# Spring 2013 Student Performance Analysis

## Grade 7 Mathematics Standards of Learning

**Presentation may be paused and resumed using the arrow keys or the mouse.**

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# Simplifying Integer Expressions

**SOL 7.3**

**The student will**

a)  model addition, subtraction, multiplication, and division of integers; and

b)  add, subtract, multiply, and divide integers.

# Suggested Practice for SOL 7.3b

**Students need additional practice evaluating expressions, particularly when expressions contain negative numbers.**

**What is the value of the expression?**

1) $(-27) - (24) \div (-3)$ $\quad$ <span style="color:red">$-19$</span>

2) $(-12) - 2 \cdot 5$ $\quad$ <span style="color:red">$-22$</span>

3) $(-10) + (-4) \cdot 2$ $\quad$ <span style="color:red">$-18$</span>

# Determining the Effect Changing One Dimension Has on Volume or Surface Area

**SOL 7.5**

**The student will**

a)  describe volume and surface area of cylinders;

b)  solve practical problems involving the volume and surface area of rectangular prisms and cylinders; and

c)  describe how changing one measured attribute of a rectangular prism affects its volume and surface area.

# Suggested Practice for SOL 7.5c

**Students need additional practice determining the effect of changing an attribute of a rectangular prism on its volume.**

**Which method would result in tripling the volume of this rectangular prism?**



height=5 cm

width=2 cm

length=10 cm
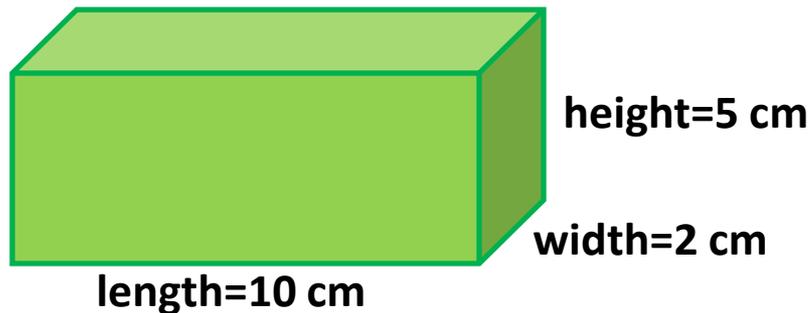
a) Add three to each dimension of the prism

b) Add three to the height of the prism and keep the other dimensions the same

c) Multiply each dimension of the prism by three

d) Multiply the width of the prism by three and keep the other dimensions the same

# Write Proportions to Determine Side Lengths of Similar Figures

**SOL 7.6**
**The student will determine whether plane figures—quadrilaterals and triangles—are similar and write proportions to express the relationships between corresponding sides of similar figures.**

# Suggested Practice for SOL 7.6

**Students need additional practice identifying a proportion that can be used to determine the missing side length of a triangle, when given similar triangles.**

**Triangle JKL is similar to triangle PQR.**
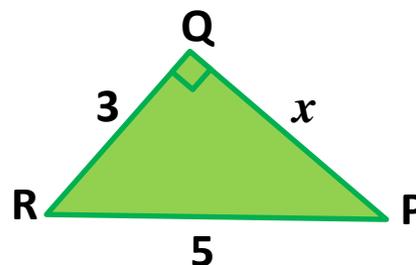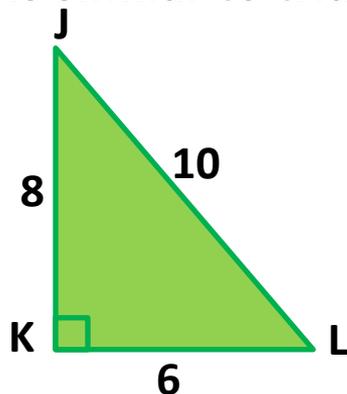


