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COMMON CORE MATH WORKOUTS

grade 8

Skills, Practice, and Problem-Solving Applications

Common Core ALIGNED State Standards

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- Geometry
- Functions
- The Number System
- Expressions and Equations
- Statistics and Probability

About the Authors

Karise Mace is the founder and president of Mathematical Expressions, a company dedicated to providing support to mathematics educational companies in the areas of writing, editing, curriculum development, project management, and textbook alignment. Mace has a Bachelor's Degree in mathematics from Greenville College in Greenville, Illinois, and a Master's Degree in secondary mathematics education from the University of Kentucky in Lexington, Kentucky. She is a certified high school mathematics educator in Pennsylvania. She has five years teaching experience and over 10 years experience in mathematics text and software publishing.

Keegen Gennuso has worked as a contracted editor for Mathematical Expressions for the past seven years. She has extensive tutoring experience in many levels of math and science, and she previously worked in the mathematics text and software publishing industry for seven years. Gennuso has a Bachelor's Degree in chemistry from Penn State University.

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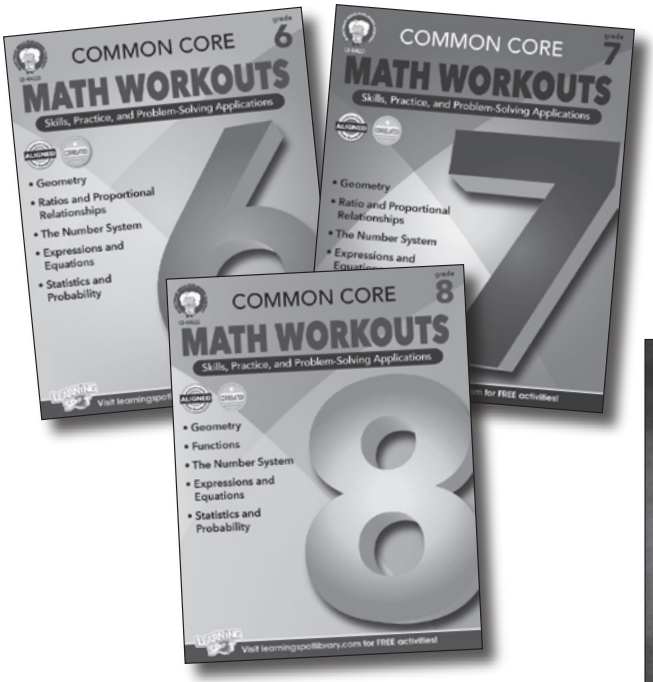

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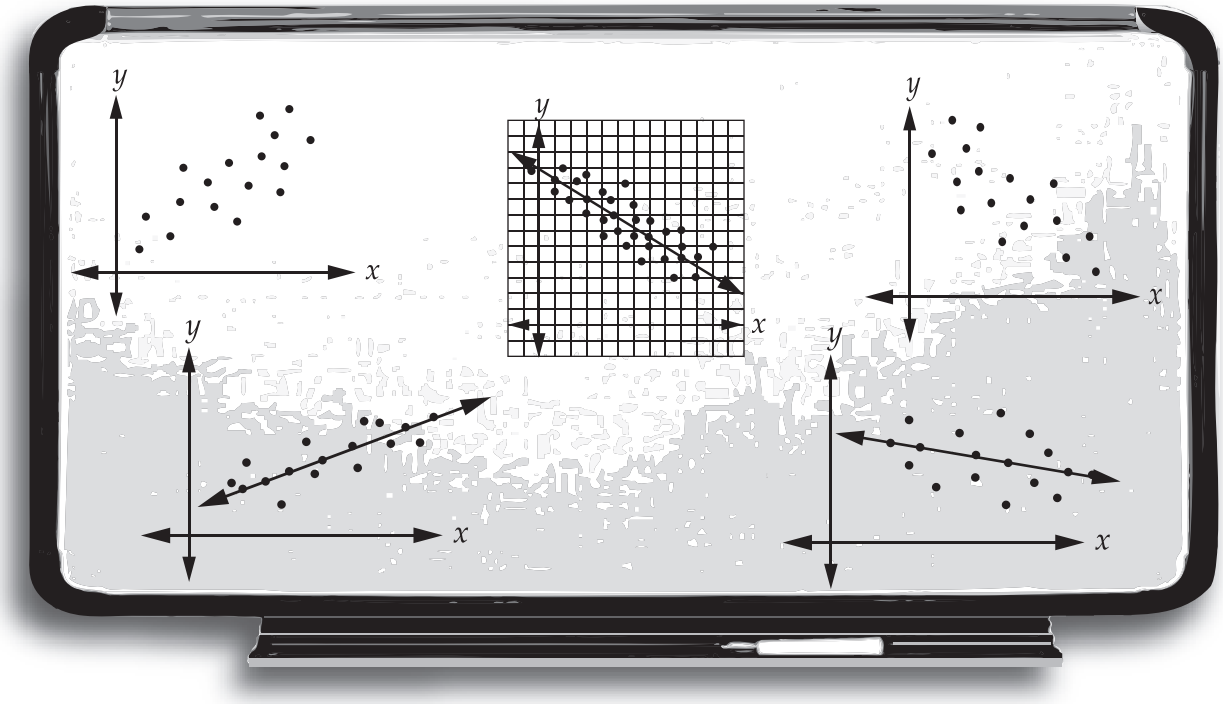


