COLUMBIA ACADEMY

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2025 SAT Summer Class

Week 0

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PART 1

The Digital SAT Math

WEEK0.1

Introduction to the Digital SAT Math

The College Board has made the SAT digital. The digitalized SAT will be administered in schools or test centers with a proctor present starting in **spring 2024** if you plan to take the SAT in the U.S. The digital SAT still scores on a 1600 point-scale. (Reading and Writing section score: 200-800 and Math section score: 200-800)

The Digital SAT Math test formats (Adaptive Test)

Math section has two adaptive test design.

- **Module 1**: 22 questions (including 2 unscored questions- research purposes only)
  Students are given a broad mix of easy, medium, and hard questions.
  -Time: 35 min, the use of calculator is permitted.

- **Module 2**: 22 questions (including 2 unscored questions- research purposes only)
  Students are given a targeted mix of questions of varying difficulties based on their performance in module 1.
  -Time: 35 min, the use of calculator is permitted.

Important! – After completing the first-stage module on math section, **the test application routes students to one of two possible second-stage modules of questions**. One whose questions are, on average, of lower difficulty than those in the first module and the other whose questions are, on average, of higher difficulty than those in the first module.
And you will get the score based on the route and your performance.

The Digital SAT Math test formats (Nonadaptive Test)

Math section has two nonadaptive test design.

- **Module 1**: 27 questions (including 2 unscored questions- research purposes only)
  Students are given a broad mix of easy, medium, and hard questions.
  -Time: 43 min, the use of calculator is permitted.

- **Module 2**: 27 questions (including 2 unscored questions- research purposes only)
  Same difficulty level as module 1.
  -Time: 43 min, the use of calculator is permitted.

- Any student who wants to take the digital SAT on a paper braille test in an approved accommodation will need to be approved by College Board.

Math section Content domains.

- **Algebra** (13-15 questions, about 35%)
  - linear equations (functions) with one or two variables, System of linear equations, and linear inequalities one or two variables. Meaning of numbers or variables in the context.

- **Advanced Math** (13-15 questions, about 35%)
  - Equivalent equations, non-linear equations in one variable and systems of equations in two variables, non-linear functions. Solving rational equations and graphs of rational and polynomial functions.

- **Problem-solving and Data Analysis** (5-7 questions, about 15%)
- Ratios, rates, proportional relationship, units. Percentages, one or two variable data: distributions and measures of center and spread, Scatterplots. Probability and conditional probability, Inference from sample statistics and margin of error.

- **Geometry and Trigonometry** (5-7 questions, about 15%)
- Area and volume. Lines, angles, and triangles, right triangles, trigonometry, Circles.

How to calculate your scores in this book

- Use the answer keys on the end of each test to find the number of questions in module 1 and module 2 that you answered correctly.

- Add the number of correct answers you got on both module 1 and module 2. That will be your raw scores. Remember, there are no guess penalties. Even though the real College Board digital SAT counts only 20 questions only for scoring (2 unscored questions for research purposes), **we count all 22 questions to get your score in this book.**

- Look for the expected Math score (200-800) in the Score Conversion table provided below the answer keys using your calculated raw scores.

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THE MATH BREAKDOWN

No Need to Know
Here are a few things you won't need to know to answer Digital SAT Math questions: calculus, logarithms, and matrices. Essentially, the Digital SAT tests a whole lot of algebra and some arithmetic, statistics, and geometry.

The Math section of the Digital SAT is split into two modules. Each module contains 22 questions, of which 16 or 17 are multiple-choice questions and the rest are student-produced response questions (SPR), meaning that you fill in your own answer instead of choosing from four answers. Questions on the second module are, on average, easier or harder based on your performance on the first module. Each module has two "pre-test" questions that do not count towards your score, but they are not identified, so treat every question as if it counts.

The Math section is further broken down by question type and content area, as described below. Unlike the Verbal section, the question types and content areas do not go in any predictable order. Everything is mixed together, so you could see a trig question, then a word problem about averages, then a question about the vertex of a parabola. We'll cover these topics and many more in the next several chapters, so you'll be ready for all of it.

Question Type Breakdown	
70% Problem Solving	15–16 questions per module
30% Word Problems	6–7 questions per module
Content Breakdown	
35% Algebra	7–8 questions per module
35% Advanced Math	7–8 questions per module
15% Problem-Solving & Data Analysis	3–4 questions per module
15% Geometry and Trigonometry	3–4 questions per module

Fill-In Questions

Approximately 25% of the questions on the Math section of the Digital SAT are what College Board calls Student-Produced Response questions, or SPRs. These are the only questions on the test that are not multiple-choice. Instead of selecting the correct answer from among several choices, you will have to find the answer on your own and type it into a box. We call these fill-ins because you fill in your answer. The fill-in questions cover the same math topics as the multiple-choice questions do, and they fit within the order of difficulty of the module. The fill-in format has special characteristics, and we'll tell you more about them in Chapter 26.

You Don't Have to Finish

We've all been taught in school that when you take a test, you have to finish it. If you answered only two-thirds of the questions on a high school math test, you probably wouldn't get a very good grade. But as we've already seen, the Digital SAT is not at all like the tests you take in school. Most students don't know about the difference, so they make the mistake of trying to work all of the questions on both Math modules of the Digital SAT.

Quick Note
Remember, this is not a math test in school! It is not scored on the same scale your math teacher uses. You don't need to get all the questions right to get an above-average score.

Because they have only a limited amount of time to answer all the questions, most students rush through the questions they think are easy in order to get to the harder ones as soon as possible. At first, it seems reasonable to save more time for the more challenging questions, but think about it this way. When students rush through a Math section, they're actually spending too little time on the easier questions (which they have a good chance of getting right), just so they can spend more time on the harder questions (which they have less chance of getting right). Does this make sense? Of course not.