**Which three proportions can be used to find the value of $x$?**

$$\boxed{\frac{8}{x} = \frac{10}{5}}$$

$$\frac{8}{10} = \frac{3}{x}$$

$$\boxed{\frac{6}{3} = \frac{8}{x}}$$

$$\frac{10}{6} = \frac{x}{5}$$

$$\frac{8}{3} = \frac{10}{x}$$

$$\boxed{\frac{8}{6} = \frac{x}{3}}$$

# Comparing and Contrasting Quadrilaterals

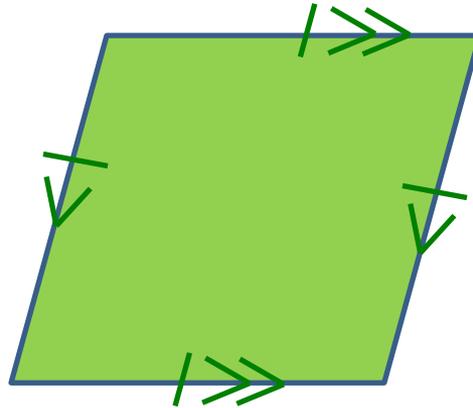**SOL 7.7**

**The student will compare and contrast the following quadrilaterals based on properties:  parallelogram, rectangle, square, rhombus, and trapezoid.**

# Suggested Practice for SOL 7.7

**Students need additional practice classifying an image of a rhombus.**

**Which classifications describe this figure?**



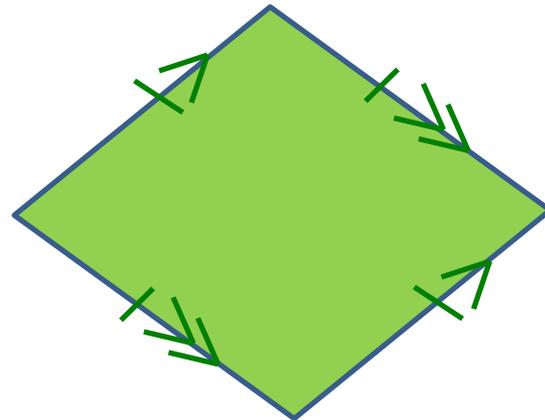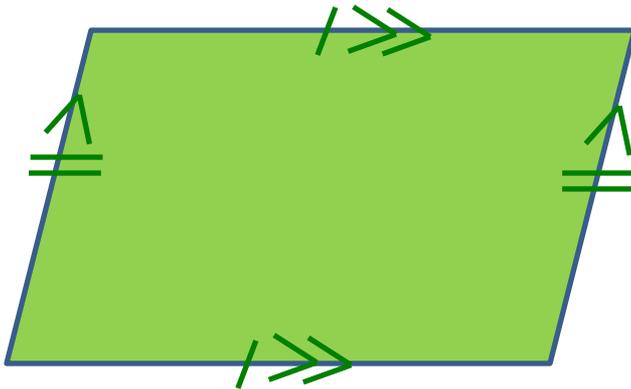| Parallelogram | Trapezoid | Quadrilateral | Square | Rhombus | Rectangle |

# Suggested Practice for SOL 7.7

**Students need additional practice differentiating between an image of a rhombus and a parallelogram.**

**Which classifications appear to describe both of these figures?**



**Parallelogram**   Trapezoid   **Quadrilateral**   Square   Rhombus   Rectangle

# Suggested Practice for SOL 7.7

**Students need additional practice identifying the properties of a rhombus.**

**Select each property that is true for any rhombus.**

There is exactly one pair of parallel sides.

There are exactly two pairs of parallel sides.

There are exactly four congruent sides.

There are exactly four right angles.

There are exactly two pairs of congruent opposite angles.

There are exactly four congruent angles.

# Graphing Transformations in the Coordinate Plane

**SOL 7.8**

**The student, given a polygon in the coordinate plane, will represent transformations (reflections, dilations, rotations, and translations) by graphing in the coordinate plane.**

