Holt Mathematics

CRCT Prep Workbook

for Grade 8

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To the Student

This book is designed to help you practice for the CRCT in Mathematics. The book contains practice questions arranged by topic, and practice tests.

The practice questions by topic are organized by content strands. There are five strands:

- Numbers and Operations
- Measurement
- Geometry
- Algebra
- Data Analysis and Probability

Within each strand, there are several 3-page worksheets on each topic. Each question, like the state test, is multiple choice.

At the back of the book, the practice tests contain mixed practice on all strands. The questions are also in multiple-choice format.

When you take the CRCT, you will have a maximum of 70 minutes to complete each section. This is an average of about 2 minutes per question. It is a good idea to time yourself as you work some of the practice questions in order to get used to working in a timed situation.

In addition to the practice in this book, your textbook has many opportunities to practice questions in the format of the CRCT, as well as practice tests and test-taking strategies.

Standardized Test-Taking Strategies for Math

Test Practice

Numbers and Operations

Geometry

Algebra

Data and Probability

CRCT in Brief	
Question format	**Multiple choice**
Number of questions	The test will contain: • 50 reading questions • 60 English/Language Arts questions • **70 Mathematics questions** • 70 Science questions • 70 Social Studies questions
Time allowed	The test will be administered over five days, and you will be tested on one subject per day. There will be two sections per subject that each take approximately 45–60 minutes, with about a 10-minute break between sections.
Materials needed	Bring two sharpened No. 2 pencils with erasers. Scratch paper will be provided. No calculators are allowed during any portion of the test.
Links	www.doe.k12.ga.us www.georgiastandards.org

Standardized Test-Taking Strategies for Math

Standardized tests, such as the CRCT, are designed in order for you to demonstrate the content and skills you have learned. It is important to keep in mind that, in most cases, the best way to prepare for these tests is to pay close attention in class and take every opportunity to improve your mathematical, reading, and writing skills.

Tips For Taking The Test

Throughout the year

– Keep up with your homework. Homework is important practice that will help you learn the skills you need for the test. Practice will also help you answer questions more quickly, leaving more time for the difficult questions.

– Review your notes, homework, and tests on a regular basis to make sure that you maintain the skills you learned earlier in the year.

– Use flashcards to learn important formulas and vocabulary words. If you can, memorize formulas to save time on the test.

– Familiarize yourself with the format and content of the test.

– Make a timeline for reviewing materials in the time leading up to the test. Do not try to “cram” the night before the test.

– Practice without your calculator, because you will not be allowed to use a calculator on the test.

Before the test

– Be sure you are well rested.

– Eat a good breakfast.

– Be on time, and be sure that you have the necessary materials.

– Be sure to bring any assistive device that you need, such as glasses or a hearing aid.

– Try not to miss class the day before the test. Your teacher may be reviewing important content.

During the Test

– Listen to the instructions of the teacher. It's easy to miss important points that can affect your score.

– Read the directions carefully. If you do not understand a direction, raise your hand and ask for clarification immediately.

– Use your scratch paper. You are more likely to make a mistake when doing a problem in your head. You can also use your written work to help check your answer. Circle the answer and write the problem number next to your work so you can find it while you are reviewing your test.

– Read the entire question, including all answer choices, and think about your answer before you make any marks on the answer sheet.

– Fill in the circle for each answer carefully and completely. Erase any stray marks on the page. If you change an answer choice, be sure to erase completely and carefully so that you do not tear a hole in the answer sheet.

– Make sure the number on the answer document matches the question number in the test booklet.

– Don't spend too much time on any one question. If you cannot answer a question right away, fill in your best choice. If you have time at the end of the test, return to any questions you are unsure of.

– If questions contain negative wording such as NOT, read them carefully and be alert for the use of double negatives within a sentence.

– Understand the format of the test so that you can gauge your time according to what section of the test you are taking.

– If you finish early, review the test and make sure the answer sheet is filled out correctly. Remember, your first answer is usually the correct one, so don't change an answer unless you can convince yourself that your original choice is wrong. Try solving the problem in a different way to see if you get the same answer.

– DON'T STRESS! Just remember what you have learned in class, and you should do well.

Tips for Answering Multiple-Choice Questions

– If there is a figure accompanying the question, review the figure carefully. Read the labels and make sure you understand what the figure represents. Remember, a figure may not be drawn to scale.

– If there is not a figure, it may be helpful to draw one on your scratch paper using the information provided.

– Read the multiple-choice question first for its general intent and then reread it carefully, looking for words that give clues or can limit possible answers to the question.

– If possible, work the question before looking at the answer choices. Then look for your answer among the given choices. If your answer is not one of the choices, read the question again. Be sure that you understand the problem. Remember, common errors are often used to generate incorrect answer choices. Be sure you work carefully.

– Make sure you answer the question being asked. A partial answer to the question may be used as an incorrect answer choice.

– Always read **all** of the possible answer choices—even if the first one seems like the correct answer. There may be a better choice farther down in the list.

– Think of what you already know about the math topic involved and use that information to help eliminate answer choices. You can also use estimation to eliminate answer choices.

– If you cannot work the question, you may be able to substitute the answer choices back into the question to find the correct choice. Start with the middle value. If the result is too large, then substitute a smaller value. If the result is too small, then substitute a larger value.

– Never leave a question blank. There is no penalty for guessing, so always choose an answer.

– When you are finished, reread the question and the selected answer to be sure that you made the best choice and that you marked it correctly on the answer sheet.

Strategies for Success

There are various strategies you can employ ahead of time to help you feel more confident about answering questions on math standardized tests. Here are a few suggestions:

1. VISUALS

Note the labels on the charts and graphs. For example, a scale on one axis may provide a valuable clue. Read all graphs twice.

When reading diagrams, read all labels and tick marks carefully, and read diagrams twice, also.

Label the figure with any information stated in the problem that is not in the diagram. Use the properties of the figure, for example, if it is stated that a figure is a square, you can label all the sides with the same length.

If a figure is not provided, it may be helpful to draw one. Be sure that you do not assume any information that is not included in the problem. Remember, the figure does not have to look perfect. It is only to help you understand the relationships in the problem.

2. CONCEPTS

When answering questions about math concepts, don't let a hard question stump you. You can always work with what you do know. It's possible to answer a question when you know only a part of the concept being tested.

Another strategy to help you on difficult questions is to draw or sketch out the question's concept. Often you can understand how to answer a question by listing what you know, sketching the process, and then identifying what you are supposed to solve.

If you do not understand a problem on the test, try to relate it to a problem you can solve. For example, you can substitute simpler numbers into a problem and figure out how to solve it. Then try again with the original values in the problem.

3. MATH SKILLS

To help you on the math sections of the tests, practice the skills as you are reading and discussing your textbook. For example, you could put the steps to a process in order in your mind. Also, sequencing a process can become a game you play with a friend who also has to take the test. Always ask yourself what the most important points are when studying sections. Some of the more common skills for studying math are

- **Analyzing Information**—the process of breaking something down into its parts and examining the relationships between them. Analyzing enables you to better understand the whole.

- **Sequencing**—the process of placing the steps in a process in order to better understand the steps and the process as a whole. When you analyze the sequence, you are determining what happens first, second, and so on.

- **Categorizing**—the process by which you group things together by the characteristics they have in common. Categorizing helps you to make comparisons and see differences among things.

- **Identifying Cause and Effect**—interpreting the relationships between events. A *cause* makes something happen. An *effect* is what happens as a result of the cause.

- **Comparing and Contrasting**—the process of examining situations or ideas, etc., for their similarities and differences.

- **Summarizing**—the process of taking a large amount of information and boiling it down into a short clear statement. To *summarize* a problem, you must analyze the problem to find the most important points and the supporting information.

- **Paraphrasing**—a paraphrase is a restatement of someone's ideas or words. A paraphrase is usually about as long as the original; the ideas are just expressed in simpler terms. A paraphrase question might be stated like this, "According to the passage, which of these statements is accurate?"

- **Visualizing**—visualizing helps you see processes and procedures in your mind's eye. Visualizing will help you be successful on a variety of math questions you could encounter on tests.

4. READING MATH

First, remember that what you have learned about math can help you in answering comprehension questions on tests. Also, though, remember the following points:

- Read the problem as if you were not taking a test.
- Look at the big picture. Ask yourself questions like, *What is the question being asked? What do the diagrams or graphs tell me?*
- Read the problem quickly first. This technique will help you know what information to look for as you read.
- Reread the problem and underline information related to the questions.
- Go back to the question and try to answer it in your mind before looking at the answers.
- Read all the answer choices and eliminate the ones that are obviously incorrect.
- If you can eliminate certain answers, getting the choice down to two, go ahead and pick one of the two responses. That's an educated guess, and you are most likely better off making the choice.

Analyzing Word Problems

Many students who are comfortable with basic skill problems are still stumped by word problems. These steps will help you work through word problems on standardized tests.

Step 1 Understand the problem

Read the problem carefully and make sure you understand what is being asked. You may wish to rewrite the question in your own words.

List the given information or circle it in your test booklet, if you are allowed to write in it. Cross out any unnecessary information.

Step 2 Make a plan

Think about similar problems you have seen in the past, and how you solved them.

Determine a strategy or strategies that you will use to solve the problem, such as drawing a diagram, working backward, finding a pattern, or other problem-solving strategies.

Step 3 Solve the problem

Solve the problem according to your plan. If the strategy you chose is not working, go back and revise. Write out all the steps on your scratch paper to avoid making careless mistakes.

Step 4 Look Back

Make sure you answered the question that was asked.

Check your answer in the words of the problem to make sure your answer is reasonable.

Make sure your answer is in the correct place on the answer document.

Learning Math Vocabulary

Learning vocabulary is important in order to be successful on standardized tests. During the test, you will not be able to ask the meaning of a word, and you may not be able to answer a question that contains a word you do not know.

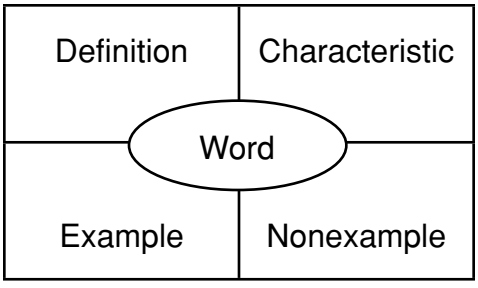
Spend time learning vocabulary throughout the year so that you are prepared for your test when the time comes.

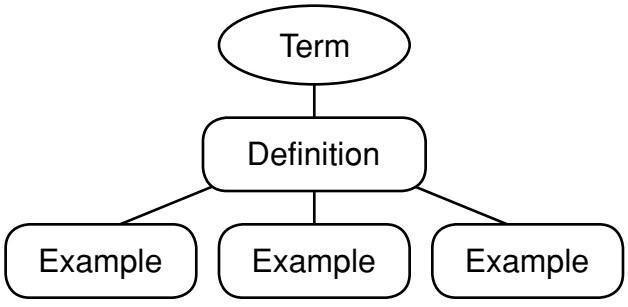
Identify important terms:

As you learn new concepts, keep a list of unfamiliar terms. Also, review the standards for your grade and write down any words you do not know.

Learn the meaning of each term:

Look up the meaning of each new word in your glossary. It may help to use the Vocabulary Questioning Strategies shown on the next page. Another way to learn vocabulary is by using graphic organizers like the ones shown below.





Memory aids:

Your lists of words may be used as memory aids, or it may be helpful to create flashcards with the term on the front and the definition and/or examples on the back. Review the flashcards frequently. As you learn the words, you may remove the flashcards from your stack, but keep them for occasional review before your exam.

Use context clues:

If you do encounter an unfamiliar word on your test, don't panic. Try to relate it to a familiar word or use context clues to determine the meaning of the word in the problem.

Vocabulary Questioning Strategies

Vocabulary term _____

Before you look up the word, predict its meaning. Some clues you can use are as follows:

- the way you have seen or heard the word used
- the everyday meaning of the word
- the meaning of the root word, prefix, or suffix

I think this word means _____

_____

Look up the word in your glossary, and write its meaning here.

_____

_____

Write a question in your own words that contains the vocabulary term, and write the answer.

Question: _____

_____

Answer: _____

_____

Think of a strategy to remember the meaning of the word. Some possible strategies are as follows: draw a picture that represents the word, write a poem or song about the word, or relate the math meaning to the everyday meaning of the word. Write your strategy here.

_____

_____

Math Anxiety

Math anxiety is a term used to describe fear and negative attitudes about working with numbers and taking math tests. Here are some suggestions to help alleviate math anxiety.

– Motivate yourself to learn math. Math class can be challenging, but it also has many rewards. Mathematics is a useful tool with a wide range of applications in nearly every field, as well as everyday life.

– Talk to your teacher about your anxiety. He or she may have suggestions or be able to help in other ways.

– Go to class every day! Research shows a strong correlation between attendance and math grades. Attending class should be a high priority.

– Make the most of your class time. Warm up for class by looking over the previous day's notes and homework. Write out any questions you have. If possible, read ahead in the text. Be alert and attentive. You won't get much benefit out of sleeping through class.

– Ask questions in class. If you just decide you can figure something out later, you may not understand the rest of the lecture, and fall further behind. Most often others will have the same question.

– Develop a note-taking system. If you are too busy writing every word the teacher says, you will not have time to comprehend much. Use abbreviations and shorthand during class, and re-work or re-write your notes soon after class to make sure you understand what was said.

– Do your homework as soon after class as possible. The longer you wait, the more you may forget. If you get behind, you will have a harder time understanding further material, and you may become frustrated.

– Find a study partner or group to work with. This will make math a more comfortable activity, maybe even fun!

– Find a place you are comfortable studying, where there are few distractions. If you have a certain place set aside for studying, you will find it easier to get into the right frame of mind to study there.

– Take breaks while studying. The mind works best in short periods of time, between 20 and 45 minutes. When you can't concentrate, take 5–10 minutes to walk around, stretch, or have a snack, then return to your work refreshed.

– Get help when you are stuck. Don't agonize for hours, ask your teacher, a tutor, a classmate, or a friend for help.

– Make a vocabulary list and a formula list. Use flashcards to memorize definitions and formulas. Remember, math is like a foreign language. You can't speak it if you don't know the words.

– To solidify your understanding, after you have done your homework, try the following:

  Check your answers against the answers in the back of the book.

  Do some extra problems from the book in areas you had trouble.

  Make up some practice problems and work them.

  Write out a general step-by-step procedure for solving each type of problem.

– Learn relaxation techniques and practice them before the test so that if you get frustrated you will be able to relax during the test.

– Learn more about math anxiety in books or on the Internet. Many people have math anxiety, and there are a lot of resources out there.

Troubleshooting

Taking practice tests can be helpful, but you will get more out of them if you analyze the tests after they have been scored to see where you made mistakes. Look at the table below to see some common types of mistakes. Use the blank rows to add in your own types with how you can avoid them in the future.

Type of mistake	Ways to avoid it in the future
I was unfamiliar with the concept involved in the question.	Review the standards to make sure I know what will be covered on the test.
I knew how to do the problem, but I couldn't remember.	Maintain skills throughout the year. Review old tests and homework to keep old topics fresh.
I misread the problem.	Read the problem carefully, and check my answer against the words of the problem to make sure the answer makes sense.
I did not know the meaning of a word in the problem.	Make lists of vocabulary terms and use vocabulary strategies to learn their meanings.
I did not transfer the answer to the answer sheet correctly.	Check frequently that the answers are in the right place. Circle the answer in the answer booklet or on scratch paper so I can go back and check it.

Name_____ Date _____ Class_____

NUMBERS AND OPERATIONS

Classify Real Numbers

M8N1.h Distinguish between rational and irrational numbers.

Select the best answer for each question.

1. π is which type of number?

A natural
B integer
C rational
D irrational

2. Which type of number is $\frac{8}{9}$?

A rational
B real
C both rational and real
D neither rational nor real

3. Adding a positive even integer and a positive odd integer will result in which kind of sum?

A always a positive odd integer
B usually an odd integer
C always a positive even integer
D usually an even integer

4. If x is any real number, then which statement must be true?

A $x^2 > x$
B $x^3 > x$
C $x^3 > x^2$
D no such relationship can be determined

5. Which is a real number between $12\frac{1}{8}$ and $12\frac{1}{4}$?

A $12\frac{1}{16}$
B $12\frac{1}{2}$
C $12\frac{1}{5}$
D $12\frac{5}{9}$

6. Which is NOT a real number?

A $\sqrt{-17}$
B $\sqrt{-14}$
C $\frac{7}{0}$
D none are real numbers

7. Which real number is NOT rational?

A -3
B 0.3
C $\sqrt{3}$
D 3

8. Which type of number is $\sqrt{20}$?

A rational and real
B not real
C rational
D irrational and real

Name_____ Date _____ Class _____

9. Which real number is between 20.1 and $20\frac{1}{8}$?

A $\sqrt{405}$

B $12\frac{1}{4}$

C 20.2

D $12\frac{1}{2}$

10. The real number $42\frac{1}{3}$ is which type of number?

A natural

B irrational

C rational

D whole

11. For a number to be irrational it must

A be a perfect square.

B be a negative integer.

C not contain terminating or repeating decimals.

D not be a whole number.

12. $\sqrt{152}$ is between which 2 integers?

A 11 and 12

B 12 and 13

C 13 and 14

D 14 and 15

13. Which of the following numbers is rational?

A $\frac{1}{\sqrt{2}}$

B $\sqrt{3}$

C $\sqrt{5}$

D $\frac{1}{17}$

14. What is the smallest number that is a sum of two different natural numbers?

A 0

B 1

C 3

D negative infinity

15. Which is a real number between $24\frac{5}{8}$ and $24\frac{2}{3}$?

A $24\frac{1}{4}$

B $24\frac{2}{5}$

C $24\frac{31}{48}$

D $24\frac{15}{16}$

16. Multiplying a positive even integer and a negative odd integer will result in which kind of product?

A a negative odd integer

B a negative even integer

C a positive odd integer

D a positive even integer

17. Which real number is NOT rational?

C $\frac{1}{\sqrt{7}}$

B $\frac{1}{3}$

A $\frac{1}{2}$

D $\frac{1}{\sqrt{4}}$

Name_____ Date _____ Class _____

18. What would have to be true about a and b if $\frac{a}{b}$ is irrational?

A a and b must both be irrational

B a and b are both rational

C either a or b must be irrational

D none of the above

19. Adding a negative odd integer and a negative odd integer will result in which kind of sum?

A negative even integer

B negative odd integer

C positive even integer

D positive odd integer

20. Which real number is between π and $\sqrt{10}$?

A $3\frac{2}{21}$

B $3\frac{5}{42}$

C 3.15

D $3\frac{1}{6}$

21. Multiplying two positive integers will result in which kind of product?

A natural number

B whole number

C integer

D all of the above

22. Which real number is NOT rational?

A $\frac{1}{6}$

B $\frac{1}{7}$

C $\frac{1}{\sqrt{8}}$

D $\frac{1}{\sqrt{9}}$

23. The number $3.\overline{125}$ is which type of real number?

A natural

B irrational

C rational

D whole

24. Which of the following expressions result in whole numbers?

A $7(4 - 5)$

B $7(4 + 5)$

C $7(4 \div 5)$

D $7 \div 4 - 5$

Name_____ Date _____ Class _____

NUMBERS AND OPERATIONS

Exponents

M8N1.i Simplify expressions containing integer exponents.

Select the best answer for each question.

1. Which of the following is equal to 3^{-3}?

A $\frac{1}{9^2}$

B $\frac{1}{27}$

C 27

D 81

2. Simplify.

$$4^2 + 3^2$$

A 12

B 25

C 48

D 96

3. To find the volume of a cube, find the 3^{rd} power of the length of an edge of the cube. What is the volume, in cubic inches, of a cube with a 12-inch long edge?

A 144

B 1,200

C 1,728

D 2,000

4. The distance from Earth to the moon is 22^4 mi. The distance from Earth to Neptune is about 22^7 mi. How many one-way trips from Earth to the moon are equal to 1 trip from Earth to Neptune?

A 3

B 3^{22}

C 22^3

D 50

5. A number to the 10^{th} power divided by the same number to the 7^{th} power equals 343. What is the number?

A 3

B 5

C 7

D 12

6. A googol is 1 followed by 100 zeroes. What is 1 googol written using an exponent?

A 1^{100}

B 10^{100}

C 100^{10}

D $1{,}000^{1000}$

Name_____ Date _____ Class_____

7. In 2003, the population of Jacksonville, FL, was 773,781. If the population doubles every 10 years, what will the population be in 2033?

A 1,547,620
B 3,210,553
C 6,190,248
D 15,475,620

8. Which of the following is equal to 6^4?

A $6^3 \times 6^1$
B 36^2
C 1,296
D all of the above

9. How many km are in 10^5 m?

A 5
B 10
C 100
D 1,000

10 Simplify.

$$(-3)^{-3}$$

A -27
B $\frac{1}{27}$
C $-\frac{1}{27}$
D 27

11. Simplify.

$$10^0 + 3^4 - 4^2$$

A 55
B 66
C 81
D 210

12. If a computer hard drive holds 2^{29} bytes of information, how many GB does it hold?

	Kilobyte (1 KB)	Megabyte (1 MB)	Gigabyte (1 GB)
Number of bytes	2^{10}	2^{20}	2^{30}

A 2^{-1}
B 2^0
C 2
D 2^2

13. Which power of 10 is closest to 9^8?

A 10^6
B 10^8
C 10^{10}
D 10^{12}

14. Simplify.

$$96^3 \div 96^2$$

A 48
B 96
C 96^2
D 192

15. Which power of 10 is closest to 2^{100}?

A 10^{20}
B 10^{25}
C 10^{30}
D 10^{35}

Name_____ Date _____ Class _____

16. What is $3 \times 3 \times 3 \times 3 \times 3 \times 12 \times 12 \times 12$ in exponential form?

A $3^5 \times 12^3$
B $5^3 \times 3^{12}$
C 36^5
D 36^8

17. Which number equals 4^{-6}?

A $-4{,}096$
B $-\frac{1}{24}$
C $\frac{1}{24}$
D $\frac{1}{4{,}096}$

18. Simplify.

$$7.5 \times 10^{-4}$$

A -75
B 0.00075
C 0.75
D 7.5

19. Which is NOT a representation of 10^7?

A $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$
B $2^5 \times 5^5 \times 10$
C $10^3 \times 10^3 \times 10$
D 10,000,000

20. In science class, Johann has a Petri dish containing 4^7 cells. How many cells does the Petri dish contain?

A 28
B 256
C 1,000
D 16,384

21. Which is the largest number?

A 2^7
B 3^8
C 4^6
D 10^3

22. Simplify.

$$\frac{(3+2)^4}{5(7-2)^3}$$

A $\frac{1}{2}$
B 12
C 3
D 1

Name_____ Date _____ Class_____

NUMBERS AND OPERATIONS

Irrational Numbers

M8N1.h Distinguish between rational and irrational numbers.

Select the best answer for each question.

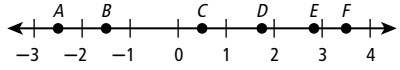
1. $\sqrt{3}$ lies between which two consecutive integers?

A 1 and 2
B 2 and 3
C 3 and 4
D none of the above

2. Angie's math teacher asked her to name an irrational number close to 5. Which of these numbers would be best for her to name?

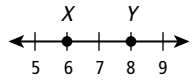
A $\sqrt{10}$
B $\sqrt{21}$
C $\sqrt{35}$
D $\sqrt{55}$

3. Which point on the number line best represents $\sqrt{8}$?



A Point *C*
B Point *D*
C Point *E*
D Point *F*

4. Which number is between Point *X* and Point *Y* on the number line?



A $\sqrt{30}$
B $\sqrt{63}$
C $\sqrt{64}$
D $\sqrt{81}$

5. Which irrational number is closest to 3?

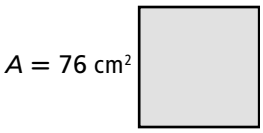
A $-\sqrt{10}$
B π
C $\sqrt{8}$
D $\sqrt{10}$

6. A cork gasket in an engine helps seal where two pieces of metal meet. One gasket is rectangular, exactly 4.36 centimeters wide and $\sqrt{47}$ centimeters long. What is the approximate area of the gasket?

A 28 square centimeters
B 29.89 square centimeters
C 37 square centimeters
D 204 square centimeters

Name_____ Date _____ Class _____

7. Which is the best estimate of the length of each side of the square?



A 9 centimeters
B 10 centimeters
C 19 centimeters
D 38 centimeters

8. Which of the following is NOT an irrational number?

A π^2
B $\sqrt{10}$
C $\sqrt{36}$
D $\sqrt[3]{109}$

9. $\sqrt{2{,}481}$ is between which 2 consecutive integers?

A 47 and 48
B 48 and 49
C 49 and 50
D 50 and 51

10. The circumference of a circle is equal to π times its diameter. If a circle has a diameter of 24 centimeters, which is the best estimate of its circumference?

A 4 centimeters
B 48 centimeters
C 72 centimeters
D 96 centimeters

11. Jorge's math teacher asked him to name an irrational number close to 8. Which of these numbers would be the best for him to name?