Introduction to the Teacher

The time has come to raise the rigor in our children's mathematical education. The Common Core State Standards were developed to help guide educators and parents on how to do this by outlining what students are expected to learn throughout each grade level. The bar has been set high, but our students are up to the challenge.

This worktext is designed to help teachers and parents meet the challenges set forth by the Common Core State Standards. It is filled with skills practice and problem-solving practice exercises that correspond to each standard for mathematics. With a little time each day, your students will become better problem solvers and will acquire the skills they need to meet the mathematical expectations for their grade level.

Each page contains two "workouts." The first workout is a skills practice exercise, and the second is geared toward applying that skill to solve a problem. These workouts make great warm-up or assessment exercises. They can be used to set the stage for the content before it is taught and then used to help teach the content covered by the standards. They can also be used to assess what students have learned after the content has been taught.

We hope that this book will help you help your students build their Common Core Math strength and become great problem solvers!

Karise Mace and Keegen Gennuso

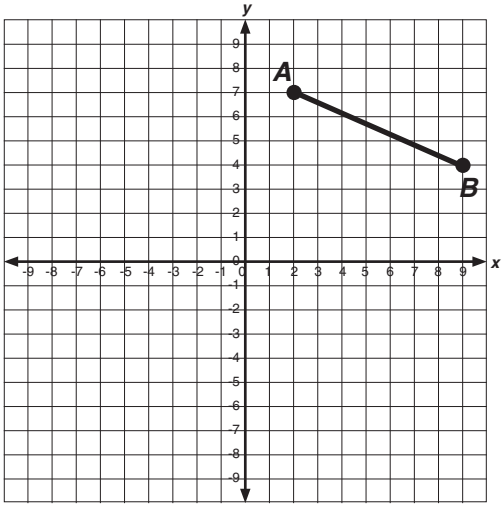
Name: _____ Date: _____

GEOMETRY – Transformations With Lines and Line Segments

CCSS Math Content 8.G.A.1a: Verify experimentally the properties of rotations, reflections, and translations—that lines are taken to lines, and line segments to line segments of the same length.

SHARPEN YOUR SKILLS:

Complete the exercises on the grid below.



1. Rotate $\overline{AB}$ 180° counterclockwise about the origin. Name the rotated segment $\overline{A'B'}$.
2. Reflect $\overline{AB}$ across the *x*-axis. Name the reflected segment $\overline{A''B''}$.
3. Translate $\overline{AB}$ 10 units to the left. Name the translated segment $\overline{A'''B'''}$.

APPLY YOUR SKILLS:

Kristy claims that $\overline{XY}$ is made by rotating $\overline{QR}$ 270° counterclockwise about the origin. Pricilla claims that $\overline{XY}$ is made by reflecting $\overline{QR}$ across the *x*-axis. Who is correct? Explain your reasoning.