Here is the secret: on the Math section, you don't have to answer every question in each module. In fact, unless you are aiming for a top score, you should intentionally skip some harder questions. Most students can raise their Math scores by concentrating on correctly answering all of the questions that they think are easy or medium difficulty. In other words...

Slow Down!

Most students do considerably better on the Math section when they slow down and spend less time worrying about the more complex questions (and more time working carefully on the more straightforward ones). Haste causes careless errors, and careless errors can ruin your score. In most cases, you can actually raise your score by answering fewer questions. That doesn't sound like a bad idea, does it? If you're shooting for an 800, you'll have to answer every question correctly. But if your target is 550, you should ignore the hardest questions in each module and use your limited time wisely.

POOD and the Math Section

The questions in both modules of the Digital SAT Math section are arranged in a loose order of difficulty. The earlier questions are generally easier and the last few are harder, but the level of difficulty may jump around a little. Furthermore, the second module might start with a question that feels much easier than the last question of the first module. Assessing the difficulty of a question is also complicated by the fact that in College Board's view, "hard" on the Digital SAT means that a higher percentage of students tend to get it wrong, often due to careless errors or lack of time.

The two experimental questions in each module can also alter the order of difficulty. If you encounter a question that seems surprisingly easy or surprisingly hard based on the questions before and after, use your POOD to decide whether to do it, mark it for later, or enter a guess.

Because difficulty levels can go up and down a bit, don't worry too much about how hard the test-writers think a question is. Focus instead on the questions that are easiest for you, and do your best to get those right—no matter where they appear—before moving on to the tougher ones. So which will be the easy ones for you? It is *personal* order of difficulty, but here are some things to consider:

- **Math knowledge:** Do you know the topic cold? Do you see exactly how to start solving it? Then the question is worth attempting, but read and work carefully!
- **SAT knowledge:** Is there a Princeton Review technique from this book that would be perfect for this question? Now is the time to put your skills to use.
- **Self-knowledge:** Do your eyes glaze over halfway through a word problem? Do you think, "More like trigoNOmetry" when you see a trig question? Then come back to that question later or just pick a random answer to select.
- **Take the first bite:** A great way to decide whether a question deserves your time is to think about Bite-Sized Pieces. If you know immediately how to start a question, there's a good chance you'll be able to finish it and get it right.

> Don't forget: Fill in answers for questions you decide to skip, use the Mark for Review tool to mark questions to come back to later, and enter an answer for every question.

USING THE ONLINE TOOLS AND SCRATCH PAPER

Online Tools

Several of the built-in features of the Digital SAT will be useful on the Math section.

- Mark for Review tool to mark questions to come back to later
- Built-in calculator, which can be accessed at any time
- Reference sheet with common geometry formulas, which can be accessed at any time
- The Annotate tool is NOT available on the Math section, so you will not be able to underline or highlight parts of the question.

Scratch Paper

The proctor at the test center will hand out three sheets of scratch paper, and you can use your own pen or pencil. Plan ahead about how to use the scratch paper in combination with what's on the screen.

Use the Tools Effectively!

Online Tools	Scratch Paper
Eliminate wrong answers	Rewrite key parts of the question
Work steps on the calculator	Write out every calculation
Look up geometry formulas	Redraw geometric figures and label them
	Rewrite answer choices as needed

Here's a question from your first practice test with an image of the testing app screen on the left and scratch paper on the right. On a question like this, use your scratch paper to rewrite parts of the question and translate them into math, and then use the Answer Eliminator tool to cross out answers that don't match that piece. Always include the question number next to your work on the scratch paper to keep yourself organized.

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Stella had 211 invitations to send for an event. She has already sent 43 invitations and will send them all if she sends 24 each day for the next d days. Which of the following equations represents this situation?

~~(A) $24d - 43 = 211$~~ Undo

(B) $24d + 43 = 211$ (B)

~~(C) $43d - 24 = 211$~~ Undo

~~(D) $43d + 24 = 211$~~ Undo

16)

24 a day for d days
24d

add to 43 sent,
not subtract

Calculators

Calculators are permitted on every Math question on the Digital SAT. In addition, the testing app includes a built-in calculator with many, many features. Practice with the built-in calculator or the one you're planning to bring with you. We'll tell you more about calculators as we go along.

WEEK 0. 1

The Princeton Review Approach

We're going to give you the tools you need in order to handle the easier questions on the Digital SAT Math section, along with several great techniques to help you crack some of the more difficult ones. But you must concentrate first on getting the easier questions correct. Don't worry about the questions you find difficult on the Math section until you've learned to work carefully and accurately on the easier questions.

When it does come time to look at some of the harder questions, use Process of Elimination to help you avoid trap answers and to narrow down your choices if you have to guess. You will learn to use POE to improve your odds of finding the answer by getting rid of answer choices that can't possibly be correct.

Generally speaking, each chapter in this section begins with the basics and then gradually moves into more advanced principles and techniques. If you find yourself getting lost toward the end of the chapter, don't worry. Concentrate your efforts on principles that are easier to understand but that you still need to master.

Chapter 19 Digital SAT Math: The Big Picture

In this chapter, you'll see a few ways you can eliminate bad answer choices, avoid traps, improve your odds of answering correctly if you have to guess, and maximize your Math score. You'll also learn how to best make use of the built-in calculator, should you choose to use it instead of bringing your own.

WEEK 0.1

THE BIG PICTURE AND IMPORTANT STRATEGIES

The Reading and Writing section of this book describes various ways to eliminate wrong answers. That idea comes into play on the Digital SAT Math section, as well. There are also ways to break down math questions and avoid trap answers. This chapter provides an overview of the strategies you should know in order to maximize your Math score.

BALLPARKING STRATEGY

One way to eliminate answers on the Math section is by looking for ones that are the wrong size, or that are not "in the ballpark." We call this strategy **Ballparking.** Although you can use your calculator on the following question, you can also eliminate one answer without doing any calculations.