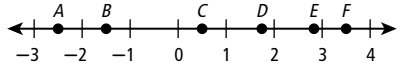
A $\sqrt{16}$
B $\sqrt{51}$
C $\sqrt{62}$
D $\sqrt{88}$

12. Which of the following are irrational numbers?

I. 0
II. $0.66\overline{6}$
III. $\sqrt[3]{9}$
IV. $\sqrt{2}$

A I and II only
B all except I
C II and IV only
D III and IV only

13. Which point on the number line best represents $-\sqrt{6}$?



A Point *A*
B Point *B*
C Point *C*
D Point *D*

14. Which of the following is an irrational number?

A $\sqrt{3}$
B $0.\overline{714285}$
C $\frac{3}{4}$
D all of the above

Name_____ Date _____ Class _____

15. Which square root is between 4 and 6?

A $\sqrt{12}$
B $\sqrt{16}$
C $\sqrt{21}$
D $\sqrt{40}$

16. Which expression proves $0.\overline{857142}$ is NOT an irrational number?

A $0.\overline{857142} = \frac{6}{7}$
B $0.\overline{857142} = \frac{857{,}142}{9{,}999{,}999}$
C $0.\overline{857142} = \frac{11}{14}$
D No such expression is possible; $0.\overline{857142}$ is an irrational number.

17. $\sqrt{30}$ is between which 2 consecutive integers?

A 4 and 5
B 5 and 6
C 6 and 7
D 7 and 8

18. Which irrational number is closest to 6?

A $\sqrt{\pi}$
B $\sqrt{35}$
C π^2
D $\sqrt{127}$

19. What is the best estimate of the length of each edge of a cube with a volume of 515 cubic inches?

A 6 inches
B 7 inches
C 8 inches
D 9 inches

20. $\sqrt{3} \times \sqrt{147}$ belongs to which subset(s) of real numbers?

I. natural numbers
II. whole numbers
III. rational numbers
IV. irrational numbers

A IV only
B III only
C I and II only
D all except IV

Name_____ Date _____ Class _____

NUMBERS AND OPERATIONS

Order of Operations

M8N1.g Simplify, add, subtract, multiply, and divide expressions containing square roots. Also M8N1.i

Select the best answer for each question.

1. Use the order of operations to simplify.

$$95 \div (8 - 3) - (3 \times 0.6)^2$$

A 2.635
B 7.84
C 15.76
D 22.8

2. Which operation should be performed first to simplify the following expression?

$$9(8 - 6)^2 \div 4$$

A addition
B subtraction
C multiplication
D division

3. Which operation symbol would make this expression correct?

$$10 \times 5 \square 8 \times 4 = 82$$

A $-$
B $+$
C $\times$
D $\div$

4. Use the order of operations to simplify.

$$96 \div 2(12 + 4) - 3^3$$

A -30
B -24
C 741
D 768

5. Rick spent \$20 per square yard for carpet and \$30 for carpet padding. Simplify $30 + 20(12^2 \div 9)$ to find out how much Rick spent in all to carpet a 12-square-foot room.

A \$212
B \$350
C \$562
D \$791

6. Use the order of operations to simplify.

$$27 \div (3 + 6) + 6^2$$

A 25
B 39
C 42
D 57

7. Which placement of the parentheses makes the statement true?

A $51 + (3 \times 8^2) - 191 = 52$
B $(51 + 3) \times 8^2 - 191 = 52$
C $51 + 3 \times (8^2 - 191) = 52$
D $51 + (3 \times 8)^2 - 191 = 52$

Name_____ Date _____ Class_____

8. Use the order of operations to simplify.

$$38 \div 2 + \sqrt{81} \times 4 - 31$$

A 12
B 24
C 96
D 212

9. Which operation should performed second to simplify the following expression?

$$92 \div (3 \times 8) - 18$$

A subtraction
B multiplication
C division
D simplify the exponent

10. Antwaan simplified this expression:
$(12 - 4 + 6 \times 2 - 8)2 = 121$
Is his answer correct?

A Yes
B No, it should equal 24.
C No, it should equal 69.
D No, it should equal 196.

11. Use the order of operations to simplify.

$$4(8) \div 2(15 - 3^2)$$

A $1\frac{1}{3}$
B $2\frac{2}{3}$
C 48
D 96

12. Use the order of operations to simplify.

$$2^3 - 7 + 16 \div (-3 + 5)$$

A $8\frac{1}{2}$
B 9
C 3
D $-3\frac{1}{2}$

13. Use the order of operations to simplify.

$$4.3 - 9.3 \div 3.1 - (2 \times 3.1)^2$$

A −17.92
B 17.92
C 37.14
D −37.14

14. Use the order of operations to simplify.

$$8 \times (-4) \times \big(-2 + (-6)\big) + 5^2$$

A 281
B 153
C −103
D −231

15. Use the order of operations to simplify.

$$4^2 \times 6.2 - 14.8 \div (-2)$$

A 42.2
B 91.8
C 106.6
D −42.2

16. Shaun simplified this expression:
$(20 - 8) \times 6 + 22 = 94$
Is his answer correct?

A Yes
B No, it should equal −24.
C No, it should equal 112.
D No, it should equal 768.

Name_____ Date _____ Class _____

17. Which operation should be performed last to simplify the following expression?

$$\sqrt{16} + (31 - 30)^3 \times 9$$

A subtraction

B multiplication

C square root

D addition

18. Use the order of operations to simplify the expression in question 17.

A 13

B 27

C 45

D 60

19. Which placement of the parentheses makes the statement true?

A $8 \times (20 - 8) + 11^2 = 273$

B $(8 \times 20 - 8) + 11^2 = 273$

C $8 \times 20 - (8 + 11^2) = 273$

D $8\ (20 - 8) + 11^2 = 273$

20. In what order would you perform the operations to simplify

$$[(2 + 4)^2 - 2 \times 3] \div 6?$$

A square 4, add the result to 2, subtract 2 from the result, multiply by 3, divide by 6

B multiply 2 and 3, subtract the result from 16, divide by 6, add 2

C add 2 and 4, square the result, multiply 2 and 3, subtract result from 36, divide by 6

D divide by 6, subtract from 14

21. Use the order of operations to simplify the expression in question 20.

A 4

B 5

C 6

D 12

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NUMBERS AND OPERATIONS

Scientific Notation

M8N1.j Express and use numbers in scientific notation.

Select the best answer for each question.

1. The temperature of the Sun's surface is about 5,500°C. Scientists believe that the temperature at the center of the Sun is 270 times hotter. What is the temperature at the center of the Sun using scientific notation?

A (1.485×10^3) °C.
B (1.485×10^6) °C
C (1.485×10^9) °C
D (1.498×10^9) °C

2. Large quantities of cloth are measured in bolts. A fabric store received 8 bolts of a popular patterned cloth. This amount of cloth is equivalent to 8.0×10^2 yards of cloth. Which represents this number in standard form?

A 0.008 yards
B 0.08 yards
C 800 yards
D 8,000 yards

3. At the last census, there were approximately six billion, three hundred ninety-two million people in the world. Which shows that number written in scientific notation?

A 6.392×10^7
B 6.392×10^8
C 6.392×10^9
D 6.392×10^{10}

4. The chart shows the average distance of some planets from the Sun.

Planet	Distance in Miles
Mercury	36,000,000
Mars	141,000,000
Jupiter	480,000,000

Which expression represents in scientific notation the distance from Jupiter to the Sun?

A 0.48×10^9
B 4.8×10^7
C 4.8×10^8
D 48.0×10^7

5. What is 64,000,000 in scientific notation?

A 6.4×10^6
B 6.4×10^7
C 64×10^7
D 640×10^7

6. Two units used to measure land are square meters and square kilometers. One square meter equals 0.000001 square kilometer. Which expression represents this number in scientific notation?

A 1.0×10^{-6}
B 1.0×10^{-5}
C 1.0×10^5
D 1.0×10^6

Name_____ Date _____ Class _____

7. The chart shows the population of some countries in 2000.

Country	Population
China	1.269×10^9
India	1.003×10^9
United States	2.823×10^8

Which represents the population of China in standard form?

A 126,900,000
B 1,000,000,269
C 1,269,000,000
D 1,269,000,000,000

8. The wavelength of red light is 6.8×10^{-4} millimeters. Which represents this number in standard form?

A 0.000068
B 0.00068
C 6.80000
D 68,000

9. The smallest unit of measure in the customary system of measure is the grain. There are 7.0×10^3 grains in one pound. Which represents that number in standard form?

A 0.0007
B 0.007
C 7,000
D 70,000

10. Write 9.567×10^{-5} in standard form.

A 0.000009567
B 0.00009567
C 0.009567
D 956,700

11. The chart shows the diameters of some planets.

Planet	Diameter in Miles
Saturn	75,000
Jupiter	89,000
Mars	4,200

Which expression represents in scientific notation the diameter in miles of Jupiter?

A 0.89×10^5
B 8.9×10^4
C 8.9×10^3
D 89×10^3

12. One International Nautical Mile is equal to just over 6.076×10^3 feet. Which of the following shows the number of feet in standard form?

A 607.6
B 6,076
C 60,760
D 607,600

13. Numbers in the octillions have between 27 and 29 places. What exponent would be used to complete $3.978 \times 10^{?}$ so that the standard number would NOT be in the octillions?

A 28
B 27
C 26
D 25

Name_____ Date _____ Class _____

14. The chart shows the estimated population of the world in several future years.

Year	Estimated Population
2010	6.826×10^9
2020	7.563×10^9
2030	8.206×10^9

Which represents the estimated world population in 2030 in standard form?

A 820,600,000
B 8,200,000,006
C 8,206,000,000,000
D 8,206,000,000

15. If the number 3.48×10^{12} is written in standard form, how many zeros would be in the number?

A 12
B 11
C 10
D 9

16 Dave wants to simplify his science report by writing the numbers in scientific notation. What negative exponent should he use when he changes 0.0000031 to scientific notation?

A −4
B −5
C −6
D −7

17. If the number 637,000,000,000,000 is written in scientific notation, what would be the power of ten?

A 12
B 13
C 14
D 15

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NUMBERS AND OPERATIONS

Squares and Square Roots

M8N1.a Find square roots of perfect squares. Also M8N1.b, M8N1.c, M8N1.d, M8N1.e, M8N1.f, and M8N1.k

Select the best answer for each question.

1. Roger found a square digital relief map on the Internet. The map contained 160,000 pixels. How many pixels high is the map?

A 40
B 400
C 160
D 1,600

2. Estimate $-\sqrt{55}$ to the nearest tenth.

A -7.0
B -7.4
C -7.6
D -8.0

3. Find the square root of 17.

A 4.1
B 16.8
C 17
D 289

4. Simplify.

$$\sqrt{16} + 7 - 2$$

A 9
B 11
C 15
D 21

5. A square court for playing the game four-square has an area of 256 square feet. How long is one side of the court?

A 4 feet
B 16 feet
C 25 feet
D 36 feet

6. What number, when doubled and then decreased by 2, has a square root of 4?

A 3
B 4
C 9
D 10

7. Which set of numbers is in order from least to greatest?

A $\sqrt{0}, \sqrt{37}, 35.2, 6^2$
B $6^2, \sqrt{0}, 35.2, \sqrt{37}$
C $\sqrt{37}, \sqrt{0}, 35.2, 6^2$
D $\sqrt{37}, 6^2, \sqrt{0}, 35.2$

8. Find the 2 square roots of 576.

A $+22, -22$
B $+23, -23$
C $+24, -24$
D $+26, -26$

Name_____ Date _____ Class_____

9. The square root of a number is $\frac{1}{2}$ of 7×6. What is the number?

A 21
B 42
C 441
D 576

10. Evaluate $\left(\frac{3}{8}\right)^2$.

A $\frac{3}{64}$
B $\frac{9}{64}$
C $\frac{15}{16}$
D $\frac{9}{8}$

11. Estimate to the nearest whole number.

$$\sqrt{18} + \sqrt{9}$$

A 4
B 7
C 12
D 15

12. Multiply.

$$\sqrt{51} \times \sqrt{36}$$

A 17.06
B 24.34
C 42.85
D 64.92

13. The area of a square field is 200 ft^2. Estimate the length of each side of the field.

A 10 feet
B 14 feet
C 20 feet
D 28.5 feet

14. Find the square roots of $\frac{81}{16}$.

A $+\frac{9}{4}, -\frac{9}{4}$
B $+\frac{9}{16}, -\frac{9}{16}$
C $+\frac{81}{4}, -\frac{81}{4}$
D $+6.2, -6.2$

15. A carpenter wants to use as many of her 195 small wood squares as possible to make a large square box lid. How many squares will she have left over after making the lid?

A 1
B 5
C 26
D 40

16. How many more small wood square would the carpenter need to make the next largest possible box lid?

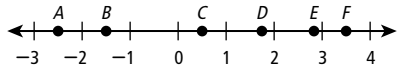
A 1
B 2
C 15
D 26

Name_____ Date _____ Class _____

17. Evaluate $14^2 - \sqrt{14}$.

A 16
B 78
C 192
D 240

18. Which point on the number line best represents $\sqrt{12}$?



A Point *A*
B Point *B*
C Point *D*
D Point *F*

19. Which is the best estimate of the length of each side of a square that has an area of 75 cm^2?

A 8 cm
B 9 cm
C 10 cm
D 11 cm

20. Which is NOT a perfect square?

A 16
B 49
C 150
D 576

21. Simplify.

$$2\sqrt{24} + \sqrt{6} - \sqrt{54}$$

A 0
B $2\sqrt{6}$
C $\sqrt{48}$
D cannot be simplified

22. Multiply.

$$\sqrt{135} \cdot (-\sqrt{1})$$

A −12
B −11.62
C 13.32
D 14.09

23. The formula gives the distance $D = 3.56\sqrt{A}$ in kilometers to the horizon from an airplane flying at an altitude A in meters. If a pilot is flying at an altitude of 2,000 m, about how far away is the horizon?

A 23 km
B 100 km
C 159 km
D 873 km

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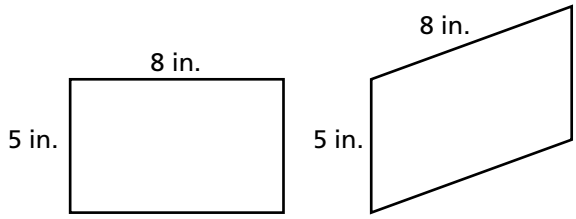
GEOMETRY

Congruent Polygons

M8G1.d Understand the meaning of congruence: that all corresponding angles are congruent and all corresponding sides are congruent.

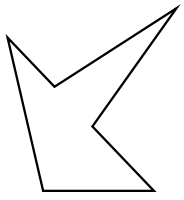
Select the best answer for each question.

1. Which describes the relationship between these quadrilaterals?

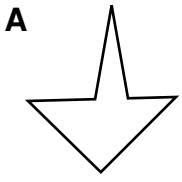


A congruent and similar
B similar but not congruent
C congruent but not similar
D neither congruent nor similar

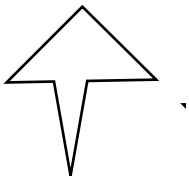
2. Which polygon is NOT congruent to this shape?



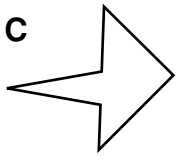
A



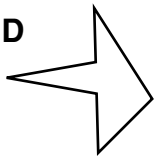
B



C



D



3. Which of the following congruence statements is true, given that for rectangle *ABCD*, $\overline{AB} = 3$ and $\overline{BC} = 4$, and for rectangle *EFGH*, $\overline{HG} = 4$ and $\overline{EH} = 3$?

A rectangle *ABCD* ≅ rectangle *EFGH*
B rectangle *ABCD* ≅ rectangle *HGFE*
C rectangle *ABCD* ≅ rectangle *HGEF*
D rectangle *ABCD* ≅ rectangle *EHGF*

4. Polygon *ABCD* ≅ polygon *PQRS*. Given that $\overline{BC} = 6x + 5$, and $\overline{QR} = 5x + 7$, find the length of $\overline{BC}$.

A 2
B 6
C 17
D not enough information to answer

5. Which term describes the corresponding sides in a pair of congruent figures?

A similar
B proportional
C congruent
D parallel

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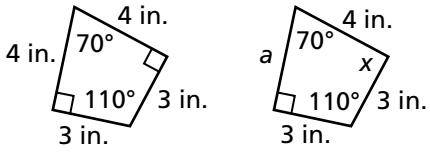
Use this pair of congruent polygons to answer questions 6 and 7.



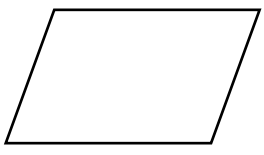
6. Find *x*.

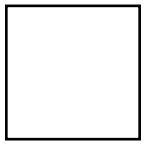
A 70°
B 90°
C 110°
D 135°

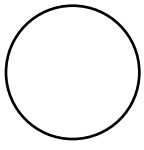
7. Find *a*.

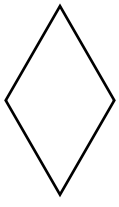
A 2 in.
B 4 in.
C 3.5 in.
D 3 in.

8. Matt drew the diagonal of polygon *ABCD* and got two congruent right triangles. Which of the following is a possible drawing of *ABCD*?

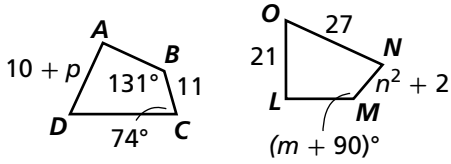
A


B


C


D


Use this pair of congruent polygons to answer questions 9–11.



9. Find *m*.

A 34
B 41
C 86
D 111

10. Find *n*.

A 3
B 12
C 15
D 17

11. Find *p*.

A 6
B 9
C 11
D 22

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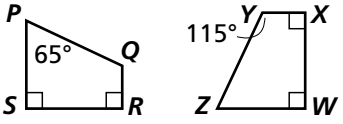
12. Which is a congruence statement for this pair of polygons?



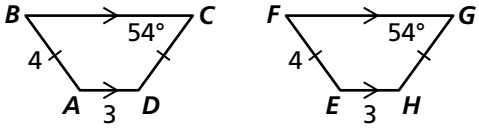
A quadrilateral *PQRS* ≅ quadrilateral *YXZW*

B quadrilateral *PQRS* ≅ quadrilateral *XWZY*

C quadrilateral *PQRS* ≅ quadrilateral *WZYX*

D quadrilateral *PQRS* ≅ quadrilateral *ZYXW*

13 Trapezoid *ABCD* ≅ trapezoid *EFGH*. If the length of $\overline{AD}$ is 3 cm, the length of $\overline{FG}$ is 7 cm, the length of $\overline{AB}$ is 4 cm, and the length of $\overline{GH}$ is 4 cm, which of the following statements about the two trapezoids' perimeters is true?



A Their perimeters are the same, but there is not enough information to determine what they are.

B Their perimeters are the same, and both equal to 18 cm.

C Their perimeters are different, but there is not enough information to determine what they are.

D Their perimeters are different. The left figure has a perimeter of 22 cm, and the right one has a perimeter of 30 cm.

14. Polygon *ABCD* ≅ polygon *EFGH*. $\angle A$ is a right angle. $m\angle E = (y^2 - 10)°$, and $m\angle H = (2y^2 - 132)°$. What is $m\angle D$?

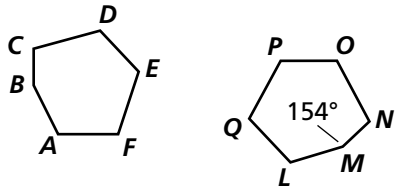
A 10°

B 68°

C 90°

D There is not enough information to solve the problem.

15 Which is a congruence statement for this pair of hexagons?



A hexagon *ABCDEF* ≅ hexagon *ONMLQP*

B hexagon *ABCDEF* ≅ hexagon *NMLQPO*

C hexagon *ABCDEF* ≅ hexagon *MLQPON*

D hexagon *ABCDEF* ≅ hexagon *LMNOPQ*

16. Which of these statements is NOT true?

A All congruent figures are similar.

B All similar figures are congruent.

C The lengths of corresponding sides in congruent figures are in proportion.

D The areas of congruent figures are the same.

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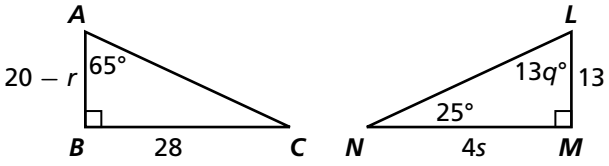
GEOMETRY

Congruent Triangles

M8G1.d Understand the meaning of congruence: that all corresponding angles are congruent and all corresponding sides are congruent.

Select the best answer for each question.

Use the two congruent triangles to answer questions 1–3.



1. Find q.

A 5
B 6
C 7
D 15

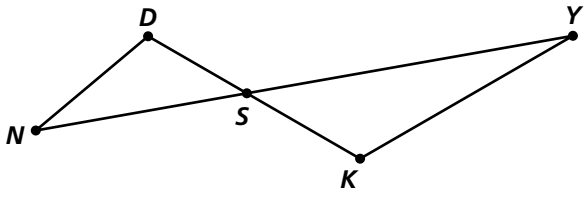
2. Find r.

A 4
B 7
C 9
D 12.5

3. Find s.

A 4
B 5
C 7
D 20

Use these two congruent triangles for questions 4 and 5.



4. Which of the following shows the relationships among corresponding sides?

A $\overline{DN} \cong \overline{KY}$, $\overline{DS} \cong \overline{YS}$, and $\overline{NS} \cong \overline{KS}$
B $\overline{DN} \cong \overline{KY}$, $\overline{DS} \cong \overline{KS}$, and $\overline{NS} \cong \overline{YS}$
C $\overline{DN} \cong \overline{KS}$, $\overline{DS} \cong \overline{KY}$, and $\overline{NS} \cong \overline{YS}$
D $\overline{DN} \cong \overline{YS}$, $\overline{DS} \cong \overline{KS}$, and $\overline{NS} \cong \overline{KY}$

5. If $m\angle SKY = 110°$, which angle in triangle DSN measures 110°?

A $\angle SDN$
B $\angle SND$
C $\angle NSD$
D There is no angle in DSN that measures 110°.

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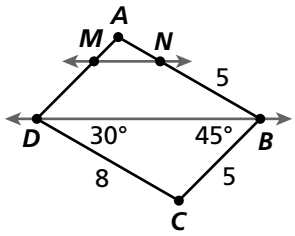
Use this figure to answer questions 6–9. *ABCD* is a parallelogram $\overline{MN} \parallel \overline{DB}$.



6. Triangle *ABD* ≅ triangle *CDB*. Which side is congruent to $\overline{DC}$?

A $\overline{DB}$
B $\overline{DA}$
C $\overline{BA}$
D $\overline{DB}$

7. Triangles *ABD* ≅ triangle *CDB*. What is the measure of ∠*A*?

A 30°
B 45°
C 75°
D 105°

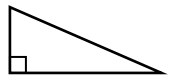
8. Which side length can be found from the information in the figure by directly using congruence?

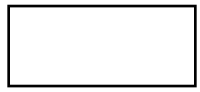
A $\overline{MN}$
B $\overline{MA}$
C $\overline{AN}$
D $\overline{AD}$

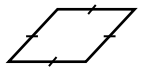
9. Triangle *ABD* ≅ triangle *CDB*. Which angle corresponds to ∠*ADB*?

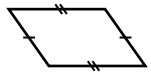
A ∠*ABD*
B ∠*BCD*
C ∠*CBD*
D ∠*CDB*

10. In which figure do you always get two congruent isosceles triangles when you draw a diagonal?

A


B


C


D


11. Given that triangle *JKL* ≅ triangle *MNP*, $m\angle L = (x^2 + 10)°$, and $m\angle P = (2x^2 + 1)°$, what is $m\angle L$?

A 3°
B 13°
C 19°
D 91°

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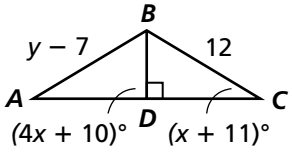
Given that triangle *ABD* ≅ triangle *CBD*, answer questions 12–14.



12. Find the value of *y*.

A 12
B 15
C 19
D 25

13. Find the value of *x*.

A 15°
B 20°
C 35°
D 75°

14. Find m∠*C*.

A 11°
B 22.5°
C 31°
D 45°

15. For 2 triangles, the following corresponding parts are given:

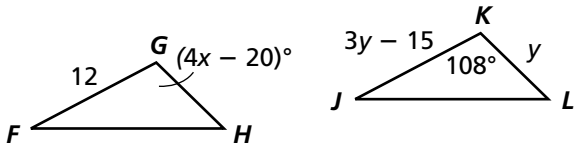
$\overline{GS} \cong \overline{KP}$, $\overline{GR} \cong \overline{KH}$, $\overline{SR} \cong \overline{PH}$,

$\angle S \cong \angle P$, $\angle G \cong \angle K$, $\angle R \cong \angle H$

Which congruence statement is correct?

A triangle *GSR* ≅ triangle *KPH*
B triangle *SRG* ≅ triangle *PHK*
C triangle *RGS* ≅ triangle *HKP*
D all of the above

Given that triangle *FGH* ≅ triangle *JKL*, answer questions 16 and 17.



