

Getting to Know the FSA EOC Exam

FSA stands for Florida Standards Assessments and it is designed to measure student achievement on the Mathematics Florida Standards.

The FSA End-of-Course (EOC) exam for Algebra 1 has a maximum of 68 items or questions.

There are three content areas in the exam:

- Algebra and Modeling: 40% score weight
 - To perform operations on polynomials
 - To understand the relationship between zeros and factors of polynomials
 - To use mathematical structure of expressions
 - To create and solve equations and inequalities
 - To reason with equations and inequalities
 - To choose and use appropriate mathematics to model situations

- Functions and Modeling: 40% score weight
 - To understand the concept of a function
 - To interpret functions and key features in a context
 - To analyze and graph functions
 - To build a function that models a relationship
 - To construct linear, quadratic, and exponential functions
 - To solve problems using functions

- Statistics and the Number System: 20% score weight
 - To summarize, represent, and interpret one- and two-variable data
 - To interpret linear models
 - To extend the properties of exponents to rational exponents
 - To use properties of rational and irrational numbers

The FSA EOC Algebra 1 exam is administered in two 90-minute sessions with one session per day over two days.

- In Session 1, calculators are / are not allowed.
 - In Session 2, calculators are / are not allowed.
- Max. of 34
Qs each day

**STUDY
EDGE
TIP**

Any student not finished by the end of each 90-minute session may continue working for up to half the length of a typical school day.

There are five achievement levels and each level has its own scale of scores.

➤ Level 1: 425 – 486 points

➤ Level 2: 487 – 496 points

➤ Level 3: 497 – 517 points

➤ Level 4: 518 – 531 points

➤ Level 5: 532 – 575 points

} This is the **PASSING ZONE!!!**

When you get to the testing room and find your computer station, remove all materials from your desk **except** your pen or pencil, Algebra 1 EOC FSA Mathematics Reference Sheet, and your work folder.

Algebra 1 EOC FSA Mathematics Reference Sheet

Customary Conversions

1 foot = 12 inches

1 yard = 3 feet

1 mile = 5,280 feet

1 mile = 1,760 yards

1 cup = 8 fluid ounces

1 pint = 2 cups

1 quart = 2 pints

1 gallon = 4 quarts

1 pound = 16 ounces

1 ton = 2,000 pounds

Metric Conversions

1 meter = 100 centimeters

1 meter = 1000 millimeters

1 kilometer = 1000 meters

1 liter = 1000 milliliters

1 gram = 1000 milligrams

1 kilogram = 1000 grams

Time Conversions

1 minute = 60 seconds

1 hour = 60 minutes

1 day = 24 hours

1 year = 365 days

1 year = 52 weeks

Before you start your exam, the testing administrator will distribute a Test ticket to you.

Look closely at your test ticket and make sure it has your correct name, date of birth, and partial ID number. If there is something incorrect, raise your hand and notify the testing administrator.

Now, let's go to the Algebra 1 FSA Practice Test provided by the Florida Department of Education Bureau of K-12 Assessment.

<http://fsassessments.org/students-and-families/practice-tests/>

This is what your testing screen will look like.

--- FIRST SCREEN ---

The first screen will be for you to log in by entering your First Name as it appears on your test ticket, your username, and the Session ID ____-____-____. The Session ID is displayed for you. Click **Sign In**. Raise your hand if you need assistance.

--- SECOND SCREEN ---

Now, you will see a screen that says **Is This You?** Verify that the information is correct. If the information is correct, select **Yes** to continue. If the information is not correct, then select **No** to return to the login page, and raise your hand.

--- THIRD SCREEN ---

Now, you will see a screen that says **Your Tests**. Click the arrow to the left of “Start FSA Algebra 1 EOC” to proceed. Now, you must sit quietly while the testing administrator in your room approves your tests.

Ignore the next screen and move on. It has too many options to modify and students won't see that one in the real test.

--- FOURTH SCREEN ---

Now, you should see a screen that says **Is This Your Test?** Verify that the screen displays the correct test, but do **not** click **Yes, Start My Test** until the testing administrator tells you to do so.

This screen also allows you to choose the background color, mouse pointer, and print size for your test. If you would like to change your selections, do so now. If you have any questions, raise your hand.

--- FIFTH SCREEN ---

Take a moment to review the **Test Instructions and Help**. These instructions remind you how to navigate from one item to the next, and how to use the tools and features of the testing platform. Raise your hand if you have any questions as you review these instructions.

Do not select **Begin Test Now** until the testing administrator instructs you to do so.

--- REAL TEST SCREEN ---

Now, let me show you all the options you have available in your test.

In the next video we will go through the practice exam and at the same time, explore all the types of items you may see in your exam!

Types of Questions on the FSA EOC Exam

How many types of questions would you encounter on the FSA EOC exam?

11 item types

Let's explore some examples of each question type while we look at the Algebra 1 FSA Practice Test provided by the Florida Department of Education Bureau of K-12 Assessment!

Multiple Choice

- You are given four answer choices and you must select the one correct answer.

Jeremy determines that $\sqrt{9} = 9^{\frac{1}{2}}$. Part of his work is shown.

$$\sqrt{9} = 3 = 3^1 = 3^{\frac{1}{2} + \frac{1}{2}} = \underline{\hspace{2cm}} = 9^{\frac{1}{2}}$$

Which expression or equation should be placed in the blank to correctly complete Jeremy's work?

- (A) $(3^2)^1$
- (B) $3^{\frac{1}{2}} + 3^{\frac{1}{2}}$
- (C) $3^{\frac{1}{2}} \cdot 3^{\frac{1}{2}} = (3 \cdot 3)^{\frac{1}{2}}$
- (D) $3^{\frac{1}{2}} \cdot 3^{\frac{1}{2}} = (3 \cdot 3)^{\frac{1}{2} + \frac{1}{2}}$

Answer is C

Table Item

- You have to type numeric values into a given table.
- You may complete the entire table or portions of the table depending on what is being asked.

The table below shows the values for the function $y = f(x)$.

x	y
-4	7
-1	-2
0	3
3	-4
6	5

x	y
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

Complete the table for the function $y = f\left(\frac{1}{5}x\right)$.

Answer is:

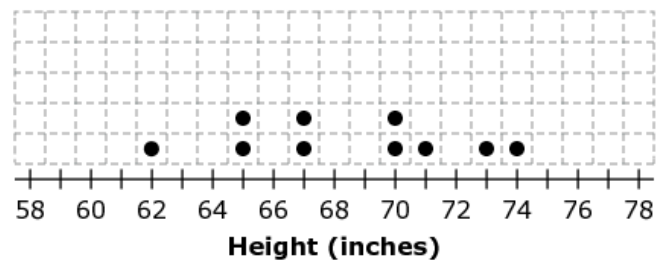
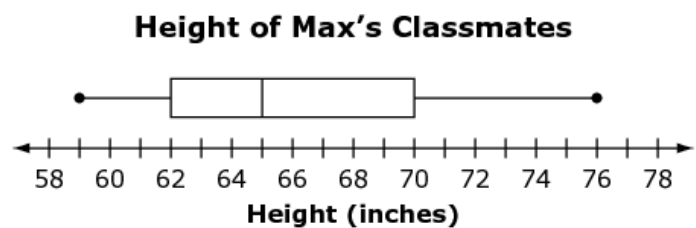
x	y
-20	7
-5	-2
0	3
15	-4
30	5

Graphic Response Item Display (GRID)

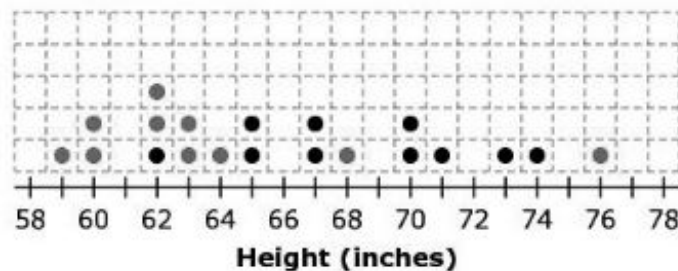
- You select numbers, words, phrases, or images and use the drag-and-drop feature to place them into a graphic.
- This item type may also require you to use the point, line, or arrow tools to create a response on a graph.

Max collected data on the height of each of his 20 classmates. The box plot shown represents his data.

Click above the number line to complete the dot plot that could also represent these data.



Answer is:



Multiselect

- There are two or more correct answers that you must select from the five to seven options given.
- The key is to make sure the problem directs you to select all of the correct answers or all that apply.

A bird drops a stick from the top of Miami Tower. The height of the stick after x seconds is given by $f(x) = 625 - 16x^2$.

Select all the correct interpretations of the coordinates of the point at the maximum of the function $f(x)$.

- the time it takes the stick to hit the ground
- the time when the stick is at its highest point
- the height of the stick when it is dropped from Miami Tower
- the time when the stick is dropped from the top of Miami Tower
- the distance of the stick from Miami Tower when it hits the ground

Answers are choices #2, #3, #4

Selectable Hot Text

- These require you to complete the solution of a problem using the choices provided.
- It gives you various choices for phrases, words, or sentences to complete a solution, and you must determine which is correct.
- To select the correct answer, you must hover over the option you want to select. When you do that, the option highlights. Then, you **MUST** click on it to select it!

Some of the steps in Raya's solution to $2.5(6.25x + 0.5) = 11$ are shown.

Statement	Reason
1. $2.5(6.25x + 0.5) = 11$	1. Given
2.	2.
3.	3. Subtraction property of equality
4. $x = 0.624$	4. ?

Select the correct reason for line 4 of Raya's solution.

- Closure property
- Distributive property
- Addition property of equality
- Division property of equality
- Symmetric property of equality

Answer is Division Property of Equality

Equation Editor

- You will answer problems using numbers, variables, expressions, or equations.
- The assessment will present you with a toolbar that includes a variety of mathematical symbols that can be used to create a response.
- You can see one, two, or even three boxes for entering an equation, number, expression, or variable.

Cora is using successive approximations to estimate a positive solution to $f(x) = g(x)$, where $f(x) = x^2 + 13$ and $g(x) = 3x + 14$. The table shows her results for different input values of x .

x	$f(x)$	$g(x)$
0	13	14
1	14	17
2	17	20
3	22	23
4	29	26
3.5	25.25	24.5

Use Cora's process to find the positive solution, to the nearest tenth, of $f(x) = g(x)$.

3.3

← → ↶ ↷ ✖

1	2	3
4	5	6
7	8	9
0	.	-

Drag-and-Drop Hot Text

- You will answer problems by dragging certain numbers, words, phrases, or sentences from the bank of possible answers to the corresponding box that completes the statement with that answer.
- When you hover over these areas, the text highlights. You will then click on the correct option, hold down the mouse button, and drag it to a graphic or other format.

Roxanne wants to test the idea that polynomials are closed under addition. Her work and explanation are shown.

Drag an expression and phrases to the boxes to complete the statement.

Add $3x^4 - 7x^3 + 12x - 9$
to .
The sum is closed because
are and by definition
the sum is a polynomial.

$5x^2 - (2x)^3 + (4x)^{-1}$ $(2x)^3 + 2.1x^2 - 11$
 $-8x^{-2} - (3x)^3 - 12x^6 + 7$

the exponents the variables the coefficients
integers real numbers whole numbers

Answer is:

Add $3x^4 - 7x^3 + 12x - 9$

to $(2x)^3 + 2.1x^2 - 11$.

The sum is closed because the exponents

are whole numbers and by definition

the sum is a polynomial.

Open Response

- You will use the keyboard to enter a response into a text field.
- These items can usually be answered in one sentence or two.

The function $f(x)$ models the value of goods that are imported into the United States, where x is the number of years since 1990. The function $g(x)$ models the value of goods that are exported from the United States.

x	$f(x)$	$g(x)$
40	\$ 8,859,296.92	\$ 6,295,111.00
45	\$10,308,975.90	\$ 8,476,064.00
50	\$11,833,485.40	\$11,412,611.00
51	\$12,147,367.00	\$12,112,204.00
52	\$12,464,241.80	\$12,854,683.00
55	\$13,432,825.40	\$15,366,531.00
60	\$15,106,996.00	\$20,690,294.00

If $f(x)$ and $g(x)$ continue to model the importing and exporting of goods, then sometime in 2041, which is 51 years after 1990, $f(x) = g(x)$.

Determine which function is exponential. Use the table of values to justify your choice.

Type your answer in the space provided. Be sure to include your function choice.

The exponential function is the value of goods that are exports because the values of goods that are imports are approximately linear.

Matching Item

- You will check a box to indicate if information from a column header matches information from a row.

Florida		Texas	
County	Population	County	Population
Smallest	8,349	Smallest	95
First quartile	27,013	First quartile	7,057
Median	107,056	Median	18,293
Third quartile	337,362	Third quartile	49,426
Largest	2,617,176	Largest	4,336,853

Florida has 67 counties, and Texas has 254 counties.

- The mean population for the state of Florida by county is 291,834 with a standard deviation of 467,012.03, and the median is 107,056.
- The mean population for the state of Texas by county is 104,127 with a standard deviation of 374,012.2261, and the median is 18,293.

Some of the data for both states are shown.

A business moves its corporate location from Texas to Florida. As a result of the move, 8,193 people move from the largest Texas county to the smallest Florida county, in terms of population.

Select all the population statistics that will be affected by this population change.

	Increases	Decreases	Stays the Same
Interquartile Range of Florida	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mean of Texas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Median of Florida	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standard Deviation of Texas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Answer is:

	Increases	Decreases	Stays the Same
Interquartile Range of Florida	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Mean of Texas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Median of Florida	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Standard Deviation of Texas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Editing Task

- You will click a highlighted space, which reveals a drop-down menu containing options for completing a sentence.
- You must select the correct word or phrase from the drop-down menu.

A librarian in a large city collects data about his summer reading program. He collects data for two years, 2011 and 2012, on how many books are read each week. His ordered data sets are shown.

2011	2012
44,126	35,001
44,901	41,534
55,080	68,550
58,546	75,534
79,984	76,617
99,860	84,834

The librarian writes a summary about his data, as shown.

Click on each blank and select the appropriate word or phrase to complete the librarian's summary.

If you compare the means, it appears that in 2011 [] books were read on average than in 2012. When the medians for the two years are compared, the data show that in 2011 [] books were read than in 2012. As far as the spread of the data, both data sets have the same [].

If you compare the means, it appears that in 2011 { } approximately 71 more books were read on average than in 2012. When the medians for the two years are compared, the data show that in 2011 { } approximately 15,229 fewer books were read than in 2012. As far as the spread of the data, both data sets have the same { } interquartile range.

