

Teacher's Guide for MindJogger Videoquizzes

Glencoe
Algebra
Concepts and Applications

Includes:

- **MindJogger Videoquiz User Guide**
- **Teaching Strategies for Videoquizzes**
- **Questions and Answers**
- **Scoring Sheet**



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TO THE TEACHER

The *Algebra: Concepts and Applications MindJogger Videoquizzes* package contains four videotapes or two DVDs, a Teacher Guide, and answer cards. There is a videoquiz for each of the 15 chapters of *Algebra: Concepts and Applications*. Included in the Teacher Guide are teaching strategies, a chapter correlation, a user guide, a copy of all of the questions and answers in *MindJogger Videoquizzes*, and a scoring sheet.

MindJogger Videoquizzes are designed to enhance student learning within the classroom. The convenience of this medium allows for individual and group learning.

TEACHING STRATEGIES

Algebra: Concepts and Applications MindJogger Videoquizzes can be used for reviewing chapter content material in preparation for chapter testing. Set in a game show context, these quizzes combine oral questioning, written questions that appear on the screen, and engaging visuals. By incorporating these modes of communication, the shows are especially helpful for oral and visual learners.

In addition to testing the acquisition of mathematics concepts, skills, and problem solving within the classroom setting, *MindJogger Videoquizzes* can serve other functions. For students who have been absent, the videoquizzes can be used for review of missed material. They may also be used as additional reinforcement of the major concepts and skills and can be an effective and enjoyable tool when preparing for semester and final exams.

CHAPTER CORRELATION

MindJogger Videoquizzes cover concepts in each chapter of *Algebra: Concepts and Applications*.

- Videoquiz 1** Use after Chapter 1: The Language of Algebra
- Videoquiz 2** Use after Chapter 2: Integers
- Videoquiz 3** Use after Chapter 3: Addition and Subtraction Equations
- Videoquiz 4** Use after Chapter 4: Multiplication and Division Equations
- Videoquiz 5** Use after Chapter 5: Proportional Reasoning and Probability
- Videoquiz 6** Use after Chapter 6: Functions and Graphs
- Videoquiz 7** Use after Chapter 7: Linear Equations
- Videoquiz 8** Use after Chapter 8: Powers and Roots
- Videoquiz 9** Use after Chapter 9: Polynomials
- Videoquiz 10** Use after Chapter 10: Factoring
- Videoquiz 11** Use after Chapter 11: Quadratic and Exponential Functions
- Videoquiz 12** Use after Chapter 12: Inequalities
- Videoquiz 13** Use after Chapter 13: Systems of Equations and Inequalities
- Videoquiz 14** Use after Chapter 14: Radical Expressions
- Videoquiz 15** Use after Chapter 15: Rational Expressions and Equations

USER GUIDE

MindJogger Videoquizzes are presented in a game show format. Separate the students into cooperative groups or teams. Each team should be supplied with a set of answer cards and a copy of the scoring sheet. Have each team sit together and face the video screen. Each team should select its own scorekeeper or you may wish to select a scorekeeper for the entire classroom.

There are three rounds to each videoquiz, with each round a little more difficult than the previous one. During each round, a question is asked and a time limit set in which to answer each question. Pencil, paper, and calculator may be needed for some of the questions.

Round One covers mathematical concepts from the chapter. For this round, each team has 15 seconds in which to decide on an answer to each of five questions. Each question is worth 5 points.

Round Two reviews mathematical skills in the chapter. In this round, each team has 20 seconds in which to decide on an answer to each of four questions. Each question is worth 10 points.

Round Three tests problem-solving abilities and critical-thinking skills. In this round, each team has 20 seconds to answer each of four questions. Each question is worth 15 points.

After each question is asked, a time clock will appear in the upper right-hand corner of the videoscreen, indicating the amount of time left in which to answer the question. If more time is needed at any time during the videoquizzes, simply pause the tape or DVD. At the end of each round, time is allotted for each team to total its score. A final score is totaled at the end of Round Three, indicating a winner for that particular segment of *MindJogger Videoquizzes*.

ANSWER CARDS

Each team should be supplied with four answer cards labeled A, B, C, and D. These cards are included in the *MindJogger Videoquizzes* package.

SCORING SHEET

Each team should be supplied with a copy of the scoring sheet. The scoring sheet is included on the last page of this booklet.

MINDJOGGER VIDEOQUIZ 1

Chapter 1

The Language of Algebra

Round 1

Question 1

Which of the following is the correct verbal expression for $5a - 6$?

- A. 5 times the quantity a minus 6
- B. 5 times a number decreased by 6
- C. the quotient of 5 and a number minus 6
- D. 5 times the difference of a number and 6

The answer is B.

Question 2

Put the following three statements in the correct order according to the order of operations.

- (1) Do all additions and/or subtractions from left to right.
- (2) Find the values of expressions inside grouping symbols, such as parentheses, brackets, and as indicated by fraction bars.
- (3) Do all multiplications and/or divisions from left to right.

- A. 1, 2, 3
- B. 2, 1, 3
- C. 2, 3, 1
- D. 3, 2, 1

The answer is C.

Question 3

Name the property shown by the statement $(3 \cdot 6) \cdot 2 = 3 \cdot (6 \cdot 2)$.

- A. Commutative Property of Addition
- B. Transitive Property of Equality
- C. Commutative Property of Multiplication
- D. Associative Property of Multiplication

The answer is D.

Question 4

In the expression $5x + 3$, the number 5 is called a _____.

- A. term
- B. variable
- C. coefficient
- D. leader

The answer is C.

Question 5

What number represented on the stem-and-leaf plot occurs most often?

Stem	Leaf
1	0 3 6
2	2 3
3	3 7
4	5 5 1 0 = 10

- A. 55
- B. 45
- C. 10
- D. 3

The answer is B.

Round 2

Question 1

Write an equation for the sentence *three times the sum of n and 6 minus 4 is eleven*.

- A. $3(n + 6) - 4 = 11$
- B. $3n + (6 - 4) = 11$
- C. $3(n + 6 - 4) = 11$
- D. $(3 + n)(6 - 4) = 11$

The answer is A.

Question 2

Find the value of $4 + 3 \cdot (9 - 5) \div 2$.

- A. 8
- B. 10
- C. 12
- D. 16

The answer is B.

The Language of Algebra (continued)

Question 3

Simplify $4(x + 1) - (x - 5)$ by using algebraic properties and combining like terms.

- A. $3x - 4$
- B. $3x - 1$
- C. $3x + 6$
- D. $3x + 9$

The answer is D.

Question 4

The area A of a rectangle is the length ℓ times the width w . If the length of a rectangle is two feet more than the width, find an equation for the area of a rectangle in terms of w .

- A. $A = (2w)w$
- B. $A = \ell w$
- C. $A = (w + 2)w$
- D. $A = 2\ell w$

The answer is C.

Round 3

Question 1

Mr. Chen has 3 suitcases. The black suitcase measures $18 \times 24 \times 4$ inches, the brown suitcase measures $26 \times 16 \times 4$ inches and the gray suitcase measures $24 \times 18 \times 4$ inches. The volume of each suitcase can be found by using the expression $\ell \times w \times h$, where ℓ is the length, w is the width, and h is the height. Which suitcases have the same volume?

- A. black and brown
- B. brown and gray
- C. black and gray
- D. black, brown and gray

The answer is C.