16. Find *y*.

A 9
B 12
C 15
D 30

17. Find the value of *x*.

A 23
B 32
C 40
D 71

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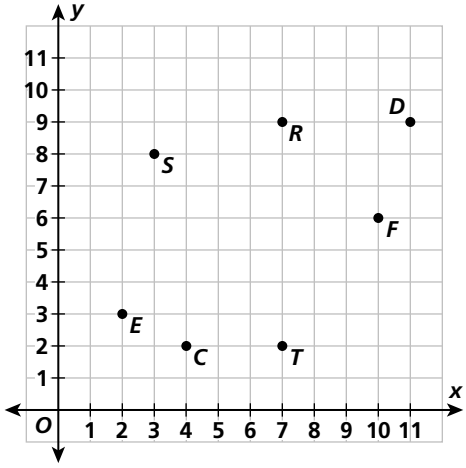
GEOMETRY

Coordinate Geometry

M8G1.a Investigate characteristics of parallel and perpendicular lines both algebraically and geometrically.

Select the best answer for each question.

Use this figure to answer questions 1 and 2.



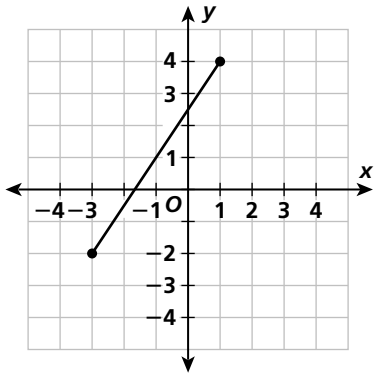
1. What is the midpoint of $\overline{FT}$?

A (8, 4)
B (9, 4)
C (8.5, 3.5)
D (8.5, 4)

2. Which segment is parallel to $\overline{ED}$?

A $\overline{RS}$
B $\overline{CF}$
C $\overline{FT}$
D $\overline{ST}$

3. What is the midpoint of this line segment?



A (−3, −2)
B (−1, 1)
C (1, −1)
D (−1, 0)

4. Two lines both contain the points with coordinates (−3, 4) and (4, −3). How are these lines related?

A They coincide.
B They are parallel.
C They are perpendicular.
D They are intersecting, but not perpendicular.

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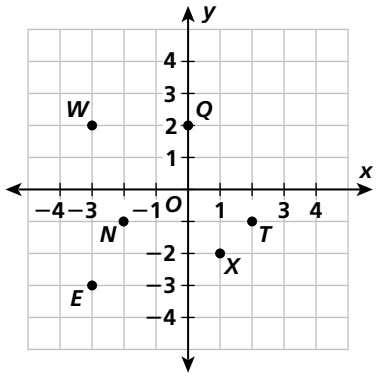
Use this figure to answer questions 5 and 6.



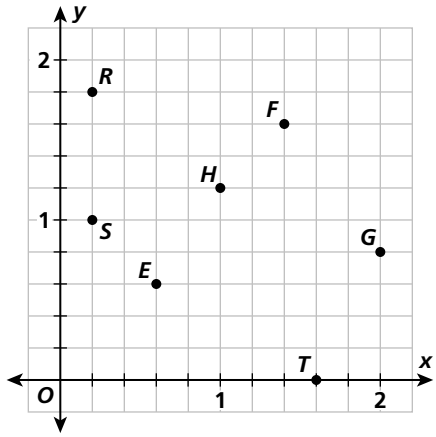
5. What is the point of intersection of $\overline{WX}$ and $\overline{NT}$?

A (0, −2)
B (0, −1)
C (−1, 0)
D (0, 0)

6. What is the midpoint of $\overline{EQ}$?

A (−2.5, −0.5)
B (−1.5, −0.5)
C (−0.5, −2.5)
D (−0.5, −1.5)

Use this figure to answer questions 7–9.



7. What are the coordinates of point *S*?

A $\left(\frac{1}{5}, 1\right)$
B $\left(\frac{1}{4}, 1\right)$
C (1, 1)
D (1, 5)

8. Which points are the vertices of a right triangle?

A *R*, *H*, and *F*
B *F*, *H*, and *G*
C *H*, *E*, and *T*
D none of the above

9. What shape is formed by connecting points *R*, *S*, and *H* with the point at (1, 0.8)?

A rectangle
B parallelogram
C trapezoid
D rhombus

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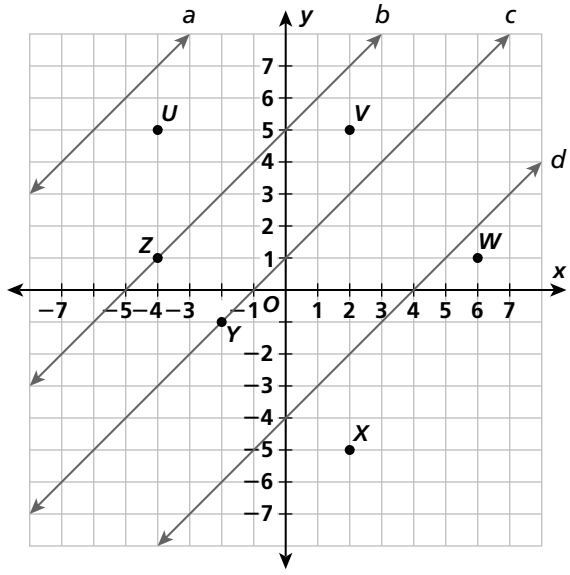
Use this figure to answer questions 10–15.



10. Which line segment intersects line *b* at the point (−3, 2)?

A $\overline{UW}$
B $\overline{UX}$
C $\overline{UY}$
D $\overline{VY}$

11. Which three points are the vertices of an isosceles triangle?

A Points *U, V, Y*
B Points *V, Y, Z*
C Points *V, W, X*
D Points *X, W, Z*

12. Which five points form a pentagon?

A Points *U, V, W, X, Y*
B Points *U, V, X, Y, Z*
C Points *V, W, X, Y, Z*
D Points *U, W, X, Y, Z*

13. Draw the line through points *U* and *X*. Where does this line intersect line *c*?

A (−2, −1) **B** (−1, −2)
C (−1, 0) **D** (0, −1)

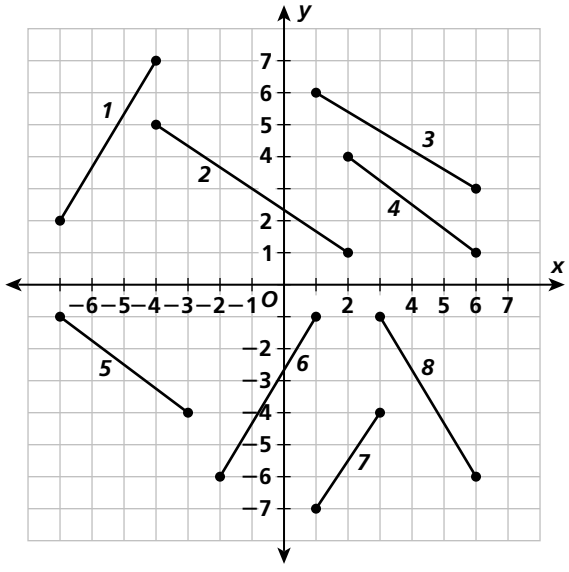
14. What shape do you get if you connect points *Y, V, W,* and *X*?

A rectangle **B** trapezoid
C rhombus **D** parallelogram

15. Draw a line that passes through point *X* and is parallel to line *d*. Where does this line intersect the *y*-axis?

A (0, −4) **B** (4, 0)
C (0, −7) **D** (7, 0)

16. Write the number of the line segment that is parallel to segment 1.



A both ⑥ and ⑦
B neither ⑥ nor ⑦
C ⑥
D ⑦

Name_____ Date _____ Class _____

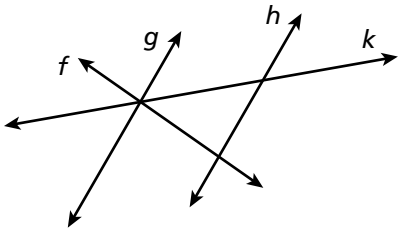
GEOMETRY

Parallel Lines

M8G1.a Investigate characteristics of parallel and perpendicular lines both algebraically and geometrically. Also M8G1b

Select the best answer for each question.

Use this figure to answer questions 1 and 2. Lines *g* and *h* are parallel.



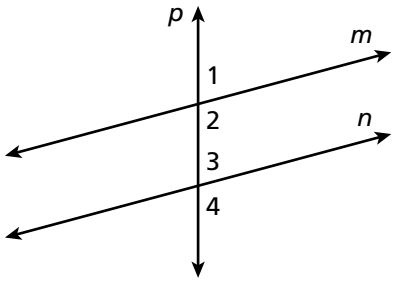
1. Which lines are transversals for parallel lines *g* and *h*?

A line *f*
B line *k*
C lines *f* and *k*
D lines *f, g,* and *k*

2. Which lines intersect in a common point?

A lines *f, g,* and *h*
B lines *f, g,* and *k*
C lines *f, h,* and *k*
D lines *g, h,* and *k*

Use this figure to answer questions 3 and 4. Lines *m* and *n* are parallel.



3. How is ∠1 related to ∠2?

A They are congruent.
B They are complementary.
C They are supplementary.
D They are obtuse.

4. Which angle corresponds to ∠2?

A ∠1
B ∠3
C ∠4
D none of these

5. Line *a* is parallel to line *b*. Line *b* is perpendicular to line *c*. How are lines *a* and *c* related?

A parallel
B perpendicular
C intersecting, but not perpendicular
D The relationship cannot be determined.

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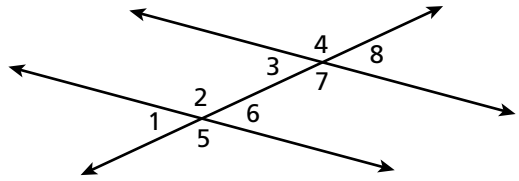
Use this figure to answer questions 6–9. Two of the lines are parallel.



6. Which is a pair of congruent vertical angles?

A ∠1 and ∠2
B ∠1 and ∠3
C ∠1 and ∠5
D ∠1 and ∠6

7. Which are the interior angles?

A ∠1, ∠2, ∠3, and ∠4
B ∠1, ∠2, ∠5, and ∠6
C ∠2, ∠3, ∠6, and ∠7
D ∠2, ∠4, ∠6, and ∠8

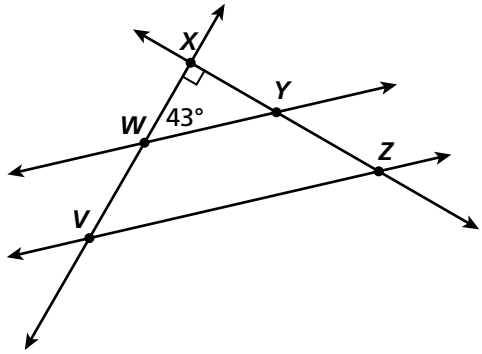
8. If m∠6 = 40°, what is m∠3?

A 40°
B 50°
C 80°
D 140°

9. Which pair of angles is NOT congruent?

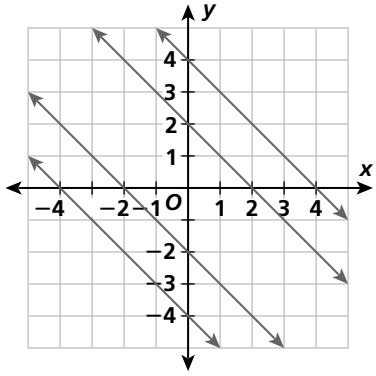
A ∠1 and ∠2
B ∠1 and ∠3
C ∠1 and ∠6
D ∠1 and ∠8

10. $\overline{WY}$ and $\overline{VZ}$ are parallel. What is the measure of ∠*YZV*?



A 43°
B 47°
C 133°
D 137°

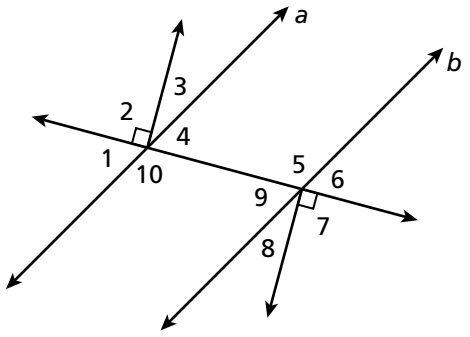
11. What do these parallel lines have in common?



A same slope
B same equation
C same *x*-intercept
D same *y*-intercept

Name_____ Date _____ Class _____

Use this figure to answer questions 12–14. Lines *a* and *b* are parallel, and m∠1 = 60°.



12. Which angle corresponds with ∠10?

A ∠9
B ∠8
C ∠7
D the angle formed by ∠7 and ∠8

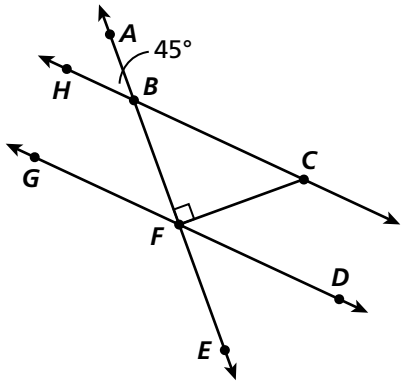
13. Which angle forms a pair of same-side interior angles with ∠4?

A ∠5
B ∠6
C ∠9
D ∠10

14. If ∠1 measures 60°, what is the measure in degrees of ∠5?

A 60°
B 90°
C 120°
D not enough information to answer

Use this figure to answer questions 15–17. $\overleftrightarrow{HC}$ and $\overleftrightarrow{GD}$ are parallel, and m∠*ABH* = 45°.



15. $\overleftrightarrow{AE}$ is a transversal for the two parallel lines. Which statement is false?

A ∠*ABC* = ∠*AFD*
B ∠*CBF* = ∠*BFG*
C ∠*HBF* = ∠*BFC*
D ∠*CBF* + ∠*BFD* = 180°

16. If m∠*ABH* = 45°, what is m∠*BCF*?

A 45°
B 60°
C 135°
D cannot be determined

17. Draw a line parallel to $\overleftrightarrow{AE}$ through point *D*. How is this line related to $\overleftrightarrow{FC}$?

A It is parallel to $\overleftrightarrow{FC}$.
B It makes a 45° angle with $\overleftrightarrow{FC}$.
C It is perpendicular to $\overleftrightarrow{FC}$.
D No relationship can be determined.

Name_____ Date _____ Class_____

GEOMETRY

Perpendicular Lines

M8G1.a Investigate characteristics of parallel and perpendicular lines both algebraically and geometrically. Also M8G1.b

Select the best answer for each question.

1. Line *a* is parallel to line *b*. Line *b* is perpendicular to line *c*. How are lines *a* and *c* related?

A parallel

B perpendicular

C intersecting, but not perpendicular

D No relationship can be determined.

2. Which line is perpendicular to $y = \frac{1}{2}x - \frac{5}{2}$?

A $y = \frac{1}{2}x + \frac{2}{5}$

B $y = 2x + 1$

C $y = -2x$

D $y = -\frac{1}{2}x$

3. Line *m* is perpendicular to line *n*. Line *n* is perpendicular to line *p*. How are lines *m* and *p* related?

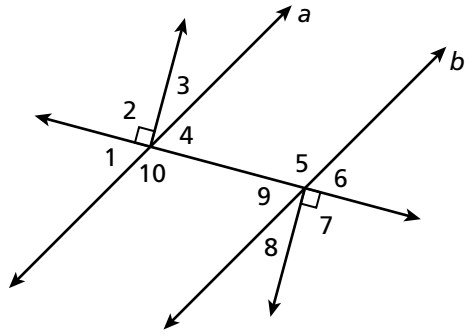
A skew

B perpendicular

C parallel

D No relationship can be determined.

Use this figure for questions 4 and 5. Lines *a* and *b* are parallel, and m∠1 = 60°.



4. ∠2 and ∠7 are right angles and *a* is parallel to *b*. What can be said about ∠3 and ∠8?

A They are supplementary.

B They are complementary.

C They are equal.

D No relationship can be determined.

5. How many angles labeled in the figure are congruent to ∠1?

A 1

B 2

C 3

D 5

Name_____ Date _____ Class _____

6. A line has a slope of $\frac{1}{3}$. What is the slope of a line that is perpendicular to this line?

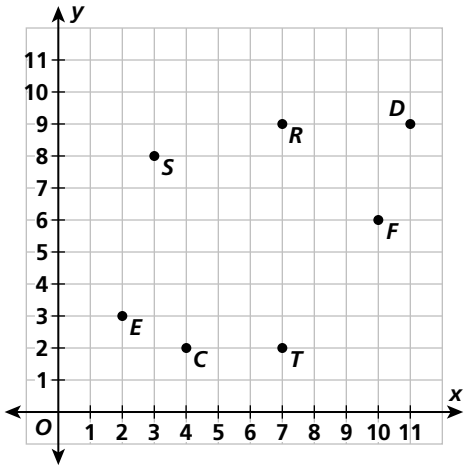
A $\frac{1}{3}$

B 3

C -3

D $-\frac{1}{3}$

7. Which segment is perpendicular to $\overline{ST}$?



A *ED*

B *ER*

C *RC*

D *FE*

8. Line a is perpendicular to line *b*. Line *b* is perpendicular to line *c*. How are lines *a* and *c* related?

A parallel

B perpendicular

C intersecting, but not perpendicular

D No relationship can be determined.

9. Which of the following shapes always contains one pair of perpendicular sides?

A rhombus

B parallelogram

C right triangle

D kite

10. Line *a* is perpendicular to line *b*. Line *b* is perpendicular to line *c*, which is perpendicular to line *d*. How are lines *a* and *d* related?

A parallel

B perpendicular

C intersecting, but not perpendicular

D No relationship can be determined.

11. At the intersection of 2 lines, one of the angles formed is 90°. What can be said about the two lines and the other 3 angles at the intersection?

I. The two lines are perpendicular.

II. Only one other angle must also be 90°.

III. The two lines are not perpendicular.

A I only

B II and III only

C III only

D I and III only

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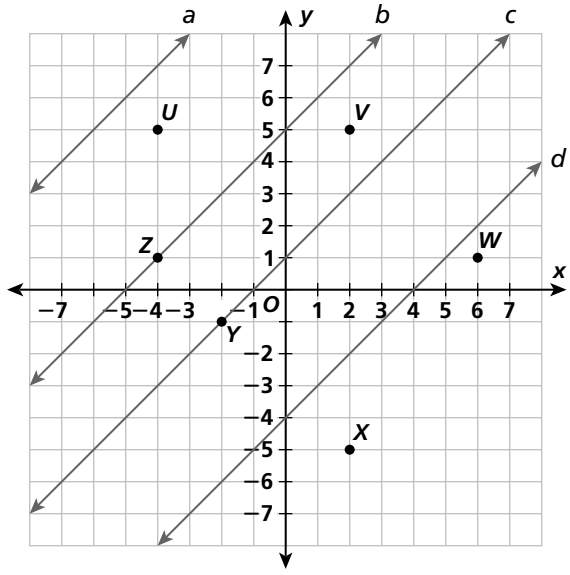
12. A line passes through point *V* and is perpendicular to line *b*. Where does this line intersect line *c*?



A (1, 6)
B (3, 4)
C (3, 5)
D (4, 3)

13. Line *a* is parallel to line *b*. Line *b* is perpendicular to line *c*. Line *c* is parallel to line *d*, which is perpendicular to line *e*. How are lines *a* and *e* related?

A parallel
B perpendicular
C intersecting, but not perpendicular
D No relationship can be determined.

14. Line *p* is perpendicular to line *r*. Line *r* is perpendicular to line *t*. In how many points do these lines intersect?

A 0
B 1
C 2
D an infinite number

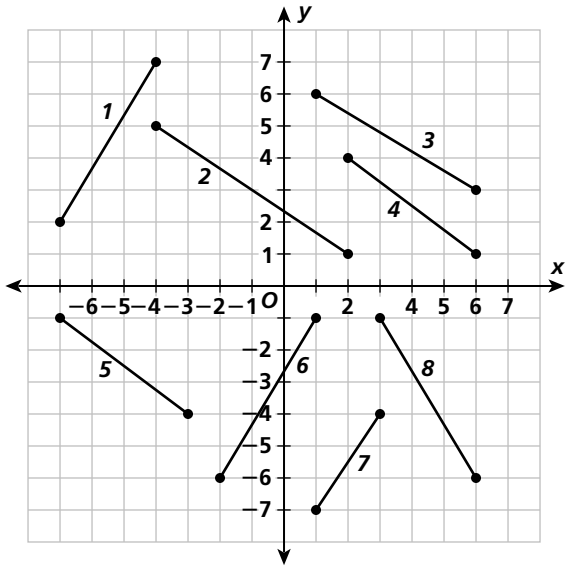
15. Line *a* is perpendicular to line *b*. Line *b* is parallel to line *c*. How are lines *a* and *c* related?

A perpendicular
B parallel
C intersecting, but not perpendicular
D No relationship can be determined.

16. Which of the following is true?

A Two lines are perpendicular if they meet at a right angle.
B Two lines are perpendicular if the product of their slopes is 1.
C Two line segments at 90° to each other are perpendicular, even if they do not intersect.
D Two lines are perpendicular only if one has a positive slope and the other has a negative slope.

17. Write the number of the line segment that is perpendicular to segment 1.



A ③ **B** ②
C ④ **D** ⑤

Name_____ Date _____ Class _____

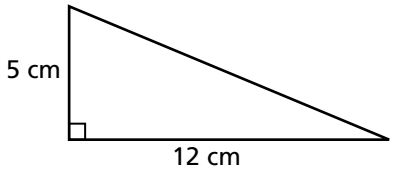
GEOMETRY

Pythagorean Theorem

M8G2.a Apply properties of right triangles, including the Pythagorean theorem. Also M8G2.b

Select the best answer for each question.

1. How long is the hypotenuse of this right triangle?



A 13 cm
B 15 cm
C 18 cm
D 20 cm

2. A Pythagorean triple is a set of three natural numbers, *a, b* and *c,* such that $a^2 + b^2 = c^2$. Which of the following is NOT a Pythagorean triple?

A (3, 4, 5)
B (8, 15, 17)
C (7, 24, 25)
D (2, 2, 4)

3. The legs of a right triangle are 9 ft and 40 ft. Suzanne is computing the length of the hypotenuse. She found the sum of 9^2 and 40^2. What should she do next?

A Subtract 9^2 from 40^2.
B Square the sum of 9^2 and 40^2.
C Take the square root of the sum.
D Nothing. She has the answer.

4. Which of the following is a Pythagorean triple?

A (65, 72, 96)
B (65, 72, 97)
C (65, 72, 98)
D (65, 72, 99)

5. Which set of side lengths will make a right triangle?

A 9 in., 12 in., 18 in.
B 9 in., 40 in., 45 in.
C 12 in., 35 in., 37 in.
D 15 in., 35 in., 45 in.

6. The number $\sqrt{53}$ is the length of the hypotenuse of a triangle with side length 2. What is the other side length?

A 7
B 8
C 9
D 10

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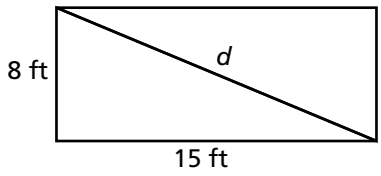
7. The gate of a fence is 8 ft tall and 15 ft wide. How long is the diagonal strip *d* used to brace this gate?

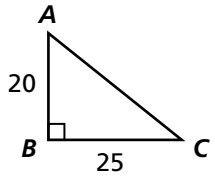


A 15.5 ft
B 17 ft
C 20 ft
D 23 ft

8. Two sides of a right triangle have lengths of 33 and 65 units. Given that the length of the third side is a natural number, what is the length of the third side?

A 55 units
B 56 units
C 72 units
D 73 units

9. Which expression equals *AC*?



A $\sqrt{500}$
B $\sqrt{1{,}025}$
C $\sqrt{2{,}000}$
D $\sqrt{2{,}025}$

10. Which set of side lengths will make a right triangle?

A 10 in., 24 in., 27 in.
B 11 in., 60 in., 62 in.
C 12 in., 34 in., 37 in.
D 13 in., 84 in., 85 in.

11. Mark drew a right triangle with one side 10 centimeters long. Which two side lengths are possible for the other sides of Mark's triangle?

A 15 cm and 25 cm
B 20 cm and 30 cm
C 24 cm and 26 cm
D 25 cm and 40 cm

12. Which number is not a part of any Pythagorean triple?

A 0
B 1
C 2
D all of the above

13. Which number sentence proves that 15, 112, and 113 are a Pythagorean triple?

A $15^2 \cdot 112^2 > 113^2$
B $15^2 + 112^2 = 113^2$
C $15^2 + 112^2 > 113^2$
D $(15 + 112)^2 = 113^2$

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14. In a *primitive* Pythagorean triple, there is no common factor greater than 1 for all three numbers. Which is true about the statement "for every Pythagorean triple (a, b, c), where $a^2 + b^2 = c^2$, c is always odd"?

A It is true for primitive Pythagorean triples.

B It is true for all Pythagorean triples.

C It is false for primitive Pythagorean triples.

D It is false for all Pythagorean triples.

15. What is the expression for the length of the side of a right triangle, if the length of the hypotenuse is 29 units and the length of the other side is 21 units?

A $29 - 21$

B $29 + 21$

C $\sqrt{841 + 441}$

D $\sqrt{841 - 441}$

16. Linda has 120 meters of fencing to enclose a garden. Which of these side lengths will make a garden with the shape of a right triangle?