Editing Task Choice

- You will click on a highlighted word or phrase that may be incorrect, which reveals a text box.
- The directions in the text box direct you to replace the highlighted word or phrase with the correct word or phrase.

Since, we do not have an example from the online practice exam, we will create our own. See below.

There are two highlights in the paragraph to show which word or phrase may be incorrect. For each highlight, click the word or phrase that is correct.

Amy was solving $3(x - 2) + 7 = 7$. Amy's first step resulted in $3x - 6 + 7 = 7$ using the Multiplication Property of Equality. Amy should then combine like terms and move on to the next step, which is using the Substitution Property, which results in $3x = 6$.

So, for example when you click on the first highlighted phrase, you will see something like:

Replace "Multiplication Property of Equality" with:

Addition Property of Equality

Distributive Property

Substitution Property

Tips to Prep for the Test

Have you ever wondered if there is a strategy to acing a test? Well there is! Planning is super important and we are going to help you plan your road to a successful testing day!

Let's explore some habits from students and decide whether or not they are good habits to prepare for a test.

Yes Create a study schedule with all the topics or standards that you need to master.

SE: It will take some time to set up, but this is time well spent because it means that every time you sit down to study you will be more efficient. You can decide to study equations first and then functions, and then you can set up your schedule to do linear functions first, then systems, then quadratic, etc.

Yes Use a Calendar, find the date of your test and start working backwards.

SE: You should still sit down and look at all the days and weeks before the test, and map out the plan. Mark out the hours that you will study, the days you know you will be too busy, and the flex days for extra studying if something unexpected cuts into your study days.

No Set up a big goal and that's it: to pass the test!

SE: It is good to have a big goal and of course, that is to pass the test. However, you also need small goals and tasks for each day you study. For example, score more than 80% in the Test Yourself! or more than 80% in any exit slip, quiz or exam. It is great to create a plan for the small goals and tasks for each day ahead of time. This will ensure you cover all the necessary material before the test and give you little boosts of confidence when you accomplish the small, daily goals.

No Study only during the weekend.

SE: Yes, it is good to study during the weekend, but try your best to set up a regular time every day. The more that you can make studying and prepping a routine, the more habit forming you make it, the more effective your study time will be. Your body and mind will be primed and ready to learn.

**STUDY
EDGE
TIP**

Add variety to your studying by covering a range of topics each day, rather than focusing on one topic for many hours. You will learn and retain more by mixing things up.

No Work non-stop and study every time you can.

SE: Sure, work as hard as you can, BUT Plan for breaks. A six to ten power session once or twice a week is not necessarily the best way to learn. Study a few hours every day and it is more efficient. Also, take about 5-8 minutes for every hour of studying to walk around, stretch, close your eyes, breath and relax.

Yes Take notes in an organized way that works for you.

SE: Your notebook is as important as the material you use to prepare for the test. You need an organized approach to taking notes and recording your progress. Every time you start a new page, write the date at the top. This will make it easier to navigate your notebook and to search through it for a particular formula.

No Throw out the problems you got wrong and keep your notebook clean with only the problems you got right.

SE: You never know when you will want to return to a problem you solved or a strategy you discovered through your studies. Make note of everything you notice along the way: the types of questions you miss, the reason you missed a question, a shortcut you learn, or a creative approach to solve a problem. Also, the act of writing everything down will help to cement the ideas in your mind.

Yes Create a personal cheat sheet.

SE (joking about it): No, it is not for cheating, but for remembering—a cheat sheet is a quick reference guide of question types, common wrong answer traps, math formulas, and anything else that you might need to reference as you begin to study. When you review your notes from a study session, add the most crucial information to your cheat sheet.

No Study on your sofa, while playing in the pool, in the dining room with food around, or in your bedroom with all of your laundry and materials everywhere.

SE: Make it neat. It's as easy as that. Eliminate all the nonsense and clutter, and not just on your desk, but in the whole room. The more you clean the space, the easier it will be to focus, find materials, and learn.

No Only study using your notebook and paper practice tests because you work better with paper and a pencil.

SE: Actually, if your test is in the computer, you should mimic that environment. Practicing with the Test Yourself! will help you out getting used to the environment and working out problem in a scratch paper. Also, go online, to the MS DoE website and find online practice exams for Algebra 1.

Yes Just like kids and their bedtime stories, you should study when sleepy and then fall asleep and rest.

SE: Do you think that bedtime stories are just for kids? Wrong! Try studying for a few minutes right before going to sleep (or say something funny). During sleep, the brain strengthens new memories, so there is a good chance you will remember whatever you were reading about.

Yes When studying, break up information into small chunks and review them repeatedly over a long period of time, especially those concepts that earn you the higher amount of points in the test.

SE: For example, don't try to memorize the steps for converting a quadratic equation from standard to vertex form – instead learn a few steps and practice them, and then move on. This would be a go-to place to remind the SE to remind students about what those “high point” topics/sections will be—can we add this to the note? I think it was algebra and functions, and the performance task.

No Forget about those crazy stories and songs about math concepts, because they can't help you.

SE: Turning the details you need to remember into a crazy story helps make the information more meaningful. For example, remember the order of mathematic operations PEMDAS this way: Philip (P) wanted to eat (E) his friend Mary (M) but he died (D) from arsenic (AS) poisoning.

No Pick a place, be consistent and always study there.

SE: Research suggests studying the same stuff in a different place every day makes us less likely to forget that information. Every time we move around (from the library to the coffee shop or the coffee shop to the toilet seat), we force the brain to form new associations with the same material so it becomes a stronger memory.

No The night before the test, make sure to have fun, dance all night, eat pizza, nachos and cheese, chicken wings, and a lot of soda.

SE: It's a proven fact that what you eat will have an effect on your physical and mental performance. Avoid coffee and doughnuts or pizza and soda the night before a test. Greasy, heavy food can make you lethargic the morning after consumption.

Yes Gather all your stuff together the night before and have it packed and ready to go for the morning of the test.

SE: Make sure you have all the materials ready. Pack a bottle of water and/or some candy (especially mints) for the nervous dry-mouth that can set in before an exam. Choose an outfit that is comfortable but that make you look good and confident, and lay it out before going to bed. Make sure to bring a jacket in case it is cold in the testing room.

Yes Schedule a question-answer review of the testable material with a study buddy every week, or at least a few days before the test.

SE: There might be opportunities for you to teach your buddy and learn at the same time, or vice versa. It is always good to share your ideas and concepts that you have learned so you increase your confidence and also explore more opportunities for learning or new strategies to solve problems.

No Your brain is so ready! You will wake up on time, so setting up an alarm is unnecessary. The noise that early in the morning will stress you out.

SE: What? This is a no-brainer, huh? You'd be surprised how often this happens to well-intentioned people. Check your morning plan and get up early enough not to be rushed. Don't rely on others to get you up. Set up multiple alarms to play safe.

Yes Exercise the day before the test.

SE: Actually, this is very true! A little light stretching and exercise will help you fall asleep faster and sleep soundly through the night. It also works out the tension you may be carrying after a day of studying and test prep. If you go to bed tense, you may wake up with a backache or headache — definitely not appreciated on the day of a test.

No Stay up late the night before the test studying even more, watching your favorite show, or playing your favorite video game.

SE: Don't burn the midnight oil the night before a test. The extra effort put into late-night studying will be offset by reduced mental performance due to lost sleep. It is even worse if you spend hours in front of the TV. It won't help, so

Tips to Work During the Test

The test day is almost here! Math Nation has the Ten Tips to help you DURING the test.

#1: Keep a positive attitude for the entire day.

- Get a good night's sleep and eat a high protein breakfast (like eggs, yogurt, or whole grain cereal). Drink plenty of water.
- Smile when you wake up, on your way to school, and in the testing room. Look in the mirror and repeat to yourself, loud and clear, "I can do it."
- Don't study right before the test. Concentrate on being calm and mentally accessing the information you have already studied.
- Try to stay relaxed. If you start to feel nervous take a few deep breaths.
- Don't engage in negative talk with other students before the test.

**STUDY
EDGE
TIP**

Listen to your favorite music playlist to maximize your focus, improve your memory, and pump you up before the test!

#2: Dress well, test well!

- Wear comfortable clothes and find an outfit that makes you feel positive and confident.
- Go to the bathroom before walking into the testing room.

#3: Keep your work station organized!

- Your station should be clear and clean. You only need scratch paper, a pencil, and a calculator.
- You will receive a Florida Computer-Based Testing work folder to make notes and write out your work.
 - There are 3 pages of open space and 1 page with a grid to graph.
 - You may also have as many work folders as needed!
- Put main ideas, information, or formulas onto the work folder so you can quickly review it at any time. This makes it easier to retain the key concepts that will be on the test.
- Online scientific calculators are provided for Session 2. Students with paper-based accommodations must be provided a handheld scientific calculator.

#4: Pace yourself, don't rush.

- Remember that you can bookmark a question, skip it and then come back to it.
- You can also bookmark any questions you are not confident about. Answer the ones you know first, then go back to the more challenging questions that you have bookmarked.

#5: Read the whole question and pay attention to detail!

- Look for key words in every question to help you to understand.
- Make sure to answer what is being asked.
- For example,
 - Which of the follow IS correct? NOT correct?
 - Check all that apply.

#6: A process of elimination may be helpful!

- Elimination is a great strategy when answering all closed-ended questions, where you have to choose an answer among a few options.
- Read all the options, before eliminating and choosing.

#7: Plan your written responses.

- Take a few minutes to decide what equation, function, expression, term, or number you are writing.
- For example, write a function, $f(x)$, to model the time, x , it takes for the ball to hit the ground.

$$\text{➤ } f(x) = x^2 + 4x - 2$$

#8: Give it a try!

- If you don't know the answer, don't worry! Just do your best to answer the question, and, at the very least, go with the answer that seems most correct.
- Remember, you can earn partial credit for those questions that require multiple interactions (or answers).

#9: Review.

- If you have time left after you have finished the assessment, look over it and make sure you haven't missed any questions.
- If you have time, check the bookmarked questions that you either did not answer or had doubt about.

#10: Don't worry if other students finish before you.

- There is no extra credit for finishing early.
- Focus on what you are doing and what is in front of you. Relax. You can do it!

The Non-Calculator Session

1. Some of the steps in Hanse's solution to the equation below are shown.

$$4.2 \left(\frac{x + 2.7}{2.5} \right) - 3.1 = 5.3$$

Statement	Reason
1. $4.2 \left(\frac{x + 2.7}{2.5} \right) - 3.1 = 5.3$	1. Given
2. $4.2 \left(\frac{x + 2.7}{2.5} \right) = 8.4$	2.
3.	3. Division Property of Equality
4. $x + 2.7 = 5$	4.
5.	5.

Select the correct reason for the line 4 of Hanse's solution.

- Addition Property of Equality
- Closure Property
- Distributive Property
- **Multiplication Property of Equality**
- Product of Powers Property

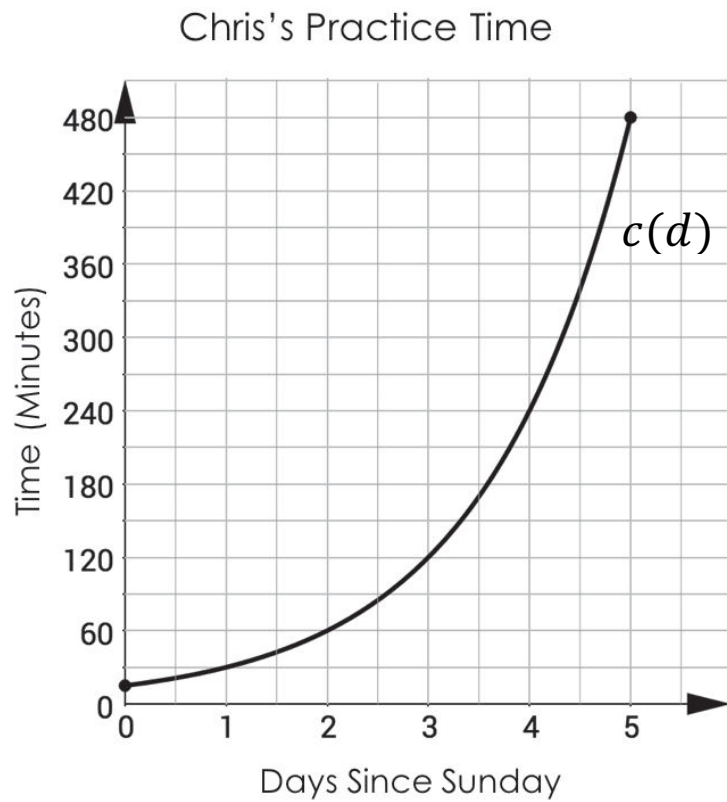
2. Aracely is using successive approximations to estimate a positive solution to $h(x) = m(x)$, where $h(x) = x^2 - 16$ and $m(x) = 2x - 5$. The table shows her results for different input values of x .

x	$h(x)$	$m(x)$
-4	0	-13
-3	-7	-11
-2	-12	-9
-1	-15	-7
3	-7	1
4	0	3
5	9	5
6	20	7

Use Aracely's process to determine the positive solution of $h(x) = m(x)$. Round your answer to the nearest tenth and write it in the space provided.

4.5

3. On Sunday, Julia and Chris will begin their final preparations for the regional qualifiers for the National Spelling Bee the following Saturday. The function $j(d) = 30d + 60$ models Julia's practice time (in minutes), where d is the number of days since Sunday. The function $c(d)$, shown in the graph below, models Chris's practice time (in minutes).



Explain the difference between Julia's and Chris's practice regimes based on their respective functions for practice time. Determine who will have more practice time by Saturday. Type your answer in the space provided.

Julia's practice regime is linear. She practices 60 minutes on the Sunday prior to the recital and increases her practice time by 30 minutes every day leading up to the qualifiers. Chris's practice regime is exponential. He practices for less than 30 minutes on Sunday, but doubles his practice time every day leading up to the qualifiers. He will have more practice time than Julia by Saturday.

4. The table below shows the values for the function $y = f(x)$.

x	y
-2	30
-1	20
0	12
2	2
3	0

Complete the table for the function $g(x) = f(x - 2)$.

x	$g(x)$
0	30
1	20
2	12
4	2
5	0

5. Consider the following system of equations.

$$\begin{cases} Fx + Gy = K \\ Mx + Ny = P \end{cases}$$

The system has the solution $(5, 0)$, where $F, G, K, M, N,$ and P are non-zero real numbers. Select all the systems of equations with the same solution.