Question 2

Juan has 6 coins that total 40 cents. If he doesn't have any pennies, how many quarters, dimes, and nickels does he have?

- A. 0 quarters, 2 dimes, 4 nickels
- B. 1 quarter, 1 dime, 4 nickels
- C. 0 quarters, 4 dimes, 2 nickels
- D. 1 quarter, 0 dimes, 5 nickels

The answer is A.

Question 3

Mrs. Quinn's class made their own rockets and launched them for a science experiment. They recorded the length of time the rockets were in the air in the table shown. How many rockets stayed in the air more than 40 seconds?

Rocket Launch		
Time (s)	Frequency	Cumulative Frequency
21 - 30		3
31 - 40		11
41 - 50	?	22
51 - 60	?	28

- A. 11
- B. 17
- C. 28
- D. 50

The answer is B.

Question 4

During the annual cookie sale, Donita kept track of all the cookies she sold in a histogram. For every 15 boxes of cookies she sold, Donita earned a free movie pass. How many movie passes did she receive?

- A. 3
- B. 4
- C. 5
- D. 6

The answer is C.

Integers

Round 1

Question 1

Which statement is false?

- A. Every natural number is a whole number.
- B. Every integer is a natural number.
- C. The set of whole numbers includes zero.
- D. Negative whole numbers are integers.

The answer is B.

Question 2

The point at which the x -axis and the y -axis intersect is called the _____.

- A. horizontal number line
- B. vertical number line
- C. origin
- D. coordinate plane

The answer is C.

Question 3

Write the algebraic expression represented by the model.

- A. $6 + (-2)$
- B. $-8 + (-6)$
- C. $-8 - 6$
- D. $6 + (-8)$

The answer is D.

Question 4

What is $8 - (-12)$ rewritten as an addition expression?

- A. $8 + 12$
- B. $8 + (-12)$
- C. $-(8 + 12)$
- D. $(-8) + (-12)$

The answer is A.

Question 5

For every integer n , where $n \neq 0$, n divided by its additive inverse is _____.

- A. positive
- B. negative
- C. zero
- D. one

The answer is B.

Round 2

Question 1

Order -4 , 0 , $|-3|$, 2 , and -10 from least to greatest.

- A. $-10, -4, |-3|, 0, 2$
- B. $-4, -10, 0, 2, |-3|$
- C. $0, 2, |-3|, -4, -10$
- D. $-10, -4, 0, 2, |-3|$

The answer is D.

Question 2

Name the point that is represented by the ordered pair $(2, -4)$.

- A. R
- B. S
- C. T
- D. U

The answer is C.

Question 3

Which expression has a positive sum?

- A. $10 + (-17)$
- B. $-20 + 21$
- C. $-4 + 3$
- D. $6 + (-6)$

The answer is B.

Question 4

Find $(-5)(2)(-4)(-1)$.

- A. -40
- B. -14
- C. 40
- D. -16

The answer is A.

Integers (continued)

Round 3

Question 1

What are all the possible locations for the graph of (x, y) if $y = -2$?

- A. Quadrants I and II
- B. Quadrants II and III
- C. Quadrants III and IV, and the negative y -axis
- D. Quadrants II and IV, and the origin

The answer is C.

Question 2

Odina wants to buy a CD that costs \$12.00 and a movie that costs \$18.00. If she has \$21.00 saved, how much more money does she need to make her purchase?

- A. \$9.00
- B. \$11.00
- C. \$19.00
- D. \$30.00

The answer is A.

Question 3

The temperature is dropping 4° every hour. At 5:00 P.M., it is 20°F . What will the temperature be at 11:00 P.M.?

- A. 4°F
- B. -1°F
- C. 0°F
- D. -4°F

The answer is D.

Question 4

A triangle has vertices $A(0, 4)$, $B(4, 2)$, and $C(2, -2)$. What are the coordinates of the vertices of a new triangle if you divide each x - and y -coordinate by -2 ?

- A. $A'(-2, 2)$, $B'(2, 0)$, $C'(0, -4)$
- B. $A'(0, -2)$, $B'(-2, -1)$, $C'(-1, 1)$
- C. $A'(0, 2)$, $B'(2, 1)$, $C'(1, -1)$
- D. $A'(-2, -2)$, $B'(-2, 1)$, $C'(1, -1)$

The answer is B.

Addition and Subtraction Equations

Round 1

Question 1

Which of the following is *not* a rational number?

- A. 0.875
- B. $\frac{\sqrt{2}}{2}$
- C. 0
- D. $-1\frac{1}{3}$

The answer is B.

Question 2

When the data in a set are arranged in numerical order, the middle number is called the _____.

- A. mean
- B. median
- C. mode
- D. range

The answer is B.

Question 3

The equation $m + 1 = 6$ is an example of _____.

- A. an open sentence
- B. a replacement set
- C. a solution equation
- D. a verbal expression

The answer is A.

Question 4

Which equation can be written for the following model?

- A. $5x = -4$
- B. $x + 5 - 4 = 0$
- C. $x + 5 = -4$
- D. $x - 5 + 4$

The answer is C.

Question 5

Which of the following equations is equivalent to $y + 4 = 2$?

- A. $y + 2 = 4$
- B. $y = -6$
- C. $y - 4 = -2$
- D. $y + 6 = 4$

The answer is D.

Round 2

Question 1

Which expression compares $-\frac{5}{9}$ and $-\frac{4}{7}$?

- A. $-\frac{5}{9} < -\frac{4}{7}$
- B. $-\frac{5}{9} > -\frac{4}{7}$
- C. $-\frac{5}{9} = -\frac{4}{7}$
- D. $-\frac{5}{9} \cong -\frac{4}{7}$

The answer is B.

Question 2

Find the mean, median, and mode for the following data: 14, 16, 8, 11, 15, 12, 15.

- A. 13, 14, 15
- B. 13, 11, 15
- C. 14, 13, 15
- D. 11, 15, 13

The answer is A.

Question 3

When 10 is subtracted from p , the result is -4 . Find the value of p .

- A. -6
- B. -14
- C. 6
- D. 14

The answer is C.

Addition and Subtraction Equations (continued)

Question 4

Solve $|a - 4| + 2 = 14$.

- A. -8
- B. 16
- C. -12 or 16
- D. -8 or 16

The answer is D.

Round 3

Question 1

Zachary jogs 4 times a week.

Suppose he jogs $1\frac{1}{2}$ miles the first

day, $2\frac{1}{8}$ miles the second day,

$1\frac{3}{4}$ miles the third day, and $2\frac{3}{8}$ miles

the fourth day. Find the total number of miles he jogged.

- A. 7 mi
- B. $7\frac{1}{4}$ mi
- C. $7\frac{1}{2}$ mi
- D. $7\frac{3}{4}$ mi

The answer is D.

Question 2

You can convert a temperature given in degrees Fahrenheit ($^{\circ}\text{F}$) to degrees Celsius ($^{\circ}\text{C}$) by using the formula $C = \frac{5}{9}(F - 32)$. If the temperature is 30°C , what is the temperature in degrees Fahrenheit?

- A. 68°F
- B. 77°F
- C. 86°F
- D. 95°F

The answer is C.

Question 3

The longest river in the world is the Nile River in Africa. It is 260 miles longer than the Amazon River in South America. The Amazon River is 3900 miles long. How long is the Nile River?

- A. 4160 mi
- B. 4140 mi
- C. 4060 mi
- D. 3640 mi

The answer is A.