1 Mark for Review

In a garden, the corn on the north edge of the garden is 30% shorter than that on the south edge. If the corn on the south edge of the garden is 50 inches tall, how tall is the corn on the north edge of the garden, in inches?

(A) 30

(B) 33

(C) 35

(D) 65

Here's How to Crack It

The question asks for the height of the corn on the north edge of the garden and states that the corn there is shorter than the corn on the south edge, which is 50 inches tall. You are asked to find the height of the corn on the north edge, so the correct answer must be less than 50. Eliminate (D), which is too high. Often, one or more of the bad answers on these questions is the result you would get if you applied the percentage to the wrong value. To find the right answer, take 30% of 50 by multiplying 0.3 by 50 to get 15; then subtract that from 50. The corn on the north edge is 35 inches tall. The correct answer is (C).

READ THE FINAL QUESTION STRATEGY

It's a bad idea to assume you know what a question is going to ask you to do. Make sure to always read the final question *before* starting to work on the question. Write key words or the entire final question on the scratch paper. Then, try to ballpark before you solve.

2 Mark for Review

If $16x - 2 = 30$, what is the value of $8x - 4$?

(A) 12

(B) 15

(C) 16

(D) 28

Here's How to Crack It

The question asks for the value of an expression, but don't just dive in and solve for the variable. First, see if you can eliminate answers by Ballparking, which can also work on algebra questions. To go from $16x$ to $8x$, you would just divide by 2. Dividing 30 by 2 gives you 15, so 28 is way too big. Eliminate it. The correct answer is not likely to be 15, either, because that ignores the –2 and the –4 in the question.

To solve this one, add 2 to each side of the equation to get $16x = 32$. Divide both sides by 2, which gives you $8x = 16$. But don't stop there! The final question asks for $8x - 4$, so (C) is a trap answer. You have to take the last step and subtract 4 from both sides to find that $8x - 4 = 12$. The correct answer is (A).

RTFQ:
Read
The
Final
Question

Get started faster and avoid trap answers by reading and rewriting the actual question being asked.

WEEK 0.1

BITE-SIZED PIECES STRATEGY

When dealing with complicated math questions, take it one little piece at a time. We call this strategy **Bite-Sized Pieces**. If you try to do more than one step at a time, especially if you do it in your head, you are likely to make mistakes or fall for trap answers. After each step, take a look at the answer choices and determine whether you can eliminate any.

Try the following question.

3 Mark for Review

A paper airplane is thrown horizontally from the top of a hill. It travels in a straight line, and as it moves forward, it also descends. The plane moves horizontally at 9 feet per second while descending one foot for every 3 feet traveled horizontally. After 5 seconds of travel, how many feet has the plane descended from the height at which it was thrown?

(A) 3

(B) 10

(C) 15

(D) 20

Bite-Sized Pieces: Do one small, manageable piece at a time and keep writing things down.

Here's How to Crack It

The question asks how many feet the plane has descended after 5 seconds. There are a few things going on here. The plane is traveling horizontally, and it is also descending. Start by figuring out how far it travels horizontally. It moves in that direction at 9 feet per second for 5 seconds, so it moves horizontally $9 \times 5 = 45$ feet. It descends 1 foot for every 3 traveled horizontally. If it goes 45 feet horizontally, it will descend more than 3 feet, so eliminate (A). Now figure out how many "3 feet" are in 45 feet—for each one of them, the plane will descend 1 foot. Since $45 \div 3 = 15$, the plane descends 15 feet. The correct answer is (C).

You may also have noticed that all the numbers in the question are odd. This makes it unlikely that the answer would be 10 or 20, which are even. If you see things like that, use them as opportunities to eliminate.

Here's another example.

4 Mark for Review

$$(5ck^2 + 5c^2 - 2c^2k) - (ck^2 + 2c^2k + 5c^2)$$

Which of the following is equivalent to the expression above?

(A) $4ck^2$

(B) $4ck^2 - 4c^2k$

(C) $5c^2k^4 - 10c^4k$

(D) $8c^2k^3 + 7c^2k - 5c^2$

Here's How to Crack It

The question asks for an expression that is equivalent to the difference of two polynomials. In math class, your teacher would want you to combine all like terms and show your work, but this isn't math class. Start with one tiny piece of this intimidating question. The first set of parentheses starts with a term containing ck^2. Check the second set of parentheses for the same combination of variables and exponents. The first term there matches, so the first step to take is $5ck^2 - ck^2 = 4ck^2$. There are no other terms with ck^2, so the correct answer must contain $4ck^2$. Eliminate (C) and (D). Now you have a fifty-fifty chance of getting it right, so you can guess and go, *or* you can do one more step to determine whether the answer is (A) or (B). The difference between the two answers is the $-4c^2k$ term, so focus on the terms in the expression that contain c^2k. In the first set of parentheses, you have $-2c^2k$, and then you subtract the $2c^2k$ term in the second set of parentheses to get $-2c^2k - 2c^2k = -4c^2k$. The correct answer is (B).

WORD PROBLEMS

The two strategies we just showed you—RTFQ and Bite-Sized Pieces—are a large part of the approach to word problems on the Digital SAT. The test-writers will try to make things difficult to understand by making a story out of the math. To make sure you have the best shot at reaching the correct answer quickly and accurately, follow this basic approach.

Word Problem Basic Approach

1. **Read the Final Question (RTFQ)**—Understand the actual question being asked. Write down key words.
2. **Let the answers point the way**—Use the answer type to help determine how to start working on the question.
3. **Work in bite-sized pieces**—Find one piece to start with, then work piece-by-piece until the final question has been answered.
4. **Use POE**—Check to see whether any answers can be eliminated after each bite-sized piece.

This approach can be helpful on questions that are "just" math, but they are vital on word problems. Here are some details about the word problem basic approach.