$\begin{cases} Fx + Gy = K \\ 7Mx + 7Ny = 7P \end{cases}$

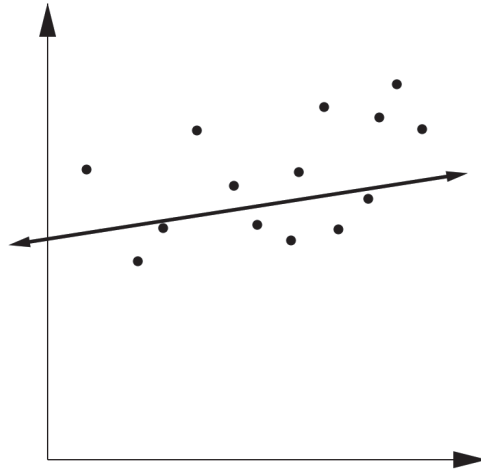
$\begin{cases} (5F + M)x + (5G + N)y = K + 2P \\ Mx + Ny = P \end{cases}$

$\begin{cases} (M - F)x + (N - G)y = P - K \\ Mx + Ny = P \end{cases}$

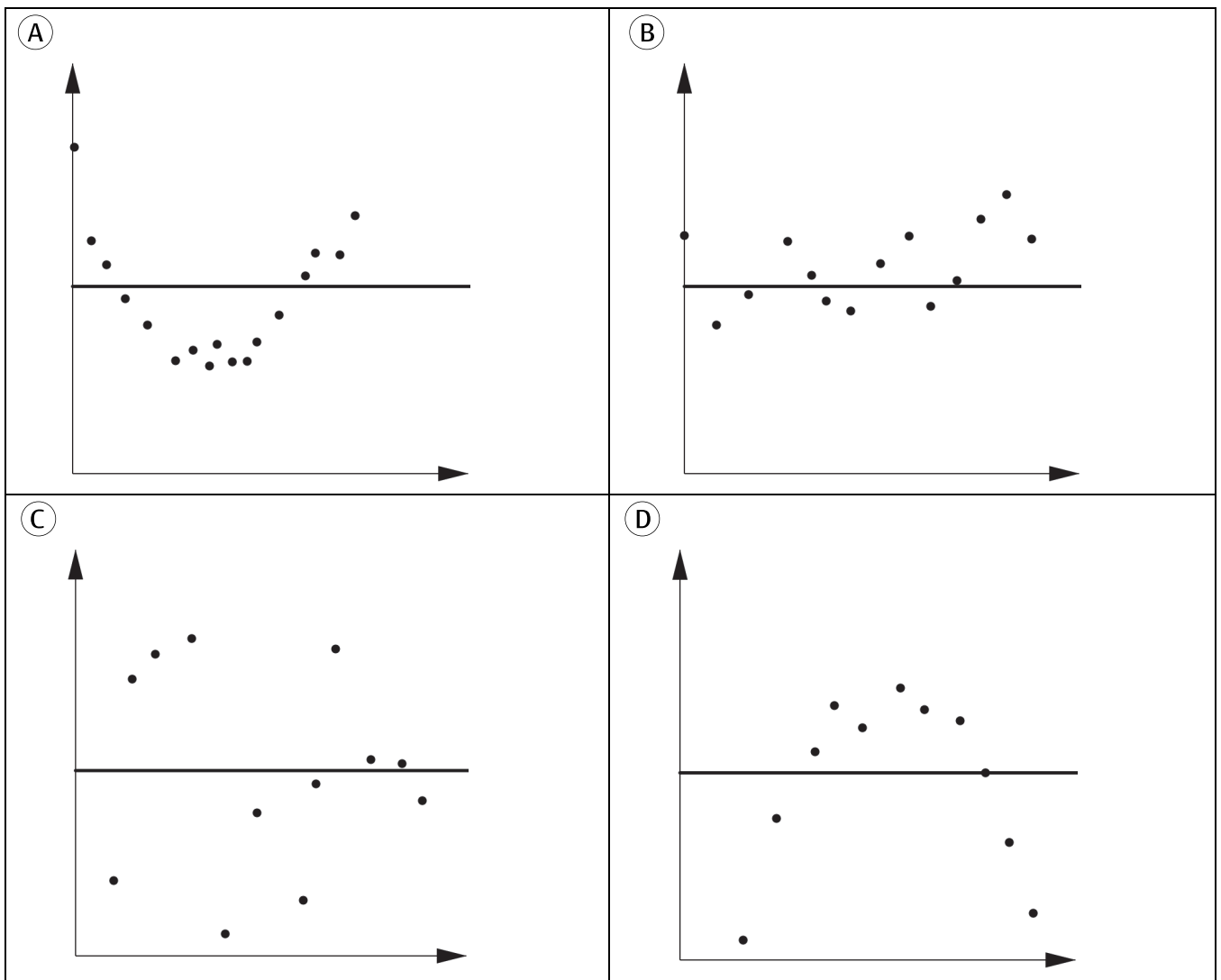
$\begin{cases} Fx + Gy = K \\ (F - M)x + (G - N)y = P - K \end{cases}$

$\begin{cases} 5Fx + 5Gy = K - 5P \\ 5Mx + 5Ny = P - 5K \end{cases}$

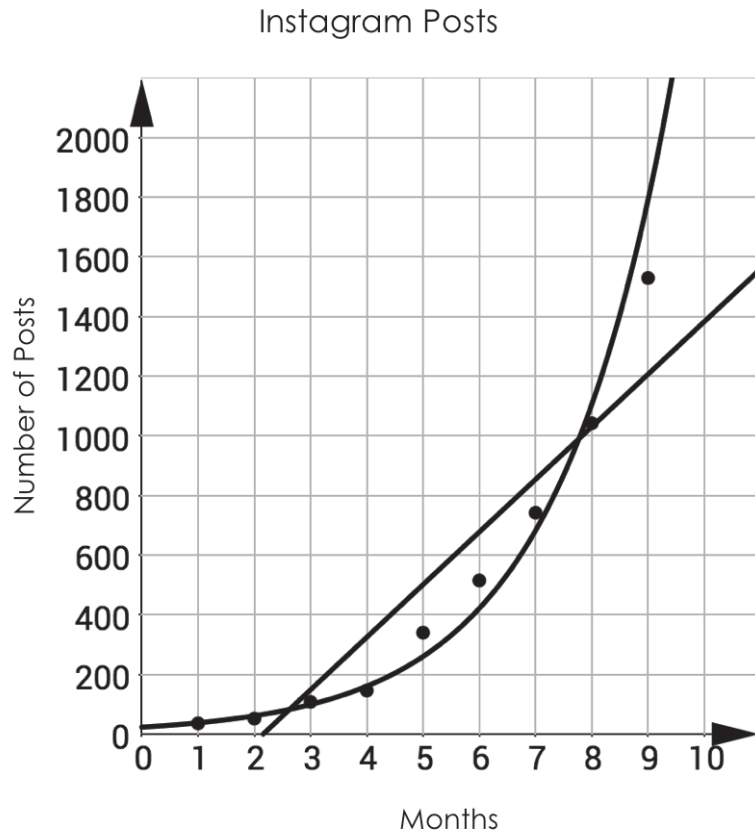
6. Consider the following scatter plot.



Which of the following figures represents the residual plot for the scatter plot shown above? **B**



7. Consider the graph below.



The points on the graph show the data on the total number of Instagram posts that students in Mrs. Coleman's class at Satellite High School posted each month. The data can be modeled by the linear function $f(x) = 176.32x - 380.47$ or the exponential function $g(x) = 23.30 \cdot 1.62^x$.

What is the domain of the graph of $f(x)$ or $g(x)$ that is shown? **D**

- Ⓐ All real numbers such that x is $x \geq 0$
- Ⓑ all real numbers x such that $0 \leq x \leq 2000$
- Ⓒ all whole numbers
- Ⓓ **all whole numbers x such that $1 \leq x \leq 9$**

8. Denzel is playing golf. He hits a shot off the tee box that has a height modeled by the function $h(t) = -16t^2 + 64t$, where $h(t)$ is the height of the ball, in feet, and t is the time, in seconds, it has been in the air.

Part A: Which property of the quadratic will Give Denzel information about the time it takes for the ball to reach its maximum height?

- maximum
- axis of symmetry
- y-intercept
- zero

Part B: Select all the expressions that will reveal that property.

- $-16(0)^2 + 64(0)$
- $-16t(t - 4)$
- $-16(t - 2)^2 + 64$
- $-16(-2)^2 + 64(-2)$
- $\frac{-64}{-2(16)}$
- $\frac{64}{2(16)}$
- $\frac{-64}{-2(32)}$

The Calculator Session

1. The function f is defined by $f(x) = x^2 + 7x - 18$.

Part A: If $g(x) = f(4x)$, then $g(x) = ax^2 + bx + c$. Determine the values for a , b , and c .

$$a = \boxed{16}$$

$$b = \boxed{28}$$

$$c = \boxed{-18}$$

Part B: Determine the positive zero of $g(x)$ and select the correct answer below. **A**

(A) $\frac{1}{2}$

(B) $\frac{7}{4}$

(C) $\frac{9}{4}$

(D) $\frac{5}{2}$

2. Consider the following sequences.

For sequence 1, we have $a_1 = 5$ and $a_n = 3a_{n-1}$.

For sequence 2, we have $b_1 = 2$ and $b_n = (b_{n-1})^2 + 1$.

Part A: To complete each highlighted blank in the following paragraph, choose one of the options listed in the word and number bank below.

The 4th term for sequence 1 is [-I-]. The 4th term for sequence 2 is [-II-]. When finding b_2 , its value is [-III-] a_1 , but value of b_3 is [-IV-] a_2 by [-V-] units.

Blank I	Blank II	Blank III	Blank IV	Blank V
<ul style="list-style-type: none">• 15• 45• 135• 405	<ul style="list-style-type: none">• 11• 26• 122• 677	<ul style="list-style-type: none">• equal to• greater than• smaller than	<ul style="list-style-type: none">• equal to• greater than• smaller than	<ul style="list-style-type: none">• 11• 13• 77• 632

Part B: Determine what type of sequences we are working with. Type your answer in the space provided.

The sequence 1 is a geometric sequence and the common ratio is 3. The sequence 2 is neither arithmetic nor geometric, though its values follow a cubic pattern.

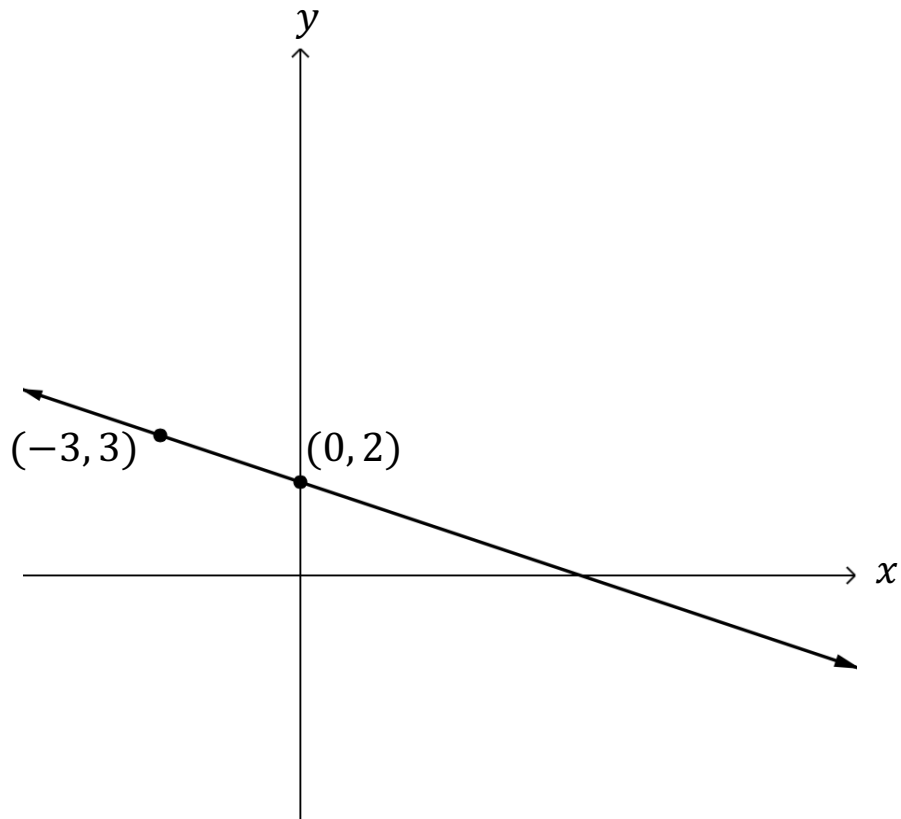
3. A teacher sponsoring the local high school chapter of the Honor Society organizes an academic competition. She wants to keep track of the number of students participating in each category of the competition. She uses a two-way table to display the data.

The teacher knows that approximately 25% more girls participate in the Science competition than in the Math competition.

Complete the two-way table to show a possible breakdown of students.

	Science	Language Arts	Math	Total
Boys	51	39	69	159
Girls	75	66	60	201
Total	126	105	129	360

4. Todd graphed the line shown on the coordinate plane below.



What is the x -coordinate of the point at which this line intersects the x -axis?

6

5. Rasheed bought five funnel cakes and three milkshakes for a total of \$47.25. Shakira bought two funnel cakes and six milkshakes for a total of \$40.50.

Complete the following statements that show the cost of each funnel cake and milkshake.

Each funnel cake costs

\$2.75.
\$3.25.
\$4.50.
\$6.75.