_____

_____

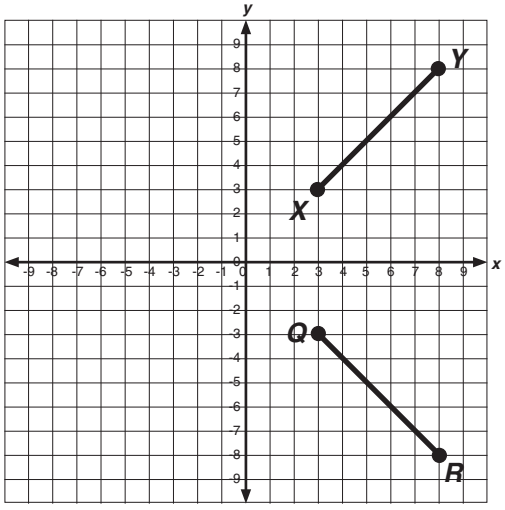
_____

_____

_____

_____

_____



Name: _____ Date: _____

EXPRESSIONS AND EQUATIONS – Scientific Notation

CCSS Math Content 8.EE.A.3: Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.

SHARPEN YOUR SKILLS:

Write the number in scientific notation.

1. 3,000,000,000 _____

2. 0.00000000006 _____

APPLY YOUR SKILLS:

1. There are an estimated 8×10^{27} grains of sand in the Sahara Desert and an estimated 8×10^{13} cells in the human body. How many times greater is the number of grains of sand in the Sahara Desert than the number of cells in the human body?

_____

_____

_____

_____

2. A proton has a diameter of approximately 1×10^{-15} meters. A gamma ray has a wavelength of approximately 1×10^{-12} meters. How many times greater is the wavelength of a gamma ray than the diameter of a proton?

_____

_____

_____

Name: _____ Date: _____

EXPRESSIONS AND EQUATIONS – Operating on Numbers Written in Scientific Notation

CCSS Math Content 8.EE.A.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

SHARPEN YOUR SKILLS:

Calculate the sum or difference. Write your answer in scientific notation.

1. $43{,}789 + (2.8 \times 10^{4})$

2. $(7.4 \times 10^{-13}) - (3.1 \times 10^{-13})$

3. $(1.7486 \times 10^{24}) - (5.193 \times 10^{23})$

4. $(3.12 \times 10^{-7}) + 0.000000045$

APPLY YOUR SKILLS:

There are an estimated 1×10^{24} stars in the universe and an estimated 5.6×10^{21} grains of sand on Earth's beaches. How many more stars are there in the universe than grains of sand on Earth's beaches? Write your answer in scientific notation.

_____

Name: _____ Date: _____

STATISTICS AND PROBABILITY – Scatter Plots

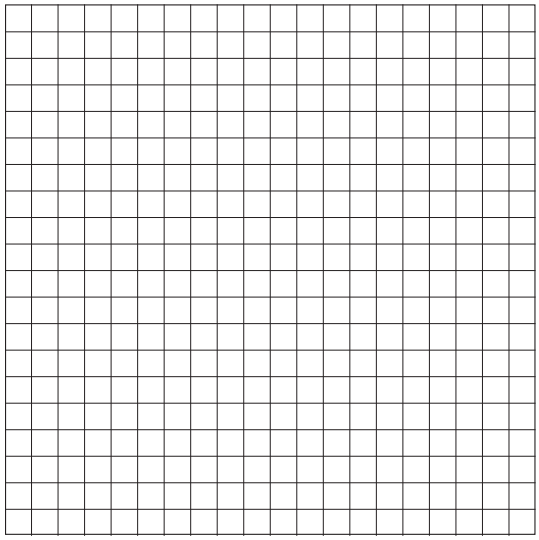
CCSS Math Content 8.SP.A.1: Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

SHARPEN YOUR SKILLS:

Construct a scatter plot for the data displayed in the table. Then describe the distribution of the data shown in the graph. Be sure to include the type of association and whether or not there is clustering or outliers in your description. Explain how you determined your answer.

x	*y*
1.3	31
1.8	34
2.1	26
2.4	23
2.6	21
2.7	19
3.2	23
3.3	21
3.4	17
3.5	19
3.5	15
3.9	15
4.2	16
5.3	14

x	*y*
1.7	31
2.0	27
2.2	33
2.5	22
2.7	22
2.8	22
3.2	18
3.3	24
3.5	18
3.5	20
3.7	17
3.9	18
5.2	11
5.4	11



_____

_____

_____

_____

APPLY YOUR SKILLS:

In the graph above, assume that the *x* values indicate the weight of a car in tons and the *y* values indicate the distance the car can travel on one gallon of gas (miles per gallon).