Question 4

At many state fairs, you can play a game where someone tries to guess your age. If the guess is within 3 years of your actual age, you don't win a prize. Write an equation to determine the least and greatest age the fair employee can successfully guess for a man who is 25 years old.

- A. $|a - 3| = 25$
- B. $|a + 3| = 25$
- C. $|a - 25| = 3$
- D. $|a + 25| = 3$

The answer is C.

Multiplication and Division Equations

Round 1

Question 1

The Fundamental Counting Principle states that if an event M can occur in m ways and is followed by an event N that can occur in n ways, then the event M followed by event N can occur in _____ ways.

- A. $m + n$
- B. $m - n$
- C. $m \times n$
- D. m^n

The answer is C.

Question 2

What is the multiplicative inverse of $\frac{a}{b}$?

- A. $-\frac{a}{b}$
- B. $\frac{b}{a}$
- C. $-\frac{b}{a}$
- D. $\frac{a}{b}$

The answer is B.

Question 3

Which operation should you perform to solve $\frac{1}{4}x = 20$?

- A. Multiply each side by 4.
- B. Multiply each side by $\frac{1}{4}$.
- C. Subtract 20 from each side.
- D. Divide each side by 4.

The answer is A.

Question 4

Given that $n = -3$, find the next three consecutive odd integers.

- A. -3, -5, -7
- B. -2, -1, 0
- C. -1, 1, 3
- D. -1, 0, 1

The answer is C.

Question 5

How many solutions does the equation $16 - 4k = 20 - 4k$ have?

- A. one solution
- B. two solutions
- C. true for every value
- D. no solution

The answer is D.

Round 2

Question 1

Find the product of $-\frac{4}{7}$ and $1\frac{2}{3}$.

- A. $-\frac{8}{21}$
- B. $-\frac{20}{21}$
- C. $-\frac{12}{35}$
- D. $-\frac{24}{21}$

The answer is B.

Question 2

Evaluate $\frac{x}{5}$ if $x = \frac{2}{3}$.

- A. $\frac{10}{3}$
- B. $5\frac{2}{3}$
- C. $2\frac{3}{5}$
- D. $\frac{2}{15}$

The answer is D.

Question 3

Suppose you start with a number k . Subtract 6 and divide by 2. The result is 8. What is k ?

- A. 10
- B. 13
- C. 18
- D. 22

The answer is D.

Multiplication and Division Equations (continued)

Question 4

Solve $3(n - 6) + 2 = 14$.

- A. 6
- B. 8
- C. 10
- D. 12

The answer is C.

Round 3

Question 1

If a tree grows an average of 1.75 feet per year and is 8 years old, how tall is it?

- A. 12.25 ft
- B. 14 ft
- C. 15.75 ft
- D. 16.5 ft

The answer is B.

Question 2

There are two boxes. Each box contains a red, blue, green, and yellow ball. Suppose you pick one ball from each box. How many outcomes are possible?

- A. 16
- B. 14
- C. 12
- D. 8

The answer is A.

Question 3

Jonathan hit $\frac{3}{5}$ of the balls pitched to him at the batting cage. Each session costs \$2.00 for 20 pitches. If Jonathan hit 48 balls, how much money did he spend?

- A. \$6
- B. \$8
- C. \$10
- D. \$12

The answer is B.

Question 4

Maria's father is 8 more than 2 times Maria's age. Her mother is 7 less than 3 times Maria's age. If her father and mother are the same age, how old is Maria?

- A. 13
- B. 14
- C. 15
- D. 16

The answer is C.

Proportional Reasoning and Probability

Round 1

Question 1

An equation stating that two ratios are equal is called a _____.

- A. rate
- B. proportion
- C. percent
- D. dimensional analysis

The answer is B.

Question 2

Express $\frac{3}{2}$ as a percent.

- A. 67%
- B. 75%
- C. 133%
- D. 150%

The answer is D.

Question 3

Which equation would you use to solve the problem, *40% of what number is 24*?

- A. $P = 0.4(24)$
- B. $40 = R(24)$
- C. $24 = 0.4(B)$
- D. $24 = B(40)$

The answer is C.

Question 4

A ratio that compares the number of favorable outcomes to the number of possible outcomes is called the _____ of an event.

- A. odds
- B. probability
- C. experimental probability
- D. random outcome

The answer is B.

Question 5

Which equation can you use to find the probability of two mutually exclusive events A and B?

- A. $P(A \text{ or } B) = P(A) + P(B)$
- B. $P(A \text{ and } B) = P(A) \cdot P(B)$
- C. $P(A \text{ and } B) = P(A) - P(B)$
- D. $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

The answer is A.

Round 2

Question 1

Solve $\frac{c}{6} = \frac{c+5}{12}$.

- A. 1
- B. 3
- C. 5
- D. 10

The answer is C.

Question 2

39 is what percent of 60?

- A. 60%
- B. 65%
- C. 70%
- D. 75%

The answer is B.

Question 3

Two dice are rolled. What is the probability that a sum of 5 or less is rolled?

- A. $\frac{1}{6}$
- B. $\frac{2}{3}$
- C. $\frac{5}{12}$
- D. $\frac{5}{18}$

The answer is D.

Proportional Reasoning and Probability (continued)

Question 4

The original price of an item and a discount rate are given. Find the sale price to the nearest cent.

sweater: \$45; 35%

- A. \$29.25
- B. \$15.75
- C. \$35.00
- D. \$30.00

The answer is A.

Round 3

Question 1

On a map, the distance between Washington, D.C. and New York City is 3 inches. The cities are actually 225 miles apart. On the same map, the distance between Philadelphia and Buffalo is 5.5 inches. What is the actual distance between Philadelphia and Buffalo rounded to the nearest mile?

- A. 375 mi
- B. 413 mi
- C. 521 mi
- D. 1238 mi

The answer is B.

Question 2

Jamaal needs a 25% solution of nitric acid. He has 20 milliliters of a 30% solution. How many milliliters of a 15% solution should he add to obtain the required 25% solution?

- A. 10 mL
- B. 25 mL
- C. 50 mL
- D. 100 mL

The answer is A.

Question 3

The cost of a gallon of gasoline rose from \$1.30 per gallon to \$1.56 per gallon in three weeks. What was the percent of increase for the cost of gasoline?

- A. 17%
- B. 83%
- C. 20%
- D. 120%

The answer is C.

Question 4

The local forecast reports a 40% chance of rain on Monday and a 50% chance of rain on Tuesday. Find the probability that it will *not* rain on both Monday and Tuesday.

- A. 10%
- B. 20%
- C. 30%
- D. 45%

The answer is C.

Functions and Graphs

Round 1

Question 1

A set of ordered pairs is called a _____.

- A. relation
- B. domain
- C. range
- D. function

The answer is A.

Question 2

Which equation is a linear equation in standard form?

- A. $y = 2x^2 + 5$
- B. $\frac{1}{2}x + \frac{1}{2}y = 10$
- C. $x = -3$
- D. $xy = 15$

The answer is C.

Question 3

Which of the following relations is not a function?

- A. (table)
- B. (graph)
- C. $y = -7$
- D. $\{(3, 4), (5, 8), (3, -4), (11, 16)\}$

The answer is D.

Question 4

Which graph shows a direct variation?

- A. (graph)
- B. (graph)
- C. (graph)
- D. (graph)

The answer is A.