A 10 m, 50 m, 60 m

B 20 m, 50 m, 50 m

C 30 m, 40 m, 50 m

D 40 m, 40 m, 40 m

17. Which of the following is a Pythagorean triple?

A (11, 60, 61)

B (11, 61, 62)

C (11, 60, 62)

D (11, 63, 64)

18. The height of an isosceles triangle is 4 cm. Two sides have length 5 cm. What is the length of the base?

A 6 cm

B 3 cm

C 1 cm

D cannot be determined

19. Which set of side lengths will make a right triangle?

A 1 ft., 2 ft., 3 ft.

B 2 ft., 4 ft., 4 ft.

C 3 ft., 5 ft., 7 ft.

D 5 ft., 12 ft., 13 ft.

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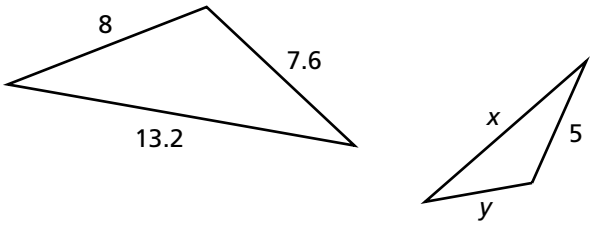
GEOMETRY

Similar Triangles

M8G1.c Understand the properties of the ratio of segments of parallel lines cut by one or more transversal.

Select the best answer for each question.

Use this pair of similar triangles to answer questions 1–3. Side lengths shown are in centimeters.



1. Knowing that $y < 5$, what is the ratio of corresponding sides?

A 7.6 : 5
B 8 : 5
C 13.2 : 7.6
D 13.2 : 8

2. Find the length of side *y*.

A 4.75 cm
B 5.26 cm
C 8.25 cm
D 12.16 cm

3. What is the length of the side corresponds with the side measuring 13.2 centimeters?

A *y*
B 5
C 7.6
D *x*

4. Two right triangles are similar and their ratio of corresponding sides is 1 : *x*. What is the ratio of their areas?

A 1 : *x*
B 1 : 2*x*
C 1 : x^2
D 1 : $x + 1$

5. Two acute triangles are similar and their ratio of corresponding sides is 1 : *y*. What is the ratio of perimeters?

A 1 : *y*
B 1 : 2*y*
C 1 : 3*y*
D 1 : y^2

6. Two angles of a triangle are 76° and 51°. Two angles of another triangle are 76° and 53°. What can be said about these two triangles?

A The triangles are not similar.
B The triangles are similar.
C The triangles are congruent.
D The triangles are not related.

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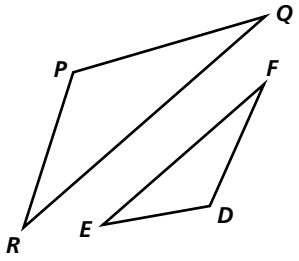
Use this pair of similar triangles to answer questions 7–9.



7. If *PR* and *PQ* are known, which length must also be known in order to find *EF*?

A *FD*

B *QR*

C both of the above

D none of the above

8. Which piece of information is needed to solve for *DE*, if the only piece of information already known is *PQ*?

A *PR* and *QR*

B *QR* and *FD*

C the ratio of corresponding sides

D There is already enough information to determine the length of *DE*.

9. Knowing *DE*, *PQ*, and *QR*, which equation cannot be used to find *EF*?

A $\frac{EF}{DE} = \frac{QR}{PQ}$

B $\frac{EF}{RQ} = \frac{DE}{PQ}$

C $\frac{PQ}{DE} = \frac{QR}{EF}$

D $\frac{EF}{DE} = \frac{PQ}{QR}$

10. How are corresponding heights of similar triangles related?

A by the same ratio as corresponding sides

B by the same ratio as the areas of the triangles

C by the square root of the ratio of corresponding sides

D by the square of the ratio of corresponding sides

11. Jay drew a right triangle with sides 5 cm, 12 cm, and 13 cm long. Daisy drew a similar triangle to Jay's. Which of the following can be the measurements of Daisy's triangle?

A 3 cm, 4 cm, and 5 cm

B 15 cm, 36 cm, and 40 cm

C 2.5 cm, 6 cm, and 6.5 cm

D 2.5 cm, 5 cm, and 6 cm

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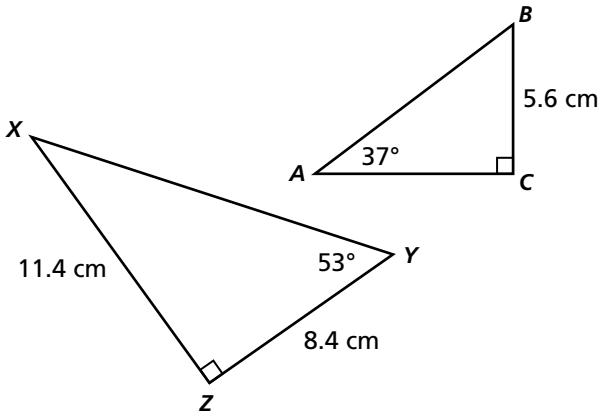
Use this pair of similar triangles to answer questions 12–14.



12. Which angle in triangle *XYZ* measures 37°?

A $\angle BAC$

B $\angle YXZ$

C $\angle ZYX$

D $\angle YZX$

13. Which equation can be used to find *AC*?

A $\frac{AC}{8.4} = \frac{11.4}{5.6}$

B $\frac{AC}{8.4} = \frac{5.6}{11.4}$

C $\frac{AC}{11.4} = \frac{8.4}{5.6}$

D $\frac{AC}{11.4} = \frac{5.6}{8.4}$

14. What is *AC*?

A 4.1 cm

B 5.8 cm

C 7.6 cm

D 17.1 cm

15. Tom is making a scale drawing of a triangle. Which is the least amount of information that Tom needs in order to draw the similar triangle?

A two side lengths

B two angle measures

C one side length and an adjacent angle measure

D three angle measures

16. Jordan has 120 meters of fencing to enclose a triangular golf range. On her scale drawing, the sides of the range measure 7 cm, 6 cm, and 2 cm. Which side lengths should Jordan use for the fence, if she is to follow her scale drawing?

A 56 m, 48 m, 16 m

B 50 m, 42 m, 28 m

C 49 m, 42 m, 29 m

D 40 m, 40 m, 40 m

17. All equilateral triangles are similar to each other. This property is true for what other type of triangle?

A scalene triangles

B right isosceles triangles

C all right triangles

D all isosceles triangles

18. Which measurements are side lengths of a triangle that is similar to a right triangle?

A 10 in., 24 in., 27 in.

B 11 in., 60 in., 62 in.

C 12 in., 34 in., 37 in.

D 13 in., 84 in., 85 in.

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ALGEBRA

Algebraic Expressions

M8A1.a. Represent a given situation using algebraic expressions or equations in one variable. Also M8A1.b

Select the best answer for each question.

1. Which algebraic expression represents the phrase "two less than double a number?"

A $2 - 2x$
B $2 - x + 2$
C $2x - 2$
D $x - 2$

2. Which algebraic expression represents the phrase "a number increased by three?"

A $3x$
B 3
C $3x + 3$
D $x + 3$

3. Which pair of algebraic expressions are equivalent?

A $6 - 2x$ and $3(2 - 2x)$
B $6 - 2x$ and $6(1 - 2x)$
C $6 - 2x$ and $2(3 - 2x)$
D $6 - 2x$ and $2(3 - x)$

4. Which algebraic expression represents the phrase "five decreased by a number?"

A $5 - x$
B $\frac{x}{5}$
C $5x$
D $x - 5$

5. Which algebraic expression has a value of 6 when $x = 4$?

A $3x - 5$
B $5x + 1$
C $6x - 18$
D $x + 3$

6. Which pair of algebraic expressions are NOT equivalent?

A $3x + 4 - x$ and $2(2 + x)$
B $6x - 7 + 2x$ and $6x - 5$
C $8 - 10x$ and $2(4 - 5x)$
D $9x - 2x$ and $3x + 4x$

7. Which expression is the equivalent of $2(3x - 5) + 4(x + 1)$?

A $10x - 6$
B $10x - 4$
C $10x - 9$
D $9x - 4$

8. Which is the value of $4x + 3(x - 1)$ when $x = 7$?

A 42
B 48
C 20
D 46

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9. What is the value of $q + q^2 + q \div 3$ when $q = 3$?

A 5
B 13
C 26
D 39

10. Which algebraic expression has a value of 12 when $x = 9$?

A $4x \div 3$
B $5x + 4$
C $7x - 11$
D $2x + 3$

11. What is 2 times the sum of y and 5 written as an algebraic expression?

A $2 + y + 5$
B $2(y + 5)$
C $2y + 10$
D $2y \times 5$

12. The Smiths paid an 18% tip on their meal m which cost $75.00 including taxes. What expression best describes the amount of tip the Smiths left?

A $m \div 0.18$
B $\frac{m}{18} \times 10$
C $18m \div 100$
D $m + 75.00 \div 18$

13. A 10 foot pine tree was planted and grew 3 feet each year. Which algebraic expression best describes the height of the tree after t years?

A $10 + 3t$
B $10t$
C $30 + 10t$
D $30t$

14. What is the value of $3t \div 3 + t$ when $t = 13$?

A -26
B 13
C 26
D 39

15. The expression $1.8c + 32$ can be used to convert a temperature in degrees Celsius c to degrees Fahrenheit. What is the temperature in degrees Fahrenheit if the temperature is 20°C?

A 54°F
B 62°F
C 68°F
D 78°F

16. Which algebraic expression represents the phrase "double a number decreased by four?"

A $4x - 2$
B $4 - 2x$
C $2x - 4$
D $2 - 4x$

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17. What is the value of $5|x|$ when $x = -25$?

A -5

B 5

C -125

D 125

18. Tammy has n quarters, using the expression $0.25n$, what is the value of 5 quarters?

A 75¢

B \$1.00

C \$1.25

D \$2.25

19. To plant n acres of a normal crop of corn, it takes $5n - 2$ bags of seed. If a farmer wants to plant a crop with twice as many stalks per acre, which expression represents the number of bags of seed he will need to plant n acres?

A $5n - 2 + 2$

B $10n - 4$

C $10n - 2$

D $25n - 4$

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ALGEBRA

Linear Functions

M8A4.e Determine the equation of a line given a graph, numerical information that defines the line, or a context involving a linear relationship. Also, M8A3.h, M8A4.b, M8A4.c, M8A4.d, M8A4.f

Select the best answer for each question.

1. Which function is nonlinear?

A $y = x^2$

B $y = 2x + 3$

C $y = \left(\frac{1}{2}\right)x$

D $y = -x - 4$

2. Every month Naomi deposits the same amount of money into her bank account. Her balances so far for this year are shown below. Which statement is true?

Jan.	Feb.	Mar.	Apr.
$55.00	$60.50	$66.00	$71.50

A Naomi deposits $5.50 every month.

B Naomi deposits $6.50 every month.

C Naomi deposits $11.00 every month.

D Naomi's balances are the same every month.

3. Which word best describes the graph of $g = z^3$.

A decreasing

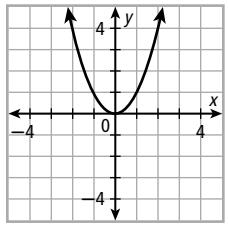
B increasing

C linear

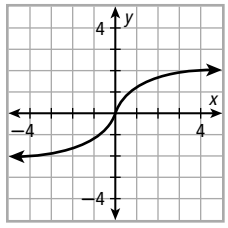
D nonlinear

4. Which graph is linear?

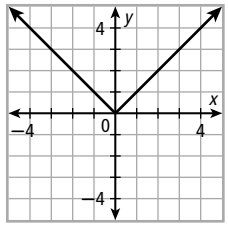
A



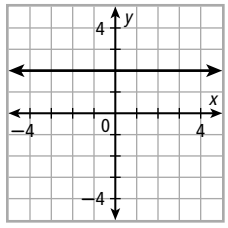
B



C



D



5. What missing value in the table below could make the function linear?

x	2	3	4	5
y	7	?	17	22

A 10

B 12

C 14

D 15

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6. Which of these functions is linear?

A $y = 4x^2$ **C** $y = 4x + 2$

B $y = 4 + x^2$ **D** $y = (4x)^2$

7. In the equation $y = 2x + 4$, if the value of x is increased by 1, what is the effect on the value of y?

A It is 1 more than the original amount.

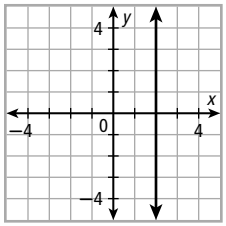
B It is 2 more than the original amount.

C It is 4 more than the original amount.

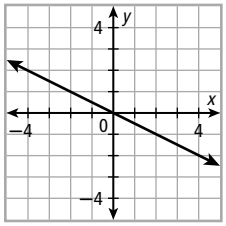
D It is 5 more than the original amount.

8. Which of these graphs is nonlinear?

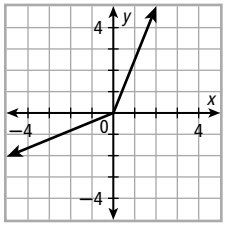
A



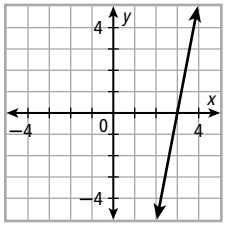
B



C



D



9. Which of these functions is linear?

A $y = x^3$

B $y = x^{\frac{1}{2}}$

C $y = \left(\frac{1}{2}\right)x^2$

D $y = \left(\frac{1}{2}\right)x$

10. Which equation models the relation in the table if c represents the cost and n represents the number of pizzas?

c	7	12	17	22
n	1	2	3	4

A $c = 7n$ **C** $c = 6n + 1$

B $c = 10n - 3$ **D** $c = 5n + 2$

11. Which is the missing value in the table given that $y = 2x - 5$?

x	**$2x - 5$**	***y***
1	$2(1) - 5$	-3
2	?	?

A -5 **C** -4

B -3 **D** -1

12. Which is the rule for this input-output table?

Input	Output
3	12
1	6
-2	-3

A $f(x) = 3x + 3$

B $f(x) = x^2 + 3$

C $f(x) = 2x + 1$

D $f(x) = x^2 + 5$

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13. A video rental store charges a $10 yearly membership fee and $3 per video. Which is the equation that gives the yearly cost c of renting *n* videos in one year?

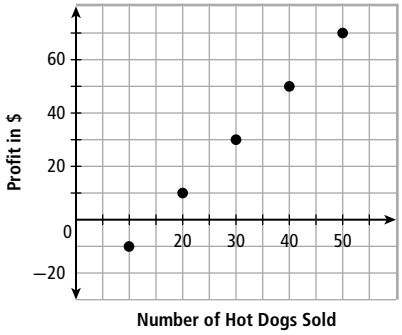
A $c = 10n + 3$

B $c = 13n$

C $c = 10 + 3n$

D $c = 3n$

14. Sergio sells hot dogs. His profit is shown by the graph. He used some of his own money to buy buns, hot dogs, relish, and ketchup. Which equation represents his profit *p* after selling *n* hot dogs?



A $p = 2n$

B $p = 2n + 30$

C $p = 30 - 2n$

D $p = 2n - 30$

15. Which is the rule for this input-output table?

Input	Output
5	7.5
7	10.5
8	12

A $f(x) = 3x + 2$

B $f(x) = 3x - 1$

C $f(x) = 3x^2$

D $f(x) = \frac{3x}{2}$

16. Complete the table for $f(x) = 3x - 2$.

x	*y*
0	
2	
4	

A 0, 8, 10

B −2, 4, 24

C 0, 4, 24

D −2, 4, 10

17. Provide the missing *x*-value.

x	$-5x + 9$	*y*
−3	$-5(-3) + 9$	24
??		29

A −4

B −2

C 2

D 4

18. Identify the best rule for this pattern.

112	60	34	21	14.5

A Each number is one half of eight more than the previous number.

B Each number is 52 less than the previous number.

C Each number is four less than one half the previous number.

D Each number is four more than twice the previous number.

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ALGEBRA

Patterns, Sequences, and Functions

M8A3.f Understand and recognize arithmetic sequences as linear functions with whole-number input values. Also M8A3.d, M8A3.e, M8A3.g, M8A3.i

Select the best answer for each question.

1. Charlie has a bank account. Each week he deposits more than he did the week before. His balances are listed below. Following this pattern, at what week will his balance exceed $100.00?

Week 1	Week 2	Week 3	Week 4
$11.00	$24.00	$39.00	$56.00

A Week 6
B Week 7
C Week 8
D Week 9

2. Which of the following is an arithmetic sequence?

A 1, 4, 9, 16, …
B 3, 6, 12, 24, …
C 7, 3, –1, –5, …
D 2, 5, 4, 8, 7, …

3. What is the 50th figure in this pattern?

↑	→	↓	←	↑	→	↓	←
1st	2nd	3rd	4th	5th	6th	7th	8th

A ↑
B →
C ↓
D ←

4. Find the 8th term in the geometric sequence:

$$\frac{1}{3}, 1, 3, 9, \ldots$$

A 91.125
B 216
C 729
D 5,832

5. What is the missing term in the input/output table?

x	$y = 11x - 15$
–2	–37
0	–15
3	?
4	29

A –4
B 7
C 18
D 22

6. Tom buys the same lunch every day at one of two restaurants, Burrito Palace and The Soup Shop, alternating every day. He spends $4.25 the first day, then $3.50 the next day, $4.25 the third day, and so on. Following this pattern, how much money will Tom have spent after the seventh day?

A $24.50
B $26.75
C $27.50
D $29.75

Name_____ Date _____ Class _____

7. What is the missing term in the input/output table?

x	$y = -7x - 30$
−3	9
0	−30
4	?
5	−65

A −85
B −58
C −38
D −2

8. What is the 99th figure in this pattern?

θ	Δ	↔	Σ	π	θ	Δ	↔
1st	2nd	3rd	4th	5th	6th	7th	8th

A θ
B Δ
C Σ
D π

9. What is the common ratio in the following geometric sequence?

$$\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots$$

A $\frac{1}{4}$
B $\frac{1}{2}$
C 1
D 2

10. Which of the following is NOT an arithmetic sequence?

A 11, 24, 37, 50, …
B 4, 8, 16, 32, …
C 0, 100, 200, 300, …
D 4, 2, 0, –2, –4, …

11. Find the 9th term in the geometric sequence: $\frac{1}{4}, \frac{1}{2}$, 1, 2, 4, 8, . . .

A 32
B 64
C 72
D 128

12. Suppose a certain tree had the property that if you cut off one of its branches, two more would grow back in the same place. If the tree starts with 24 branches and you cut off 6, how many branches would the tree have after the new branches have grown in?

A 12
B 18
C 24
D 30

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13. A car averages 25 miles per gallon. Maria fills up the tank, which holds 16 gallons, and heads off on a trip. What numbers should be in the second row in the table?

Miles traveled	50	125	250	350
Gallons remaining				

A 2, 5, 10, 14
B 3, 8, 16, 22
C 14, 11, 6, 2
D 22, 17, 9, 3

14. Which pattern shows a common ratio?

A 128, 64, 32, 16
B 5, 8, 11, 14
C 1, 4, 9, 16
D 1, 4, 7, 10

15. Which of the following is NOT an arithmetic sequence?

A 2, 5, 8, 11, …
B 1, 2, 3, 4, …
C 29, 21, 13, 5, …
D 81, 27, 9, 3, …

16. What is the missing term in the input/output table?

x	$y = 6x - 11$
−2	−23
0	−11
2	?
4	13

A −5
B −1
C 1
D 7

17. What is the common ratio in the following geometric sequence?

4096, 2048, 1024, 512, …

A 2
B $\frac{1}{2}$
C 1
D −2

18. Find the 20th term in the arithmetic sequence: 4, 11, 18, 25, …

A 60
B 53
C 140
D 137

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ALGEBRA

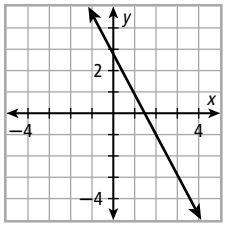
Rates of Change

M8A4.a Interpret slope as a rate of change. Also M8A4.b

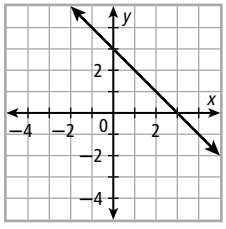
Select the best answer for each question.

1. Which graph corresponds to the equation $y = -2x + 3$?

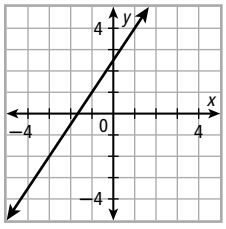
A



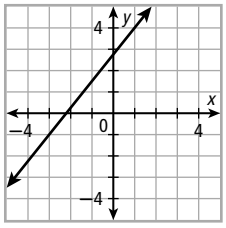
B



C



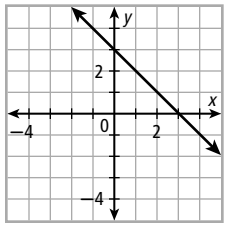
D



2. In the linear equation $y = 4x - 6$, the value 4 represents which of the following?

A the slope of the line
B the *y*-coordinate of the *y*-intercept
C the *x*-coordinate of the *y*-intercept
D the quadrant in which the line lies

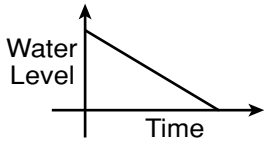
3. At what point does the line in the following graph cross the *y*-axis?



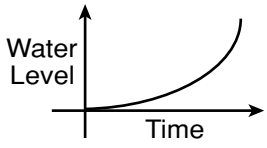
A (0, 4)
B (4, 0)
C (0, 3)
D (3, 0)

4. Choose the graph below that shows the level of water in a sink as it fills.

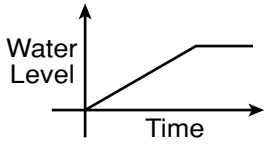
A



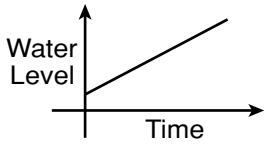
B



C



D



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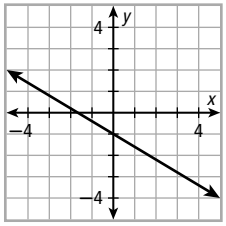
Use the graph for questions 5 and 6.



5. How would you describe the slope of the line?

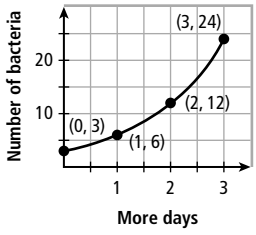
A The slope is positive.
B The slope is negative.
C The slope is 0.
D The slope is undefined.

6. At what point does the line cross the *y*-axis?

A $\left(-\frac{3}{2}, 0\right)$ **C** $\left(0, -\frac{3}{2}\right)$

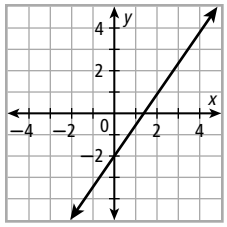
B $(0, -1)$ **D** $(-1, 0)$

7. Every hour, a lab student checked the number of bacteria in a culture. The graph of her data is shown. Which of the following statements is true?



A The rate of change is constant.
B The graph shows a linear function.
C The slope of the line is 61.
D The rate of change is not constant.

Use the graph for questions 8 and 9.



8. How would you describe the slope of the line?

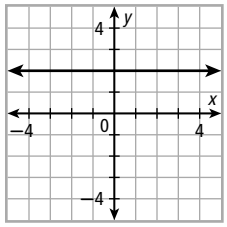
A The slope is positive.
B The slope is negative.
C The slope is 0.
D The slope is undefined.

9. At what point does the line cross the *y*-axis?

A $\left(\frac{3}{2}, 0\right)$ **C** $\left(0, \frac{3}{2}\right)$

B $(0, -2)$ **D** $(-2, 0)$

10. How would you describe the slope of the line in the following graph?



A The slope is positive.
B The slope is negative.
C The slope is 0.
D The slope is undefined.

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11. Which of the following could describe the graph of a line with an undefined slope?

A The line rises from left to right.
B The line falls from left to right.
C The line is horizontal.
D The line is vertical.

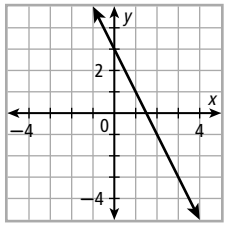
12. In the linear equation $y = 3x + \frac{1}{2}$, the value $\frac{1}{2}$ represents which of the following?

A the slope of the line
B the *y*-coordinate of the *y*-intercept
C the *x*-coordinate of the *y*-intercept
D the ratio of the slope to the *y*-intercept

13. In the linear equation $y = 2x - 3$, the value 2 represents which of the following?

A the slope of the line
B the *y*-coordinate of the *y*-intercept
C the *x*-coordinate of the *y*-intercept
D the quadrant in which the line lies

14. At what point does the line in the following graph cross the *y*-axis?



A $\left(0, \frac{3}{2}\right)$ **C** (0, 3)

B (3, 0) **D** $\left(\frac{3}{2}, 0\right)$

15. How would you describe the slope of the line described by the following function?

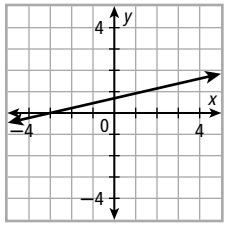
$$y = \left(-\frac{5}{3}\right)x + \frac{5}{3}?$$

A The slope is positive.
B The slope is negative.
C The slope is 0.
D The slope is undefined.