Each milkshake costs

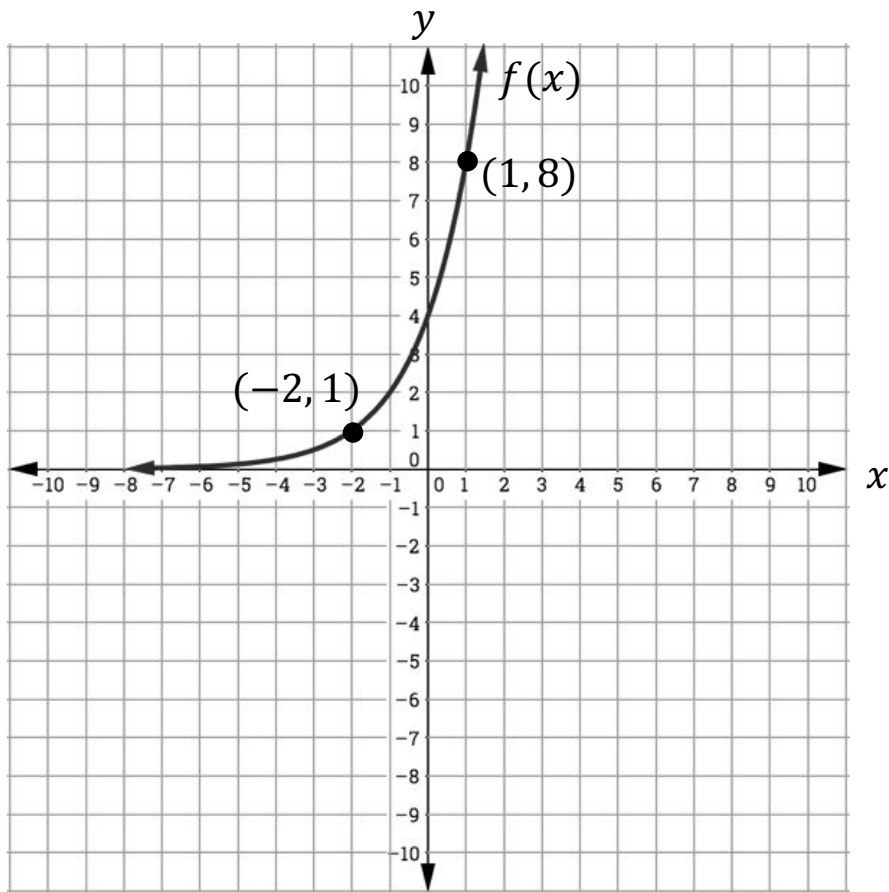
\$2.75.
\$3.25.
\$4.50.
\$6.75.

6. The production costs, C , in thousands of dollars, for an energy drink company to manufacture cans of energy drink is given by the model $C(x) = 50 + 3.8x - 0.0038x^2$, where x is the number of cans of energy drinks produced in one day, in thousands. The company wants to keep its production cost at or below \$781.12.

What is a reasonable constraint for the model? **D**

- Ⓐ $-12.989 \leq x \leq 1012.989$
- Ⓑ $260 \leq x \leq 740$
- Ⓒ $-12.989 \leq x \leq 260$ and $740 \leq x \leq 1012.989$
- Ⓓ $0 \leq x \leq 260$ and $740 \leq x \leq 1012.989$

7. Consider the following graph.



Write a function $f(x)$ that represents the graph shown above.

$$f(x) = 4 \cdot 2^x \text{ or } f(x) = 2^{x+2}$$

8. Consider the following situation.

Patricio has just been given a new job as the manager in charge of the sales department of a car dealership. He has two salary options. He can either receive a fixed salary of \$1,500.00 per week or a salary of \$250.00 per week plus an 2.5% commission on his weekly car sales. The variable c represents Patricio's weekly car sales.

The highlighting in the paragraph shows a solution set that might be incorrect. Select the solution set that is correct.

$\{c | c > \$1,500.00\}$ represents the dollar amount of car sales that he must generate in a week in order for the option with commission to be the better choice.

- $\{c | c > \$500.00\}$
- $\{c | c > \$1,500.00\}$
- $\{c | c > \$5,000.00\}$
- $\{c | c > \$50,000.00\}$

Arithmetic with Polynomials and Rational Expressions

1. What is the product of polynomials $(2a - 7 + a^2)$ and $(5 - a)$? **A**

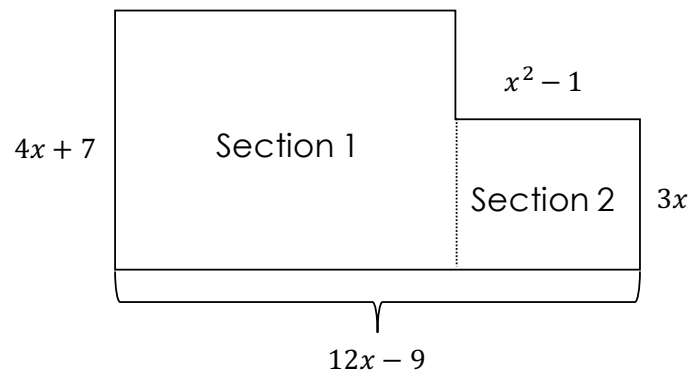
Ⓐ $-a^3 + 3a^2 + 17a - 35$

Ⓑ $-a^3 + 7a^2 + 3a - 12$

Ⓒ $a^3 - 3a^2 - 17a + 35$

Ⓓ $a^3 - 7a^2 - 3a + 12$

2. The irregular figure shown below represents a car garage. Section I represents the area that fits two cars and section II represents a storage area.



Complete the following statements.

The total area of the garage is

$$-x^3 + 41x^2 + 49x - 56$$

units².

The perimeter of the garage is

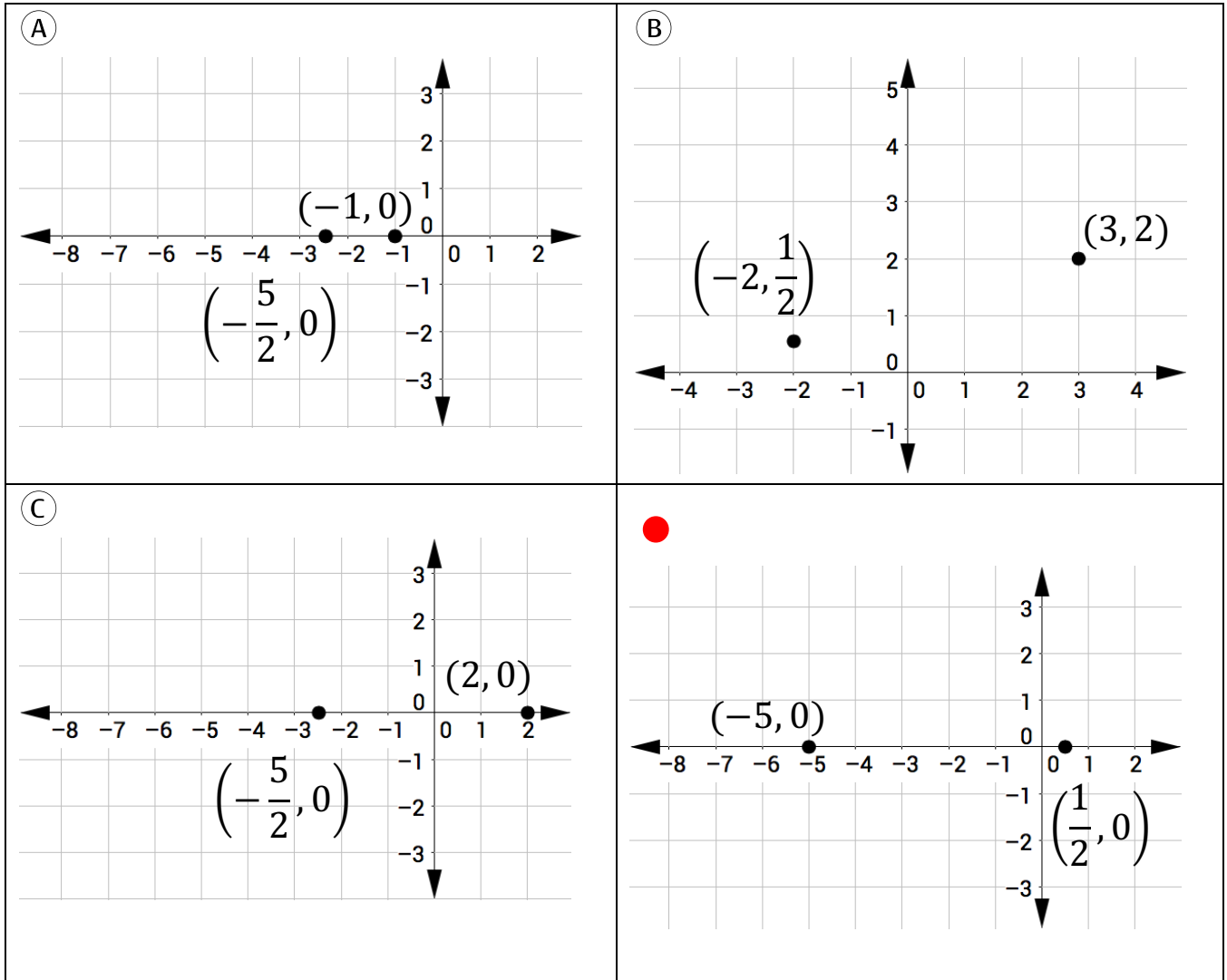
$$32x - 4$$

units.

3. Consider the following polynomial function.

$$p(x) = 2x^2 + 9x - 5$$

Kiana plot the zeros of $p(x)$ on a coordinate plane. Which of the following graphs represents Kiana's plot? **D**



Creating Equations

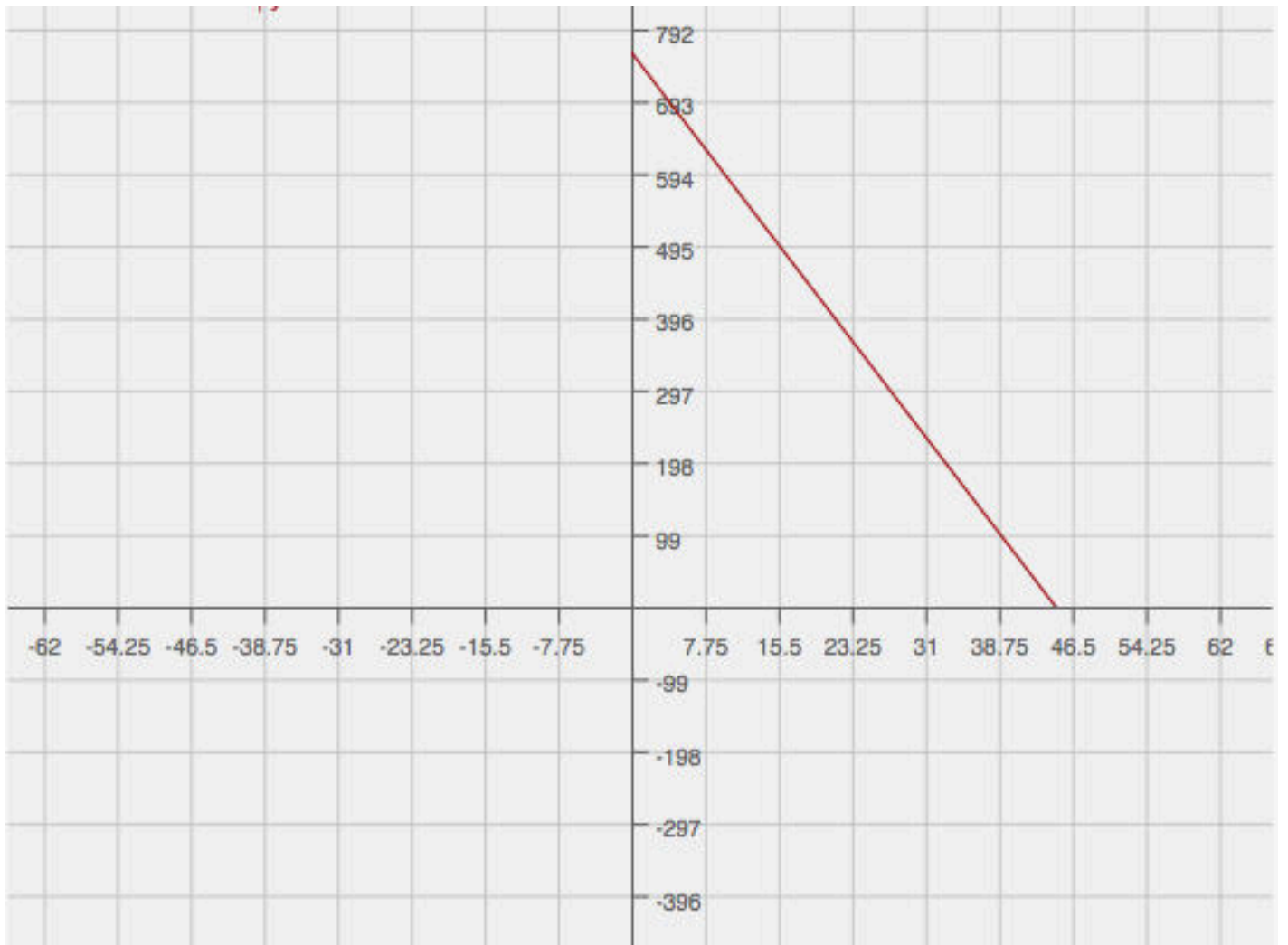
1. A hot air balloon launches at 2,100 feet above sea level and rises 75 feet every minute.

Write an equation to model the height of the hot air balloon above the ground, using h to represent its height above the ground and m to represent the number of minutes since the hot air balloon takes off.

$$h = 2100 + 75m$$

2. A skydiver is 760 meters above the ground when he opens his parachute. After opening the parachute, he descends at a constant speed of 17 meters per second.

Sketch the graph of the function $h(s)$, that represents the height of the skydiver above the ground at any point in time, s , in seconds, after he opens his parachute.



3. Samuel has been given the formula for the sum of an arithmetic sequence.

$$s = \frac{n}{2}(a + L)$$

Samuel needs to solve the formula for L .

Which of the following are correct representations of the formula solved for L ? Select all that apply.

$L = 2s - na$

$L = \frac{2s}{n} + a$

$L = \frac{2s}{n} - a$

$L = \frac{2s-a}{n}$

$L = \frac{2s-na}{n}$

Algebra Reasoning with Equations and Inequalities

1. An ice cream shop was doing research on its sales. The results showed that the relationship between the average daily temperature in Fahrenheit, t , and the daily ice cream profit in dollars, c , could be modeled by the equation $c = 17.6t - 721.6$.