RTFQ—The final question will start with something like *Which of the following, What is,* or *How many.* Find the final question (it's usually at the end) and write down key words. If the question asks for the value of a variable or the measure of an angle, write down which variable or which angle. If it asks for a specific part of a graph or a word problem, write down which part. Terms and units, such as *median, positive, minutes,* or *miles,* also go on the scratch paper.

Let the answers point the way—On multiple-choice questions, the answer type often gives a clue about how to approach the question. Do the answers have numbers? variables? equations? graphs? a bunch of words? Use that information to get started.

Work in bite-sized pieces—Rather than trying to plan the entire question up front, just get started. Work the question one bite-sized piece at a time, reading more along the way and making notes on the scratch paper. The final question and the answer types usually reveal the best approach. If it's not obvious, either mark the question to come back to later or enter a guess.

Use POE—On some questions, it's possible to eliminate answers along the way while working in bite-sized pieces. If the question asks about an equation representing a situation, for example, an answer that gets any piece of the equation wrong can be eliminated. Eliminate answers that don't work when you plug them in, answers that are clearly too big, too small, or have the wrong sign, and answers that contradict information given in the question.

THE CALCULATOR

You are allowed to use a calculator on every question in the Math section, although it doesn't help on every question. You have two calculator options:

- Use the built-in Desmos calculator within the testing app.
- Bring your own approved scientific or graphing calculator.

Whether you use the built-in calculator or your own, practice, practice, practice! A calculator can make some questions much easier to answer and will save you time on other questions. To practice with the built-in calculator, download the Bluebook app or just use the free version on the Desmos website.

Calculator Guide

Head to your Student Tools to read our Guide for the built-in calculator. There you will find basic information about opening and using the calculator, details about how to use the keypads and advanced functions, and instructions for getting the most out of the graphing calculator. This Guide also includes a number of questions from your first practice test with detailed instructions and screenshots to show you how to solve them using the built-in calculator.

Even if you are planning to use your own calculator, this Guide might help you think of ways to use it that you hadn't considered before.

Call on the Calculator
Practice using the built-in calculator in your Student Tools or your own throughout your test preparation. Use it for example questions in this book, use it while taking practice tests, and use it any time you're doing practice questions for the Digital SAT.

Personal Calculator

If you have a good calculator that you are familiar with and like using, you may take it with you and use it on the test. Make sure that your calculator is either a scientific or a graphing calculator and can perform the order of operations correctly. To test your calculator, try the following problem, typing it in exactly as written without hitting the ENTER or "=" key until the end: $3 + 4 \times 6 =$. The calculator should give you 27. If it gives you 42, it's not a good calculator to use.

If you do decide to use your own graphing calculator, keep in mind that it *cannot* have a QWERTY-style keyboard (like the TI-95). Most of the graphing calculators have typing capabilities, but because they don't have typewriter-style keyboards, they are perfectly legal. To see the full College Board calculator policy, visit satsuite.collegeboard.org/digital/what-to-bring-do/calculator-policy.

Also, you *cannot* use the calculator on your phone. In fact, on test day, you will have to turn your phone off and put it away.

The only danger in using a calculator on the Digital SAT is that you may be tempted to use it in situations in which it won't help you. Some students believe that their calculator will solve many difficulties they have with math. This type of thinking may even occasionally cause students to miss a question they might have otherwise answered correctly on their own.

Remember that your calculator is only as smart as you are. But if you practice and use a little caution, you will find that your calculator will help you a great deal.

What a Calculator Is Good at Doing

Here's a list of some of the things a calculator is good for on the Digital SAT:

- arithmetic
- decimals
- fractions
- square roots
- percentages
- graphs (if it is a graphing calculator)

We'll discuss the calculator's role in most of these areas in the next few chapters.

Calculator Arithmetic

Calculators Don't Think for You
A calculator crunches numbers and often saves you a great deal of time and effort, but it is not a substitute for your problem-solving skills.

Adding, subtracting, multiplying, and dividing integers and decimals is easy on a calculator. But, you need to be careful when you key in the numbers. A calculator will give you an incorrect answer to an arithmetic calculation if you press the wrong keys.

The main thing to remember about a calculator is that it can't help you find the answer to a question you don't understand. If you wouldn't know how to solve a particular problem using pencil and paper, you won't know how to solve it using a calculator either. Your calculator will help you, but it won't take the place of a solid understanding of basic Digital SAT mathematics.

Use Your Paper First

Write Things Down
You have scratch paper, so make the most of it. Keep track of your progress through each question by writing down each step.

When you decide to use a calculator to help answer a question, the first step should be to set up the problem or equation on paper; this will keep you from getting lost or confused. This is especially important when solving the problem involves a number of separate steps. The basic idea is to use the scratch paper to make a plan, and then use your calculator to execute it.

Working on paper first will also give you a record of what you have done if you change your mind, run into trouble, or lose your place. If you suddenly find that you need to try a different approach to a question, you may not have to go all the way back to the beginning. This will also make it easier for you to check your work, if you have time to do so.

Don't use the memory function on your calculator (if it has one). Because you can use your scratch paper, you don't need to juggle numbers within the calculator itself. Instead of storing the result of a calculation in the calculator, write it on your scratch paper, clear your calculator, and move to the next step of the question. A calculator's memory is fleeting; scratch paper is forever.

Order of Operations

In the next chapter, we will discuss the proper order of operations for solving equations that require several operations to be performed. Be sure you understand this information, because it applies to calculators as much as it does to pencil-and-paper computations. You may remember PEMDAS from school. PEMDAS is the order of operations. You'll learn more about it and see how questions on the Digital SAT require you to know the order of operations. You must always perform calculations in the proper order.

Fractions

Most scientific calculators have buttons that will automatically simplify fractions or convert fractions from decimals. (For instance, on the TI-81, TI-83, and TI-84, hitting "Math" and then selecting the first option, "Answer → Fraction," will give you the last answer calculated as a fraction in the lowest terms.) Find out if your calculator has this function! If it does, you can use it to simplify messy fractions. This function is also very useful when you get an answer as a decimal, but the answer choices given are all fractions.