Question 5

Which of the following best describes the equation $3xy = 6$?

- A. direct variation
- B. inverse variation
- C. linear function
- D. constant

The answer is B.

Round 2

Question 1

What is the domain of the relation shown below?

- A. $\{-1, 2\}$
- B. $\{-2, 5\}$
- C. $\{-1, 0, 1, 2\}$
- D. $\{-2, 1, 2, 5\}$

The answer is D.

Question 2

Which of the ordered pairs $(2, 0)$, $(1, 5)$, $(-2, -4)$, or $(8, 2)$ are solutions of $y = 3x + 2$?

- A. $(2, 0)$, $(8, 2)$
- B. $(1, 5)$, $(-2, -4)$
- C. $(2, 0)$, $(1, 5)$
- D. $(-2, -4)$, $(8, 2)$

The answer is B.

Question 3

If $f(x) = 4x + 5$, find $f(-3)$.

- A. -17
- B. -8
- C. -7
- D. -2

The answer is C.

Question 4

Suppose y varies inversely as x and $y = 6$ when $x = 3$. Find the constant of variation k .

- A. $\frac{1}{2}$
- B. 2
- C. 12
- D. 18

The answer is D.

Functions and Graphs (continued)

Round 3

Question 1

Mrs. Jackson's commission for selling furniture is 7.5% of her total sales. She uses the equation $c = 0.075s$ to find the amount of her commission c based on the amount of her sales s . Her sales for each week in the month of April are shown in the table below. What was her commission for the month?

Mrs. Jackson's April Sales			
Week 1	Week 2	Week 3	Week 4
\$3000	\$3200	\$3600	\$4000

- A. \$1420
- B. \$1380
- C. \$1250
- D. \$1035

The answer is D.

Question 2

A phone company charges 20 cents for each long-distance phone call plus 10 cents a minute. The equation $y = 0.10x + 0.20$, where y is the charge for a phone call and x is the number of minutes spent on the phone, is graphed below. If Cathy was billed \$1.40 for a recent phone call, how long was the call?

- A. 10 min
- B. 11 min
- C. 12 min
- D. 14 min

The answer is C.

Question 3

The weight of an object on Mars varies directly as its weight on Earth. An object that weighs 60 pounds on Earth weighs 24 pounds on Mars. How much would an object weigh on Mars if its weight on Earth is 90 pounds?

- A. 30 lb
- B. 36 lb
- C. 40 lb
- D. 45 lb

The answer is B.

Question 4

The equation $d = \frac{m}{V}$ gives the density d of an element. The mass m varies inversely as the volume V . Suppose a liquid solution has a mass of 12 grams when its volume is 10 cubic centimeters. Find the mass of the liquid when its volume is 15 cubic centimeters.

- A. 18 g
- B. 16 g
- C. 17 g
- D. 15 g

The answer is A.

Linear Equations

Round 1

Question 1

Which expression can be used to find the slope of a line that passes through two points with coordinates (x_1, y_1) and (x_2, y_2) ?

- A. $\frac{y_2 - y_1}{x_2 - x_1}$
- B. $\frac{x_2 - x_1}{y_2 - y_1}$
- C. $\frac{x_2 - y_2}{x_1 - y_1}$
- D. $\frac{y_1 - x_1}{y_2 - x_2}$

The answer is A.

Question 2

The line whose equation is $y + 2 = 3(x - 5)$ passes through the point at _____.

- A. (0, -5)
- B. (-2, 5)
- C. (5, 2)
- D. (5, -2)

The answer is D.

Question 3

What is the relationship between the variables in the scatter plot?

- A. positive relationship
- B. negative relationship
- C. independent relationship
- D. no relationship

The answer is B.

Question 4

Which of the following is *not* enough information to graph a linear equation?

- A. slope
- B. slope and y -intercept
- C. x -intercept and y -intercept
- D. two points on the line

The answer is A.

Question 5

Choose the graph of the line that is parallel to the graph of $2x + y = 4$.

- A. (graph)
- B. (graph)
- C. (graph)
- D. (graph)

The answer is C.

Round 2

Question 1

Determine the slope of the line graphed below.

- A. $\frac{3}{4}$
- B. $\frac{1}{2}$
- C. 2
- D. $\frac{1}{5}$

The answer is B.

Question 2

Write an equation in slope-intercept form for the line with slope 2 passing through the point at (4, 7).

- A. $y - 7 = 2(x - 4)$
- B. $y = 2x + 2$
- C. $y = 2x - 1$
- D. $y - 2x = -1$

The answer is C.

Question 3

Find the x -intercept and y -intercept of $3x - 2y = -12$?

- A. $x: -4, y: 6$
- B. $x: 6, y: -4$
- C. $x: 4, y: -6$
- D. $x: -6, y: 4$

The answer is A.

Linear Equations (continued)

Question 4

Change $y = -2x - 5$ so that the graph of the new equation has the same slope, but is shifted up 3 units.

- A. $y = 2x - 2$
- B. $y + 8 = -2x$
- C. $3y = -2x - 5$
- D. $y = -2x - 2$

The answer is D.

Round 3

Question 1

The graph shows how the perimeter of a square varies directly as the side length. Write an equation for the line in point-slope form. Use the coordinates of the point that represents a square having a side measure of 2.

- A. $y - 8 = x - 2$
- B. $y = 4x$
- C. $y - 8 = 4(x - 2)$
- D. $y - 4 = 2(x - 1)$

The answer is C.

Question 2

Aisha is vacationing on an island. She can rent a bicycle daily for a flat fee of \$3.00 plus an additional \$2.00 per hour. Use the graph to predict how much Aisha will spend to rent a bicycle for 5 hours.

- A. \$12
- B. \$13
- C. \$14
- D. \$15

The answer is B.

Question 3

The graph shows the amount of gas a car uses when it is driven on the highway and in the city. What does a steeper slope indicate?

- A. You drive more miles using one gallon of gas.
- B. You drive fewer miles using one gallon of gas.
- C. You use more gas for each mile you drive.
- D. You drive faster on the highway than the city.

The answer is A.

Question 4

Which term best describes quadrilateral $ABCD$ with vertices $A(3, 4)$, $B(4, -1)$, $C(-1, -3)$, and $D(-2, 2)$?

- A. trapezoid
- B. rectangle
- C. square
- D. parallelogram

The answer is D.

Powers and Roots

Round 1

Question 1

Write 12 to the eighth power using exponents.

- A. 12×8^2
- B. 12^8
- C. 8^{12}
- D. 12×10^8

The answer is B.

Question 2

Which of the following demonstrates the rule for multiplying powers?

- A. $2^3 \cdot 2^4 = 2^7$
- B. $2^3 \cdot 2^4 = 2^{12}$
- C. $2^3 \cdot 4^2 = 8^5$
- D. $2^3 \cdot 4^2 = 8^6$

The answer is A.

Question 3

4^{-x} is equivalent to _____.

- A. $4^{\frac{1}{x}}$
- B. -4^x
- C. $\frac{1}{4^x}$
- D. $\frac{1}{x^4}$

The answer is C.

Question 4

Which expression represents 0.00217 in scientific notation?

- A. 2.17×10^{-3}
- B. 2.17×10^{-5}
- C. 2.17×10^3
- D. 2.17×10^2

The answer is A.

Question 5

What is the prime factorization of 36?