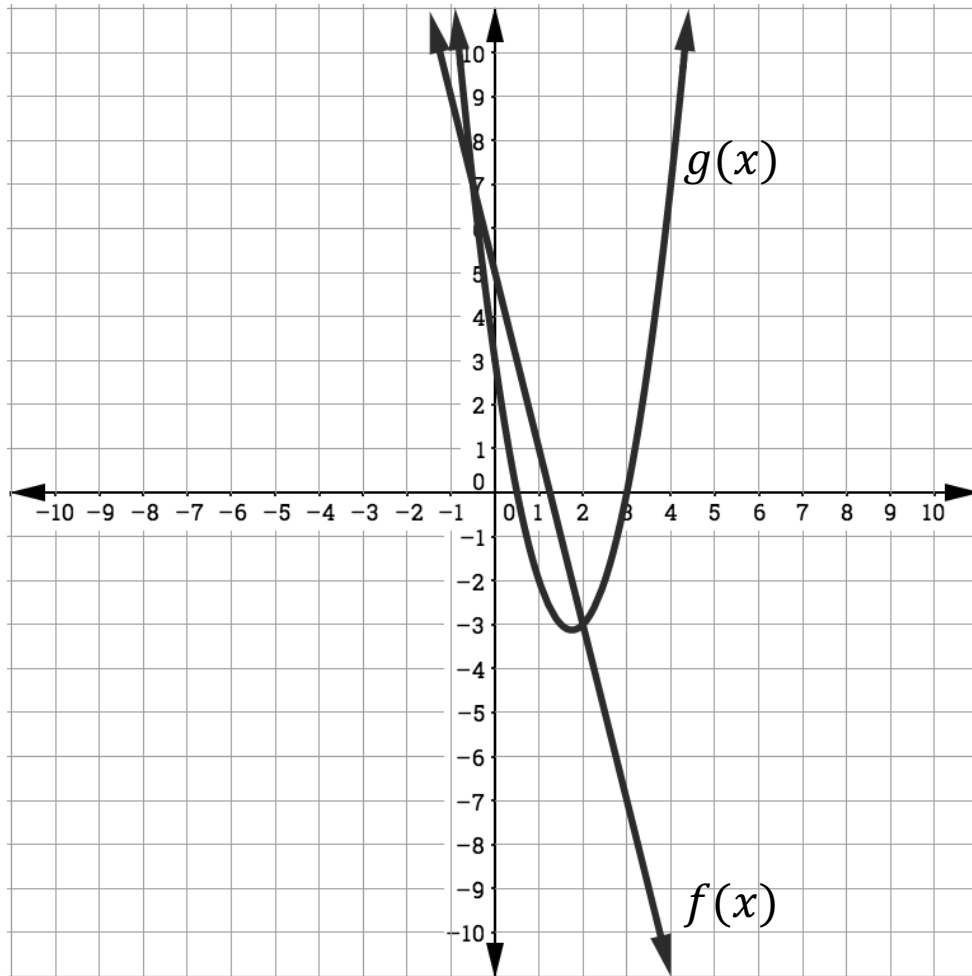
According to the model, which of the following temperatures to the nearest tenth of a degree would make the ice cream shop have a positive profit? **D**

- Ⓐ 17.6°F
- Ⓑ 35.2°F
- Ⓒ 41.0°F
- Ⓓ **72.2°F**

2. Two linear functions, $f(x)$ and $g(x)$, have one point of intersection, which is $(1, 3)$. Which pair of functions listed below could represent $f(x)$ and $g(x)$? **D**

- Ⓐ $f(x) = -5x + 2$ and $g(x) = 4x - 7$
- Ⓑ $f(x) = -2x + 7$ and $g(x) = 7x - 20$
- Ⓒ $f(x) = x - 4$ and $g(x) = -3x$
- Ⓓ **$f(x) = 4x - 1$ and $g(x) = -3x + 6$**

3. The figure below shows the graphs of two functions, $f(x)$ and $g(x)$. $f(x)$ is a linear function that passes through the points $(0, 5)$ and $(1, 1)$, and $g(x)$ is a parabola defined by the quadratic function $g(x) = 2x^2 - 7x + 3$.



Respond to Part A and Part B based on the information given above.

Part A: Determine the x -coordinate of the point in quadrant II where $f(x) = g(x)$.

-0.5

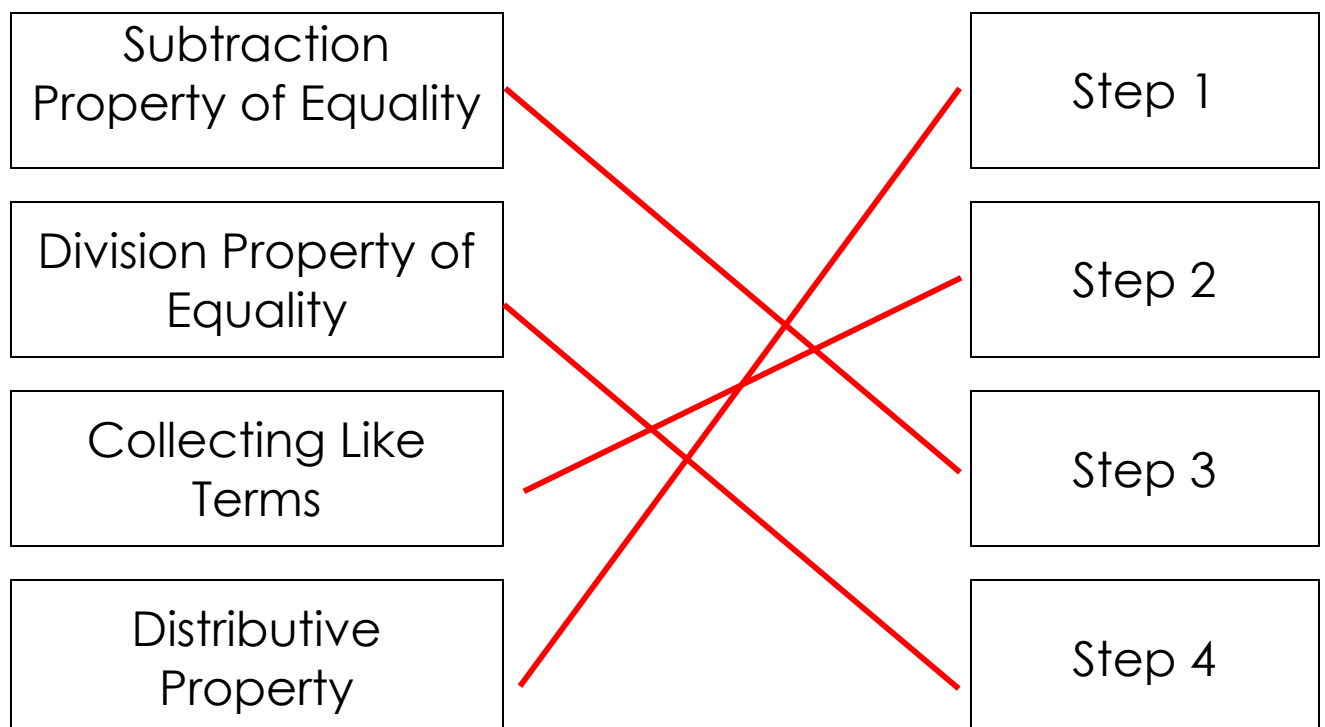
Part B: Using the model $f(x) = mx + b$, where m is the slope and b is the y-intercept, write the values for m and b into the text boxes in the equation below.

$$f(x) = \boxed{-4}x + \boxed{5}$$

4. Trinity attempted to solve the equation $2(x - 3) + 7 = 11$. Her work is shown below.

$$\begin{array}{ll} \text{Step 1:} & 2x - 6 + 7 = 11 \\ \text{Step 2:} & 2x + 1 = 11 \\ \text{Step 3:} & 2x = 10 \\ \text{Step 4:} & x = 5 \end{array}$$

Draw a line to connect the statement that best describes each step shown above.



5. Jeremiah wants to find the x -intercepts of the quadratic function $f(x) = 2x^2 - 12x - 54$ so he decides to set the function equal to zero and solve by completing the square. His first two steps are shown below.

$$\text{Step 1: } \frac{2}{2}x^2 - \frac{12}{2}x - \frac{54}{2} = x^2 - 6x - 27$$

$$\text{Step 2: } x^2 - 6x + \underline{\hspace{2cm}} = 27 + \underline{\hspace{2cm}}$$

Assuming that the remainder of his work is correct, determine if the following statements are true or false.

Statement	True	False
In step 1, Jeremiah divided by the coefficient of x^2 to get $a = 1$.	<input checked="" type="radio"/>	<input type="radio"/>
The missing value in Step 2 is -9 .	<input type="radio"/>	<input checked="" type="radio"/>
There are two roots for $f(x)$ located at $(-3, 0)$ and $(9, 0)$.	<input checked="" type="radio"/>	<input type="radio"/>
The equation for the axis of symmetry for $f(x)$ is $x = 3$.	<input checked="" type="radio"/>	<input type="radio"/>
The highest point on the graph of $f(x)$ is located at $(3, -72)$.	<input type="radio"/>	<input checked="" type="radio"/>
$(x - 3)^2 = 36$ is an equivalent form of the equation $2x^2 - 12x = 54$.	<input type="radio"/>	<input checked="" type="radio"/>

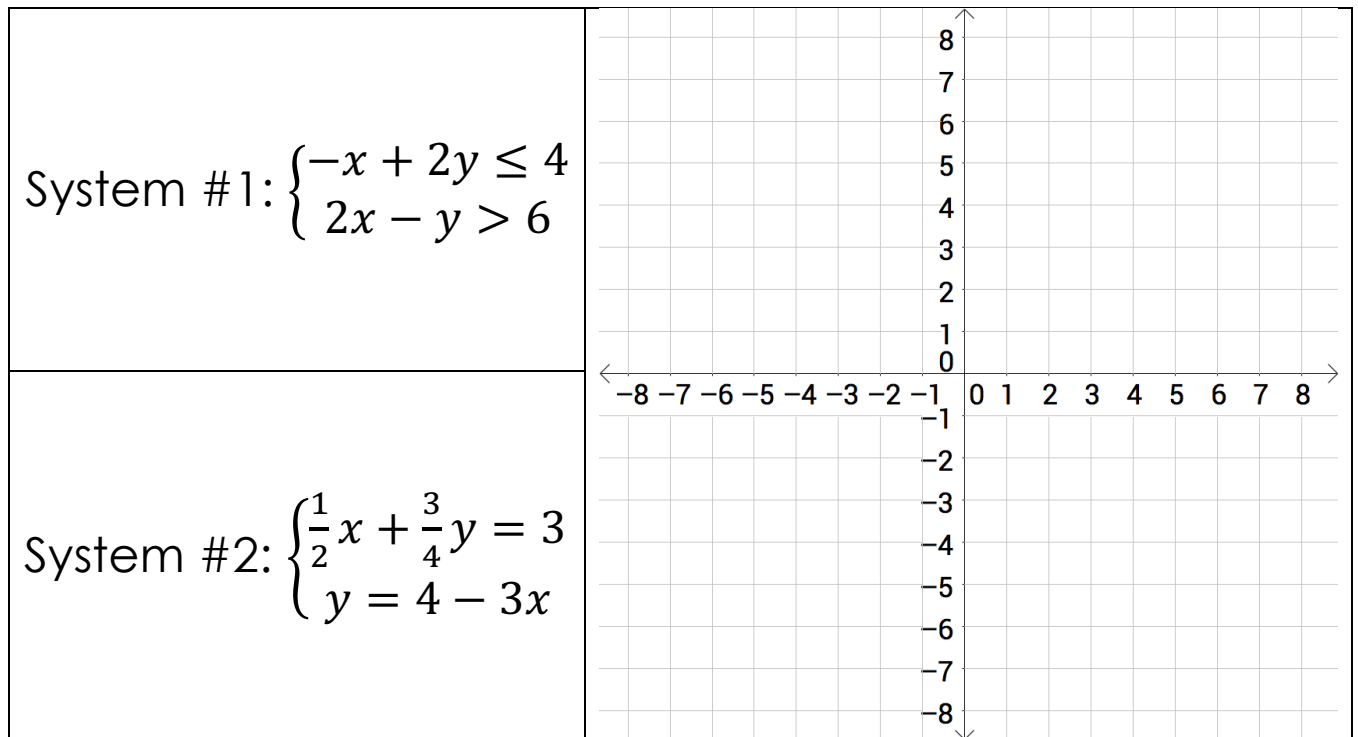
6. Consider the system of linear inequalities below.

$$\begin{cases} y > \frac{3}{2}x - 2 \\ y \leq 3x - 17 \end{cases}$$

Select the box or boxes under the coordinate pairs that represent points in the solution set for this system.

	(x, y)
(0, -17)	
(0, -2)	
(4, 2)	
(10, 13)	
(12, 18)	✓
(14, 19)	
(15, 28)	✓

7. Ethan will use the coordinate plane below to graph the solution set for the system of linear inequalities and the system of equation shown here.



Select the correct option from each drop-down box that completes the statements below.

The point

(0, 0)
(5, 4)
(8, 6)
(9, 7)

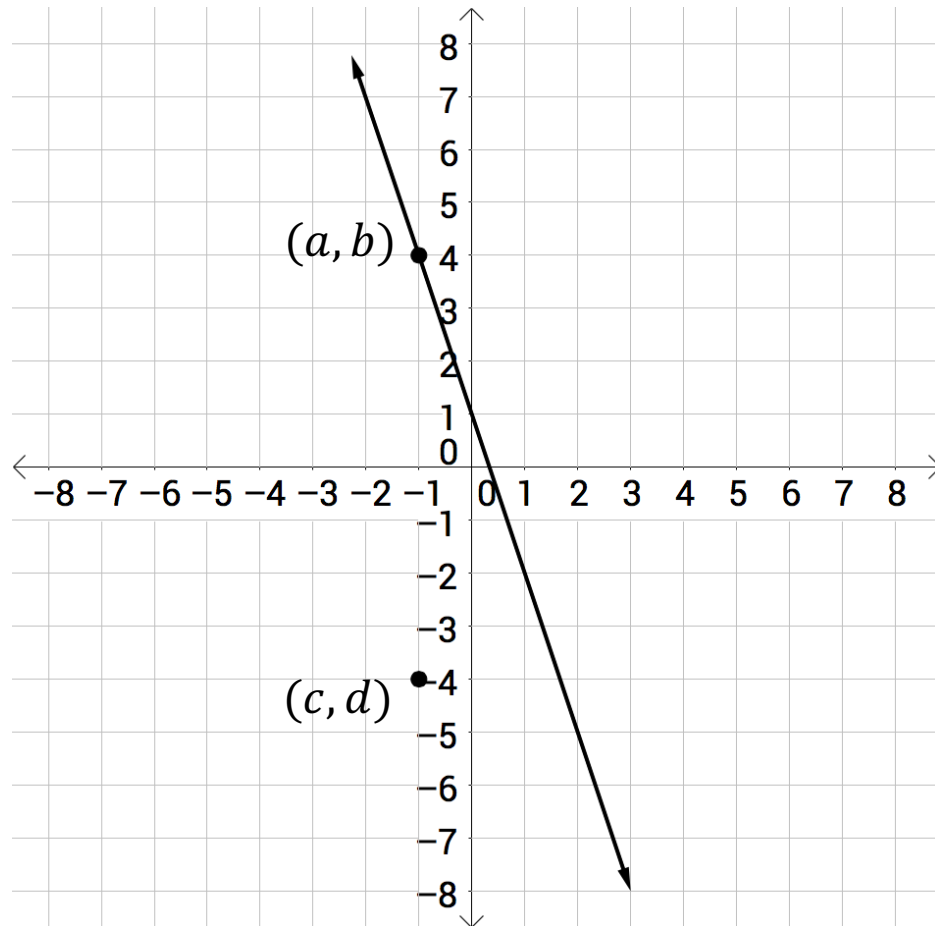
 is a solution point to System #1.