The Digital SAT Calculator Guide has details about working with fractions, along with other types of math and graphs. Pull up the Guide in your Student Tools and become an expert!

Batteries

Change the batteries on your calculator a week before the Digital SAT so that you know your calculator won't run out of power halfway through the test. You can also take extra batteries with you, just in case. Although it isn't very likely that the batteries will run out on your calculator on the day of the test, it could happen—so you want to be prepared.

Final Words on the Calculator

Remember that the test-writers are trying to test your ability to use your calculator wisely. As such, they have purposely created many questions in which the calculator is worthless. So be sure to read the final question—there may be some serious surprises in there. Practice your math skills *and* your calculator skills so you have options about how you solve questions.

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Summary

- Look for ways to eliminate answer choices that are too big or too small. Ballparking can help you find the right answer without extensive calculations, avoid trap answers, and improve your chances of getting the question right even if you have to guess.
- Use the built-in tools as much as possible. The most useful ones on the Math section are the Calculator, Reference Sheet, and Answer Eliminator tool.
- Use your scratch paper constantly: number the work for each question, write down key words from the final question, redraw geometric figures, and write down every step of math. Even if you use a calculator, it's worth setting up the math on your scratch paper to stay organized and avoid mistakes.
- Utilize the Word Problem Basic Approach: Read the Final Question (RTFQ), Let the Answers Point the Way, Work in Bite-Sized Pieces, and use Process of Elimination (POE).
- Practice with the calculator you plan to use for the test: either the built-in Desmos calculator or your personal scientific or graphing calculator.
- If you are going to use the built-in calculator, read the Digital SAT Calculator Guide in your Student Tools to maximize its effectiveness.
- If you are going to use your own calculator, make sure it is on the approved list and has fresh batteries.
- Set up the question on the scratch paper before entering anything into a calculator. By doing so, you will eliminate the possibility of getting lost or confused.
- A calculator can't help you find the answer to a question you don't understand. Be sure to use your calculator as a tool, not a crutch.
- Whether you are using a calculator or not, you must always perform calculations in the proper order (PEMDAS).

WEEK 0.1

CHAPTER 17: MATH INTRODUCTION AND GENERAL STRATEGIES

There are often several ways to solve a math problem. You don't have to solve it the way the SAT® wants you to. Since our purpose is to get you to the correct answer in the quickest amount of time, we'll walk you through the strategies, techniques, tips, etc., that our students find extremely helpful. A number of these strategies may seem unfamiliar. However, they have been proven to work and, with practice, they can work for you too.

The College Board tells us that the questions on the Math section fall into four content domains:

1. Algebra
2. Advanced Math
3. Problem-Solving and Data Analysis
4. Geometry and Trigonometry

We've identified the specific categories most commonly tested within these headings, with each question category representing its own chapter, with the specific strategy for tackling each one.

MATH GENERAL STRATEGIES

1. **NEVER leave a question blank.** There is no penalty for guessing.
2. **Complete easy questions first.** Questions follow a loose order of difficulty, meaning they tend to get harder as you go. Spend your time wisely on the questions likely to award you points. Pick and choose which questions you can complete when time is running out.
3. **Abide by a 5-second rule (or something close to it).** If after 5 or so seconds you have no idea what to do, skip that question and return to it if time allows.
5. **BALLPARK:** You may be able to get an answer in the ballpark, even if you don't know how to fully solve a problem.
6. **BITE-SIZE:** Break the question down into manageable Bite-sized steps when you get to a stopping point after each step.
7. **Use your CALCULATOR wisely.** Don't trust it unquestioningly; you should always be mentally checking to see if what it's spitting out makes sense.
8. **Know when to walk away!** Beware time-sucker problems. Take a guess and move on.
9. For EVERY math question, ask if the question would be easier if I **Plugged In** for the Variable or Plugged in the Answer.

MATH

QUESTION CATEGORY	STRATEGY
Plug In for the Variable	Find the Target Value
Plug in the Answer	Start with B and Label Columns
Basic Algebra	Isolate the variable
Slope Intercept Form of a Line	Write out the Formulas
Proportions	Write out Top and Bottom Units
Functions	Think of f(x) as y
Systems of Equations	Substitute, Stack, or Graph
Inequalities	Flip the Sign
Quadratics	Know the Basic Equations
Graphs	Select Quickest Option
Percents	Translate Text to Math
Exponents/Radicals	MADSPM
Mean/Median/Mode/Range	Use Average Pie for Mean
Probability	Success/Total
Represents Situation	Bite-size and POE
Geometry	Draw/Label/Complete Formulas/Carve
Trigonometry	SOHCAHTOA
Statistics and Survey Design	Large and Random Sample Sizes are Best

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FILL-INS: A TEST DRIVE

To get a feel for this format, let's work through two examples. As you will see, fill-in questions are just regular Digital SAT Math questions.

1 Mark for Review

If $a + 2 = 6$ and $b + 3 = 21$, what is the value of $\frac{b}{a}$?

Here's How to Crack It

The question asks for the value of $\frac{b}{a}$. You need to solve the first equation for a and the second equation for b. Start with the first equation, and solve for a. By subtracting 2 from both sides of the equation, you should see that $a = 4$.

Now move to the second equation, and solve for b. By subtracting 3 from both sides of the second equation, you should see that $b = 18$.

The question asked you to find the value of $\frac{b}{a}$. That's easy. The value of b is 18, and the value of a is 4. Therefore, the value of $\frac{b}{a}$ is $\frac{18}{4}$.

That's an odd-looking fraction. How in the world do you fill it in? Ask yourself this question: "Does $\frac{18}{4}$ fit?" Yes! Fill in $\frac{18}{4}$.