# Suggested Practice for SOL 7.8

**Students need additional practice applying transformations to a given figure on a coordinate plane.**

1. **Identify the coordinates of the image of triangle ABC after a dilation about the origin by a factor of 2.**
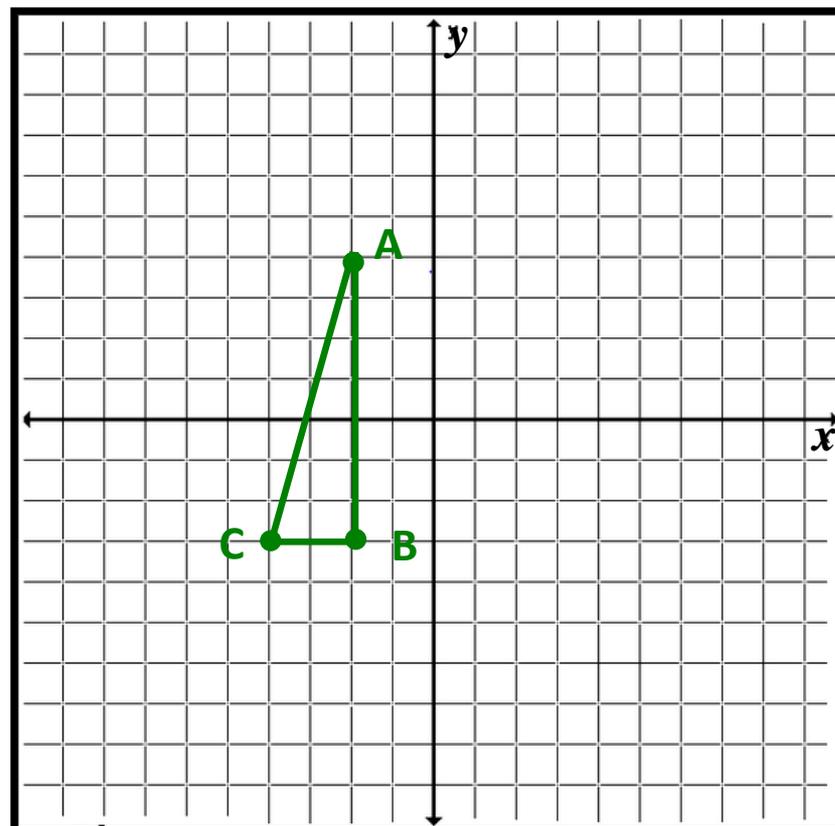
$A'\,(-4, 8), B'\,(-4, -6), C'(-8, -6)$

2. **Identify the coordinates of the image of triangle ABC after a rotation of 180 degrees clockwise about the origin.**

$A'\,(2, -4), B'\,(2, 3), C'(4, 3)$

3. **Identify the coordinates of the image of triangle ABC after a reflection over the $y$-axis.**

$A'\,(2, 4), B'\,(2, -3), C'(4, -3)$

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A (-2,4)   B (-2,-3)   C (-4,-3)

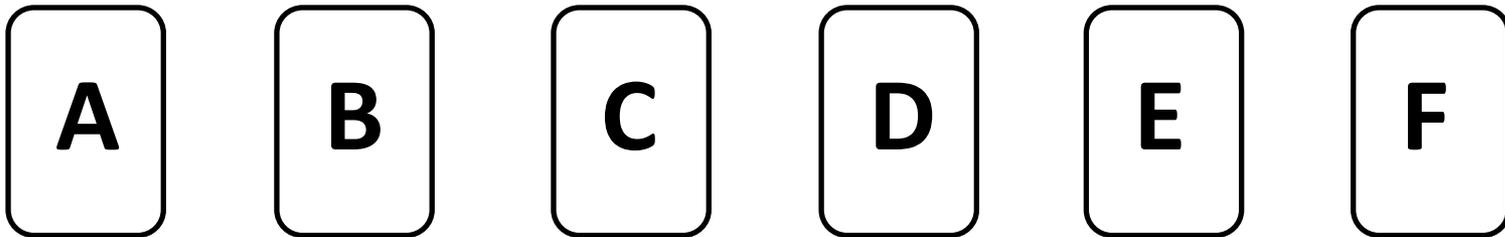# Determining Experimental and Theoretical Probability of Events

**SOL 7.9**

**The student will investigate and describe the difference between the experimental probability and theoretical probability of an event.**

# Suggested Practice for SOL 7.9

**Students need additional practice determining the theoretical and/or experimental probability of an event.**

These cards are the same size and shape.  They are placed inside a bag.

| A | B | C | D | E | F |
|---|---|---|---|---|---|

A card is randomly selected and then placed back inside the bag.  This is done 30 times. The card with an A is selected 3 times.