- A. 6^2
- B. $12 \cdot 3$
- C. $3^2 \cdot 4$
- D. $2^2 \cdot 3^2$

The answer is D.

Round 2

Question 1

Simplify $\frac{12a^4b^8}{3a^2b^4}$.

- A. $4a^2b^2$
- B. $4a^2b^4$
- C. $4ab^2$
- D. $2ab^2$

The answer is B.

Question 2

Simplify $(10^2c^{-1}d^4)(5^{-2}c^3d^{-6})$ using only positive exponents.

- A. $\frac{4c^2}{d^2}$
- B. $\frac{4d^2}{c^2}$
- C. $\frac{2c^2}{d^2}$
- D. $2c^2d^2$

The answer is A.

Question 3

Estimate $\sqrt{55}$ to the nearest whole number.

- A. 5
- B. 6
- C. 7
- D. 8

The answer is C.

Powers and Roots (continued)

Question 4

Use the Pythagorean Theorem to find the missing measure.

- A. 6
- B. 8
- C. 12
- D. 16

The answer is D.

Round 3

Question 1

The volume V of a cylinder can be found by the formula $V = \pi r^2 h$, where r is the radius and h is the height of the cylinder. Find the volume of a cylinder that has a radius of 5 centimeters and a height of 10 centimeters.

- A. $50\pi \text{ cm}^3$
- B. $150\pi \text{ cm}^3$
- C. $250\pi \text{ cm}^3$
- D. $500\pi \text{ cm}^3$

The answer is C.

Question 2

Light travels at a speed of approximately 3.0×10^8 meters per second. How far will light travel in 60 seconds? Express your answer in standard form.

- A. $1.8 \times 10^{10} \text{ m}$
- B. $1.8 \times 10^5 \text{ km}$
- C. 1,800,000,000 m
- D. 18,000,000,000 m

The answer is D.

Question 3

Mr. Campbell wants to add a square sunroom onto his house. At a home improvement center, he finds a great deal on 150 floor tiles, each measuring 1 square foot. What is the length in whole feet of each side of the largest room he can build?

- A. 10 ft
- B. 12 ft
- C. 14 ft
- D. 15 ft

The answer is B.

Question 4

Courtney is bicycling through the city. If she rides 6 blocks north and 8 blocks east, how far is she on a direct line from her starting position?

- A. 7 blocks
- B. 10 blocks
- C. 12 blocks
- D. 14 blocks

The answer is B.

Polynomials

Round 1

Question 1

Which expression is a monomial?

- A. $7a+b$
- B. $-cd^2$
- C. $5(r+1)$
- D. $3x^{-4}$

The answer is B.

Question 2

Find the additive inverse of $c^2d - cd^2 + d^3$.

- A. $d^3 + cd^2 - c^2d$
- B. $-d^3 - cd^2 + c^2d$
- C. $c^2d + cd^2 - d^3$
- D. $-c^2d + cd^2 - d^3$

The answer is D.

Question 3

Which expression represents the area of the rectangle?

- A. $x^2 + 4x \text{ ft}^2$
- B. $x + 4 \text{ ft}^2$
- C. $x^2 + 4 \text{ ft}^2$
- D. $4x^2 \text{ ft}^2$

The answer is A.

Question 4

Which expression shows the FOIL method for multiplying the binomials $(x+5)$ and $(x-2)$.

- A. $x(x-2) + 5(x-2)$
- B. $x(x) + 5(x) - (5)(2)$
- C. $(x)(x) + (x)(-2) + (5)(x) + (5)(-2)$
- D. $x^2 - 10$

The answer is C.

Question 5

Which product does not contain an ab term?

- A. $(a+b)^2$
- B. $(a-b)^2$
- C. $(a+b)(a-b)$
- D. $a(a+b)$

The answer is C.

Round 2

Question 1

Find the degree of the polynomial $5r^2s^3 + 4rs^6 - t^5$.

- A. 5
- B. 6
- C. 7
- D. 8

The answer is C.

Question 2

Find the sum of $(4ab + 2bc - 3ac)$ and $(5bc + 3ac - 2ab)$.

- A. $9ab + 5bc - 5ac$
- B. $7bc - 2ab$
- C. $2bc + 5ac - 2ab$
- D. $2ab + 7bc$

The answer is D.

Question 3

Find the product of $(n+6)$ and $(n-4)$.

- A. $n^2 + 2n - 24$
- B. $n^2 - 2n - 24$
- C. $n^2 + 6n - 4$
- D. $n^2 - 2n + 2$

The answer is A.

Question 4

Find the product $(2s+3t)(2s-3t)$.

- A. $4s^2 - 9t^2$
- B. $4s^2 + 6st - 9t^2$
- C. $4s^2 - 6st + 9t^2$
- D. $4s^2 - 12st - 9t^2$

The answer is A.

Polynomials (continued)

Round 3

Question 1

The expression $\frac{1}{3}\pi r^2 h$ can be used to find the volume of a cone, where r is the radius and h is the height of the cone. Find the volume of a cone with a radius of 3 centimeters and a height of 9 centimeters to the nearest tenth.

- A. 9.4 cm³
- B. 28.3 cm³
- C. 84.8 cm³
- D. 254.5 cm³

The answer is C.

Question 2

The measure of the perimeter of triangle ABC is $10x + 3y$. Find the measure of the third side of the triangle.

- A. $x + 2y$
- B. $x + 4y$
- C. x
- D. $2x + y$

The answer is B.

Question 3

Find the area of the shaded region.

- A. $x^2 + 1$
- B. $x^2 + 3$
- C. $3x - x^2$
- D. $x^2 + 3x$

The answer is D.

Question 4

A square has a side measure of $2a$ units. If you increase the length by 3 units and decrease the width by 3 units, how will the area of the figure change?

- A. decrease 9 units²
- B. increase 9 units²
- C. decrease 6 units²
- D. remain the same

The answer is A.

Factors

Round 1

Question 1

Which of the following shows the prime factorization of 100?

- A. 1, 2, 4, 5, 10, 20, 25, 50, 100
- B. 2, 5, 10
- C. $4 \cdot 5 \cdot 5$
- D. $2 \cdot 2 \cdot 5 \cdot 5$

The answer is D.

Question 2

The product of the prime factors common to two or more integers is called the _____.

- A. greatest common factor
- B. least common factor
- C. greatest common product
- D. composite

The answer is A.

Question 3

To factor a trinomial such as $x^2 - 6x + 8$, you need to find two integers whose _____ is 8 and whose _____ is -6 .

- A. sum, product
- B. product, sum
- C. quotient, sum
- D. product, difference

The answer is B.

Question 4

Which model shows the correct factorization of $3x^2 + 13x + 12$?

- A. (figure)
- B. (figure)
- C. (figure)
- D. (figure)

The answer is C.

Question 5

Which of the following can be factored as the product of a sum and a difference of the same terms?

- A. $x^2 - 2x + 1$
- B. $x^2 + 6x + 9$
- C. $x^2 + 16$
- D. $4x^2 - 1$

The answer is D.

Round 2

Question 1

Find the greatest common factor of 12, 24, and 42.

- A. 3
- B. 4
- C. 6
- D. 12

The answer is C.

Question 2

Write $3x^3y + 9x^2y - 6y^2$ in factored form.

- A. $3xy(x^2 + 3x - 2y)$
- B. $3y(x^3 + 3x^2 - 2y)$
- C. $3y(x^2 - 1)(x + 2y)$
- D. $(3x^2 - 2y)(x + 3y)$

The answer is B.