The point

(0, 4)
(1, 1)
(3, -5)
(6, 0)

 is a solution point to System #2.

8. The graph of the equation $y = -3x + 1$ is shown below.



Based on the given information, which of the following statements are correct? Select all that apply.

- Since it lies on the graph of the line, the point (a, b) is a solution to the equation $y = -3x + 1$.
- If $y = 3x - 1$ is graphed on the above coordinate plane, it will have a solution at the point (a, b) .
- Since $a = c$, both points (a, b) and (c, d) are solutions to the equation $y = -3x + 1$.
- The point $\left(\frac{3}{2}, -\frac{7}{2}\right)$ lies on the graph of the line that represents the equation $y = -3x + 1$.
- Since it does not lie on the graph of the line, the point (c, d) is a solution of the equation $y = -3x + 1$.

9. Consider the functions below.

$$m(x) = x^2 - 1$$
$$p(x) = |x + 1| - 2$$

Which of the following intervals contain a value of x for which the functions are equivalent? Select all that apply.

- $x \leq 6$
- $-6 < x < -3$
- $-3 \leq x < 1$
- $1 \leq x \leq 3$
- $3 < x < 6$
- $x \geq 6$

10. LeBron attempted to solve the following equation.

$$\frac{1}{2}(4x - 1) = \frac{5}{2} + x$$

His work is shown below.

Step 1: $4x - 1 = 5 + x$

Step 2: $3x - 1 = 5$

Step 3: $3x = 6$

Step 4: $x = 2$

Part A: Based on the information provided, which statement explains why his solution is incorrect? **A**

- (A) He forgot to multiply x by 2 in Step 1.**
- (B) He did not distribute correctly in Step 2.
- (C) He added 1 on both sides of the equation in Step 3 instead of subtracting 1.
- (D) He multiplied by the reciprocal of 3 to get $x = 2$ in Step 4.

Part B: Complete the following statement by selecting the correct text at the end. Circle the correct answer.

The correct answer to the equation that LeBron tried to solve above is $x = 1$ | $x = 2$ | **$x = 3$** | $x = 4$.

Seeing Structure in Expressions

1. Select the expression in each row that matches the equivalent expression in each column.

	$(x + 2)^2$	$(x - 2)^2$	$(x + 2)(x - 2)$	$2(x - 1)$
$x^2 - 4$	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
$x^2 - 4x + 4$	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
$\frac{2x^2 - 2x}{x}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
$x^2 + 4x + 4$	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. Charles went to the hardware store and purchased a hammer, a pair of gloves, a bag of nails, and a shovel. The total cost includes the cost of the items and the state sales tax. The equation $T = 1.065x$ can be used to calculate the total cost of his purchase, where x represents the pretax subtotal of his purchase.

Part A: In the equation $T = 1.065x$, what does the number "1.065" represent? **D**

- Ⓐ It represents \$106.50, which is the total cost for the purchases made by Charles.
- Ⓑ It represents the 10.65% of state sales tax that is added to the pretax cost of the purchase.
- Ⓒ It represents the \$1.65 state sales tax that Charles had to pay for every \$10 he spent in the hardware store.
- Ⓓ **It represents 106.5%, so when multiplied by the pretax cost of the purchase, the resulting product is the total cost, including state sales tax.**

Part B: Complete the following statement by writing the correct answer in the box provided.

The rate of state sales tax that Charles had to pay is percent.

Building Functions

1. Last summer, Carmelo started mowing lawns in the neighborhood to earn some money to pay for his graduation party. He mowed three lawns on Day 1 and five lawns every day after that. Which function models the total number of lawns, $m(d)$, Carmelo has mowed after d days? **A**

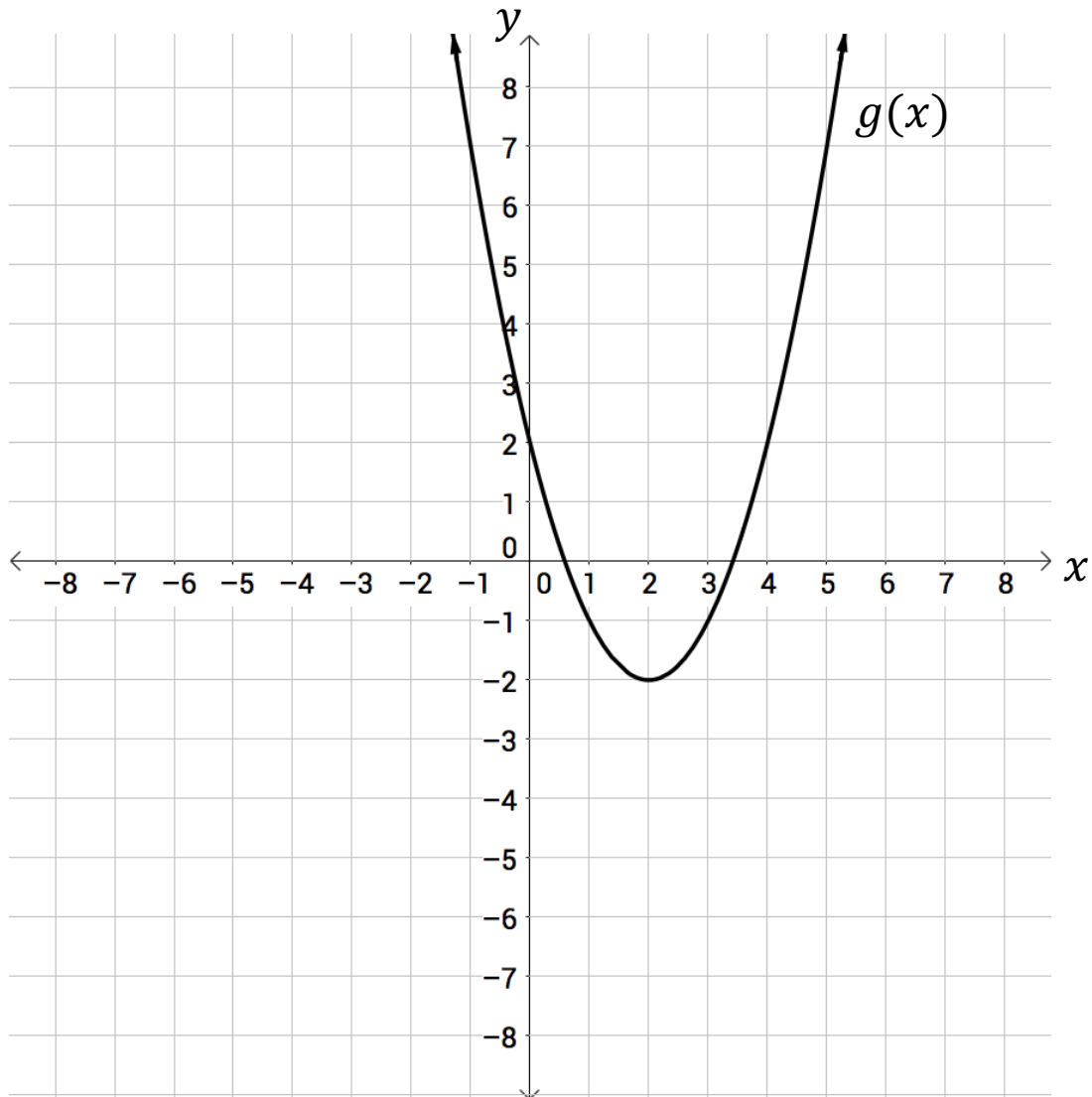
- Ⓐ $m(d) = 5(d-1) + 3$
Ⓑ $m(d) = 3d + 5d$
Ⓒ $m(d) = 3(d - 1) + 5$
Ⓓ $m(d) = 3d - 5d$

2. Grandma Gigi gave Leyla a rare purple stone for her Sweet 16 birthday. At that time, the stone was worth \$245. It has been increasing in value by the same percentage each year. When Leyla turned 21, the stone was worth \$560.50.

If $s(t)$ represents the value in dollars of the stone t years after Grandma Gigi gave it to Leyla, determine the value of a and r if $s(t) = a(r)^t$.

$$a = \boxed{245} \text{ and } r = \boxed{1.18}$$

3. The graph below displays the graph of $g(x)$ as a transformation of the function $f(x) = x^2$.



Which of the following functions represents $g(x)$? **A**

- (A)** $f(x - 2) - 2$
- (B) $f(x - 2) + 2$
- (C) $f(x + 2) - 2$
- (D) $f(x + 2) + 2$

4. Consider the following functions.

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

$$g(x) = 2x^2 - 3$$

$$h(x) = 2x^3 - 4x$$

$$m(x) = 2^x$$

$$p(x) = x^2 + 2x + 1$$

$$v(x) = 2x^3 - 3x^2 - 4x + 4$$

Which of the following statements are correct? Select all that apply.

- $f(x)$, $g(x)$, and $p(x)$ are odd functions.
- $g(x)$ moves $f(x)$ three units down after a vertical stretch.
- $p(x)$ represents a transformation of the independent variable from $f(x)$.
- $v(x)$ is neither an even or an odd function.
- $h(x)$ is an even function.
- $m(x)$ is a vertical compression of $f(x)$ and a transformation of the dependent variable from $g(x)$.

Interpreting Functions

1. Consider the following function rules.

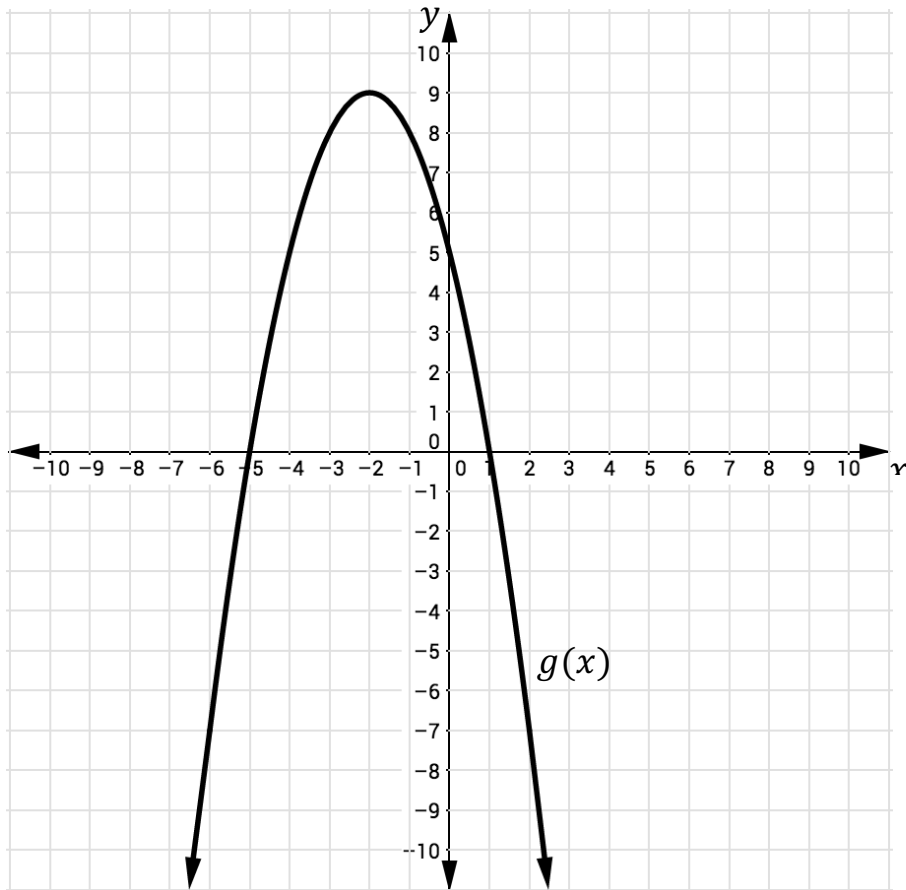
$$f(x) = -4x + 10$$

$$g(x) = \frac{3}{4}x^2 - 1$$

Determine if the following statements are true or false.

Statement	True	False
$f(2) = g(2)$	<input checked="" type="radio"/>	<input type="radio"/>
$f(1) = 6$ and $g(1) = -\frac{1}{4}$	<input checked="" type="radio"/>	<input type="radio"/>
$f(0) = 10$ and $g(0) = 1$	<input type="radio"/>	<input checked="" type="radio"/>
$f(3) + g(3) = 3.75$	<input checked="" type="radio"/>	<input type="radio"/>
$f(-2) = g(-2)$	<input type="radio"/>	<input checked="" type="radio"/>
$f(7) + g(5) = \frac{1}{4}$	<input type="radio"/>	<input checked="" type="radio"/>
$f(4) = -6$ and $g(4) = 11$	<input checked="" type="radio"/>	<input type="radio"/>

2. Consider the function $f(x) = x^2 - 4x - 4$ and the graph of the function $g(x)$ sketched in the figure below.



Based on the given information, which of the following statements are true? Select all that apply.

- $f(x)$ and $g(x)$ are functions because each of them assigns a single unique output for each of their inputs.
- The function $f(x)$ has more elements in its range than the function $g(x)$.
- The values $\{-8, -3, 0, 2, 9\}$ are elements of the range for both functions $f(x)$ and $g(x)$.
- The axis of symmetry of $f(x)$ is the same as the axis of symmetry of $g(x)$.
- The domain of the function $f(x)$ is all real numbers, which is the same domain of function $g(x)$.

3. The restaurant Pizza by the π offers six sizes: personal (8 in), small (10 in), medium (12 in), large (14 in), extra-large (16 in), and π -zilla (24 in). The table below shows the cost of a cheese pizza as a function of the diameter of the pizza.

Diameter	Cost
8	\$6.99
10	\$9.49
12	\$10.99
14	\$11.79
16	\$13.99
24	\$25.99

Part A: What is the average rate of change in cost when moving from a medium pizza to a π -zilla? **B**

- (A) \$0.79
- (B) **\$1.25**
- (C) \$1.49
- (D) \$1.99

Part B: What does this value mean in the context of this problem?

On average, for each 1-inch increase in diameter (from the medium to the pi-zilla), the cost of the pizza increases by \$1.25.

4. Suppose a rocket is launched from a platform. The function $h(t) = -4.9t^2 + 200t + 25$ gives the rocket's height, h , in meters, in terms of time, t , in seconds. The function $h(t)$ is equivalent to $-4.9(t - 20.41)^2 + 2,065.82$.