1) What is the theoretical probability of selecting a card with an A? $\dfrac{1}{6}$

2) What was the experimental probability of selecting a card with an A? $\dfrac{1}{10}$

3) Compare and contrast the theoretical and experimental probabilities of selecting a card with an A after a card is randomly selected 1,000 times.

Sample Answer:  The theoretical probability of selecting a card with an A stays the same.  The experimental probability should get closer to the theoretical probability.

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# Determining the Probability of Compound Events

**SOL 7.10**

**The student will determine the probability of compound events, using the Fundamental (Basic) Counting Principle.**

# Suggested Practice for SOL 7.10

**Students need additional practice using the Fundamental Counting Principle to determine the number of possible outcomes.**

**The letters A, B, C, and D can be used to create a code for a lock.**

1) **Each letter can be repeated.  What is the total number of four-letter codes that can be made using these letters?**

$$4 \cdot 4 \cdot 4 \cdot 4 = 256$$

2) **Each letter can be repeated.  What is the total number of three-letter codes that can be made using these letters?**

$$4 \cdot 4 \cdot 4 = 64$$

**Extension:  No letter can be repeated.  What is the total number of three-letter codes that can be made using these letters?**

$$4 \cdot 3 \cdot 2 = 24$$

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# Suggested Practice for SOL 7.10

**Students need additional practice determining the probability of compound events.**

A fair coin has faces labeled heads and tails. A fair cube has faces labeled 1, 2, 3, 4, 5, and 6. Adam will flip this coin and roll the cube one time each.

1) What is the probability that the coin will land with heads facing up and the top side of the cube will be a number that is composite? $\dfrac{1}{6}$

2) What is the probability that the coin will land with tails facing up and the top side of the cube will be a number that is a multiple of 2? $\dfrac{1}{4}$

# Analyzing Histograms

**SOL 7.11**

**The student, given data in a practical situation, will**

**a) construct and analyze histograms; and**

**b) compare and contrast histograms with other types of graphs presenting information from the same data set.**
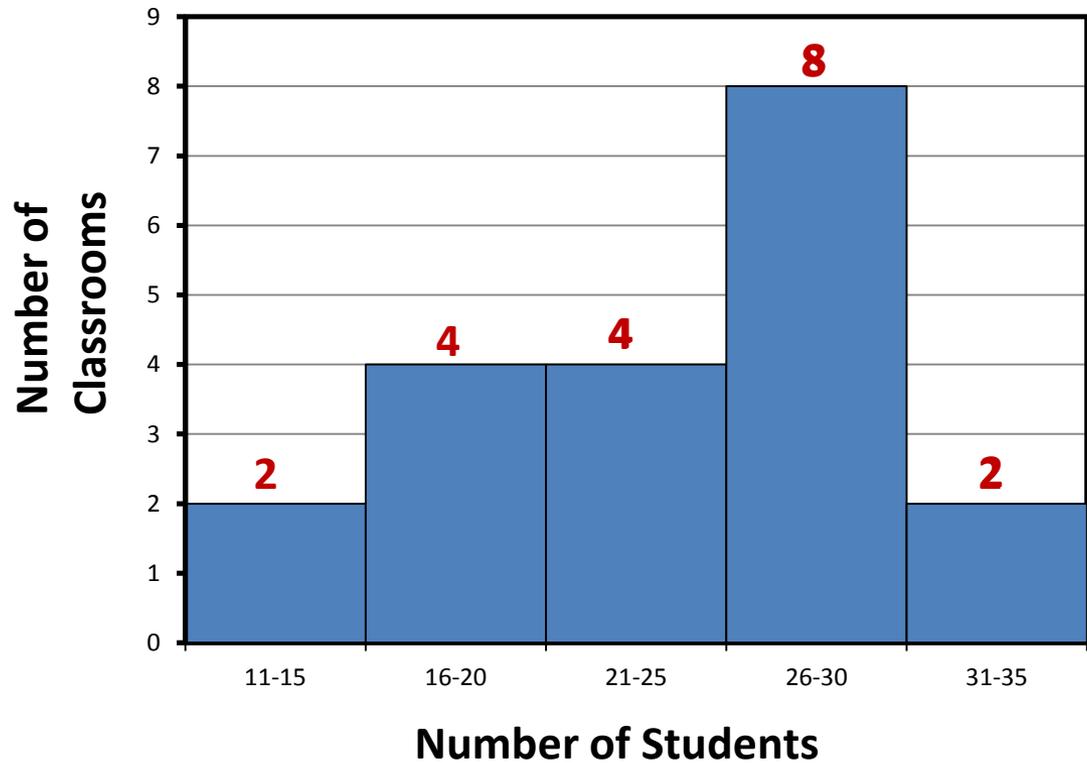
# Suggested Practice for SOL 7.11a