18/4

Your math teacher wouldn't like it, but the scoring computer will. You shouldn't waste time reducing $\frac{18}{4}$ to a prettier fraction or converting it to a decimal. Spend that time on another question instead. The fewer steps you take, the less likely you will be to make a careless mistake.

2 Mark for Review

The radius of circle O is 212 times the radius of circle P. If the area of circle O is t times the area of circle P, what is the value of t?

Here's How to Crack It

The question asks for the relationship between the areas of two geometric figures. It doesn't matter that this is a fill-in instead of a multiple-choice question: you still start with the Geometry Basic Approach. Draw two circles on your scratch paper. Next, label the figure. Mark the center of one circle as O and the center of the other as P, and draw in the radius of each circle. The question doesn't give you any numbers for the radius or area of circle P, so plug in. Make the radius 2 and label that on the figure. Finally, write down formulas. The area of a circle is given by $A = \pi r^2$. Plug in $r = 2$ to get $A = \pi(2)^2$, or $A = 4\pi$ for circle P.

The question states that *the radius of circle O is 212 times the radius of circle P*, so multiply 2 by 212 to get $r = (2)(212) = 424$. Label the radius of circle O as 424. Plug $r = 424$ into the area formula to get $A = \pi(424)^2$, or $A = 179{,}776\pi$. To solve for t, divide the area of circle O by the area of circle P to get $t = \frac{179{,}776\pi}{4\pi}$, or $t = 44{,}944$. This is a big number! However, it's still only 5 characters long, so it will fit in the fill-in box. The fill-in box doesn't accept commas, so don't worry about that. The correct answer is 44944.

44944

MORE POOD

The fill-in questions are mixed in with the multiple-choice questions, and both math modules have an approximate order of difficulty. More important than the question order is your Personal Order of Difficulty (POOD), a strategy that encourages you to focus on the questions you know how to answer first. Don't spend too much time on a question you are unsure about, no matter which format it is.

Keep in mind, of course, that many of the math techniques that you've learned are still very effective on fill-in questions. The Geometry Basic Approach and Plugging In both worked well on the previous question. If you're able to plug in or take an educated guess, go ahead and fill in that answer. As always, there's no penalty for getting it wrong.

Here's another fill-in question that you can answer by using a technique you've learned before.

3 Mark for Review

Town A has 2,200 residents. The mean age of the residents of Town A is 34. Town B has 3,680 residents with a mean age of 40. What is the mean age of the residents of Town A and Town B combined?

Here's How to Crack It

The question asks for a mean, or average. Work the question in bite-sized pieces and start with Town A. For averages, use the formula $T = AN$, in which T is the *Total*, A is the *Average*, and N is the *Number of things*. The question states that *Town A has 2,200 residents*, so that is the *Number of things*. The question also states that the *mean age of the residents of Town A is 34*, so that is the *Average*. Plug these numbers into the average formula to get $T = (34)(2{,}200)$, or $T = 74{,}800$. Do the same thing for Town B: the *Number of things* is 3,680 residents, and the *Average* is the mean age of 40, so the formula becomes $T = (40)(3{,}680)$, or $T = 147{,}200$.

Next, add the two totals to get 74,800 + 147,200 = 222,000. This is the *Total* for the two towns combined. The *Number of things* for the two towns combined is 2,200 + 3,680 = 5,880 residents. Use the average formula one more time to get $222{,}000 = (A)(5{,}880)$. Divide both sides of the equation by 5,880 to get $37.7551020408 = A$.

There clearly isn't room to enter this answer in the fill-in box, so either cut it off or round when you run out of room. You can enter 37.75 or 37.76 and get the question right. Don't round too much, though: if you enter 37.8, you'll get the question wrong. Enter the full five characters to get credit for a positive answer. The correct answer is 37.75 or 37.76.

37.75	or	37.76

Careless Mistakes

On fill-in questions, you obviously can't use POE to get rid of bad answer choices, and Plugging In the Answers won't work either. In order to earn points on fill-in questions, you're going to have to find the answer yourself, as well as be extremely careful when you enter your answers in the fill-in box. If you need to, double-check your work to make sure you have solved correctly. If you suspect that the question is a difficult one and you get an answer too easily, you may have made a careless mistake or fallen into a trap.

Try the example below with this in mind.

4 Mark for Review

A teacher is grading two assignments that each had to be a specific length: research papers and short stories. Each research paper has 5 more pages than each short story. How many pages are in a research paper if 7 research papers and 5 short stories have a total of 275 pages?

Here's How to Crack It

The question asks for the number of pages in a research paper given other information about two assignments. Use another skill from earlier in this book and translate English to math in bite-sized pieces. The question states that *each research paper has 5 more pages than each short story.* Let r represent the number of pages in a research paper. The word *has* translates to =. The phrase *5 more than* translates to 5 +. Finally, let s represent the number of pages in a short story. The sentence, therefore, translates to $r = 5 + s$. Do the same thing with the information that *7 research papers and 5 short stories have a total of 275 pages.* Use r and s again for the number of pages in a research

paper and a short story, respectively. Translate *and* as + and *have a total of* as =, and the sentence translates to $7r + 5s = 275$. You now have two equations with the same two variables:

$$r = 5 + s$$

$$7r + 5s = 275$$

Substitute $5 + s$ for r in the second equation to get

$$7(5 + s) + 5s = 275$$

Distribute the 7.

$$35 + 7s + 5s = 275$$

Combine like terms on the left side, then subtract 35 from both sides.

$$12s = 240$$

Isolate s.

$$s = 20$$

It's tempting to fill in 20 and call it a day, but always read the final question! The question asks for the number of pages in a research paper, not in a short story. Plug 20 for s into the first equation to solve for r.

$$r = 5 + 20 = 25$$

Thus, $r = 25$, so fill in that value. The correct answer is 25.