Question 3

Factor $x^2 + 5x - 14$.

- A. $(x - 2)(x + 7)$
- B. $(x + 2)(x - 7)$
- C. $(x - 1)(x + 14)$
- D. $(x + 1)(x - 14)$

The answer is A.

Factors (continued)

Question 4

Find two binomials whose product is $4x^2 - 12x + 9$.

- A. $(2x + 3), (2x - 3)$
- B. $(2x + 3), (2x + 3)$
- C. $(2x - 3), (2x - 3)$
- D. prime polynomial

The answer is C.

Round 3

Question 1

Write an expression in factored form that represents the area of the shaded region.

- A. $2(3a + 4) m^2$
- B. $4(2a + 1) m^2$
- C. $6(a + 2) m^2$
- D. $8(a + 1) m^2$

The answer is D.

Question 2

In a certain type of plant, red flowers are a dominant trait over white flowers. Let R represent red flowers, and let r represent white flowers. What are the gene pairs for each parent plant according to the Punnett square below?

Rr	rr
Rr	rr

- A. Rr, rr
- B. Rr, Rr
- C. Rr, RR
- D. rr, rr

The answer is A.

Question 3

The volume of a rectangular crate is $2x^3 + 5x^2 + 3x$ cubic units. If x is an integer, which of the following is not a possible measure for one side of the crate?

- A. x
- B. $x + 2$
- C. $2x + 3$
- D. $x + 1$

The answer is B.

Question 4

The measure of the area of a square is $x^2 + 12x + 36$. Find the measure of the perimeter.

- A. $x + 6$
- B. $x + 12$
- C. $4x + 24$
- D. $4x + 36$

The answer is C.

Quadratic and Exponential Functions

Round 1

Question 1

In an equation of the form $ax^2 + bx + c = 0$, suppose $a = -1, b = 6$, and $c = 9$. In which direction will the parabola open?

- A. upward
- B. downward
- C. to the left
- D. to the right

The answer is B.

Question 2

How does the graph of $y = (x - 3)^2 + 1$ change from the parent graph of $y = x^2$?

- A. right 3 units, up 1 unit
- B. left 3 units, up 1 unit
- C. left 1 unit, down 3 units
- D. left 1 unit, down 3 units

The answer is A.

Question 3

The function $f(x) = -x^2 + 2x + 3$ is graphed below. Where are the zeros of the function located?

- A. $(1, 4)$
- B. $y = 3$
- C. $x = -1$ and $x = 3$
- D. $x = 1$ and $x = -3$

The answer is C.

Question 4

Which equation represents the Quadratic Formula, where $a \neq 0$?

- A. $x = -b \pm \frac{\sqrt{b^2 - 4ac}}{2a}$
- B. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- C. $x = \frac{b^2 \pm \sqrt{-b - 4ac}}{2a}$
- D. $x = b^2 \pm \frac{\sqrt{-b - 4ac}}{2a}$

The answer is B.

Question 5

What is the y -intercept of the exponential function $y = 5^x - 4$?

- A. $y = 1$
- B. $y = 5$
- C. $y = -4$
- D. $y = -3$

The answer is D.

Round 2

Question 1

What is the equation of the axis of symmetry for the graph of $y = 2x^2 + 8x - 11$?

- A. $y = 4$
- B. $x = -4$
- C. $y = 2$
- D. $x = -2$

The answer is D.

Question 2

Solve $4m^2 + 12m = 0$.

- A. $m = 0$ or $m = 3$
- B. $m = 0$ or $m = -3$
- C. $m = 3$ or $m = -3$
- D. $m = 0$ or $m = -4$

The answer is B.

Question 3

Find the value of c that makes $r^2 + 18r + c$ a perfect square.

- A. 9
- B. 36
- C. 81
- D. 324

The answer is C.

Question 4

Use the Quadratic Formula to solve $x^2 + 2x - 2 = 0$.

- A. $-1 \pm \sqrt{3}$
- B. $-1 \pm 2\sqrt{3}$
- C. $-2 \pm 2\sqrt{3}$
- D. no real solutions

The answer is A.

Quadratic and Exponential Functions (continued)

Round 3

Question 1

In a computer game, a space shuttle has the shape of a parabola given by the equation $y = 0.5x^2$. It is programmed to move from the point $(0, 0)$ to the point $(4, 6)$ before leaving the screen. Which equation describes its final position?

- A. $y = 0.5(x + 4)^2 + 6$
- B. $y = 0.5(x + 6)^2 + 4$
- C. $y = 0.5(x - 4)^2 + 6$
- D. $y = 0.5(x - 6)^2 + 4$

The answer is C.

Question 2

Mason launches a new rocket whose path can be modeled by the quadratic function $h(t) = -16t^2 + 80t$, where $h(t)$ is the height in feet at any time t in seconds. After how many seconds will the rocket hit the ground?

- A. 4 s
- B. 5 s
- C. 6 s
- D. 7 s

The answer is B.

Question 3

The Martinez family is building a pool in their back yard. They want the maximum length of the pool to be 4 feet less than twice the width. Find the width of the largest possible pool, if the area is to be 300 square feet.

- A. 11.3 ft
- B. 14.2 ft
- C. 12.4 ft
- D. 13.3 ft

The answer is D.

Question 4

Jill opened a savings account with \$400. The account pays an annual interest rate of 3%. How much money will she have after 6 years?

- A. \$477.62
- B. \$472.00
- C. \$474.18
- D. \$470.86

The answer is A.

Inequalities

Round 1

Question 1

A solution written in the form $\{t \mid t < -3 \text{ or } t > 5\}$ is written in _____.

- A. standard notation
- B. set-builder notation
- C. compound notation
- D. two variables

The answer is B.

Question 2

Suppose $a < b$. All of the following are true, except _____.

- A. $b > a$
- B. $a - c < b - c$
- C. $ac < bc, c > 0$
- D. $\frac{a}{c} < \frac{b}{c}, c < 0$

The answer is D.

Question 3

The solution of a compound inequality using *and* can be found by the _____ of the graphs of the two inequalities.

- A. intersection
- B. union
- C. boundaries
- D. half planes

The answer is A.

Question 4

In order to solve $|y - 2| < 5$, which two inequalities must you solve?

- A. $y - 2 < 5$ and $y - 2 > 5$
- B. $y - 2 < 5$ and $y + 2 > -5$
- C. $y - 2 < 5$ and $-y + 2 < 5$
- D. $y - 2 < 5$ and $-y + 2 > -5$

The answer is C.

Question 5

The solution for an inequality in two variables is represented by an area on the coordinate plane called _____.

- A. a boundary
- B. a half-plane
- C. an intersection
- D. a union

The answer is B.

Round 2

Question 1

Which graph shows all the values for a number that is at most 14?

- A. (graph)
- B. (graph)
- C. (graph)
- D. (graph)

The answer is B.

Question 2

Solve $6 > -\frac{3}{4}w$.

- A. $w = -8$
- B. $\{w \mid w < 8\}$
- C. $\{w \mid w < 12\}$
- D. $\{w \mid w > -8\}$

The answer is D.

Question 3

Solve $4y - 8 \geq 13 - 3y$.

- A. $\{y \mid y \geq 3\}$
- B. $\{y \mid y \leq 5\}$
- C. $\{y \mid y \leq -3\}$
- D. $\{y \mid y \geq 21\}$

The answer is A.