16. In the linear equation $y = 4x + 2$, the value 2 represents which of the following?

A the slope of the line
B the *y*-coordinate of the *y*-intercept
C the *x*-coordinate of the *y*-intercept
D the quadrant in which the line lies

Use the graph for questions 17 and 18.



17. How would you describe the slope of the line?

A The slope is positive.
B The slope is negative.
C The slope is 0.
D The slope is undefined.

18. At what point does the line cross the *y*-axis?

A $\left(\frac{3}{4}, 0\right)$ **C** $\left(0, \frac{3}{4}\right)$

B (0, −3) **D** (−3, 0)

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ALGEBRA

Relations and Functions

M8A3.c Distinguish between relations that are functions and those that are not functions. Also M8A3.a, M8A3.b, M8A3.d, and M8A3.i

Select the best answer for each question.

1. Use the table to write the rule for the linear function.

x	−2	−1	0	1
y	−5	−2	1	4

A $f(x) = 2x - 1$
B $f(x) = 3x + 1$
C $f(x) = 3x - 2$
D $f(x) = 2x + 3$

2. Your distance from lightning is proportional to the time it takes to hear the thunder. Which equation best represents the relationship in the table? How far are you from lightning when the thunder takes 35 seconds to reach you?

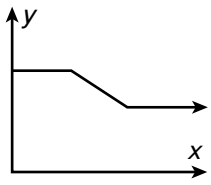
***t* (sec)**	2	10	20	35
***d* (mi)**	0.4	2	4	

A $d = 5t$, 175 miles
B $d = 0.2t$, 7 miles
C $d = 0.4t$, 14 miles
D $d = 0.5t$, 17.5 miles

3. Mr. Sate bought 6 rulers for $7.00. Use a graph, table, or algebraic equation to predict how much he would pay for 9 more rulers.

A $10.00 **C** $10.50
B $10.53 **D** $11.00

4. Which statement is true for the graph shown?



A The graph shows a linear function.
B The graph shows a relation.
C The graph shows a curve.
D The graph is increasing.

5. On vacation, Juan drove 275 miles in 5 hours. Use a graph, table or algebraic equation to predict how far Juan will travel at the same rate in the next 3 hours.

A 440 miles **C** 165 miles
B 195 miles **D** 55 miles

6. Which statement is NOT true?

A The graph of a horizontal line is a function.
B Every function is a relation.
C Every relation is a function.
D An equation of the form $y = mx + b$ represents a function.

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7. Use the table to find the cost of manufacturing 100 widgets.

Number of widgets	20	40	60	80	100
Cost ($)	$90	$130	$170		

A $250.00
B $260.00
C $300.00
D $350.00

8. Use the table to write the rule for the linear function.

x	*y*
−3	10
−1	6
0	4
2	0

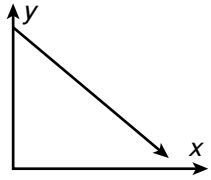
A $f(x) = x + 13$
B $f(x) = -3x + 1$
C $f(x) = -4x - 2$
D $f(x) = -2x + 4$

9. Three hikers ate their food rations at a steady rate. Use the table to find the amount of food left after the 5th day.

Days hiked	1	2	3	4	5
Food left (lb)	70	55	40		

A 30 lb
B 20 lb
C 15 lb
D 10 lb

10. Which statement best describes this graph?



A a linear function with negative slope
B a linear function with positive slope
C a relation that is not a function
D a function that is not a relation

11. Certain bacteria can double in number over 1 hour. Suppose the collection of 60 bacteria cells are placed in a Petri dish. Which expression can be used to find how many cells, *c*, there would there be after *x* hours?

A $c = 60x \times 2$
B $c = 60 \times 2^x$
C $c = 60 \times x^2$
D $c = 60x + 2$

12. Refer to question 11. Which equations represent functions?

A both A and D
B both B and C
C all of them
D none of them

Name_____ Date _____ Class _____

13. The table shows the *x*- and *y*-coordinates of some ordered pairs.

x	−1	2	3	5
y	−16	−4	0	8

Which equation describes the relationship of the *x*-values to the *y*-values?

A $y = 3x - 13$

B $y = -x + 3$

C $y = 4x - 12$

D $y = 8x - 8$

14. Refer to the equations in question 13. Which equations represent functions?

A all of them

B both B and C

C both A and D

D none of them

15. Carly plans to graph data comparing the altitude of an airplane to time as it makes its descent. Which statement is NOT true.

A The data are continuous so Carly should join the points on the graph.

B The data are discrete so Carly should not join the points on the graph.

C As time increases, altitude decreases.

D The plane will be on the runway when the altitude is 0.

16. The table below shows the *x*- and *y*-coordinates of some ordered pairs.

x	−1	2	5	8
y	7	4	1	−2

Which equation describes the relationship of the *x* values to the *y* values?

A $y = x - 8$

B $y = -x + 6$

C $y = -2x + 5$

D $y = -7x$

17. A theme park charges the same ticket price for children, adults, and seniors. Jaime plans to graph data comparing the total revenue from ticket sales to the number of people entering the theme park. Which statement is true?

A The data is continuous, so the points on the graph should be joined.

B The data is discrete, so the points on the graph should not be joined.

C The graph comparing revenue to number of people will be a curve.

D As the number of people increases, total revenue decreases.

18. Which is the value of the function $f(x) = 4x - 7$ when $x = -3$?

A −3

B −19

C 5

D −5

Name_____ Date _____ Class_____

ALGEBRA

Solve One-Step Equations

M8A1.c Solve algebraic equations in one variable, including equations involving absolute values. Also M8A1.a and M8A1.d

Select the best answer for each question.

1. Which value of y makes the equation true?

$$72 = \frac{y}{6}$$

A 12
B 426
C 432
D 8

2. Which value of z is the solution to $4z^2 - 3z + z = 72$?

A 4.5
B 5
C 7
D 12

3. Which equation has the solution $x = -3$?

A $x - 1 = -4$
B $-2x = 6$
C both A and B
D neither A nor B

4. Which value of m is the solution to this equation?

$$-4m = 112$$

A 28
B -28
C 448
D -448

5. Which equation is solved by $q = -12$?

A $q + 12 \cdot 8 = 102$
B $q^2 + q = -132$
C $q \div 2q = -\frac{1}{2}$
D $2q^2 - (-8q) + 4 = 196$

6. Which equations have the solution $x = 11$?

Equation I	**Equation II**
$-4x = -44$	$x - 20 = -9$
Equation III	**Equation IV**
$2 + x = 13$	$-5x = 55$

A all of them
B none of them
C equations II and III
D equations I, II, and III

7. Katherine's class is selling raffle tickets for \$3 to raise money for charity. Katherine's class raised \$504. Which equation would you use to find the number of tickets sold, n?

A $504 = \frac{n}{3}$
B $504 = 3n$
C $3 = \frac{n}{504}$
D $504 = n - 3$

Name_____ Date _____ Class _____

8. Which value of x makes the equation true?

$$-17 - x = -9$$

A 26
B -26
C -8
D 8

9. Which value of p is the solution to this equation?

$$48 = 57 + p$$

A -9
B 9
C -11
D 11

10. Which equation has the solution $x = -1$?

A $-3x = -3$
B $4 + x = 6$
C both A and B
D neither A nor B

11. Which equations has $x = -5$ as a solution?

Equation I	**Equation II**
$-3x = 15$	$\lvert x\rvert - 7 = -2$
Equation III	**Equation IV**
$1 - x = 6$	$-\frac{x}{5} = 1$

A all of them
B none of them
C equations I and III
D equations I and IV

12. Last week Christine worked 14 hours and earned \$143.50. This week she is scheduled to work 10 hours. How much will she earn this week?

A \$200.90
B \$14.35
C \$102.50
D \$120.00

13. Which value of g makes the equation true?

$$|g| - 12 = 4$$

A 16
B -8
C 8 and -8
D 16 and -16

14. Greg walks at a constant speed of 3.5 miles per hour. Which equation would you use to find the number of hours, t, Greg walked if he traveled 21 miles?

A $21 = 3.5t$
B $21 = \frac{t}{3.5}$
C $3.5 = \frac{t}{21}$
D $21 \times 3.5 = t$

15. What is the value of $|x| + 14$ when $x = -24$?

A -38
B -10
C 10
D 38

Name_____ Date _____ Class_____

16. Which value of z makes the equation true?

$$-36 = \frac{z}{12}$$

A 3

B 432

C −432

D −3

17. John is 4 inches taller than Harley. Which equation would you use to find John's height, j, if Harley is 68 inches tall?

A $68 = 4j$

B $68 = \frac{j}{4}$

C $68 = j + 4$

D $68 = j - 4$

18. Which value of k makes the equation true?

$$|k| \div (-9) = -27$$

A −3 and 3

B 243 and 3

C −243 and −3

D 243 and −243

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ALGEBRA

Solve One-Step Inequalities

M8A2 Students will understand and graph inequalities in one variable. Also M8A2.a, M8A2.b, M8A2.c, and M8A2.d

Select the best answer for each question.

1. Which inequality has the solution $m \geq 6$?

A $2m \geq -4$
B $-2m \leq 12$
C $m + 9 \geq 3$
D $4 - m \geq 10$

2. Which is the solution to this inequality?

$$\frac{x}{5} < 15$$

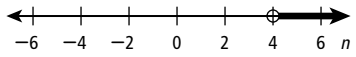
A $x < 3$
B $x > 3$
C $x > 75$
D $x < 75$

3. Which inequalities have the solution $p \leq 9$?

Inequality I	**Inequality II**
$5 + p \leq 14$	$p - 12 \leq -3$
Inequality III	**Inequality IV**
$4p \leq 36$	$-3p \geq -14$

A all but IV
B none of them
C all of them
D inequalities II and III

4. Which inequality is represented by this graph?



A $n \leq 4$
B $n \geq 4$
C $n < 4$
D $n > 4$

5. Alexis earns $6.75 per hour babysitting. She needs at least $25 to go on a field trip. Which inequality would you use to find out how many hours, h, Alexis needs to baby sit?

A $6.75h > 25$
B $6.75h \leq 25$
C $6.75h \geq 25$
D $6.75h < 25$

6. Which values of q make the inequality true?

$$-7q + 4 > 18$$

A $q > -2$
B $q < -2$
C $q > -\frac{22}{7}$
D $q < -\frac{22}{7}$

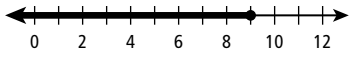
Name_____ Date _____ Class _____

7. Which values of p solve this inequality?

$$24 \geq 66 + p$$

A $p \geq -42$
B $p \leq -42$
C $p \geq 90$
D $p \leq 90$

8. Which inequality is represented by this graph?



A $x \leq 9$
B $x \geq 9$
C $x < 9$
D $x > 9$

9. Which inequalities have $x < -5$ as a solution?

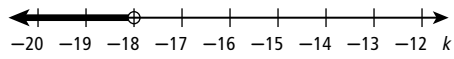
Inequality I	**Inequality II**
$-3x < 15$	$x - 9 < -14$
Inequality III	**Inequality IV**
$-7x > 35$	$x + 6 < 1$

A all of them
B none of them
C all but I
D all but III

10. Which inequality has the solution $d < -1$?

A $-3d \leq -3$
B $7 - d \geq 6$
C both A and B
D neither A nor B

11. Which inequality is represented by this graph?



A $k > -18$
B $k < -18$
C $k \leq -18$
D $k \geq -18$

12. Colton has $20. He wants to buy as many tickets for a draw as he can. Each ticket costs $0.75. Which inequality would you use to find out how many tickets, n, Colton can buy?

A $20 \leq 0.75n$
B $20 \leq 0.75 + n$
C $20 - n \leq 0.75$
D $20 \geq 0.75n$

13. Which inequality has the solution $t \geq -11$?

A $t + 9 \geq -2$
B $-5 - t < 6$
C $12t > 132$
D $-7t \geq 77$

14. Which is the solution to this inequality?

$$h - 19 < 21$$

A $h < 40$
B $h > 40$
C $h > 2$
D $h < 2$

Name_____ Date _____ Class _____

15. Which inequalities have the solution $s > 4$?

Inequality I	**Inequality II**
$6s > -24$	$s - 8 \leq -12$
Inequality III	**Inequality IV**
$-s > -4$	$6 + s \leq 10$

A all of them
B none of them
C all but IV
D inequalities II and III

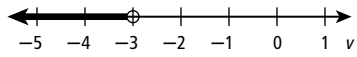
16. Which inequality has the solution $m \geq -7$?

A $10 - m \leq 17$
B $-4m \leq 28$
C both A and B
D neither A nor B

17. To win a prize in a board game, you must spend more than $19 on banners. Each banner costs $3. Which inequality would you use to find the number of banners you must buy to win a prize?

A $19 > 3n$
B $19 \leq 3n$
C $19 \geq 3n$
D $19 < 3n$

18. Which inequality is represented by this graph?



A $v < -3$
B $v > -3$
C $v < 3$
D $v < 3$

Name_____ Date _____ Class_____

ALGEBRA

Solve Two-Step Equations

M8A1.c Solve algebraic equations in one variable, including equations involving absolute values. Also M8A1.a and M8A1.d

Select the best answer for each question.

1. Which value of d makes the equation true?

$$4d - 15 = 9$$

A -1.5
B -2
C -6
D 6

2. What is the value of $-2|q| + 3$ when $q = -7$?

A -11
B 15
C 5
D -5

3. Which equation has the solution $x = -1$?

A $3x - 2 = -4$
B $-6x + 9 = 16$
C $10 - 3x = 7$
D $-2 - 5x = 3$

4. Which value of s is the solution to this equation?

$$81 = 27 - 3s$$

A -36
B 36
C -18
D 18

5. Which value of c makes the equation true?

$$6 - 2|c| = -32$$

A -19 and -13
B 13 and 19
C 19 and -19
D 13 and -13

6. Which equation has $x = 7$ as a solution?

Equation I	**Equation II**
$14 - 3x = -15$	$4\|x\| - 3 = -31$
Equation IIi	**Equation IV**
$16 + 5x = 51$	$2x - 30 = -16$

A all of them
B none of them
C equations II and III
D equations III and IV

7. Jen earns twice her regular hourly wage for each hour she works over 40 hours in a week. Last week she worked 45 hours and earned $442.50. Which equation would you use to find Jen's hourly wage?

A $40w + 5(2w) = 442.50$
B $40w + 45(2w) = 442.50$
C $40w + 2w = 442.50$
D $w + 2w = 442.50$

Name_____ Date _____ Class _____

8. Which equation does NOT have the solution $x = -6$?

A $-4x - 1 = -25$

B $12 + \frac{x}{3} = 10$

C $16 - 3x = 34$

D $-9 - 2x = 3$

9. Here is a solution to a problem.

$$\begin{aligned} 3(2x + 5) &= 12 \\ 6x + 5 &= 12 \\ 6x &= 7 \\ x &= \frac{7}{6} \end{aligned}$$

Which statement is true?

A The 3 was not distributed correctly.

B The terms in the brackets should have been added first.

C In the second step, 5 should have been added to both sides of the equation, not subtracted.

D The solution is correct.

10. Which equation has a solution of -18?

A $3x - 9 = 45$

B $-4 + \left(\frac{1}{3}\right)x = -10$

C $\left(\frac{1}{6}\right)x + 3 = \left(\frac{1}{6}\right)(x + 3)$

D $-x + 2 = -16$

11. Which of these equations does NOT have a solution of $x = 12$?

A $\frac{x}{-4} = -3$

B $\left(\frac{2}{3}\right)x - 5 = \left(\frac{1}{4}\right)x$

C $\frac{x}{3} + 1 = -\frac{x}{2} + 1$

D $\frac{(5x)}{6} - 3 = \frac{x}{2} + 1$

12. Mitchell is paid twice the normal hourly wage for each hour he works over 40 hours in a week. Last week he worked 50 hours and earned $754.20. What is Mitchell's hourly wage?

A $11.72

B $12.57

C $13.55

D $18.86

13. At the circus, an adult ticket costs 3 times more than a child's ticket. If 2 adults and 3 children go to the circus and pay $45.00, what is the cost of an adult ticket to the circus?

A $5.00

B $10.00

C $15.00

D $20.00

14. Here is Sam's solution to a problem.

$$\begin{aligned} 4(6x + 9) &= 60 \\ 24x + 36 &= 60 \\ 24x &= 24 \\ x &= 1 \end{aligned}$$

Which statement is true?

A Sam did not distribute the 4 correctly.

B Sam should have added the $6x$ and $9x$ together first to get $15x$.

C Sam subtracted 36 from 60 instead of adding 36 to 60.

D Sam did not make an error.

Name_____ Date _____ Class _____

15. Solve for k.

$$\left(\frac{3}{8}\right)k - 5 = \left(\frac{1}{2}\right)k - 8$$

A $k = -24$

B $k = -\frac{8}{3}$

C $k = \frac{8}{3}$

D $k = 24$

16. Bree wants to solve this equation:

$$-\left(\frac{1}{8}\right)x - 5 = \left(\frac{1}{4}\right)x + 3$$

What step should she do first?

A Subtract 5 from both sides.

B Add 5 to both sides.

C Multiply both sides by -8.

D Divide both sides by 4.

17. Ray did several odd jobs this week and donated $\frac{1}{5}$ of the money he earned to a local food bank and $\frac{1}{4}$ of the money he earned to a homeless shelter. If Ray donated a total of $27.00 to the two organizations, how much did he earn this week doing odd jobs?

A $27.00

B $60.00

C $133.25

D $243.00

18. What is the value of a in the following equation?

$$\left(\frac{5}{2}\right)a - (a + 4) = a + 10$$

A 3

B 28

C 7

D 12

Name_____ Date _____ Class _____

ALGEBRA

Solve Two-Step Inequalities

M8A2 Students will understand and graph inequalities in one variable. Also M8A2.a, M8A2.b, M8A2.c, and M8A2.d

Select the best answer for each question.

1. Which inequality has the solution $v \geq 2$?

A $-2v - 7 \geq -3$

B $8 + 3v \leq 2$

C $7v + 9 \geq 23$

D $3 - 5v \geq 10$

2. Which is the solution to this inequality?

$$\frac{x}{6} - 2 < 5$$

A $x < 42$

B $x > 42$

C $x > 18$

D $x < \frac{1}{2}$

3. Which inequalities have the solution $s \leq 1$?

Inequality I	**Inequality II**
$3 + 4s \leq 7$	$3s - 10 \leq -13$
Inequality III	**Inequality IV**
$9 - 7s \leq 4$	$1 - 3s \geq -4$

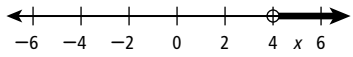
A all of them

B none of them

C all but IV

D inequality I

4. Which inequality is represented by this graph?



A $5 - x > 4$

B $2x + 1 \geq 9$

C $2x - 5 > 3$

D $6x - 7 > 5$

5. Carly has $18 to spend on pizza. A large pizza costs $9 plus $1.75 per topping. Which inequality would you use to find out how many toppings, n, Carly can get on her pizza?

A $9 + 1.75n > 18$

B $1.75n + 9 \leq 18$

C $18 \leq 1.75n + 9$

D $9 + 1.75n < 18$

6. Which values of p make the inequality true?

$$-5p + 1 > 21$$

A $p > -4.4$

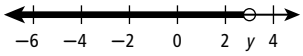
B $p < -4.4$

C $p > -4$

D $p < -4$

Name_____ Date _____ Class_____

7. Which inequality is represented by this graph?



A $6 - 2y \geq 0$
B $6 - 2y > 0$
C $6 - 2y \leq 0$
D $6 - 2y < 0$

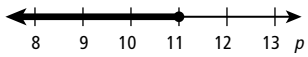
8. Which inequality has the solution $w \geq -14$?

A $16 - 3w \leq 58$
B $-3w + 1 \leq 38$
C both A and B
D neither A nor B

9. At a carnival, the cost to play a bowling game is \$2 plus \$0.40 for each attempt to knock over the pins. Which inequality would you use to find the number of attempts you can make if you have \$4.30?

A $4.3 \leq 0.4a + 2$
B $0.4a + 2 \leq 4.3$
C $2 + 0.4a < 4.3$
D $2 + 0.4a > 4.3$

10. Which inequality is represented by this graph?



A $4 - p < -7$?
B $4 - p > -7$?
C $4 - p \geq -7$?
D $4 - p \leq -7$?

11. What is the solution to the following inequality?

$$13 - 6x < 4x - 77$$

A $x > -9$
B $x > 9$
C $x < -9$
D $x < 9$

12. Which inequality does NOT have -9 as part of the solution set?

A $5y - 4 > 32 + 7y$
B $\left(\frac{2}{3}\right)y > -21$
C $7 - 2y > 10$
D $8 + \left(\frac{1}{3}\right)y > 2 - y$

13. Which inequality has the solution $a \geq 45$?

A $55 - a < 11$
B $2a + 8 > 90$
C $3a - 90 \geq 45$
D $-3a - 4 \geq -136$

14. Which is the solution to this inequality?

$$24m - 35 < 37$$

A $m < \frac{1}{12}$
B $m > \frac{1}{12}$
C $m > 3$
D $m < 3$

Name_____ Date _____ Class_____

15. Which inequality does NOT have the solution $g \leq 7$?

Inequality I	**Inequality II**
$4g + 18 \leq 46$	$12g - 80 \leq 4$
Inequality III	**Inequality IV**
$-g + 3 \geq -4$	$16 - 5g \leq -19$

A Inequality I
B Inequality II
C Inequality III
D Inequality IV

16. What is the solution to the following inequality?

$$-5(6y + 22) < -12y + 70$$

A $y < -10$
B $y < \frac{8}{3}$
C $y > -10$
D $y > \frac{8}{3}$

17. What is the solution to the following inequality?

$$-\left(\frac{5}{2}\right)y + 2 < -\left(\frac{3}{2}\right)y - 4$$

A $y < -6$
B $y < -3$
C $y > 3$
D $y > 6$

18. What is the solution to the following inequality?

$$\left(\frac{1}{2}\right)x + 2 \geq \left(\frac{1}{4}\right)x - 3$$

A $x \leq -20$
B $x \leq -5$
C $x \geq -5$
D $x \geq -20$

Name_____ Date _____ Class_____

ALGEBRA

Systems of Equations

M8A5 Students will understand systems of linear equations and use them to solve problems. Also M8A5.a, M8A5.b, and M8A5.c

Select the best answer for each question.

1. Which ordered pair represents the solution to the following linear system?

$$y = 2x - 2$$
$$y = -\frac{1}{4}x + 7$$

A (4, 1)
B (4, −6)
C (4, 6)
D (4, −1)

2. What are the coordinates of the point of intersection for the following linear system?

$$y = 2x + 1$$
$$y = 3x - 1$$

A (2, 2)
B (2, 5)
C (5, 2)
D (5, 5)

3. Two basketballs and one football cost $92. Four basketballs and 3 footballs cost $212. Which system of equations could be used to find the costs of one basketball and of one football?

A $b + 2f = 92$
$4b + 3f = 212$

B $2b + f = 92$
$4b + 3f = 212$

C $2b + f = 92$
$3b + 4f = 212$

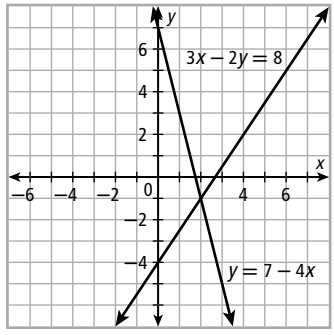
D $b + 2f = 92$
$3b + 4f = 212$

4. Which ordered pair represents the solution to the following linear system?

$$y = 2x$$
$$y = x + 4$$

A (4, 1)
B (4, −2)
C (4, 8)
D (4, 4)

5. What are the coordinates of the solution to this linear system?



A (2, 1)
B (−2, 1)
C (−1, 2)
D (2, −1)

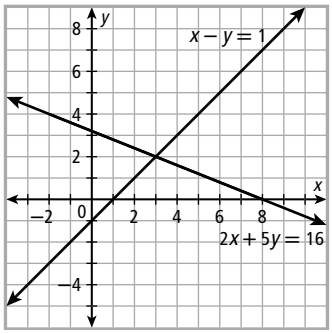
6. Which ordered pair is the solution to the following linear system?

$$y = 6 - x$$
$$y = x - 4$$

A (1, 5)
B (5, 1)
C (−1, 5)
D (−5, −1)

Name_____ Date _____ Class _____

7. What are the coordinates of the solution to this linear system?



A (2, 3)
B (−2, 3)
C (3, 2)
D (−2, −3)

8. Five Frisbees and 3 volleyballs cost $88. The cost of 2 Frisbees and 7 volleyballs is $186. Which system of equations could be used to find the costs of one Frisbee and of one volleyball?

A $3f + 3v = 88$
$2f + 7v = 186$
B $5f + 3v = 88$
$7f + 2v = 18$
C $5f + 3v = 88$
$2f + 7v = 186$
D $3f + 5v = 88$
$2f + 7v = 186$

9. Refer to question 8. What is the cost of one of each of the items?

A Frisbee: $26; volleyball: $2
B Frisbee: $2; volleyball: $26
C Frisbee: $3; volleyball: $22
D Frisbee: $15; volleyball: $17

10. A fitness club offers two membership plans. The first plan costs $30 per month. The second plan costs $18 per month plus $2 for each visit to the club. Which is the least number of visits you need to make so the first plan is worthwhile?