**Students need additional practice analyzing histograms.**

**The graph describes the number of students in each classroom during first block at a high school.**

**What percent of the classrooms have at least 21 students during first block?**

$$\frac{14}{20} = 70\%$$

**Number of Students By Classroom in First Block**



*y-axis: Number of Classrooms*

*x-axis: Number of Students*

Bar values: 11-15: 2, 16-20: 4, 21-25: 4, 26-30: 8, 31-35: 2

# Suggested Practice for SOL 7.11b

**Students need additional practice determining which graphical representation is the best to use for a given analysis.**

Jamie recorded the time it took 25 students to complete a mathematics test.  She created a histogram and a stem-and-leaf plot to represent the data.  To determine the median of the data set, Jamie analyzed the –

a)  histogram because it showed each value in the set of data
b)  stem-and-leaf-plot because it showed each value in the set of data
c)  histogram because the median is always the bar with the greatest height
d)  stem-and-leaf-plot because the median is always the "leaf" that appears most often

# Representing Relations in Different Forms

**SOL 7.12**

**The student will represent relationships with tables, graphs, rules, and words.**

# Suggested Practice for SOL 7.12

**Students need additional practice representing a relation on the coordinate plane when the relation is given as a rule.**

**Plot three points on the coordinate plane that lie on the relation represented by $y = -\dfrac{1}{2}x + 2$. The coordinates of the points must be integers.**

**Sample Answers**
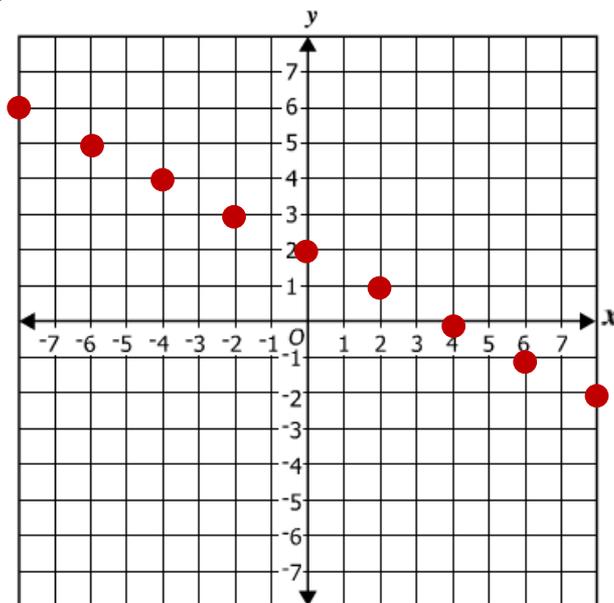
# Suggested Practice for SOL 7.12

**Students need additional practice matching a rule to a table of values.**

**Which number sentence represents the relation shown in this table?**

| $x$ | $y$ |
|---|---|
| -2 | -11 |
| 2 | 1 |
| 6 | 13 |

a)  $y = x + 7$

b)  $y = 8x + 5$

c)  $y = 2x - 3$

d)  $y = 3x - 5$

# Solving and Graphing Inequalities

**SOL 7.15**

**The student will**

a) solve one-step inequalities in one variable; and

b) graph solutions to inequalities on the number line.