Respond to Part A, Part B, and Part C based on the given information.

Part A: Select the answer that completes the following statement.

The parabola opens down.
 up.

Part B: Complete the following statements by writing the correct answer in the boxes below.

The initial height at which the rocket is launched is

meters.

The initial velocity of the rocket is m/s.

Part C: Identify the vertex of the function $h(t)$. Round to the nearest hundredth.

(,)

5. Draw a line to connect the statement that best describes each function.

It has no real roots.

The vertex is located in Quadrant III.

The y -intercept is located at the origin.

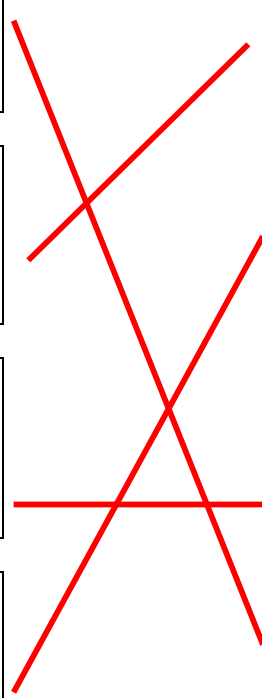
It has two zeros, both located between -1 and 1 .

$$f(x) = (x + 4)^2 - 9$$

$$f(x) = 4x^2 - 3$$

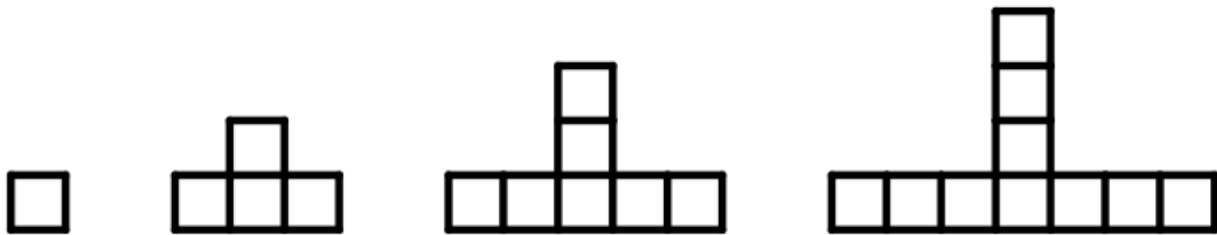
$$f(x) = -x(x - 7)$$

$$f(x) = -2x^2 + 3x - 7$$



6. The following figures were created with squares, where each side of the squares has a length of exactly one unit. P_1 represents the perimeter of the first figure, P_2 represents the perimeter of the second figure, and so on.

Part A: Based on this pattern, what would be the rule for the perimeter of the n^{th} figure when $n > 1$? **C**



$$\begin{array}{ccc} P_1 = 4 & P_2 = 10 & P_3 = 16 \\ n = 1 & n = 2 & n = 3 \end{array}$$

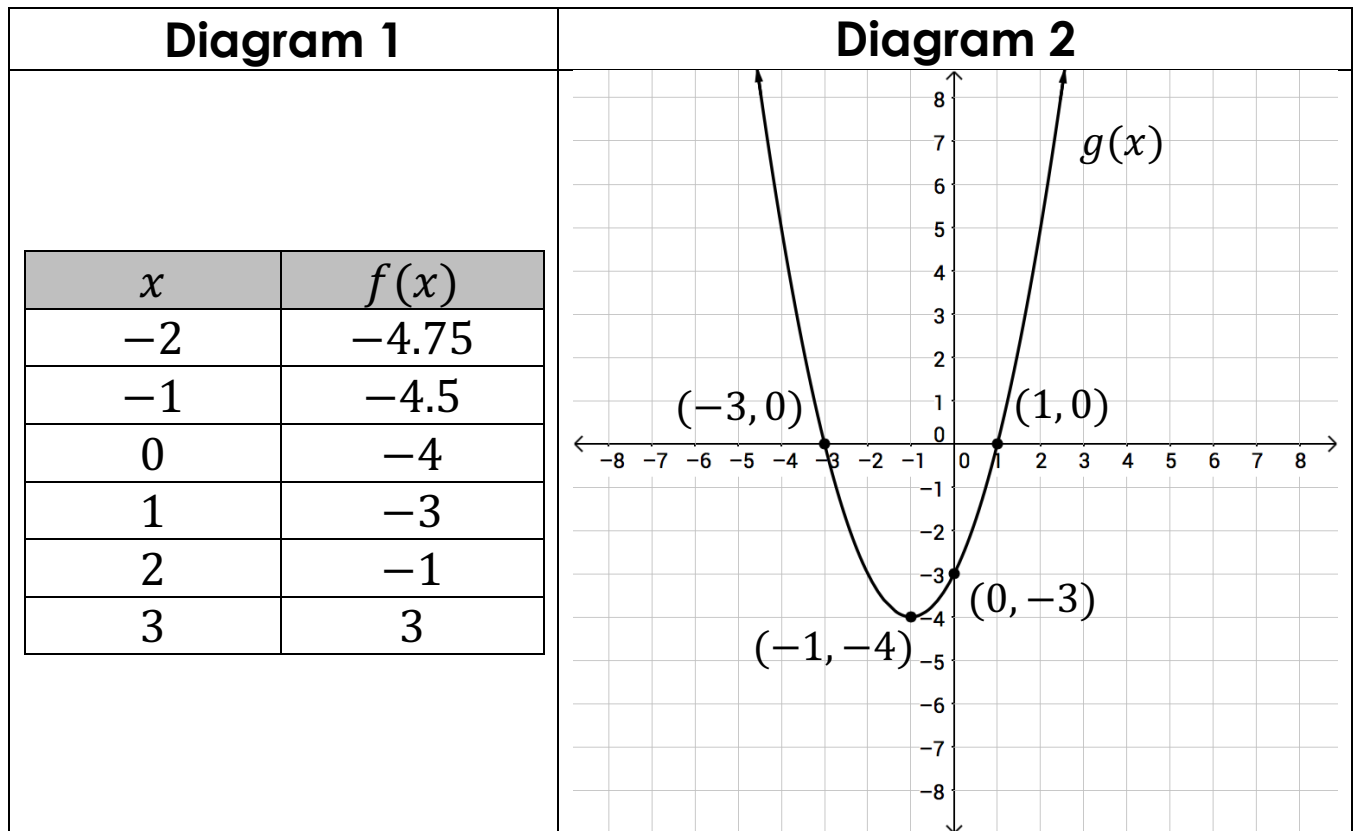
- (A) $P_n = 2P_{n-1} - 3$
- (B) $P_n = 2P_{n-1} + 6$
- (C) $P_n = P_{n-1} + 6$**
- (D) $P_n = P_{n-1} + 3$

Part B: Circle the best answers that complete the following statements.

The pattern above is an example of a(n) **arithmetic** | geometric | quadratic sequence.

The domain of this sequence is a subset of the **integers** | radicals | exponents.

7. Examine each of the diagrams below.



Based on the given information in Diagrams 1 and 2, which of the following statements is correct? **D**

- Ⓐ The y -intercept of $g(x)$ is one unit below the y -intercept of $f(x)$.
- Ⓑ The domain of $f(x)$ and $g(x)$ is $-\infty < x < \infty$ and the range of $g(x)$ has more elements than the range of $f(x)$.
- Ⓒ The sum of $f(2)$ and $g(2)$ is 4, and $f(3)$ is nine units less than $g(3)$.
- Ⓓ **The functions $f(x)$ and $g(x)$ are both quadratic and their respective vertices are located in Quadrant III.**

Linear, Quadratic, and Exponential Models

1. Dr. León is a chiropractor who offers house calls to his patients. He uses the function $c(m) = 26m + 60$ to calculate the total medical bill (in dollars), $c(m)$, for each 20-min session, m . During the holidays, Dr. León changes his total medical bill function to $c(m) = 35m + 45$.

Which of the following statements are correct? Select all that apply.

- Dr. León usually charges per 20-min session worked.
- Dr. León charges a \$45 fee for making the house call during the holidays.
- Dr. León charges \$35 per 20-min session worked during the holidays.
- Dr. León usually charges a \$26 fee for making the house call.
- Dr. León drops his house call fee by \$15 during the holidays.
- Dr. León drops his fee by \$9 for each 20-min session during the holidays.
- Dr. León will charge you \$138 for 1-hour session any time of the year, but during the holidays he charges you \$12 more.

2. Consider the following scenarios.

#1: After reading three books this year, Dwayne joined a book club, and now he reads two books every month.

#2: The volume of a landfill doubles every three years.

Part A: Complete the following statements by selecting and circling the correct option.

Scenario #1 can be modeled by a(n)

exponential function.
 linear
quadratic

Scenario #2 can be modeled by a(n)

exponential function.
linear
quadratic

Part B: Which of the following statements is correct? **B**

- (A) The function that models scenario #1 grows by equal differences over decreasing intervals.
- (B) The function that models scenario #2 grows by equal factors over equal intervals.**
- (C) The rate of change is the same in both scenarios.
- (D) In both scenarios, we see quantities doubling each time.

3. Write a function rule for the following sequences. Use the notation provided in the table.

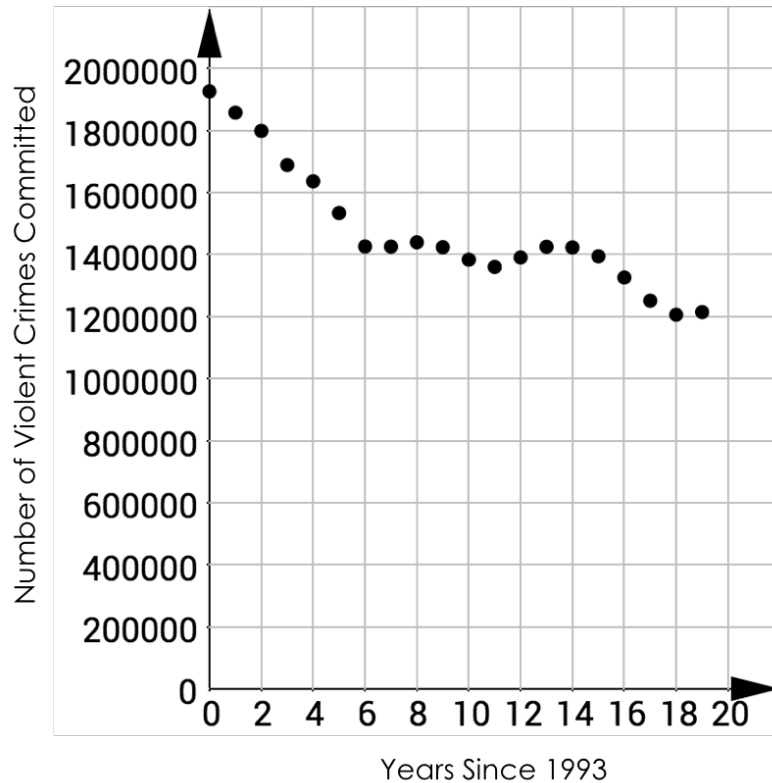
Term Number	1	2	3	4	...	n
Term	17	13	9	5	...	$f(n)$

$$\boxed{f(n)} = \boxed{-4n} \quad \boxed{21}$$

Statistics and the Number System

1. The scatterplot below shows the number of violent crimes committed in the United States for the years 1993-2012.

Violent Crimes in the United States, 1993-2012



Source: United States Department of Justice, <https://ucr.fbi.gov/>

The linear equation that best models this relationship is $y = -31,256x + 1,773,900$, where x represents the number of years since 1993 and y represents the number of violent crimes. In the space below, write a valid interpretation of this model.

The y -intercept tells us that the number of violent crime committed in 1993 was 1,773,900. Since a negative slope tells us there is a negative relationship between time passed and violent crimes committed, we can say that since 1993, the number violent crimes committed have been decreasing at an average rate of 31,256 per year.

2. A developer of a new gaming app collects data on how many apps are downloaded each day. Her ordered data sets for the last two weeks are shown.

Week 1	312	391	435	476	487	499	562
Week 2	292	354	398	465	497	504	542

The developer writes a summary about her data, as shown.

If you compare the means, it appears that in Week 1 **-insert text-** apps were downloaded on average than in Week 2.

- approximately 11 fewer
- approximately 11 more
- approximately 16 fewer
- **approximately 16 more**

When the medians for the two years are compared, the data show that in Week 1 **-insert text-** apps were downloaded than in Week 2.

- 11 fewer
- **11 more**
- 16 fewer
- 16 more

As far as the spread of the data, both data sets have the same **-insert text-** .

- **range**
- lower quartile
- upper quartile
- interquartile range

3. Consider the following statements.

$$\left(a^{\frac{5}{6}}\right)^x = \frac{1}{a}$$

$$(3a)^{\frac{3}{4}} = \sqrt[4]{pa^3}$$

$$\left(\frac{a^{\frac{1}{2}}}{b^{-\frac{1}{4}}}\right)^4 = a^m b$$

$$\left(\frac{a^{\frac{5}{6}}}{a^{\frac{1}{3}}}\right) = \sqrt[y]{a}$$

Determine the values of x , p , m , and y that make each statement above true.