Question 4

Which graph represents the solution for $-1 \leq x - 5 \leq 3$?

- A. (graph)
- B. (graph)
- C. (graph)
- D. (graph)

The answer is B.

Inequalities (continued)

Round 3

Question 1

Tracy wants to drink at least 64 ounces of water every day. Suppose she drinks 16 ounces of water in the morning and 30 ounces in the afternoon. Which solution set shows the number of ounces w she still needs to drink in order to meet her goal?

- A. $\{w \mid w > 17\}$
 B. $\{w \mid w > 18\}$
 C. $\{w \mid w \geq 18\}$
 D. $\{w \mid w \leq 19\}$

The answer is C.

Question 2

During a gymnastics competition, Obi is competing in four events. In his first 3 events, he scored 9.0, 8.8, and 9.2. He needs an average score greater than 9.1 to win first place. What is the *lowest* score Obi can receive and still win the competition?

- A. 9.2
 B. 9.3
 C. 9.4
 D. 9.5

The answer is D.

Question 3

The recipe for a chocolate cake states to bake the cake at 350° for 20 minutes. However, due to varying oven temperatures, the baking time t may vary up to 3 minutes. What is the range of possible baking times for the chocolate cake?

- A. $\{t \mid 16 \leq t \leq 22\}$
 B. $\{t \mid 17 \leq t \leq 20\}$
 C. $\{t \mid 20 \leq t \leq 23\}$
 D. $\{t \mid 17 \leq t \leq 23\}$

The answer is D.

Question 4

Coach O'Brien wants to take his soccer team out for pizza after the last game of the season. A large pizza costs \$12.00 and a pitcher of soft drinks costs \$4.00. He wants to spend less than \$80.00. What is one solution for the number of each item he can purchase?

- A. 5 pizzas, 6 pitchers
 B. 5 pizzas, 4 pitchers
 C. 6 pizzas, 3 pitchers
 D. 7 pizzas, 2 pitchers

The answer is B.

Systems of Equations and Inequalities

Round 1

Question 1

What type of system of equations is graphed below?

- A. consistent and independent
 B. consistent and dependent
 C. inconsistent
 D. none of the above

The answer is C.

Question 2

Which equation below correctly demonstrates the substitution method for solving the system of equations $y = x + 3$ and

$$2x + 3y = 24?$$

- A. $2x + 3(x + 3) = 24$
 B. $2x + (3x + 3) = 24$
 C. $(y - 3) + 3y = 24$
 D. $x - y + 3 = 2x + 3y - 24$

The answer is A.

Question 3

What steps should you take to eliminate the variable x in the system of equations $6x + 2y = 10$ and $-3x + 4y = 5$?

- A. Multiply the second equation by -2 , then add.
 B. Multiply the second equation by 2 , then add.
 C. Multiply the first equation by $-\frac{1}{2}$, then add.
 D. Multiply the first equation by $\frac{1}{2}$, then subtract.

The answer is B.

Question 4

State the solution of the system of equations graphed below.

- A. (2, 0)
 B. (-2, 0) and (2, 0)
 C. (-1, -3) and (2, 0)
 D. (0, -4) and (0, -2)

The answer is C.

Question 5

Which region on the graph below satisfies $y \leq -x - 2$ and $y \geq 2x + 1$?

- A. blue region
 B. pink region
 C. yellow region
 D. green region

The answer is D.

Round 2

Question 1

Determine how many solutions exist for the system $4x + 2y = 10$ and $2x + y = 5$?

- A. one solution
 B. two solutions
 C. infinitely many solutions
 D. no solutions

The answer is C.

Question 2

Use substitution to solve $y = 3x + 2$ and $7x - 2y = -3$.

- A. (-7, -19)
 B. (1, 5)
 C. (-1, -1)
 D. (3, 11)

The answer is B.

Question 3

What is the solution of the system $3x - 5y = -4$ and $4y - 3x = 8$?

- A. (4, -8)
 B. (-4, -8)
 C. (8, 4)
 D. (-8, -4)

The answer is D.

Systems of Equations and Inequalities (continued)

Question 4

Find the solution of the quadratic-linear system $x = -3$ and $y = -x^2 - 2x + 1$.

- A. $(-3, -2)$
- B. $(-3, 16)$
- C. $(-3, 4)$
- D. $(-3, -14)$

The answer is A.

Round 3

Question 1

The graphs of the equations $y = 2x + 1$, $4x + y = 7$, and $2y = x - 4$ contain the sides of a triangle. Find the coordinates of the vertices of the triangle.

- A. $(1, 3)$, $(2, -1)$, $(-2, -3)$
- B. $(3, 1)$, $(2, -1)$, $(2, 3)$
- C. $(1, 3)$, $(2, -1)$, $(3, 5)$
- D. $(-1, -1)$, $(2, -1)$, $(2, -3)$

The answer is A.

Question 2

The difference between two numbers is 18. The greater number is 6 more than twice the other number. Find the numbers.

- A. 24 and 42
- B. 12 and 30
- C. 4 and 22
- D. -8 and 10

The answer is B.

Question 3

At Magic Merlin's game center, Jose played 2 games of laser tag and 3 rounds of putt-putt golf for \$17.00. Ryan played 3 games of laser tag and 2 rounds of putt-putt golf for \$18.00. How much does each activity cost?

- A. laser tag: \$2.50, putt-putt golf: \$4.00
- B. laser tag: \$3.00, putt-putt golf: \$3.00
- C. laser tag: \$3.00, putt-putt golf: \$4.00
- D. laser tag: \$4.00, putt-putt golf: \$3.00

The answer is D.

Question 4

Yolanda works at the soccer stadium during the summer. She earns a \$1.00 commission for each souvenir cup she sells and a \$4.00 commission for each shirt she sells. Last Saturday she sold fewer than 16 items and earned at least \$28.00 in commissions. Which of the following is *not* a possible combination of her sales?

- A. 4 cups, 6 shirts
- B. 10 cups, 5 shirts
- C. 12 cups, 3 shirts
- D. 8 cups, 7 shirts

The answer is C.

Radical Expressions

Round 1

Question 1

Name the set or sets of numbers to which $\sqrt{0.25}$ belongs. Let N = natural numbers, W = whole numbers, Z = integers, Q = rational numbers, and I = irrational numbers.

- A. I
- B. Q, Z
- C. Z, W, N
- D. Q

The answer is D.

Question 2

The distance d between any two points with coordinates (x_1, y_1) and (x_2, y_2) is given by which formula?

- A. $d = \sqrt{(x_2 - x_1)^2 - (y_2 - y_1)^2}$
- B. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
- C. $d = \sqrt{(x_2 - x_1) + (y_2 - y_1)}$
- D. $d = (x_2 - x_1)^2 + (y_2 - y_1)^2$

The answer is B.

Question 3

To simplify $\frac{5}{2 + \sqrt{7}}$, multiply both the numerator and denominator by _____.

- A. $2 - \sqrt{7}$
- B. $2 + \sqrt{7}$
- C. $\sqrt{7}$
- D. $-\sqrt{7}$

The answer is A.

Question 4

Which expression is *not* in simplest form?

- A. $\sqrt{10} - 5\sqrt{2}$
- B. $5\sqrt{7} + 3\sqrt{8}$
- C. $\sqrt{13} - \sqrt{11}$
- D. $4\sqrt{6} + 7\sqrt{3}$

The answer is B.

