of change)
3	01-8.6A 02-8.6A	Generate similar figures using dilations including enlargements and reductions
3	03-8.6B 04-8.6B 05-8.6B 06-8.6B 07-8.6B 08-8.6B	Graph dilations, reflections, and translations on a coordinate plane

GRADE 8 TEKS/TAKS OPEN ENDED PROBLEM SETS
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TAKS OBJ	OPEN-ENDED PROBLEM SET-TEKS	STUDENT EXPECTATION
3	09-8.7A 10-8.7A	Draw three-dimensional figures from different perspectives
3	11-8.7B 12-8.7B	Use geometric concepts and properties to solve problems in fields such as art and architecture
3	13-8.7C 14-8.7C	Use pictures or models to demonstrate the Pythagorean Theorem
3	15-8.7D 16-8.7D	Locate and name points on a coordinate plane using ordered pairs of rational numbers
4	01-8.8A 02-8.8A 03-8.8A	Find lateral and total surface area of prisms, pyramids, and cylinders using concrete models and nets (two-dimensional models)
4	04-8.8B	Connect models of prisms, cylinders, pyramids, spheres, and cones to formulas for volume of these objects
4	05-8.8C 06-8.8C 07-8.8C 08-8.8C	Estimate measurements and use formulas to solve application problems involving lateral and total surface area and volume
4	09-8.9A 10-8.9A	Use the Pythagorean Theorem to solve real-life problems
4	11-8.9B 12-8.9B 13-8.9B	Use proportional relationships in similar two-dimensional figures or similar three-dimensional figures to find missing measurements
4	14-8.10A 15-8.10A 16-8.10A 17-8.10A	Describe the resulting effects on perimeter and area when dimensions of a shape are changed proportionally
4	18-8.10B 19-8.10B	Describe the resulting effect on volume when dimensions of a solid are changed proportionally
5	01-8.11A 02-8.11A 03-8.11A	Find the probabilities of dependent and independent events
5	04-8.11B 05-8.11B 06-8.11B	Use theoretical probabilities and experimental results to make predictions and decisions
5	07-8.11C	Use theoretical probabilities and experimental results to make predictions and decisions
5	08-8.12A 09-8.12A	Select the appropriate measure of central tendency or range to describe a set of data and justify the choice for a particular situation
5	10-8.12B 11-8.12B	Draw conclusions and make predictions by analyzing trends in scatterplots
5	12-8.12C 13-8.12C 14-8.12C 15-8.12C 16-8.12C 17-8.12C 18-8.12C 19-8.12C	Select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, stem and leaf plots, circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, with and without the use of technology

GRADE 8 TEKS/TAKS OPEN ENDED PROBLEM SETS
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TAKS OBJ	OPEN-ENDED PROBLEM SET-TEKS	STUDENT EXPECTATION
5	20-8.13A 21-8.13A	Evaluate methods of sampling to determine validity of an inference made from a set of data
5	22-8.13B 23-8.13B 24-8.13B 25-8.13B 26-8.13B 27-8.13B	Recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis
6	01-8.14A 02-8.14A 03-8.14A	Identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics
6	04-8.14B 05-8.14B 06-8.14B	Use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness
6	07-8.14C 08-8.14C	Select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem
6	09-8.14D	Select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problems
6	10-8.15A 11-8.15A	Communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models
6	12-8.15B	Evaluate the effectiveness of different representations to communicate ideas
6	13-8.16A 14-8.16A	Make conjectures from patterns or sets of examples and nonexamples
6	15-8.16B 16-8.16B	Validate his/her conclusions using mathematical properties and relationships

TOTAL GRADE 8 OPEN ENDED PROBLEM SETS = 120

GRADE 8 MATHEMATICS

(8.14) Underlying processes and mathematical tools. The student applies Grade 8 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to: (A) identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics.

A strain of bacteria is growing at an average of twice its number each hour. After 3 hours the bacteria count was 12,000. What was the original bacteria count? Show your work.

1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?

2. Will the Grade 8 Mathematics Formula Chart be helpful on this problem? Why or why not?

3. Would a picture or diagram be helpful? If so, how?

4. What problem-solving strategy or strategies will I use to help solve this problem?

5. **Extension** (8.13B): If the bacteria continues to grow at the same rate, predict when the count will exceed 100,000.

A strain of bacteria is growing at an average of twice its number each hour. After 3 hours the bacteria count was 12,000. What was the original bacteria count? Show your work.