A 7
B 6
C 5
D 1

11. Which ordered pair is the solution to the following linear system?

$$y = -x + 7$$
$$y = 2x + 4$$

A (1, 6)
B (6, 1)
C (1, 1)
D (6, 6)

12. Which linear system has the solution (4, 5)?

A $y = 3x - 7$
$y = 4x + 3$
B $y = 3x - 7$
$2x - y = 3$
C $y = 3x + 1$
$2y - 5x = 32$
D $3y = x - 1$
$y - x = 4$

Name_____ Date _____ Class _____

13. Colin has $1.85 in nickels and quarters. Altogether he has 17 coins. Which linear system can be used to find out how many of each type of coin Colin has?

A $n + q = 17$
$5n + 25q = 1.85$

B $n + q = 17$
$0.05n + 0.25q = 1.85$

C $n + q = 17$
$25n + 5q = 1.85$

D $n + q = 17$
$0.25n + 0.05q = 1.85$

14. Refer to question 13. How many of each coin does Colin have?

A nickels: 5; quarters: 12

B nickels: 12; quarters: 5

C nickels: 17; quarters: 0

D nickels: 0; quarters: 17

15. Which linear system has the solution $(-3, 9)$?

A $4y - x = 1$
$y - 3x = 0$

B $y = x - 6$
$2y - 5x = 3$

C $y = 4x - 11$
$y - x = 12$

D $y = x + 12$
$y + 3x = 0$

16. The total yearly cost of a membership to an amusement park is $175.00 plus $8.00 parking for each visit. Non-members pay $35.50 to visit the park, which includes parking. What is the least number of times a member must visit to park to make the yearly membership cost effective?

A at least 5 visits

B at least 6 visits

C at least 7 visits

D at least 8 visits

17. Which linear system has the solution $(0, -1)$?

A $y = 3x - 1$
$y = \frac{x}{5} - 1$

B $y = 5x - 1$
$y = x + 3$

C $y = -x + 1$
$y = 5x - 1$

D $y = x - 1$
$y = x - 4$

18. Employees at a retail store can choose how they want to be paid. The first option is a wage of $9.00 per hour. The second option is a wage of $7.50 per hour plus a $4.50 shift bonus for each shift worked. Suppose an employee chose the first option. What is the minimum number of hours he needs to work per shift so that the first option pays more?

A at least 3 hours

B at least 1 hour

C at least 5 hours

D both plans always pay the same

Name_____ Date _____ Class _____

DATA AND PROBABILITY

Counting

M8D2.b. Apply the addition and multiplication principles of counting. Also M8D2.a

Select the best answer for each question.

1. Marcella has three hats, two gloves, and four scarves at home. How many different combinations of hats, gloves, and scarves can she wear to school in a particular morning?

A less than 9
B 9
C 12
D 24

The student council in Jack's middle school consists of 6 representatives. In order to be fair, the school states that 3 of the representatives have to come from 7th grade, and 3 of the representatives have to be female students. In a mid-term executive meeting, the 6 representatives sit in a line. Use the given information to answer questions 2 to 4.

2. In how many different ways can the six representatives sit in the line if two boys or two girls can NOT sit beside each other?

A 36
B 48
C 72
D 21,600

3. Mary is the president of the student council and Jack is the vice-president. In how many ways can they sit if the president and the vice-president have to take the first and the last seat in the line?

A 12
B 24
C 48
D 96

4. Jenny, Iris, and Tom are the three senior representatives in the student council and have been good friends for four years. In how many ways can the six representatives sit in the line if these three seniors always want to sit together?

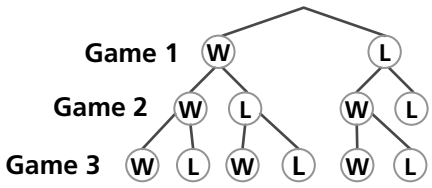
A 24
B 72
C 144
D none of the above

5. If two dice are rolled, how many different outcomes are possible? (Assume order is important.)

A 6
B 12
C 36
D 144

Name_____ Date _____ Class_____

6. The tree diagram represents the possible outcomes for a team after three games in a state football championship. (W means win and L means loss.) The championship rules are as follows: There are no ties. A team is eliminated if it loses 2 games in a row. How many outcomes are there for the fourth game?



A 6
B 8
C 10
D 12

7. Teams A, B, C, D, and E are in the playoffs. In how many ways can these teams be ranked from highest to lowest based one their scores if the only information given is that Team B has a score higher than Team D does and Team C is in the third place?

A 10
B 12
C 24
D 120

8. A dinner table has six chairs. How many ways can a host seat 5 guests if the host always sits at the head of the table?

A 10
B 24
C 120
D 720

9. Seven people are waiting to audition for a play. In how many different orders can the auditions be done?

A 7
B 14
C 5,040
D 49

Use this information to answer questions 10 and 11. A bag contains 5 red marbles, 6 green marbles, and 4 black marbles. Chris randomly picks a marble out of the bag, records the color, and puts it back. Chris repeats the experiment 3 times.

10. How many possible outcomes are there?

A 3
B 6
C 18
D 120

11. How many possible outcomes are there that do not include any marbles of the same color?

A 6
B 3
C 2
D 1

Name_____ Date _____ Class _____

Use this information to answer questions 12 to 15. A math course has four sections. Three students each randomly choose a section to enroll in.

12. In how many different ways can the three students choose to enroll?

A 6
B 9
C 27
D 64

13. In how many different ways can they all end up in the same section?

A 1
B 3
C 4
D 27

14. In how many different ways can they all end up in different sections?

A 12
B 24
C 27
D 64

15. In how many different ways can they enroll so that that none of them are enrolled in the first section and they are all in different sections?

A 1
B 3
C 4
D 6

16. Mary's dance club recruits executives at the beginning of every semester. For this term, seven students have handed in their applications, and three of them will be chosen to become executives. How many different combinations are there if the three executives are chosen randomly?

A 35
B 140
C 210
D 343

17. Refer to question 16. How many different ways can the executives be randomly chosen and assigned to positions of president, vice-president, and social director?

A 35
B 140
C 210
D 343

18. A car comes with a choice of 7 colors, 4 interiors, standard or automatic transmission, 4-cylinder or 6-cylinder engine, and 2-wheel or 4-wheel drive. How many possible different cars are there?

A 168
B 224
C 2,688
D 5,376

Name_____ Date _____ Class_____

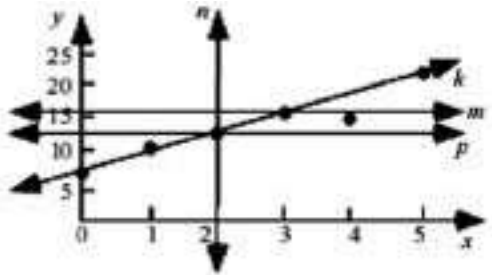
DATA AND PROBABILITY

Scatter Plots and Lines of Best Fit

M8D4.a. Gather data that can be modeled with a linear function. Also M8D4.b

Select the best answer for each question.

1. Which line appears to be the line of best fit for the data shown?



A line *k*
B line *m*
C line *n*
D line *p*

2. Harry noticed that as the day went on, the temperature increased. Which is true about the line of best fit for the data shown in a scatterplot?

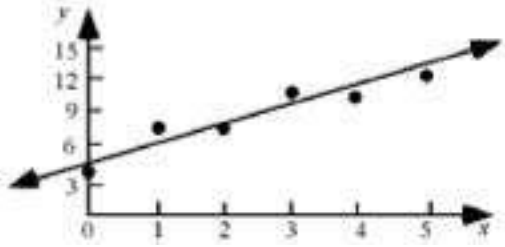
A The line falls from left to right.
B The line rises from left to right.
C The line is horizontal.
D The line rises, then falls from left to right.

3. The table below shows a set of data. Which of the following is the best estimate of the *y*-coordinate of the data point (6, *y*)?

x	1	2	3	4	5
y	24	21	17	15	12

A 0
B 9
C 15
D 18

4. Given the trend shown in the scatterplot below, which is the best estimate of the *y*-coordinate of the data point (6, *y*)?

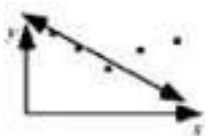


A 6
B 8
C 13
D 35

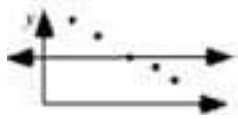
Name _____ Date _____ Class _____

5. Which diagram shows a line of best fit?

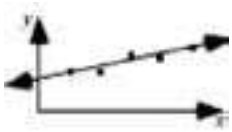
A



B



C



D

6. The table below shows a set of data. Which of the following is true about the line of best fit?

x	1	2	3	4	5
y	4	7	9	12	15

A The line rises from left to right.

B The line falls from left to right.

C The line is horizontal.

D The line rises, then falls from left to right.

7. The table below shows a set of data. Which of the following is the best estimate of the *y*-coordinate of the data point (9, *y*)?

x	4	5	6	7	8
y	13	17	21	25	28

A 2

B 9

C 24

D 32

8. Tamara noticed that as time passed, the temperature of her beverage decreased. Which is true about the line of best fit for the data shown in a scatterplot?

A The line falls from left to right.

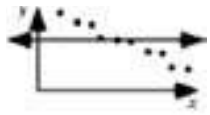
B The line rises from left to right.

C The line is horizontal.

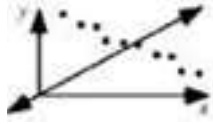
D The line rises, then falls from left to right.

9. Which diagram shows a line of best fit?

A

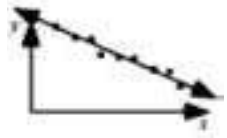


C



B

D



10. In a scatterplot showing values of *x* along the horizontal axis and values of *y* along the vertical axis, the line of best fit for the data rises from left to right. What is the most reasonable conclusion about the pairs (*x*, *y*)?

A As *x* increases, *y* decreases.

B As *x* increases, *y* increases.

C As *x* increases, *y* stays the same.

D As *x* increases, *y* increases to a maximum, then decreases.

Name_____ Date _____ Class_____

11. Which is true about the line of best fit for data shown in a scatterplot?

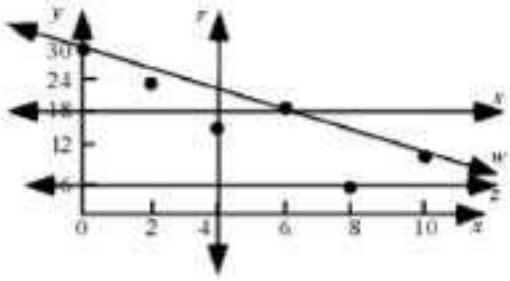
A The line must go through all the data.

B The line must not go through any of the data.

C The line may go through some data points and not others.

D The line must be horizontal.

12. Which of the following lines appears to be the line of best fit for the data shown?



A line *r*

B line *s*

C line *w*

D line *z*

13. The table below shows a set of data. Which of the following is a reasonable estimate of the value of *y* when $x = 12$?

x	2	4	6	8	10
y	17	22	28	33	37

A 39

B 42

C 45

D 48

14. In a scatterplot comparing *x* and *y*, the *y*-values are along the vertical axis. The line of best fit is horizontal. Which statement best describes relationship between *x* and *y*?

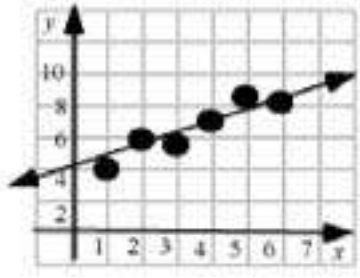
A As *x* increases, *y* increases.

B As *x* increases, *y* decreases.

C as *x* increases, *y* stays the same.

D as *y* increases, *x* stays the same.

15. Using the scatterplot below, make a reasonable estimate of the value of *y* when $x = 7$. Which of the following is NOT a possible answer?



A 7

B 8

C 9

D 10

16. The table below shows a set of data. Estimate the *y*-coordinate of the data point (9, *y*). Explain your reasoning.

x	4	5	6	7	8
y	13	17	21	25	28

A 27

B 30

C 32

D 35

Name_____ Date _____ Class _____

DATA AND PROBABILITY

Theoretical Probability

M8D3.a. Find the probability of simple independent events. Also M8D3.b.

Select the best answer for each question.

1. What is the theoretical probability of getting a four on one roll of a number cube?

A 12.5%
B 16.7%
C 20%
D 25%

2. What is the theoretical probability of getting three heads in three tosses of a coin?

A 6.25%
B 12.5%
C 25%
D 37.5%

3. A set of cards includes 15 green cards, 10 blue cards, and 10 orange cards. What is the probability that a card randomly chosen will be orange?

A $\frac{1}{10}$
B $\frac{1}{15}$
C $\frac{2}{7}$
D $\frac{5}{7}$

4. Based on theoretical probability, which result is most likely if you tossed a fair coin 100 times?

A 35 heads and 65 tails
B 10 heads and 90 tails
C 50 heads and 50 tails
D 40 heads and 60 tails

5. What is the theoretical probability of having five girls in a row in one family?

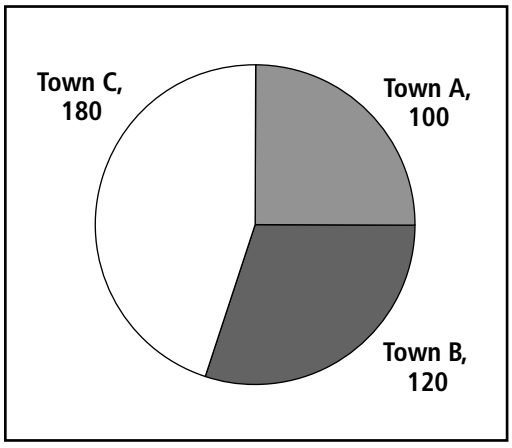
A $\frac{1}{64}$
B $\frac{1}{32}$
C $\frac{1}{16}$
D $\frac{1}{8}$

6. If a family has five girls in a row, what is the theoretical probability that the next child will also be a girl?

A $\frac{1}{32}$
B $\frac{1}{16}$
C $\frac{1}{8}$
D $\frac{1}{2}$

Name_____ Date _____ Class _____

Students at Tri-City Middle School come from Towns A, B, and C. The following graph shows the number of students at Tri-City High from each town. Use the graph for questions 7 to 9.



7. What is the probability that a student picked at random is from Town B?

A 6%
B 12%
C 30%
D 36%

8. What is the probability that a student picked at random does NOT come from Town C?

A 45%
B 55%
C 65%
D 70%

9. 100 new students from nearby Town D enroll at Tri-City Middle School. What percent of the students now come from Town A?

A 20%
B 22%
C 24%
D 6%

10. Amir tossed a number cube several times. He got the number "3" on 5 of the tosses. Based on theoretical probabilities, what is the best estimate of the total number of times he tossed the cube?

A 10
B 15
C 24
D 30

11. What is the theoretical probability of having a boy, a girl, a boy, and a girl in that order in one family?

A $\frac{1}{64}$
B $\frac{1}{32}$
C $\frac{1}{16}$
D $\frac{1}{8}$

12. What is the probability of rolling a fair number cube and getting a 6 three times in a row?

A $\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$
B $\frac{1}{6} \times \frac{1}{6} \times \frac{1}{3}$
C $\frac{1}{6} \times \frac{1}{6}$
D $\frac{1}{6} \times 3$

Name_____ Date _____ Class _____

Use this information for questions 13 and 14. A platter of fruit has 18 apples, 10 pears, 8 oranges, and 4 mangos. Pieces of fruit are picked at random.

13. What is the probability of getting a pear or an orange?

A 25%
B 20%
C 45%
D 55%

14. What is the probability of getting a piece of fruit that is NOT an apple?

A 55%
B 45%
C 25%
D 20%

15. Which answer gives the sample space for the outcome of rolling a single number cube?

A {0, 1, 2, 3, 4, 5, 6}
B {1, 2, 3, 4, 5, 6}
C {0}, {1}, {2}, {3}, {4}, {5}, {6}
D the number facing up on a given roll

16. The picture shows an octahedron. It is formed by two square pyramids whose bases have been joined together. The faces of the octahedron are numbered consecutively starting with 1. If the octahedron is rolled, what is the probability that the octahedron would land on the side numbered 2 or 5?

A $\frac{1}{10}$
B $\frac{1}{5}$
C $\frac{1}{8}$
D $\frac{1}{4}$

17. There are three outcomes in a sample space. The probability of the first outcome is $\frac{1}{3}$ and the probability of the second outcome is $\frac{1}{6}$. What is the probability of the third outcome?

A $\frac{1}{2}$
B $\frac{1}{3}$
C $\frac{1}{6}$
D $\frac{2}{3}$

Name_____ Date _____ Class_____

DATA AND PROBABILITY

Set Theory

M8D1.b Determine subsets, complements, intersection, and union of sets. Also M8D1.c

Select the best answer for each question.

For questions 1–3, set $A = \{m, a, t, h\}$ and set $B = \{t, h, e, o, r, y\}$.

1. What is the intersection of A and B, denoted by $A \cap B$?

A {t, h}
B {m, a, e, o, r, y}
C $\varnothing$
D none of the above

2. Sets A and B are both subsets of the alphabet. Let $C = A \cup B$, what is the complement of C, C', with respects to the alphabet?

A {m, a, t, h, e, o, r, y}
B {a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}
C {b, c, d, f, g, i, j, k, l, n, p, q, s, u, v, w, x, z}
D {t, h}

3. Which of the following is the complement of A with respect to C, as defined in the previous question?

A A
B B
C {e, o, r, y}
D $A \cap B$

4. The set of all prime numbers is a subset of the set of all natural numbers. Which of the following is an element in the complement of the set of prime numbers with respect to the set of natural numbers?

A 0
B 1
C 2
D 3

5. If E, F and G are arbitrary sets, which of the following is equal to $(E \cap F) \cup G$?

A $E \cap (F \cup G)$
B $E \cap F \cap G$
C $(E \cap F) \cup (F \cap G)$
D $(E \cup G) \cap (F \cup G)$

6. If $A \subset B$ and A' is the complement of A with respect to B, what are $A \cap A'$ and $A \cup A'$?

A B and $\varnothing$
B $\varnothing$ and B
C A and B
D none of the above

Name_____ Date _____ Class _____

7. Set $A = \{a, b, c\}$, set $B = \{d, e, f\}$, and $C = \{d, e, c, a, f\}$. Which of the following statements is true?

I. $a \in A \cap C$
II. $B \subset C$
III. $b \notin A \cup C$
IV. $c \in B \cap C$

A I only
B I and II
C III and IV
D II and III

8. $\{1, 2\} - \{red, green\} = ?$

A $\{1, 2\}$
B $\{red, green\}$
C $\varnothing$
D $\{1, 2, red, green\}$

9. If $A = \{January, February, March\}$ and $B = \{March, April, May\}$, what is $A - B$?

A A
B B
C {January, February}
D {January, February, March}

10. A proper subset of a set is a subset that does NOT contain all the elements of the set. Which of the following is NOT a proper subset of the set of all integers?

A the union of the set of whole numbers and the set of negative integers
B the set of all prime numbers
C the set of all odd numbers
D the set of all even numbers

11. In set theory, the axiom for extensionality states that two sets are the same if and only if they have the same elements. By that axiom, which of these sets are the same?

A the set of all whole numbers and the set of all natural numbers
B the set of all prime numbers and set of all odd numbers
C the set of all multiples of 2 and set of all even numbers
D the set of letters in the word "axiomatic" and the set of letters in the word "automatic"

12. Which of the following statements is true about the special sets of numbers; the natural numbers ($\mathbb{N}$), the integers ($\mathbb{Z}$), the rational numbers ($\mathbb{Q}$), and the real numbers ($\mathbb{R}$)?

A $\mathbb{N} \subseteq \mathbb{Z} \subseteq \mathbb{Q} \subseteq \mathbb{R}$
B $\mathbb{N} \supset \mathbb{Z} \supset \mathbb{Q} \supset \mathbb{R}$
C $\mathbb{N} \subseteq \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R}$
D $\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R}$

13. The intersection of which pair of sets is the empty set?

A natural numbers and integers
B natural numbers and irrational numbers
C rational numbers and real numbers
D real numbers and irrational numbers

Name_____ Date _____ Class_____

For questions 14–17, set A = {red, orange, yellow, green, blue} and set B = {January, February, ... , November, December}.

14. If C = {red, October}, what is $(C - B) - A$?

A A
B $A \cup B$
C C
D $\varnothing$

15. Set D = {orange, green, blue} and x represents an element of D. Which of the following is true?

A $x \in D$ and $x \in A$
B $x \in D$ and $x \notin A$
C $x \in D$ and $x \in B$
D $x \in A$ and $x \in B$

16. Using set D from the previous question, what is $A - D$?

A $A \cap D - A \cup D$
B D
C {red, yellow}
D $D - A$

17. A and B have no common elements. Which of the following is an equivalent statement of this?

A $A \cap B = \varnothing$
B A and B are mutually exclusive.
C $B \cap A = \varnothing$
D all of the above

18. O = {all positive odd integers}, P = {all prime numbers}, and Q = {positive differences of consecutive perfect squares of integers}. Which of the following is true about these three sets?

A $P \subset O \subset Q$
B $P - O = \{2\}$ and $Q - O = \varnothing$
C $(O - P) \subset Q$
D both B and C, but NOT A

19. If P = {all prime numbers} and E = {all even numbers} Which of the following expression represents the set of all even primes?

A $E \cup P$
B $E \cap P$
C $E - P$
D $P - E$

20. If c is an arbitrary element and X and Y are arbitrary sets, which of the following expressions indicates c to be an element that is a member of one of X and Y, but NOT both?

A $c \in [(X - Y) \cup (Y - X)]$
B $c \in (X \cup Y)$
C $c \notin (X \cap Y)$
D $c \in X$

Name_____ Date _____ Class _____

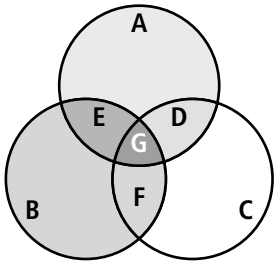
DATA AND PROBABILITY

Venn Diagrams

M8D1.a Demonstrate relationships among sets through use of Venn diagrams.

Select the best answer for each question.

Use this Venn diagram for questions 1–5. The three circles represent sets *A*, *B*, and *C*, are the sets. Sets *D*, *E*, *F*, and *G* are the intersections, which do NOT overlap each other, as labeled.



1. Which of the following is set E equal to, in terms of A, B, and C?

A $A \cap B$
B $A \cap B \cap C$
C $(A \cup B) \cap C$
D $(A \cap B) - (A \cap B \cap C)$

2. Which of the following is set $D \cup G$ equal to, in terms of A, B, and C?

A $A \cap C$
B $A \cap C \cap B$
C $(A \cup C) \cap B$
D $(A \cap B) - (A \cap B \cap C)$

3. Which of the following is set $D \cup G \cup F$ equal to, in terms of A, B, and C?

A $A \cap B$
B $A \cap B \cap C$
C $(A \cup B) \cap C$
D $(A \cap B) - (A \cap B \cap C)$

4. Which of the following is set G equal to, in terms of A, B, and C?

A $A \cap B$
B $A \cap B \cap C$
C $(A \cup B) \cap C$
D $(A \cap B) - (A \cap B \cap C)$

5. Each area on the diagram represents a nonempty set, that is, $C - F - G - D \neq \varnothing$. Sets A, B, and C could represent which choice of three groups of things?

A all mammals, all humans, all invertebrates
B all isosceles triangles, all acute triangles, all triangles with one side length 3 units
C all letters of the Greek alphabet, all irrational numbers, all prime numbers
D all plants, all carnivores, all flowers

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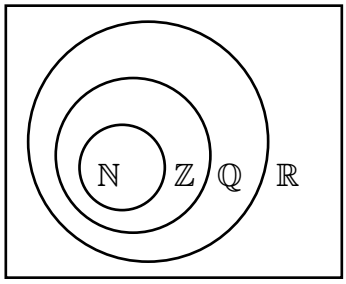
Use this Venn diagram of the set of all real numbers and its subsets for questions 6–8. ($\mathbb{N}$, $\mathbb{Z}$, $\mathbb{Q}$, and $\mathbb{R}$ represent natural numbers, integers, rational numbers and real numbers, respectively.)



6. Which of the following is the representation of the relationship between the subsets of the real numbers?

A $\mathbb{N} \subseteq \mathbb{Z} \subseteq \mathbb{Q} \subseteq \mathbb{R}$

B $\mathbb{N} \supset \mathbb{Z} \supset \mathbb{Q} \supset \mathbb{R}$

C $\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R}$

D none of the above

7. From the Venn diagram, determine which statement is false.

A All natural numbers are real numbers.

B All integers are rational numbers.

C Some real numbers are rational numbers.

D No real numbers are natural numbers.

8. Which subset of the rational numbers is NOT in the set of integers?

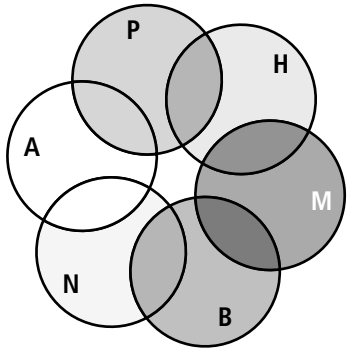
A natural numbers

B irrational numbers

C all fractions

D irreducible fractions where the denominator is NOT 1

Use this Venn diagram for questions 9–11. Sets *A*, *N*, *M*, *B*, *H*, and *P* represent Andrew's, Natasha's, Boris's, Maria's, Helen's and Pierre's group of friends respectively.