Question 5

What is the first step in solving the equation $\sqrt{w - 8} + 3 = 15$?

- A. Square each side.
- B. Subtract 15 from each side.
- C. Subtract 3 from each side.
- D. Add 8 to each side.

The answer is C.

Round 2

Question 1

Find the distance between $A(4, 1)$ and $B(-2, 5)$.

- A. $\sqrt{18}$
- B. $\sqrt{20}$
- C. $\sqrt{40}$
- D. $\sqrt{52}$

The answer is D.

Radical Expressions (continued)

Question 2

Simplify $\frac{\sqrt{5}}{\sqrt{40}}$.

- A. $\frac{1}{8}$
- B. $\frac{\sqrt{8}}{8}$
- C. $\frac{\sqrt{2}}{4}$
- D. $\frac{\sqrt{2}}{2}$

The answer is C.

Question 3

Simplify $6\sqrt{12} - 3\sqrt{3}$.

- A. $9\sqrt{3}$
- B. $-6\sqrt{12}$
- C. 9
- D. $3\sqrt{3}$

The answer is A.

Question 4

Solve $\sqrt{r+8} = r+2$.

- A. -4, 1
- B. 1
- C. -4
- D. 4, -1

The answer is B.

Round 3

Question 1

To estimate the amount of time t in hours that a thunderstorm will last, meteorologists use the

formula $t = \sqrt{\frac{d^3}{216}}$, where d is

the diameter of the storm in miles. Estimate how long a thunderstorm will last if its diameter is 7 miles.

- A. 0.4 h
- B. 1.3 h
- C. 1.6 h
- D. 2.0 h

The answer is B.

Question 2

An air traffic controller is monitoring the flight paths of two charter airplanes. The position of the airplanes are plotted on a coordinate grid measured in miles. One plane has coordinates (12, 160), and the other plane has coordinates (-8, 135). What is the approximate distance between the two planes?

- A. 15 mi
- B. 23 mi
- C. 32 mi
- D. 45 mi

The answer is C.

Question 3

Investigators can use the formula $s = 2\sqrt{5\ell}$ to estimate the speed s of a car in miles per hour by measuring the length ℓ in feet of the skid marks. After an accident, investigators measured skid marks 160 feet long. How fast was the car traveling?

- A. $40\sqrt{5}$ mph
- B. $80\sqrt{5}$ mph
- C. $20\sqrt{2}$ mph
- D. $40\sqrt{2}$ mph

The answer is D.

Question 4

A triangle has sides with lengths $6\sqrt{3}$, $3\sqrt{7}$, and $7\sqrt{3}$ units. What is the perimeter of the triangle?

- A. $13\sqrt{6} + 3\sqrt{7}$ units
- B. $13\sqrt{3} + 3\sqrt{7}$ units
- C. $9\sqrt{3} + 3\sqrt{7}$ units
- D. $16\sqrt{13}$ units

The answer is B.

Rational Expressions and Equations

Round 1

Question 1

An excluded value for a rational expression is any value that results in _____.

- A. a numerator of zero
- B. a denominator of zero
- C. an irrational number
- D. a prime polynomial

The answer is B.

Question 2

To simplify a rational expression, divide the numerator and the denominator by their _____.

- A. reciprocals
- B. least common multiple
- C. greatest common factor
- D. least common denominator

The answer is C.

Question 3

To divide $\frac{5}{x}$ by $\frac{3}{x^2}$,

- A. multiply the numerators and multiply the denominators.
- B. multiply $\frac{3}{x^2}$ by the reciprocal of $\frac{5}{x}$.
- C. multiply $\frac{5}{x}$ by the reciprocal of $\frac{3}{x^2}$.
- D. find the cross products.

The answer is C.

Question 4

In the expression

$$(3x^2 + 8x + 5) \div (x - 2) =$$

$3x + 2 + \frac{1}{x-2}$, the remainder is _____.

- A. 1
- B. 2
- C. $2 + \frac{1}{x-2}$
- D. $x - 2$

The answer is A.

Question 5

To find the _____ of two or more numbers, find the prime factorization of each number and use each factor the greatest number of times it appears in each factorization.

- A. greatest common factor
- B. least common multiple
- C. greatest common denominator
- D. solution set

The answer is B.

Round 2

Question 1

Simplify $\frac{3x - 18}{x^2 - 8x + 12}$.

- A. $\frac{3}{x-6}$
- B. $\frac{x-6}{x^2-x+2}$
- C. $\frac{3}{x+2}$
- D. $\frac{3}{x-2}$

The answer is D.

Rational Expressions and Equations (continued)

Question 2

Find $\frac{6x^3}{y^2} \div \frac{3x}{2y}$.

- A. $\frac{4x^2}{y}$
- B. $\frac{y}{4x^2}$
- C. $\frac{9x^4}{y^3}$
- D. $\frac{2x^2}{y}$

The answer is A.

Question 3

Find $\frac{2t-4}{t-1} + \frac{3t-1}{t-1}$.

Write in simplest form.

- A. $\frac{5t-1}{t-1}$
- B. $\frac{5}{2}$
- C. 5
- D. $\frac{5}{t-1}$

The answer is C.

Question 4

Solve $\frac{3}{4x} - \frac{1}{2x} = \frac{1}{12}$.

- A. 12
- B. 6
- C. 4
- D. 3

The answer is D.

Round 3

Question 1

Malena is running in a cross-country race. The total distance d of the race can be represented by the expression $2x^2 + 9x + 4$. If she runs at a steady pace r represented by $x + 4$, find the expression that represents the time t that it will take her to finish the race. (Use the formula distance = rate · time.)

- A. $2x + 1$ units
- B. $x + 4$ units
- C. $2x$ units
- D. $x + 1$ units

The answer is A.

Question 2

Find the perimeter of rectangle $ABCD$.

- A. 4 cm
- B. 6 cm
- C. 8 cm
- D. 10 cm

The answer is C.

Question 3

Mr. Sanchez is having a picnic for his friends. While shopping, he finds that hot dogs are sold in packages of 8, hot dog buns are sold in packages of 12, and cans of soda are sold in packages of 6. If he buys the least number of packages so that he has an equal amount of each item, how many hot dogs, hot dog buns, and cans of soda will he have?

- A. 12
- B. 24
- C. 36
- D. 48

The answer is B.

Rational Expressions and Equations (continued)

Question 4

In Titusville, Florida, a large airboat carries passengers up and down the St. Johns River to look for alligators. The airboat travels an average speed of 6 miles per hour. At this rate a 10-mile trip with the wind takes the same amount of time as a 6-mile trip against the wind. What is the rate of the wind? (Use the formula distance = rate · time.)

- A. 2 mph
- B. 2.5 mph
- C. 1 mph
- D. 1.5 mph

The answer is D.

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Scoring Sheet

Chapter _____ Names _____
Date _____
Period _____

Round 1 (Each correct answer is worth 5 points.)

Question 1 _____
Question 2 _____
Question 3 _____
Question 4 _____
Question 5 _____
Total Points _____

Round 2 (Each correct answer is worth 10 points.)

Question 1 _____
Question 2 _____
Question 3 _____
Question 4 _____
Total Points _____

Round 3 (Each correct answer is worth 15 points.)

Question 1 _____
Question 2 _____
Question 3 _____
Question 4 _____
Total Points _____

Total Points from all three rounds _____

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