1. Describe the distribution of the data in the graph using this context.

_____

_____

2. If you want a car that can travel a lot of miles on one gallon of gas, would you choose a light-weight car or a heavy car? Explain how you determined your answer.

_____

_____

Name: _____ Date: _____

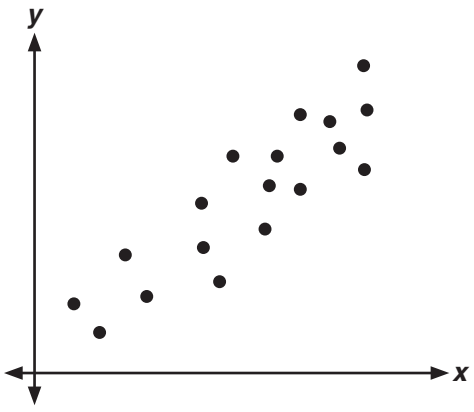
STATISTICS AND PROBABILITY – Best Fit Lines

CCSS Math Content 8.SP.A.2: Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

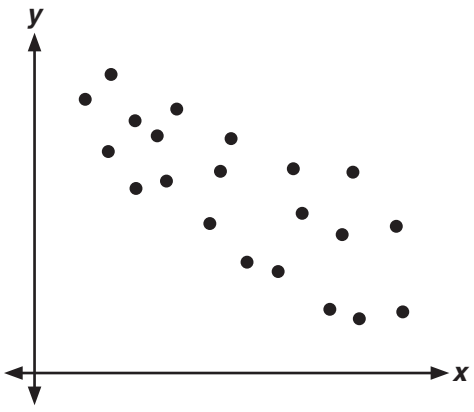
SHARPEN YOUR SKILLS:

Fit a straight line to the data displayed in the scatter plot.

1.



2.



APPLY YOUR SKILLS:

The scatter plots below show the same data. Which one shows a line that fits the data best? Explain how you determined your answer.

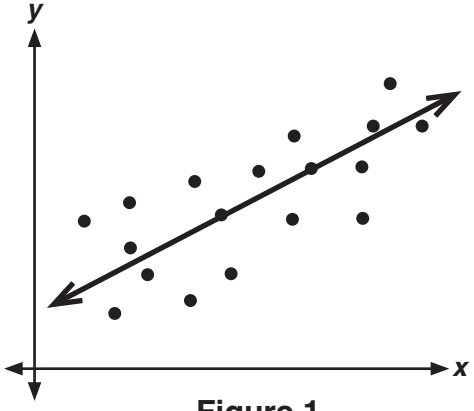


Figure 1

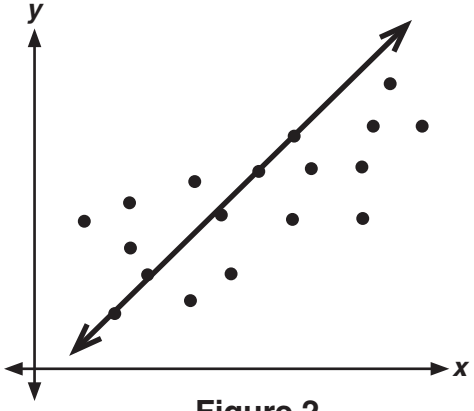


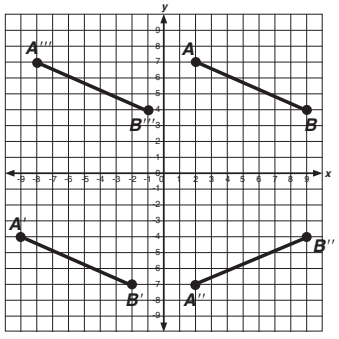
Figure 2

Answer Keys

GEOMETRY

Transformations With Lines and Line Segments (p. 1)

SHARPEN YOUR SKILLS:



APPLY YOUR SKILLS:

Kristy and Priscilla are both correct. Reflecting point $Q(3, -3)$ over the x-axis would yield the point (3, 3). Rotating point Q 270° counterclockwise about the origin would also yield the point (3, 3). Similarly, reflecting point $R(8, -8)$ over the x-axis or rotating it 270° counterclockwise about the origin would yield the point (8, 8). Therefore, $\overline{XY}$ can be described as the reflection of $\overline{QR}$ over the x-axis or the 270° counterclockwise rotation of $\overline{QR}$ about the origin.