9. Since a Venn diagram shows all logical relations between sets, which pair does NOT share a friend?

A Pierre and Helen

B Natasha and Boris

C Natasha and Helen

D Andrew and Pierre

10. A politician is someone who is everybody's friend. Which of the following statements is true?

A Everyone has at least one friend in common with someone else.

B There is no politician in this group.

C Each person is a politician.

D A and B only

11. Andrew has three friends. Lisa's set of friends is a subset of Andrew's friends and she shares friends only with Andrew. How many friends does Lisa have?

A 0

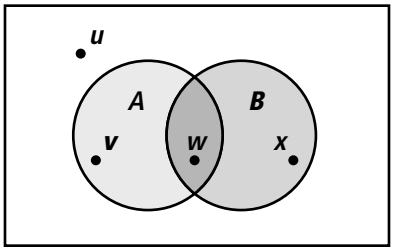
B 1

C 2

D 3

Name_____ Date _____ Class _____

Use this Venn diagram for questions 12–14. *A* = {all plants that bear fruit}, *B* = {all plants that have flowers}, and the box outside both circles represents all plants. Points *u*, *v*, *w*, and *x* represent particular elements in the sets.



12. Moss is a small plant that does NOT flower or bear fruit. Which point might represent moss?

A *u*
B *v*
C *w*
D *x*

13. Cherry trees, besides bearing fruit also have beautiful flowers. Which point might represent a cherry tree?

A *u*
B *v*
C *w*
D *x*

14. A lilac plant flowers but does NOT bear fruit. Which point represents lilacs?

A *u*
B *x*
C *w*
D *v*

15. Which of the following describes the Venn diagram for the set all numbers with two subsets, the sets of even and odd primes?

A two circles with no intersection inside a rectangle
B three circles with 4 different regions of intersection
C two intersecting circles inside a rectangle
D none of the above

16. Manon has 3 letters from Roland, 3 letters that were sent from France, and 2 letters that are neither from Roland nor sent from France. How many letters does Manon have in total?

A at least 3
B at most 5
C at least 5
D cannot be determined

17. In a certain grade 8 class, 2 students wore blue, 5 students wore red, and 2 students wore both red and blue. How many students wore blue but NOT red?

A 0
B 1
C 2
D cannot be determined

Name_____ Date _____ Class_____

SAMPLE TEST A

Select the best answer for each question.

1. Which of the following is equal to 2^{-5}?

A -10

B $\frac{1}{16^2}$

C $\frac{1}{32}$

D 32

2. Which of the following congruence statements is true, given that rectangle *JKLM* has side lengths $JK = 8$ and $KL = 6$, and rectangle *STUV* has side lengths $TS = 6$ and $UT = 8$?

A rectangle *JKLM* ≅ rectangle *STUV*

B rectangle *JKLM* ≅ rectangle *VSTU*

C rectangle *JKLM* ≅ rectangle *UTSV*

D rectangle *JKLM* ≅ rectangle *VUTS*

3. Which pair of algebraic expressions are equivalent?

A $6x - 2(x + 2)$ and $8x + 4$

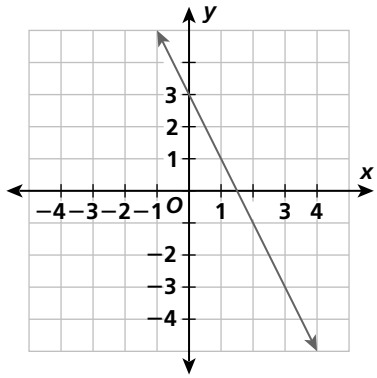
B $6x - 2(x + 2)$ and $4(x - 1)$

C $6x - 2(x + 2)$ and $4(x + 4)$

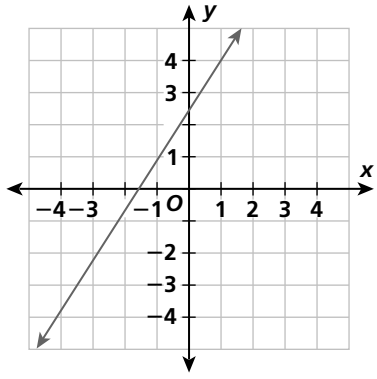
D $6x - 2(x + 2)$ and $4(x + 1)$

4. Which graph corresponds to the equation $y = -x + 3$?

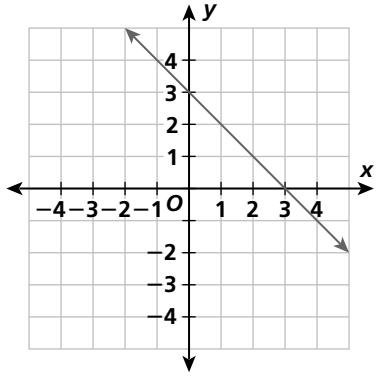
A



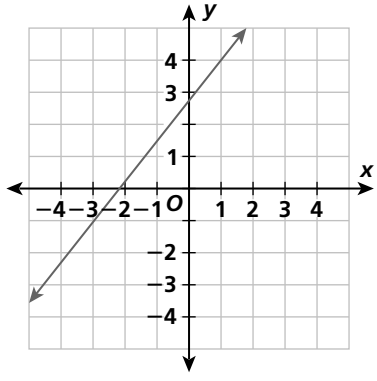
B



C



D



Name_____ Date _____ Class _____

5. Which equation has the solution $a = -16$?

A $\frac{a}{4} - 2 = 2$

B $36 - 2a = 4$

C $-12 - 3a = 32$

D $-a + 9 = 25$

6. Nick drew a triangle with sides 6 cm, 10 cm, and 17 cm long. Nora drew a similar triangle to Nick's. Which of the following can be the measurements of Nora's triangle?

A 2 cm, 3 cm, and 7.5 cm

B 2 cm, 6 cm, and 13 cm

C 3 cm, 6 cm, and 6.5 cm

D 3 cm, 5 cm, and 8.5 cm

7. Which number is $4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4$ in exponential form?

A 4^8

B 8^4

C 32^4

D 32^8

8. A courier will carry packages that weigh less than 22 lbs. Suppose you wish to send books to a friend in another state. The packing crate weighs 3 lbs and each book weighs 4 lbs. Which inequality would you use to find out how many books you can send?

A $3 + 4n > 22$

B $4n + 3 \leq 22$

C $22 \leq 4n + 3$

D $3 + 4n < 22$

9. Find the square root of 72.

A 4.5

B 8.5

C 9.3

D 11.1

10. Use the table to write the rule for the linear function

x	-2	-1	0	1
y	-1	1	3	5

A $f(x) = 2x - 1$

B $f(x) = 3x + 1$

C $f(x) = 3x - 2$

D $f(x) = 2x + 3$

11. The sample space for picking one coin from the box of coins is {G, S, B}, where G = gold, S = silver, and B = brass. Which of the following is the sample space for picking two coins from this box?

A {GG, GS, GB, SG, SS, SB, BG, BS}

B {GG, GS, GB, SG, SS, SB, BG, BS, BB}

C {G, S, B, G, S, B}

D {GG, SS, BB}

12. Multiply.

$$4^6 \times 4^8 =$$

A 4^{14}

B 4^{48}

C 16^{14}

D 16^{48}

Name_____ Date _____ Class _____

13. Two lines are parallel. The measures of two corresponding angles are $a°$ and $3b°$, and the measures of two same-side interior angles are $3a°$ and $b°$. What are then values of a and b?

A $a = 0, b = 0$

B $a = 18, b = 54$

C $a = 54, b = 18$

D $a = 90, b = 90$

14. Which operation should be performed first to simplify the following expression?

$$12(8 + 6)^2 \div 3$$

A addition

B subtraction

C multiplication

D division

15. The population of Tokyo, Japan is about 12,400,000. Which of the following shows that number in scientific notation?

A 1.24×10^6

B 1.24×10^7

C 12.4×10^7

D 0.124×10^9

16. What missing value in the table below would make the function linear?

x	2	3	4	5
y	5	8	11	?

A 12

B 13

C 14

D 15

17. Which statement is NOT true about a line of best fit for data shown in a scatter plot?

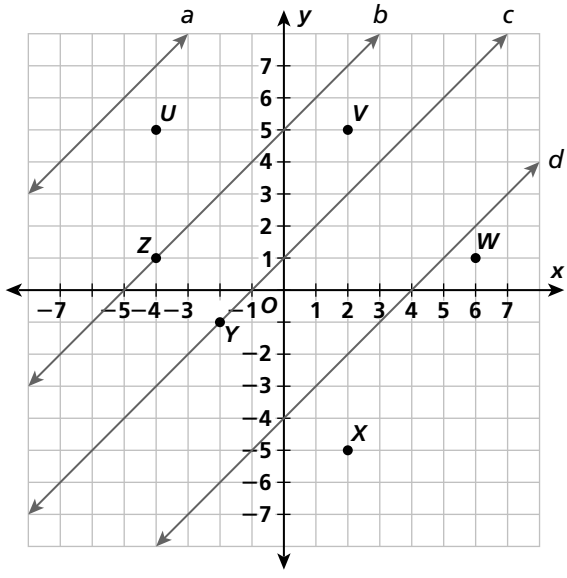
A The line of best fit must be vertical.

B The line of best fit may be horizontal.

C The line of best fit may go through all of the points.

D Both A and B

18. A line passes through point U and is perpendicular to line a. Where does this line intersect line b?



A (−3, 2)

B (−2, 3)

C (−1, 5)

D (1, 3)

19. Given that polygon $CDEF \cong$ polygon $KLMN$, which is equal to $m\angle E$?

A $m\angle K$

B $m\angle L$

C $m\angle M$

D $m\angle N$

Name _____ Date _____ Class _____

20. $\sqrt{32}$ lies between which two consecutive integers?

A 4 and 5
B 5 and 6
C 6 and 7
D 7 and 8

21. Which is NOT a Pythagorean triple?

A (3, 4, 5)
B (5, 12, 13)
C (8, 16, 18)
D (7, 24, 25)

22. Which equation models the relationship in the table if *c* represents the cost and *n* represents the number of pizzas?

c	7	14	21	28
n	1	2	3	4

A $c = 6n + 1$
B $c = 10n - 3$
C $c = 7n$
D $c = 5n + 2$

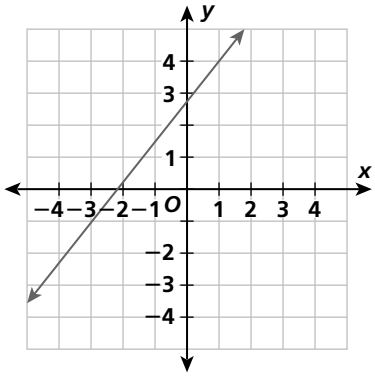
23. Which algebraic expression has a value of 1 when $x = 6$?

A $x - 7$
B $2x - 9$
C $5x - 4$
D $13 - 2x$

24. The square root of a number is 21 more than 8×9. What is the number?

A 5151
B 6000
C 8,649
D 10,500

25. How would you describe the slope of the line?



A The slope is positive.
B The slope is negative.
C The slope is 0.
D The slope is undefined.

26. Which value of *h* makes the equation true?

$$-10|h| - 4 = -40$$

A −3.6 and 3.6
B −4.4 and 4.4
C 4.4 and −3.6
D 3.6 and −4.4

27. Use the order of operations to simplify.

$$(8^2 \times 4) - 12 \times 13 + 5$$

A 87 **B** 105
C 122 **D** 314

28. Which statement is always true?

A The graph of a curved line is a function.
B Every function is a relation.
C Every relation is a function.
D An equation of the form $y^2 = x$ represents a function.

Name_____ Date _____ Class _____

29. If $A \subset B$ and A' is the complement of A with respect to B, what are $A - A'$ and $A \cup A'$?

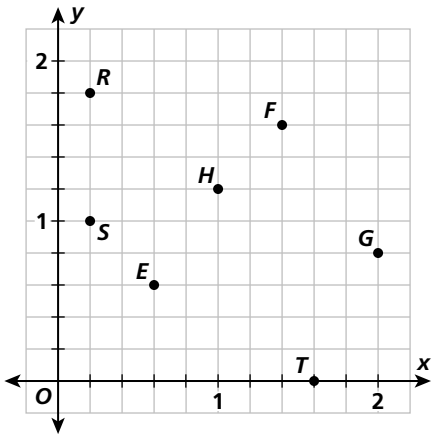
A B and $\varnothing$
B $\varnothing$ and B
C A and B
D $\varnothing$ and $\varnothing$

30. What are the coordinates of the point of intersection for the following linear system?

$$2y - x = 0$$
$$y = 3x - 5$$

A (1, 1)
B (−1, 5)
C (1, 2)
D (2, 1)

31. What are the coordinates of point G?



A $\left(\frac{1}{5}, 2\right)$
B $\left(\frac{2}{5}, 2\right)$
C $\left(2, \frac{4}{5}\right)$
D (2, 1)

32. Which of the following shapes does NOT contain a pair of parallel sides?

A rhombus
B parallelogram
C isosceles triangle
D rectangle

33. Which values of d are solutions of this inequality?

$$33 \geq -3d$$

A $d \leq -11$
B $d \geq -11$
C $d > -11$
D $d < -11$

34. Which type of real number is $\sqrt{30}$?

A rational
B irrational
C integer
D natural

35. Which of these linear functions has a slope of −2 and a y-intercept of (0, 3)?

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

36. One side of a triangle is 5 cm. The ratio of corresponding sides of this triangle and a similar, larger triangle is 2 : 7. What is the length of the corresponding side in the larger triangle?

A 7 **B** 10
C 17.5 **D** 35

Name_____ Date _____ Class _____

37. Fabio earns $9.50 per hour at his part time job. Which equation would you use to find *t*, the number of hours Fabio worked, if he earned $361?

A $361 = \frac{t}{9.50}$

B $361 = 9.50 + t$

C $9.50 = \frac{t}{361}$

D $361 = 9.50t$

38. Which operation symbol would make this expression correct?

$$4 \square 2 + 8 \times 2^3 - 4 = 62$$

A $+$

B $-$

C $\times$

D $\div$

39. Suppose *a*, *b*, and *c* are the side lengths of a right triangle. Which is NOT equivalent to the Pythagorean Theorem?

A $a + b = c$

B $a^2 = c^2 - b^2$

C $b^2 = c^2 - a^2$

D $c = \sqrt{a^2 + b^2}$

40. Which statement is true about $\sqrt{1{,}225}$?

A It is equal to $\sqrt{25} \times \sqrt{49}$.

B It is an irrational number.

C It is equal to 38.

D It is a repeating decimal.

41. Sam's math teacher asked her to name an irrational number close to 8. Which of these numbers should she NOT name?

A $\sqrt{16}$

B $\sqrt{51}$

C $\sqrt{62}$

D π^2

42. Which values of *u* make the inequality true?

$$-15u > 75$$

A $u > -5$

B $u < -5$

C $u \geq -5$

D $u \leq -5$

43. Which of these functions is nonlinear?

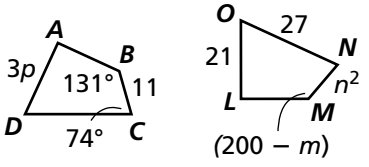
A $y = \frac{1}{4}x - 7$

B $y = 3$

C $y = 5x + \frac{1}{2}$

D $y = x^2$

44. Find *m*.



A 22 **B** 111

C 69 **D** 222

45. Find *n*.

A $\sqrt{11}$ **B** 12

C 3 **D** 17

Name_____ Date _____ Class _____

46. Solve for r.

$$\frac{3r}{4} - 7 = \frac{r}{2} + 1$$

A 32

B −32

C 8

D 24

47. Which expression is equivalent to $5(2x + 3) + 3(x - 1)$?

A $10x + 2$

B $13x + 12$

C $13x + 18$

D $10x + 12$

48. What is the common ratio in the following geometric sequence?

$$-6, 12, -24, 48, \ldots$$

A 2

B $\frac{1}{2}$

C $-\frac{1}{2}$

D −2

49. In the equation $y = \frac{1}{2}x$, if the value of x is increased by 2, what is the effect on the value of y?

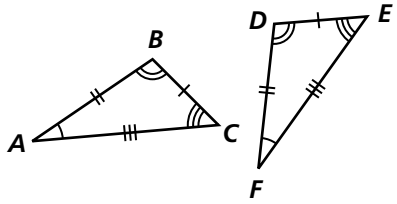
A It is half the original amount.

B It is equal to the original amount.

C It is one more than the original amount.

D It is double the original amount.

50. Which congruence statement is correct?



A triangle ABC ≅ triangle EFD

B triangle ABC ≅ triangle FDE

C triangle ABC ≅ triangle DEF

D triangle ABC ≅ triangle FED

51. The sample space for a particular trial is {(1,1), (1,2), (2,1), (2,2)}. All the outcomes in this sample space are equally likely. Which answer describes an experiment that could have this sample space?

A randomly choosing a number that is either a 1 or a 2.

B tossing two coins, with 1 being heads and 2 being tails

C tossing a coin, with 1 being heads and 2 being tails

D rolling a number cube

52. Estimate to the nearest whole number.

$$\sqrt{0} + \sqrt{588}$$

A 22

B 23

C 24

D 50

Name_____ Date _____ Class _____

53. Which of these expressions represents a function?

A $y = 6x^2$

B $y = 6x - 7$

C both A and B

D neither A nor B

54. Simplify.

$$12.1 \times 10^{-3}$$

A -36.1

B -0.0121

C 0.0121

D 363

55. Add.

$$(5^3 + 6^2 + 4)$$

A 15^5

B 25^2

C 165

D 200

56. $\sqrt{57}$ lies between which two consecutive integers?

A 4 and 5

B 5 and 6

C 6 and 7

D 7 and 8

57. What is the least number of congruent equilateral triangles needed to form a regular hexagon?

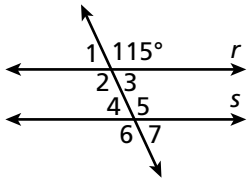
A 3

B 4

C 5

D 6

58. Line $r \parallel$ line s. Find the measure of $\angle 6$.



A 65°

B 145°

C 115°

D 180°

59. Which values of x make the equation $-3|x| = -42$ true?

A 14 and -126

B 126 and -14

C 14 and -14

D 126 and -126

60. Which of the following can NOT be the hypotenuse in a Pythagorean triple?

A 2

B 5

C 13

D 17

61. Which of the following is an irrational number?

A $\sqrt{12}$

B $\sqrt[3]{\pi^2}$

C $\sqrt{\frac{14}{3}}$

D all of the above

Name_____ Date _____ Class_____

62. If E, F and G are arbitrary sets, which of the following is equal to $(E \cup F) \cap G$?

A $E \cup (F \cap G)$
B $E \cup F \cup G$
C $(E \cup F) \cap (F \cup G)$
D $(E \cap G) \cup (F \cap G)$

63. Simplify.

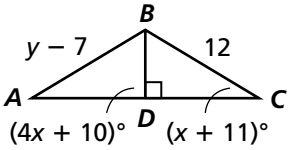
$$[86 - [6 - (-2)^5]]$$

A 42
B 48
C 77
D 105

64. What is 3.45×10^7 in standard form?

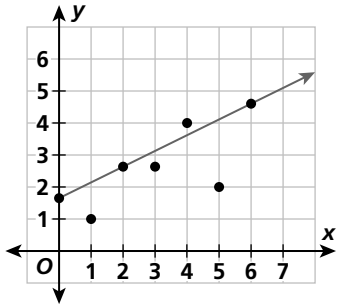
A 34,500
B 345,000
C 34,500,000
D 34,500,000,000

65. Find m∠A.



A 12°
B 19°
C 21°
D 31°

66. What is the greatest vertical distance between the line of best fit and the points representing the values in the data set?



A 0.5
B 1
C 2
D 2.5

67. A fair six-sided number cube came up showing a 4 three times in a row. Rivka says this makes it more likely that a 4 will turn up the next time. Amalie says this makes it less likely that a 4 will turn up next time. Which of the following statements is right about Rivka and Amalie's comments?

A Rivka's comment is right.
B Amalie's comment is right.
C Both of their comments are reasonable.
D Both of their comments are incorrect.

68. Which values of b make the inequality true?

$$7 - 9b + 1 > 14$$

A $b > -\frac{2}{3}$ **B** $b < -\frac{2}{3}$
C $b \leq -\frac{2}{3}$ **D** $b > 14$

Name_____ Date _____ Class _____

69. Which rational number is between $\sqrt{\frac{1}{4}}$ and $\sqrt{1}$?

A $\frac{1}{8}$

B 0.25

C $\frac{3}{4}$

D 1

70. Find the 20th term in the arithmetic sequence: 1, −3, −7, −11…

A −75

B −85

C 75

D 85

71. The census of 2000 found that approximately 6.42×10^5 people lived in North Dakota. Which of the following shows that number in standard form?

A 6,420

B 64,200

C 642,000

D 6,420,000

72. The sample space for a particular spinner is {*S*, *T*, *P*, *Q*, *R*}. The spinner is spun once. If all outcomes are equally likely, which of the following has a probability of 40%?

A spinning an *S*

B spinning an *S* and a *T*

C spinning an *S* or a *T*

D spinning an *S*, a *T*, and a *P*

73. Use the order of operations to simplify.

$$(3^2 + 3) - 25 \div 5$$

A −2.6

B 7

C 12

D 15

74. Four rawhide bones and 7 nylon bones cost $150. Three rawhide bones and 1 nylon bone cost $36. How much does each type of dog bone cost?

A rawhide: $18
nylon bone: $6

B rawhide: $18
nylon bone: $18

C rawhide: $10
nylon bone: $16

D rawhide: $6
nylon bone: $18

75. What is the rule for the linear function represented in the table?

x	*y*
−3	−11
−2	−6
1	9
2	14

A $f(x) = 3x - 2$

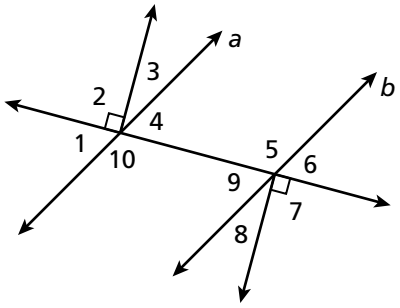
B $f(x) = 2x - 5$

C $f(x) = 5x + 4$

D $f(x) = x - 10$

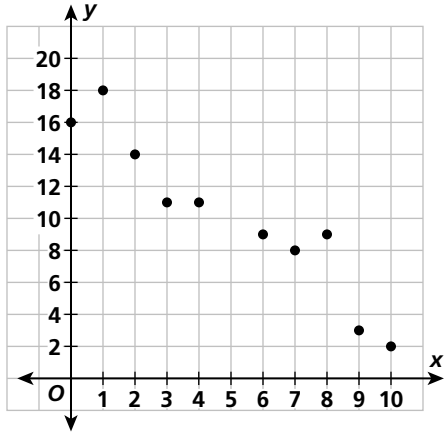
Name_____ Date _____ Class_____

76. ∠2 and ∠7 are right angles and *a* is parallel to *b*. What can be said about ∠4 and ∠9?



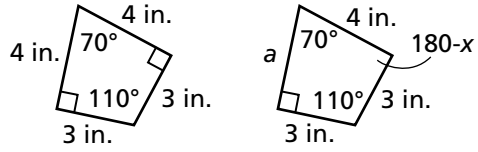
A They are supplementary.
B They are complementary.
C They are congruent.
D No relationship can be determined.

77. Predict the value of *y* when the value of *x* is 5.



A 15 **B** 10
C 0 **D** 5

78. What is $m\angle x$?



A 70° **B** 90°
C 110° **D** 135°

79. Which real number is between 1 and $\sqrt{2}$?

A 1.4
B $1\frac{2}{3}$
C $1\frac{5}{8}$
D 2

80. Martin earns $7.50 per hour painting houses. Which equation would you use to find *t*, the number of hours Martin worked, if he earned $270?

A $270 = \frac{t}{7.50}$
B $270 = 7.50 + t$
C $7.50 = \frac{t}{270}$
D $270 = 7.50t$

81. If 2.86×10^{-4} is written in standard notation, how many zeros would be included to the right of the decimal point?

A 2
B 3
C 4
D 5

82. For two parallel lines and a transversal, the $m\angle 1 = 103°$. For which pair of angle measures is the sum the biggest?

A ∠1 and a same-side interior angle
B ∠1 and a corresponding angle
C ∠1 and its supplement
D ∠1 and its complement

Name_____ Date _____ Class _____

83. Line *A* passes through points (0, 3) and (2, 6). Line *B* passes through points (−3, −2) and (0, 0). A third Line *C* is parallel to Line *A* and passes through point (−2, −3). Which of the following statement is true?

A Line *C* is perpendicular to Line *B*.

B Line *C* is parallel to Line *B*.

C Line *C* intersects Line *B* at the origin.

D Line *C* intersects line *B* at (−3, −2).

84. On a number line, between which two whole numbers would $\sqrt{777}$ be located?

A 24 and 25

B 25 and 26

C 27 and 28

D 28 and 29

85. About 129,600,000,000 gallons of water flow over Niagara Falls every day. Which shows that number written in scientific notation?