25

WEEK0.2

MULTIPLE CORRECT ANSWERS

As you've already seen, some fill-in questions will have more than one possible correct answer. It won't matter which correct answer you enter as long as it really is correct. This happens frequently when the answer is a fraction or a decimal. It can also happen when there is more than one solution to an equation.

Let's look at one of those.

5 Mark for Review

What is one possible solution to the equation $|a + 3| = 7$?

Here's How to Crack It

The question asks for a possible solution to an equation with an absolute value. With an absolute value, the value inside the absolute value bars can be either positive or negative. Set $a + 3$ equal to both 7 and –7, and solve both equations. When $a + 3 = 7$, subtract 3 from both sides of the equation to get $a = 4$. When $a + 3 = -7$, subtract 3 from both sides of the equation to get $a = -10$. Enter either 4 or –10 and you'll get the question right.

In this case, that was more work than you needed to do. The question asked for *one possible solution*, so you could have stopped after finding one value. However, questions about absolute value might ask for a specific solution—either the positive solution or the negative solution—so always read the final question (RTFQ) to make sure you don't enter a value that isn't correct.

4 **or** –10

Fill-In Drill

Answers and explanations can be found starting on page 591.

1 Mark for Review

If $a^b = 4$, and $3b = 2$, what is the value of a?

2 Mark for Review

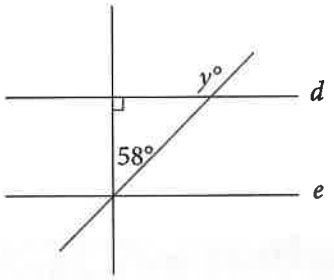
If $4x + 2y = 24$ and $\frac{7y}{2x} = 7$, what is the value of x?

3 Mark for Review

$$n = 12(2)^{\frac{t}{3}}$$

The number of mice in a certain colony is shown by the formula above, such that n is the number of mice and t is the time, in months, since the start of the colony. If 2 years have passed since the start of the colony, how many mice does the colony contain now?

4 Mark for Review



In the figure above, if d is parallel to e, what is the value of y?

5 Mark for Review

The function g is defined by $g(x) = -(x - 3)(x + 11)$. For what value of x is the value of $g(x)$ at its maximum?

WEEK0.2

6 Mark for Review

If line m is defined by the equation $-3x = -2y - 12$ and line n is parallel to line m, what is the slope of line n?

7 Mark for Review

If Alexandra pays \$56.65 for a table, and this amount includes a tax of 3% on the price of the table, what is the amount, in dollars, that she pays in tax?

8 Mark for Review

In triangle ABC, where angle A is a right angle, $\sin(C)$ is $\frac{13}{85}$. What is the value of $\tan(B)$?

9 Mark for Review

The kinetic energy (KE) of a ball in motion is given by the equation $KE = \frac{1}{2}mv^2$, where m is the mass of the ball in kilograms (kg) and v is the velocity in meters per second $\left(\frac{\text{m}}{\text{s}}\right)$. A ball with a mass of 5 kg and a kinetic energy of 18.225 kg$\left(\frac{\text{m}^2}{\text{s}^2}\right)$ is to be rolled along the ground. What is the velocity of the ball in meters per second, assuming there is no friction?