# Suggested Practice for SOL 7.15a

**Students need additional practice solving inequalities and identifying values that are part of the solution set.**

**What is the solution to $-10x \leq 50$ ?**

**a)** $\quad x \leq -5$

**b)** $\quad x \geq -5$

**c)** $\quad x \leq 5$

**d)** $\quad x \geq 5$

# Suggested Practice for SOL 7.15a

**What is the solution to** $-12 \geq x - 4$ **?**

a) $\quad -16 \geq x$

b) $\quad -16 \leq x$

c) $\quad -8 \geq x$

d) $\quad -8 \leq x$

# Suggested Practice for SOL 7.15a

**Which is a value of $x$ that will make $x - 4 < -3$ true?**
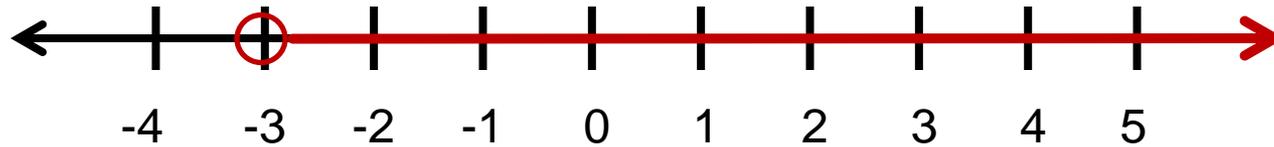
a) $-1$

b) $1$

c) $2$
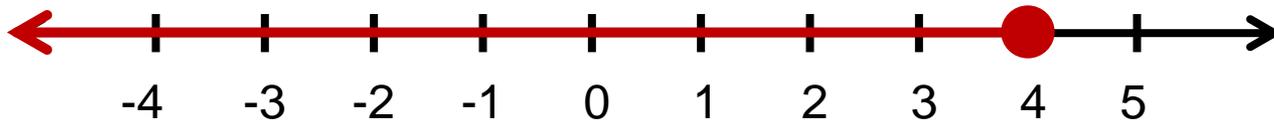
d) $7$

# Suggested Practice for SOL 7.15b

**Students need additional practice graphing solutions to inequalities.**

**Graph the solution to the inequality on the number line.**

**1)** $-3x < 9$



**2)** $-1 \geq x - 5$

# Identifying Properties

**SOL 7.16**

**The student will apply the following properties of operations with real numbers:**

a) the commutative and associative properties for addition and multiplication;

b) the distributive property;

c) the additive and multiplicative identity properties;

d) the additive and multiplicative inverse properties; and

e) the multiplicative property of zero.

# Suggested Practice for SOL 7.16

**Students need additional practice identifying properties of operations with real numbers.**

**Which property is illustrated by this number sentence?**

$$(-1 \cdot 5) + 6 = 6 + (-1 \cdot 5)$$

a)   Identity Property of Addition
b)   Inverse Property of Multiplication
c)   Commutative Property of Addition
d)   Associative Property of Multiplication

# Suggested Practice for SOL 7.16

**Identify the property illustrated by each equation.**

1) $\frac{1}{3}(-1+6) = \frac{1}{3}(-1) + \frac{1}{3}(6)$   **Distributive Property**

2) $(5+6) = (5+6) \cdot 1$   **Identity Property of Multiplication**

3) $1 \cdot (5+6) = (5+6) \cdot 1$   **Commutative Property of Multiplication**

4) $10 + (-10) = 0$   **Inverse Property of Addition**

**Choose from this list of properties:**

| | |
|---|---|
| **Inverse Property of Addition** | **Commutative Property of Addition** |
| **Identity Property of Addition** | **Commutative Property of Multiplication** |
| **Identity Property of Multiplication** | **Associative Property of Addition** |
| **Distributive Property** | **Associative Property of Multiplication** |

# Practice Items

This concludes the student performance information for the spring 2013 Grade 7 Mathematics SOL test.

Additionally, test preparation **practice items** for Grade 7 Mathematics can be found on the Virginia Department of Education Web site at:

**http://www.doe.virginia.gov/testing/sol/practice_items/index.shtml#math**

# Contact Information

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