A 12.96×10^{12}

B 1.296×10^{10}

C 1.296×10^{11}

D 1.296×10^{12}

86. Which statement is true about $\sqrt{1{,}225}$?

A It is equal to $\sqrt{25} \times \sqrt{49}$.

B It is an irrational number.

C It is equal to 38.

D It is a repeating decimal.

87. A company that manufactures squeaky toys for dogs expects that 1 of every 60 toys will have a defective squeaker. How many defective squeakers should they expect in a shipment of 75,945 squeaky toys? Round to the nearest whole number.

A 1,264

B 1,265

C 1,266

D 1,267

88. Kayla went over her allotted cell phone minutes this month by 42 minutes. Her regular bill is $39.95, but this month it was $54.65. Which ratio compares her overtime minutes to the cost of those minutes?

A $\frac{\$39.95}{\$54.65}$

B $\frac{42}{\$39.95}$

C $\frac{42}{\$14.70}$

D $\frac{42}{\$54.65}$

89. According to the census, the population of St. Louis in 2000 was 348,189. The city covers an area of 61.37 square miles. What was the population density of St. Louis in 2000?

A about 6 people per square mile

B about 175 people per square mile

C about 6,000 people per square mile

D about 18,000,000 people per square mile

Name_____ Date _____ Class_____

90. The distance between two cities is 120 miles. On a map, the distance between the cities is 9.6 centimeters. What is the scale of the map?

A 1 centimeter = 12 miles
B 1 centimeter = 25 miles
C 2 centimeters = 12 miles
D 2 centimeters = 25 miles

91. A line segment has endpoints at (−5, 0) and (0, 6). What are the coordinates of the midpoint of this line segment?

A (−2, 3) **B** (−2.5, 3)
C (−2.5, 3.5) **D** (−3.5, 3.5)

92. Which group would be the best random sample of all people living in a certain town?

A Every 50th name on an alphabetical list of town residents.
B Every person in the town's library at 4:45 on a Saturday afternoon.
C Every person whose last name begins with the letter K.
D The parents of all eighth grade students.

93. A spinner is divided into five equal sectors, numbered 1, 2, 3, 4, and 4. Which of the following statements is NOT true?

A The chance of spinning a 2 is the same as for spinning a 3.
B All the outcomes are equally likely.
C The chance of spinning a 4 is twice the chance of spinning a 1.
D The chance of spinning either a 2 or a 3 is the same as the chance of spinning a 4.

94. Two gloves are drawn together from a bag containing 100 pairs. What is the probability of getting one left glove and one right glove?

A $\frac{50}{199}$
B $\frac{50}{99}$
C $\frac{1}{2}$
D $\frac{3}{4}$

95. What is the solution to the following inequality?

$$\frac{(2x)}{5} \leq -4?$$

A $x \leq -10$
B $x \leq -\left(\frac{2}{5}\right)$
C $x \geq -10$
D $x \geq -\left(\frac{2}{5}\right)$

96. Which expression is equivalent to $-5r - 3s + 2t + (-6s) - 5t + 2r$?

A $-9r + 3s - 3t$
B $-3r - 9s - 3t$
C $-r + 3s - 3t$
D $-9r + 9s - 7t$

97. When $y = -3x + 4$ is graphed, the value 4 represents which of the following?

A the slope of the line
B the y-coordinate of the y-intercept
C the x-coordinate of the y-intercept
D the quadrant in which the line lies

Name_____ Date _____ Class _____

SAMPLE TEST B

Select the best answer for each question.

1. Sammi has had her driver's license for 2 years. Her father has had his license for c times as many years as Sammi. Which expression can used to show the number of years Sammi's father has had his driver's license?

A $2 + c$
B c^2
C $2c$
D $\frac{c}{2}$

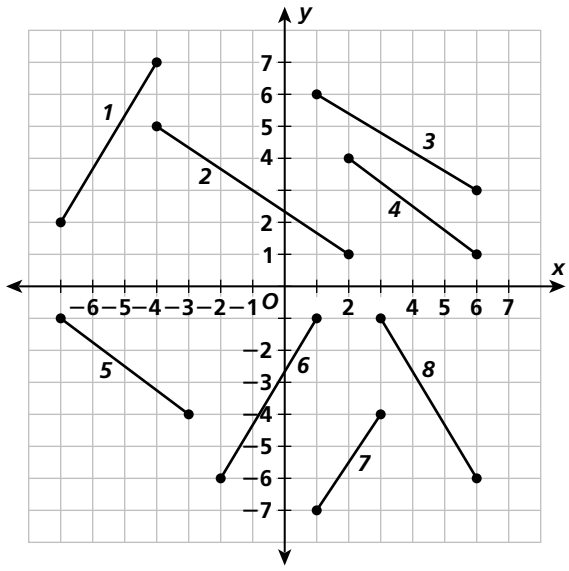
2. Which is NOT a real number?

A $\sqrt{-16}$
B 0.16
C $\sqrt{16}$
D 16

3. Which of the following could NOT be used to define slope?

A $m = \frac{(\text{vertical change})}{(\text{horizontal change})}$
B $m = \frac{\text{rise}}{\text{run}}$
C $m = \frac{(x_2 - x_1)}{(y_2 - y_1)}$
D $m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$

4. Which line segment is perpendicular to segment ①?



A ②
B ③
C ④
D ⑤

5. Which ordered pair represents the solution to the following linear system?

$$y = x - 9$$
$$y = -2x + 6$$

A $(5, 1)$
B $(5, -4)$
C $(4, 6)$
D $(4, -5)$

6. Which irrational number is closest to 8?

A $\sqrt{\pi}^3$
B $\sqrt{47}$
C $\sqrt{63}$
D $\sqrt{234}$

Name_____ Date _____ Class _____

7. Here is a solution to a problem.

$$3(2x) + 7 = 22$$
$$6x + 7 = 22$$
$$6x = 15$$
$$x = 2.5$$

Which statement is true?

A In the first step, the 7 should have been multiplied by 3.

B In the second step, 7 should have been subtracted from both sides of the equation, not added.

C In the third step, both sides should have been multiplied by 6, not divided.

D The solution is correct.

8. Lemma recorded the temperature each hour from 4 A.M. until noon one day. She displayed the data in a scatter plot. Which statement is least likely about the relationship between time and temperature on her scatter plot?

A As time passes, the temperature increases.

B As time passes, the temperature decreases.

C As time passes, the temperature stays the same.

D As the temperature increases, time stays the same.

9. Which is the value of $8 + 5(x - 2)$ when $x = 3$?

A 13

B 21

C 5

D 1

10. There are 50 gold coins, 30 silver coins, and 20 brass coins in a box. A coin is randomly chosen and replaced three times. What is the probability of getting one coin of each type?

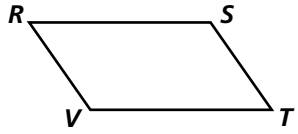
A 30%

B 15%

C 3%

D 100%

11. If $m\angle R = (x + 50)°$, and $m\angle T = (3x + 20)°$, what is the value of x?



A 15°

B 22.5°

C 65°

D 75°

12. Use the order of operations to simplify.

$$45 + \left(12 - 4^2\right) \times 3$$

A 16

B 33

C 123

D 8427

13. Polygon *DEFG* is congruent to Polygon *NOPQ*. Given that $FG = 11x - 1$, and $PQ = 14x - 10$, find PQ.

A 12

B 26

C 32

D 17

Name_____ Date _____ Class _____

14. If b is an arbitrary element and X and Y are arbitrary sets, which of the following expressions indicates b to be an element that is not a member of both sets X and Y and is not necessarily in either X or Y?

A $b \in (X - Y)$
B $b \in (X \cup Y)$
C $b \notin (X \cap Y)$
D $b \in X$

15. Evaluate $\left(\frac{4}{5}\right)^2$.

A $\frac{3}{25}$
B $\frac{16}{25}$
C $\frac{8}{5}$
D $\frac{16}{5}$

16. Which pattern shows a common ratio?

A 2, 3, 9, 20, 36
B 15, 19, 23, 27
C −3, 6, −12, 24
D −2, 0, 2, 4

17. Which inequality has the solution $x \geq -5$?

A $1 - 4x \leq 21$
B $2x + 16 < 26$
C $-7x - 1 \geq -34$
D $13 - 2x \geq 23$

18. If a computer hard drive holds 2^{38} bytes of information, how many GB does it hold?

	Kilobyte (KB)	Megabyte (MB)	Gigabyte (GB)
Amount in bytes	2^{10}	2^{20}	2^{30}

A 2^{-8}
B 2^0
C 2
D 2^8

19. Line A passes through points $(0, 3)$ and $(2, 6)$. Line B passes through points $(-3, -2)$ and $(0, 0)$. What is the relationship between Line A and Line B?

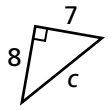
A skew
B parallel
C perpendicular
D intersecting

20. $\sqrt{80}$ lies between which two consecutive integers?

A 7 and 8
B 8 and 9
C 9 and 10
D 10 and 11

Name_____ Date _____ Class_____

21. Find the length of the hypotenuse.

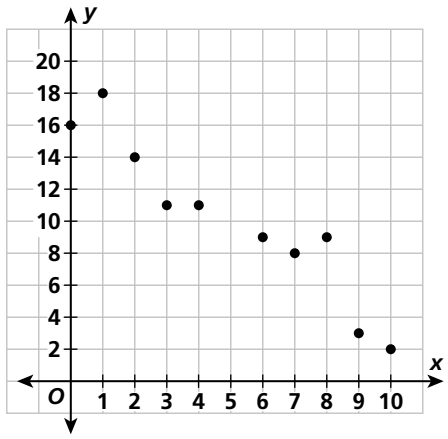


A 8
B 10.6
C 12
D 15.5

22. Two right triangles are similar and their ratio of corresponding sides is 1 : 5. What is the ratio of their areas?

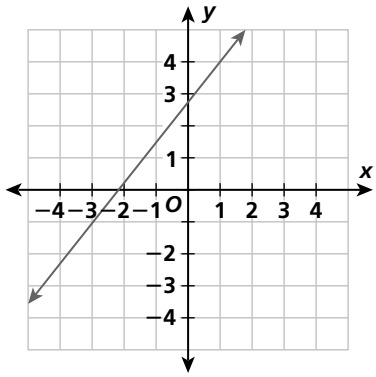
A 1 : 5
B 1 : 20
C 1 : 25
D none of the above

23. Which line is most likely to be the line of best fit for the data?



A a horizontal line through $(2, 10)$ and $(8, 10)$
B a vertical line through $(5, 4)$ and $(5, 16)$
C a line that rises from left to right
D a line that falls from left to right

24. At what point does the line cross the *y*-axis?



A $\left(\frac{5}{2}, 0\right)$
B $\left(0, \frac{5}{2}\right)$
C $(0, -2)$
D $(-2, 0)$

25. Given that polygons *BCDE* and *GHIJ* are congruent, what does *HI* equal?

A *BC*
B *CD*
C *DE*
D *EB*

26. Use the order of operations to simplify.

$$30 + 22 \div 11 - 7 - 3^2$$

A 12
B 16
C 33
D 102

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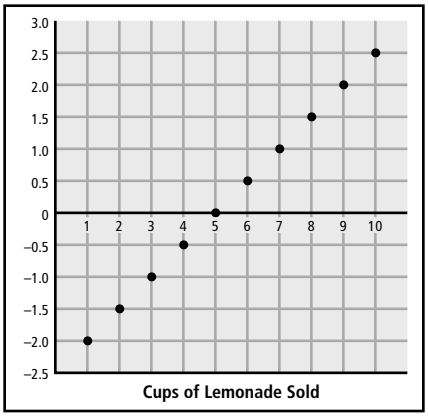
27. Lamar sells lemonade. His profit is shown by the graph. He used some of his own money to buy cups and lemonade mix. Which equation represents his profit (p) after selling n cups of lemonade?



A $p = 0.50n - 2.50$
B $p = 0.50n$
C $p = n - 2.50$
D $p = 2.50 - 0.50n$

28. Which equation has the solution $x = 6$?

A $x - 8 = -2$
B $3x = 6$
C both A and B
D neither A nor B

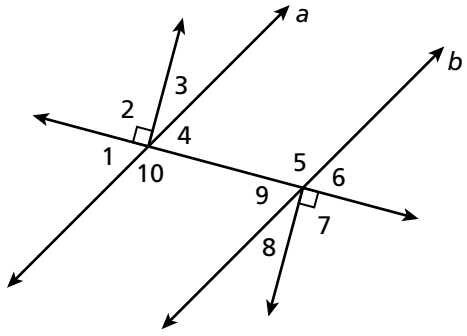
29. What is 5.3×10^{-8} in standard form?

A 0.0000000053
B 0.000000053
C 53,000,000
D 530,000,000

30. The sample space for a particular trial is $\{(1, 1), (1, 2), (2, 1), (2, 2)\}$. All the outcomes in this sample space are equally likely. What is the probability of getting the outcome (2, 2)?

A 50%
B 25%
C 75%
D 100%

31. $\angle 2$ is a right angle. Which is true about $\angle 3$ and $\angle 4$?



A They are supplementary.
B They are complementary.
C They are equal.
D No relationship can be determined.

32. Which value of d makes the equation true?

$$d - 12 = 36$$

A 24
B 48
C 3
D 28

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33. Given that triangle *CDE* is congruent to triange *NOP*, which length is equal to *DE*?

A *NO*
B *OP*
C *PN*
D *CD*

34. Which is in order from greatest to least?

A $6\frac{1}{4}, \sqrt{48}, 2.6^2$
B $\sqrt{48}, 2.6^2, 6.48, 6\frac{1}{4}$
C $6.48, 6\frac{1}{4}, \sqrt{48}, 2.6^2$
D $2.6^2, 6\frac{1}{4}, 6.48, \sqrt{48}$

35. $\{0, 100\} - \{2, 4\} = ?$

A $\{0, 100\}$
B $\{0 - 2, 100 - 4\}$
C $\varnothing$
D $\{0, 2, 4, 100\}$

36. Dividing a negative integer by a negative integer results in which kind of quotient?

A usually a negative integer
B always a negative integer
C usually a positive integer
D always a positive integer

37. There are 22 dimes and nickels in a jar. The total value of money is $1.40. Which linear system can be used to find out how many of each type of coin is in the jar?

A $n + d = 22$
$5n + 10d = 1.40$
B $n + d = 22$
$n + d = 1.40$
C $n + d = 22$
$0.05n + 0.10d = 1.40$
D $n + q = 22$
$n - d = 1.40$

38. Triangle *MNO* $\cong$ triangle *STU*. m$\angle M = \left(x^2 - 10\right)^\circ$, and m$\angle S = (7x - 2)^\circ$. What is m$\angle S$?

A 8°
B 21°
C 33°
D 54°

39. Which is the algebraic expression for the phrase “eleven increased by a number”?

A $11 - x$
B $\frac{11}{x}$
C $11x$
D $11 + x$

40. Two acute triangles are similar and their ratio of corresponding sides is 1 : 3. What is the ratio of their perimeters?

A 1 : 3
B 1 : 6
C 1 : 9
D 1 : 12

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41. Line a is perpendicular to line b. Line b is perpendicular to line c. How are lines a and c related?

A skew
B parallel
C perpendicular
D No relationship can be determined.

42. Which number is largest?

A 4^3
B 5^4
C 6^5
D 8^2

43. Simplify.

$$11^2 - 5^3 + 15$$

A -11
B 11
C 39
D 97

44. Estimate $-\sqrt{456}$ to the nearest tenth.

A -22.2
B -21.3
C -11.4
D -7.6

45. How would two sets A and B be represented in a diagram if $A \subset B$?

A two intersecting circles
B one circle labeled A and B
C two nonintersecting circles
D one circle inside another circle

46. Two lines both contain the points with coordinates $(-5, 3)$ and $(3, -5)$. How are these lines related?

A They coincide.
B They are parallel.
C They are perpendicular.
D They are intersecting, but not perpendicular.

47. Elliot simplified this expression: $(13 \times 3) - 9 \div 10 = 38.1$ Is his answer correct?

A No, it should equal 3.
B Yes.
C No, it should equal 12.
D No, it should equal 39.

48. Which is the value of the function $f(x) = -3x + 1$ when $x = -2$?

A -2
B -5
C 7
D -8

49. Which inequality has the solution $z \geq -8$?

A $z + 5 \geq 3$
B $6z \geq 48$
C $-3z \geq -24$
D $3 + z \geq -5$

50. What is the value of $16 + |x|$ when $x = -5$?

A -11
B 11
C 21
D -21

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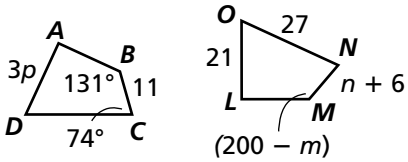
51. Find m.



A 32
B 45
C 69
D 90

52. Which of the following describes the Venn diagram for the set all numbers with two subsets, the sets of primes and even numbers?

A two circles with no intersection inside a rectangle
B three circles with 4 different regions of intersection
C two intersecting circles inside a rectangle
D a circle contained in another circle inside a rectangle

53. Which of the following is NOT an arithmetic sequence?

A 100, 91, 82, 73, …
B 0, 3, 8, 15, …
C −16, −8, 0, 8, …
D 9, 18, 27, 36, …

54. Which of the following is NOT a Pythagorean triple?

A (7, 24, 25)
B (11, 60, 61)
C (14, 15, 19)
D (20, 21, 29)

55. Simplify.

$$9^2 + 3^0 - 11^2$$

A −40
B −39
C −37
D 32

56. Which equation has the solution $d = 11$?

A $\sqrt{d} = 4.25$
B $d^2 - 12 = 16$
C $d^3 = 1211$
D $d^3 \div 2d \times 3 = 181.5$

57. $\sqrt{247}$ lies between which two consecutive integers?

A 11 and 12
B 12 and 13
C 15 and 16
D 18 and 19

58. What is 9,193,000,000 in scientific notation?

A 9.193×10^6
B 9.193×10^7
C 9.193×10^8
D 9.193×10^9

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59. How would two sets A and B be represented if $A \subseteq B$?

A two intersecting circles

B one circle labeled A and B

C two nonintersecting circles

D one circle inside another circle

60. Find the next symbol in this sequence.

○,○,□,□,●,●,■,■,○,○,□,□, ...

A ○

B □

C ■

D ●

61. The table represents a bus schedule where buses run every 20 minutes. What are the next three entries in the table if the first bus arrives at 6:17 A.M.?

Bus Number	Time
1	6:17 A.M.
2	
3	
4	

A 6:40 A.M., 7:00 A.M., 7:20 A.M.

B 6:27 A.M., 6:47 A.M., 7:07 A.M.

C 6:37 A.M., 6:57 A.M., 6:77 A.M.

D 6:37 A.M., 6:57 A.M., 7:17 A.M.

62. In a certain grade 8 class, 5 students had grapes with lunch, 4 students had sandwiches, and 3 students had neither. How many students are in the class?

A 8

B 9

C 12

D cannot be determined

63. Find the square roots of 1681.

A $+31, -31$

B $+41, -41$

C $+47, -47$

D $+61, -61$

64. Two angles of a triangle are 60° and 40°. Two angles of another triangle are 40° and 80°. Which statement must be true about these two triangles?

A The triangles are not similar.

B The triangles are similar.

C The triangles are congruent.

D The triangles are not congruent.

65. What is 0.000000125 in standard form?

A 1.25×10^{-8}

B 1.25×10^{-7}

C 125×10^{6}

D 125×10^{8}

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66. What is the missing term in the input/output table?

x	$y = -x + 16$
−6	22
−4	?
−2	18
0	16

A −20
B 21
C −21
D 20

67. In a certain grade 8 class, 5 students wore yellow, 4 students wore orange, and 3 students wore both yellow and orange. How many students wore yellow but not orange?

A 0
B 1
C 2
D cannot be determined

68. $\sqrt{125}$ is which type of number?

A real and rational
B real and irrational
C it is not a real number
D none of the above

69. Which linear system has the solution $(6, 0)$?

A $y + x = 6$
$y = -x - 6$
B $y + x = 6$
$2y = x - 6$
C $y - x = 6$
$3y - 2x = 12$
D $y - x = 6$
$6y = x$

70. How would two set A and B be represented if $A - B = \varnothing$?

A two intersecting circles
B two nonintersecting circles
C one circle labeled A and B
D two concentric circles

71. Which NOT a Pythagorean triple?

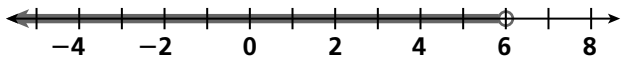
A $(7, 24, 25)$
B $(9, 40, 41)$
C $(13, 84, 85)$
D $(15, 16, 17)$

72. Which is the solution to this inequality?

$$27 - 2y < 15$$

A $y \geq 6$
B $y \leq 6$
C $y > 6$
D $y < 6$

73. Which inequality is represented by this graph?



A $x \leq 6$
B $x \geq 6$
C $x < 6$
D $x > 6$

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74. Use the order of operations to simplify.

$$[38 \times 2 - (21 \div 3)^2] \div 9$$

A 3
B 39
C 47
D 58

75. The sample space for an experiment is $\{(1, 1), (1, 2), (2, 1), (2, 2)\}$. All the outcomes in this sample space are equally likely. What is the probability of getting an outcome that has one 1 and one 2?

A 50%
B 25%
C 75%
D cannot be determined

76. The chart shows the diameters of some planets.

Planet	Diameter in Miles
Saturn	75,000
Jupiter	89,000
Mars	4,200

Which expression represents in scientific notation the diameter in miles of Mars?

A 0.42×10^5
B 4.2×10^2
C 4.2×10^3
D 4.2×10^5

77. Which statement is true about a graph that compares distance traveled to time?

A the data are continuous so the points on the graph are joined
B the data are discrete so the points on the graph are not joined
C the graph will be a curve
D as time increases, distance traveled decreases

78. Estimate $\sqrt{39{,}957}$ to the nearest tenth.

A 199.9
B 175
C 222.5
D 400

79. Which situation is best represented by the expression $30 + x$?

A Fred's father is 30 years older than him.
B Juan earns $30/hr as a caterer.
C Steven has 30 boxes of baseball cards.
D The Morris building is 30 times taller than the school.

80. Adult tickets to a school play cost 2 times more than a child's ticket. Five adults and 4 children go to the play. The total cost of tickets is $42. Which equation would you use to find the cost of a child's ticket?

A $42 = 5x + 4x$
B $42 = 5(2x) + 4x$
C $42 = 5x + 4\left(\frac{x}{2}\right)$
D $42 = 2x + x$

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81. Which is a true statement?

A The sum of two odd integers is odd.

B The product of an even integer and an odd integer is an odd integer.

C The product of two even integers is even.

D The sum of two even integers is an odd integer.

82. Which best describes the product of $\frac{3}{10} \times -\frac{4}{5}$?

A less than $-\frac{4}{5}$

B greater than $\frac{3}{10}$ but less than 1

C between $-\frac{4}{5}$ and $\frac{3}{10}$

D greater than 1

83. What is $8 - 9 + (-5) + (-8) + 9 + 5$?

A 0

B 1

C 26

D 44

84. A 9-lb package of hamburger costs \$19.71. A sticker on the package reads, "You save 35¢ per pound." What was the original price per pound?

A \$2.54

B \$2.23

C \$2.19

D \$1.84

85. Between which two whole numbers would you find $\sqrt[3]{200}$?

A 66 and 67

B 14 and 15

C 5 and 6

D 4 and 5

86. To change kilgrams to long tons you multiply the number of kilograms by 9×10^{-4}. What is 9×10^{-4} written in standard form?

A 0.10009

B 0.009

C 0.0009

D 9,0000

87. Set A is a set of numbers each greater than 10. Set B consists of the numbers in set A each decreased by 4. Which of the following is always true?

A Sets A and B have the same range.

B The range of set A is 14 more than the range of set B.

C The range of set A is 4 less than the range of set B.

D The range of set A is 4 times the range of set B.

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88. The chart shows the balance in Neil's savings account and the change from the previous month. For which month did the account have the greatest change?

Month	Balance	Change
February	$782.40	----
March	$796.50	+$13.10
April	$1,076.34	+$279.84
May	$731.29	−$345.05
June	$895.08	+$163.79

A March
B April
C May
D June

89. Which best describes the result of subtracting a negative odd integer from a positive even integer?

A negative even integer
B negative odd integer
C positive even integer
D positive odd integer

90. Three integers have a sum of 33. The second integer is 3 more than the first integer. The third integer is eight less than twice the second integer. What are the three integers?

A 6, 9, 10
B 8, 11, 14
C 9, 12, 21
D 2, 13, 18

91. Some planets have masses less than the mass of Earth by the factors shown in the table.

Planet	Factor
Mercury	0.0553
Pluto	0.0021
Venus	0.8151
Earth	1.0

Which equation is true for p, the mass of Pluto, and e, the mass of Earth?

A $p = 0.0553e$
B $p = 0.0021e$
C $p = e - 0.0021$
D $e = 0.0021p$

92. Which is the value of the expression $(8 - 3)^2 \times 4 \div 2$?

A 10
B 46
C 50
D 242

93. When the stock market declined, Hayes lost 18% of the value of his stocks. The stock was worth $2,486.95 before the loss. What was the stock worth after the loss?

A $447.65
B $1,985.45
C $2,006.75
D $2,039.30