Transformations With Angles (p. 2)

SHARPEN YOUR SKILLS:

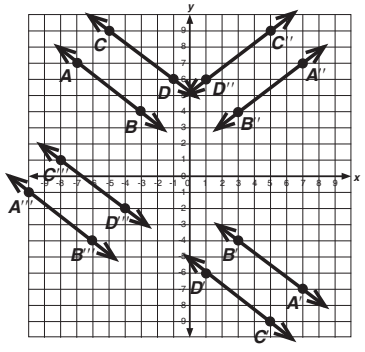
1. $\angle X$ is produced by reflecting $\angle A$ over the y-axis.
2. $\angle Y$ is produced by rotating $\angle A$ 180° counterclockwise about the origin.
3. $\angle Z$ is produced by reflecting $\angle A$ over the x-axis.

APPLY YOUR SKILLS:

If $\angle B$ is reflected over the x-axis or translated up 6 units, its vertex will be at point M.

Transformations With Parallel Lines (p. 3)

SHARPEN YOUR SKILLS:



APPLY YOUR SKILLS:

Sample answer: Rotating point S (–9, –4) 180°counterclockwise about the origin will yield point (9, 4). Reflecting point S (–9, –4) over the x-axis and then over the y-axis will also yield point (9, 4). These transformations would have a similar effect on points Q, R, and T. Therefore, rotating the lines $\overleftrightarrow{QR}$ and $\overleftrightarrow{ST}$ 180° counterclockwise about the origin or reflecting them over the x-axis and then over the y-axis will yield the same set of lines.

Transformations and Congruency (p. 4)

SHARPEN YOUR SKILLS:

Answers will vary.

APPLY YOUR SKILLS:

Yes, the figures are congruent. Sample answer: You can reflect figure EFG over the y-axis and then translate it down 7 units to get figure PQR.

Transformations and Coordinates (p. 5)

SHARPEN YOUR SKILLS:

1. Subtracting a from the x-coordinate. The new point would be $(x - a, y)$.
2. Subtracting a from the y-coordinate. The new point would be $(x, y - a)$.
3. Keeping the x-coordinate and taking the opposite of the y-coordinate. The new point would be $(x, -y)$.
4. Keeping the y-coordinate and taking the opposite of the x-coordinate. The new point would be $(-x, y)$.
5. Taking the opposite of the y-coordinate and then switching the x- and y-coordinates. The new point would be $(-y, x)$.
6. Taking the opposite of both the x- and y-coordinates. The new point would be $(-x, -y)$.

APPLY YOUR SKILLS:

1. $A'(8, 5)$, $B'(3, 9)$, and $C'(-1, -4)$; I added 6 to each of the x-coordinates.
2. $A'(2, -3)$, $B'(-3, 1)$, and $C'(-7, -12)$; I subtracted 8 from each of the y-coordinates.
3. $A'(-2, -5)$, $B'(3, -9)$, and $C'(7, 4)$; I took the opposite of each of the x- and y-coordinates.
4. $A'(2, -5)$, $B'(-3, -9)$, and $C'(-7, 4)$; I kept the x-coordinates and took the opposite of each of the y-coordinates.

Transformations and Coordinates (p. 6)

SHARPEN YOUR SKILLS:

1. $Q'(-30, -42)$, $R'(24, 54)$, and $S'(48, -12)$; I multiplied each coordinate by 6.
2. $R'(-6, 13.5)$, $E'(9, 13.5)$, $C'(9, -12)$ and $T'(-6, -12)$; I multiplied each coordinate by $\frac{3}{4}$.

APPLY YOUR SKILLS:

MyaKay is incorrect. If triangle XYZ was a dilation of triangle ABC by a scale factor of $\frac{2}{3}$, then each of the coordinates of XYZ would be $\frac{2}{3}$ of each of the corresponding coordinates of triangle ABC. However, this is not the case for point Z, because its y-coordinate is not $\frac{2}{3}$ of the y-coordinate of point C.

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