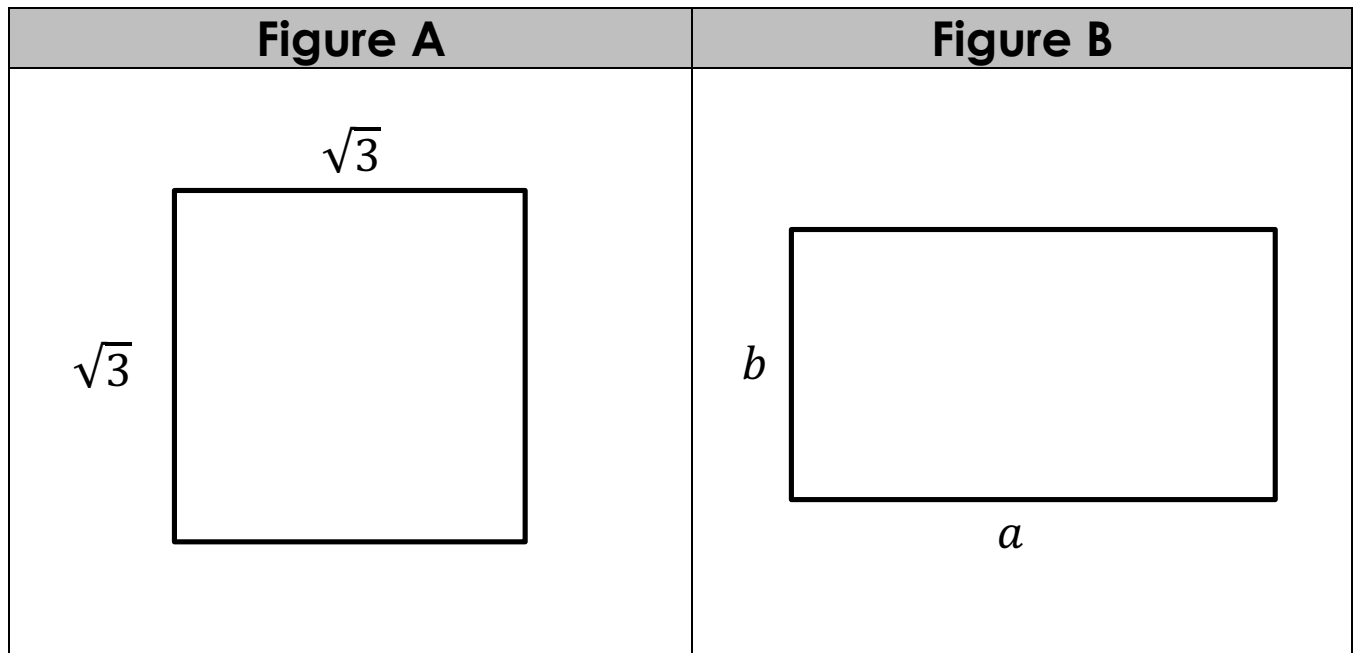
$x = \boxed{-\frac{6}{5}}$

$p = \boxed{27}$

$m = \boxed{2}$

$y = \boxed{2}$

4. Examine the two figures below.



Let a be a non-zero rational number and b be an irrational number. Which of the following statements are correct? Select all that apply.

- The area of Figure A is an irrational number.
- The perimeter of Figure A is an irrational number.
- The area of Figure B is an irrational number.
- The perimeter of Figure B is a rational number.
- The sum and the product of the two a -unit long sides of Figure B is a rational number.
- The sum and the product of the two b -unit long sides of Figure B is a rational number.
- The product of the areas of both figures is a rational number.

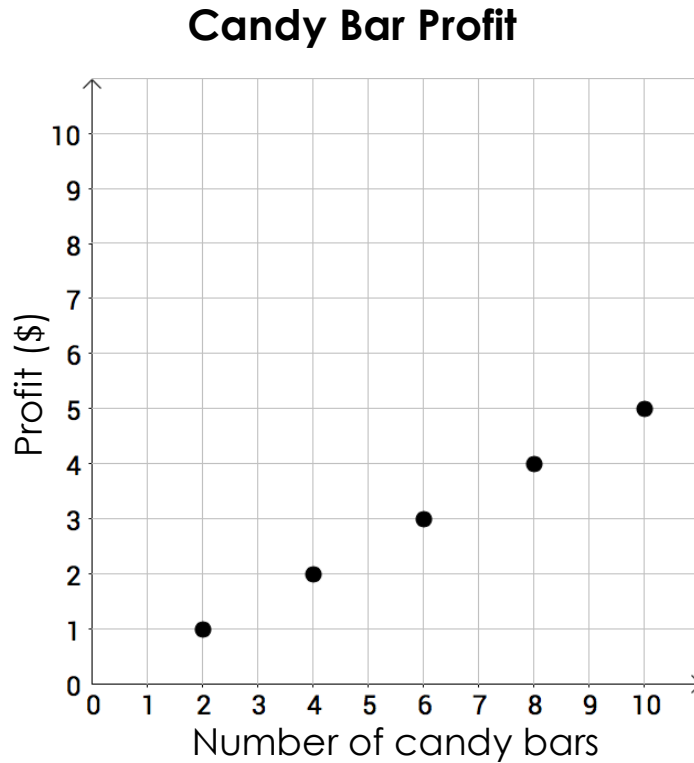
Interpreting Categorical and Quantitative Data

1. A group of college students participated in a study in which they sampled four smart phones, iPhone 7, Galaxy S7, Moto Z, and Pixel. They tried each phone for a week and then, after the four-week trial, they were each asked to select their favorite phone. The results of the survey are shown in the table below.

	<i>iPhone 7</i>	<i>Galaxy S7</i>	<i>Moto Z</i>	<i>Pixel</i>
Males	20	30	5	5
Females	25	20	5	10

- Based on the survey results, which statements are valid? Select all that apply.
50% of the college students were females.
- About 21% of the females preferred the iPhone 7.
- $\frac{5}{12}$ of the college students preferred the Galaxy S7.
- About 8.3% of the college students preferred the Moto Z.
- $\frac{1}{24}$ of the males preferred the Pixel.
- One-third of the males preferred the iPhone 7.
- About one-sixth of the females preferred the Moto Z.

2. The graph below displays data on the profit Tommy makes at his candy bar stand.



Part A: Complete the following statement.

Tommy earns **\$0.50** for each candy bar that he sells.

Part B: The regression equation $y = A + Bx$ can be used to model the data displayed in the graph. What do the variables B , x , and y represent in the equation?

	Profit (\$)	Number of candy bars	Slope of the regression line
B	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
x	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
y	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Two business partners, Juan and Nelson, are looking to rent an office. They are interested in renting an 800-square-foot office that is listed for \$1,325 a month. They conducted some research on eight commercial buildings that were rented within the past month near the location where they would like to rent. They collected information on office size (in square feet) and monthly rent (in dollars).

Office Size (ft ²)	720	760	652	824	880	752	780	860
Monthly Rent (\$)	1025	1075	940	1155	1225	1065	1100	1200

Part A: Using the model $y = A + Bx$, compute the regression equation for the data in the table.

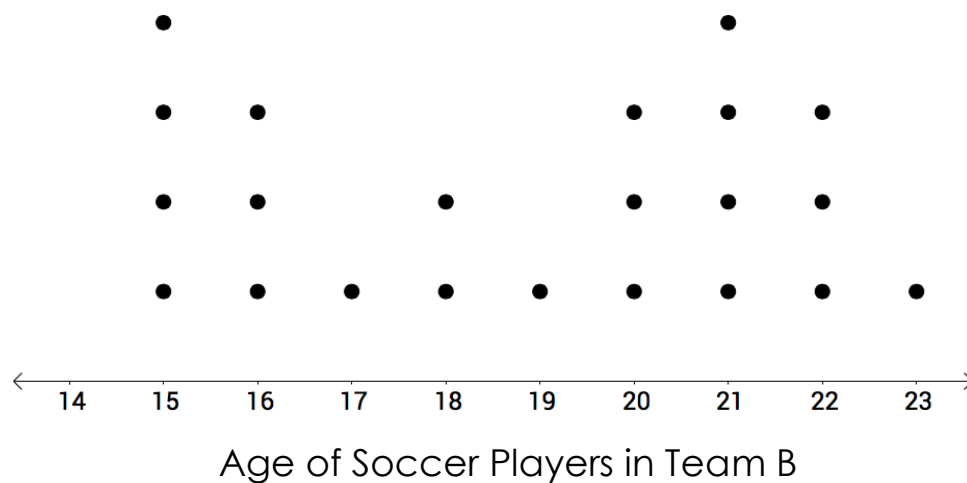
Then, write the values for A and B into the text boxes in the equation below.

$$y = \boxed{125} + \boxed{1.25} x$$

Part B: Juan concluded that there is a positive relationship between apartment size and the cost of rent. Nelson agrees and added that the office space they are interested in renting is overpriced. Which of the business partners is correct? **C**

- (A) Juan
- (B) Nelson
- (C) Both of them
- (D) Neither of them

4. The dot plots below show the ages of the members of two soccer teams that play in a local community league which aims to motivate youth through sports.



Based on the information presented, complete the statements in the following page by selecting the correct answer in each box.

The median age of the players on Team A is

greater than
equal to
less than

the median age of the players on B.

The mean age of the players on Team A is

greater than
equal to
less than

the mean age of the players on B.

The IQR for the age of the players on Team A is

greater than
equal to
less than

the IQR for the age of the players on B.

The first quartile of players' age for Team A is

greater than
equal to
less than

the first quartile of players' age for B.

Modelling with Real World Functions

Use the following information to respond to items 1-8.

Over the summer, Makayla works two jobs to help her parents save money. During the day, she works at an animal shelter, spending time with the animals and cleaning their cages. In the evening, she goes to her second job at a grocery store operating a cash register and bagging groceries. She makes \$6.00 per hour in the animal shelter and \$9.00 per hour in the grocery store. Makayla needs to make at least \$75 a day; however, she must work less than 10 hours per day.

1. Create two linear inequalities that can be used to model this scenario, where a = the number of hours working at the animal shelter and g = the number of hours working at the grocery store.

Linear inequality 1:

$$a + g < 10$$

Linear inequality 2:

$$6a + 9g \geq 75$$

2. Determine if there are any restrictions on linear inequality 1 and choose the correct statement below. Justify your answer in the corresponding box.

- Yes, there is a restriction on linear inequality 1.

$0 < a < 10$ and $0 < g < 10$: she must work less than ten hours

- There are no restrictions on linear inequality 1.

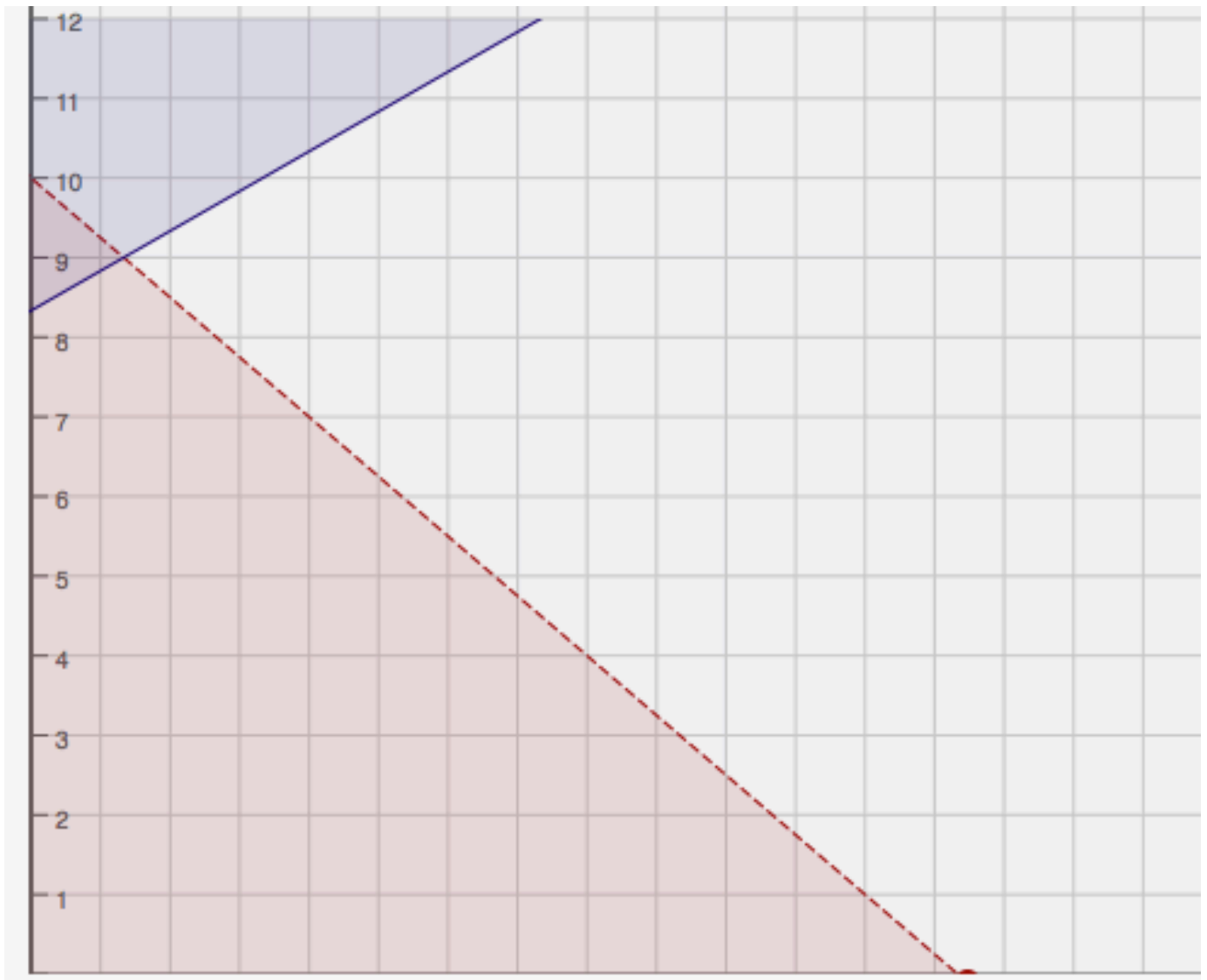
3. Determine if there are any restrictions on linear inequality 2 and choose the correct statement below. Justify your answer in the corresponding box.

- Yes, there is a restriction on linear inequality 2.

$a \geq 0, g \geq 0$: time cannot be a negative value

- There are no restrictions on linear inequality 2.

4. On the coordinate plane below, graph the solution set for the system of linear inequalities that you created in Item 1 by graphing the number of hours per day working at the animal shelter on the horizontal axis and the number of hours per day working at the grocery store on the vertical axis. Be sure to label each linear inequality and the axes accordingly.



5. Consider the linear inequality that models the number of hours Makayla works per day.

The x -intercept of the boundary line for this linear

inequality is

(0, 5).
(0, 10).
(5, 0).
(10, 0).

The y -intercept of the boundary line for this linear

inequality is

(0, 5).
(0, 10).
(5, 0).
(10, 0).

6. Which of the following coordinates represent the intersection of the two boundary lines of the system of inequalities you graphed in Item 4?

- (A) (0, 10)
(B) (1, 8)
(C) (10, 0)
(D) (10, 10)

7. Makayla's brother was looking at the system of linear inequalities that models Makayla's situation. He argues that the intersection of the two boundary lines of the system is a solution for her because she will earn exactly \$75, which is the minimum Makayla should earn. Is Makayla's brother correct? Justify your answer.

No, because despite the fact that she will earn \$75, which is the minimum she wants, she will work 10 hours and she must work less than that.

8. Which of the following combinations of hours can Makayla work in a week to earn at least \$75? Select all that apply.
- Six hours at the animal shelter and three hours at the grocery store
 - Two hours at the animal shelter and seven hours at the grocery store
 - One hour at the animal shelter and eight hours at the grocery store
 - Four hours at the animal shelter and six hours at the grocery store
 - Eight hours at the animal shelter and one hour at the grocery store