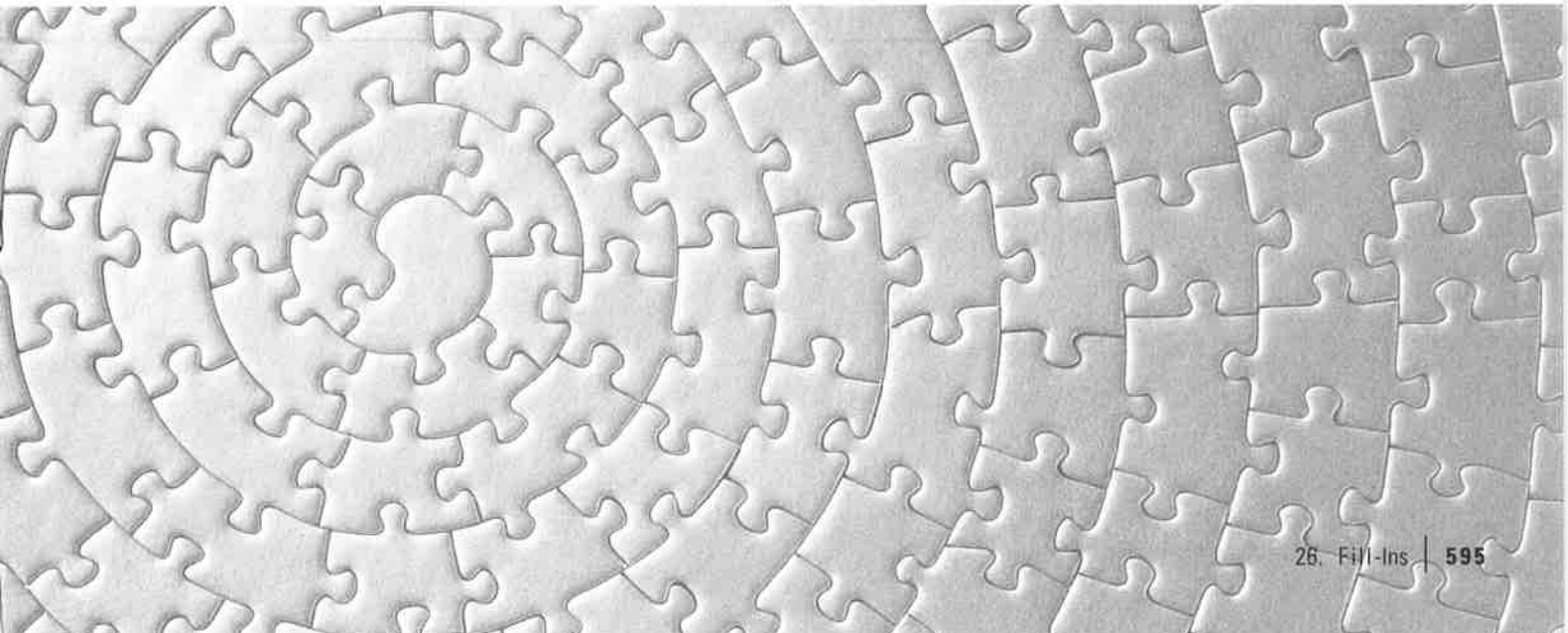
10 Mark for Review

$$x(mx + 42) + 18 = 0$$

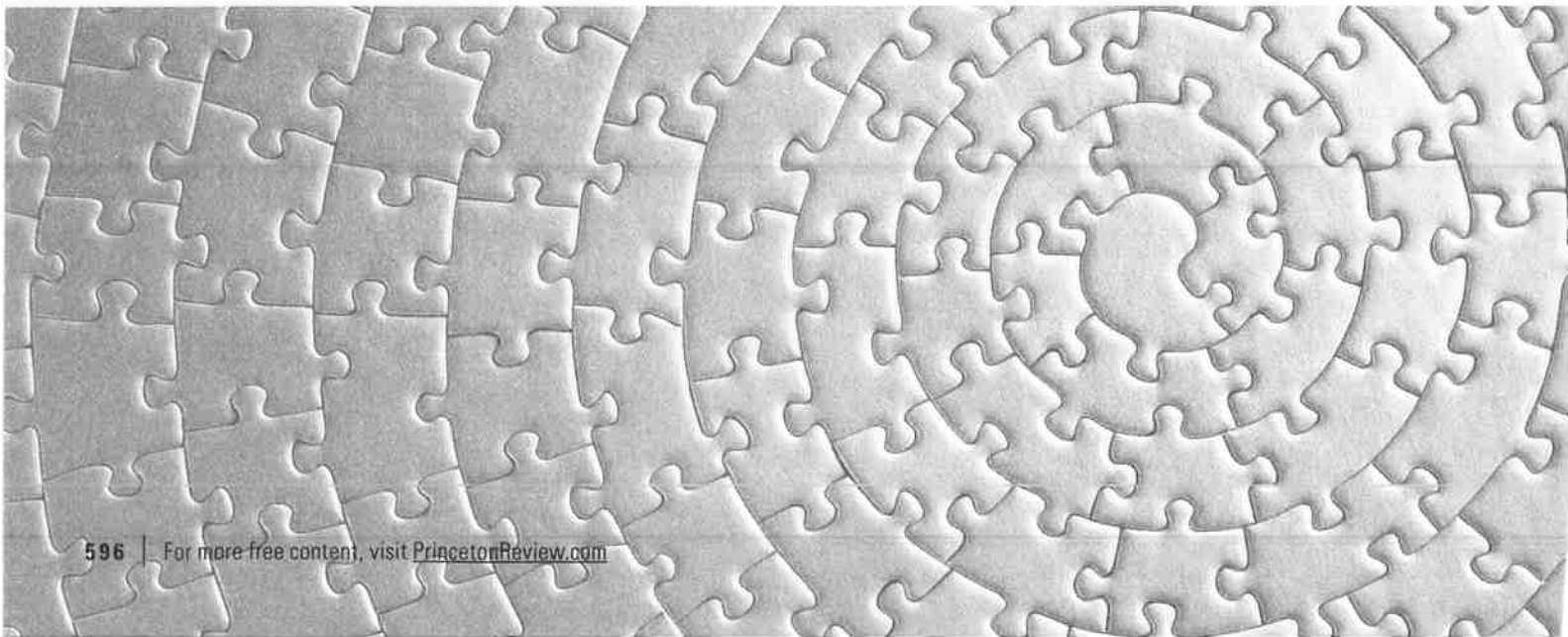
If the equation above has exactly two real solutions and m is an integer constant, what is the greatest possible value of m?

Summary

- Both of the Math modules on the Digital SAT contain several questions without answer choices. The test-writers call these questions "student-produced responses." We call them fill-ins because you have to fill in your own answer.
- Despite their format, fill-ins are really just like other Math questions on the Digital SAT, and many of the same techniques that you have learned still apply.
- The fill-in questions and multiple-choice questions are mixed together in a loose order of difficulty. Use your knowledge of your own strengths and weaknesses to decide which ones to tackle first and which ones, if any, to skip.
- The fill-in format increases the likelihood of careless errors. Know the instructions and check your work carefully.
- Just like the rest of the Digital SAT, there is no guessing penalty for fill-ins, so you should always fill in an answer, even if it's a guess.
- Enter only one answer even if the question has multiple possible answers. It doesn't matter which answer you enter, as long as it's one of the possible answers.
- Enter up to 5 characters when the answer is positive. Enter up to 6 characters, including the negative sign, when the answer is negative.
- The characters that can be entered are the digits 0–9, the negative sign, the forward slash (/) for fractions, and the decimal point. Special characters such as % or π cannot be entered.
- If the answer to a fill-in question contains a fraction or decimal, you can enter the answer in either form. Use whichever form is easier and less likely to cause mistakes.
- If your answer is a fraction that doesn't fit in the space, either reduce the fraction or convert it to a decimal.



- If a fraction fits in the space, you don't have to reduce the fraction before entering it.
- Do not enter mixed numbers. Convert mixed numbers to fractions or decimals before entering your answer.
- If your answer is a long or repeating decimal, fill up all of the space. Either keep entering digits until the space is full or round the last digit that will fit.



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WEEK0.3

DESMOS CALCULATOR GUIDE

While you are allowed to bring your own calculator for the digital exam just as you would for the paper exam, the digital exam will now contain a built-in graphing calculator for you to use through the Desmos interface. This calculator is similar to the regular TI-84 calculator that you are used to in class, but there are some important differences.

Algebraic Math

Maximizing Your Performance

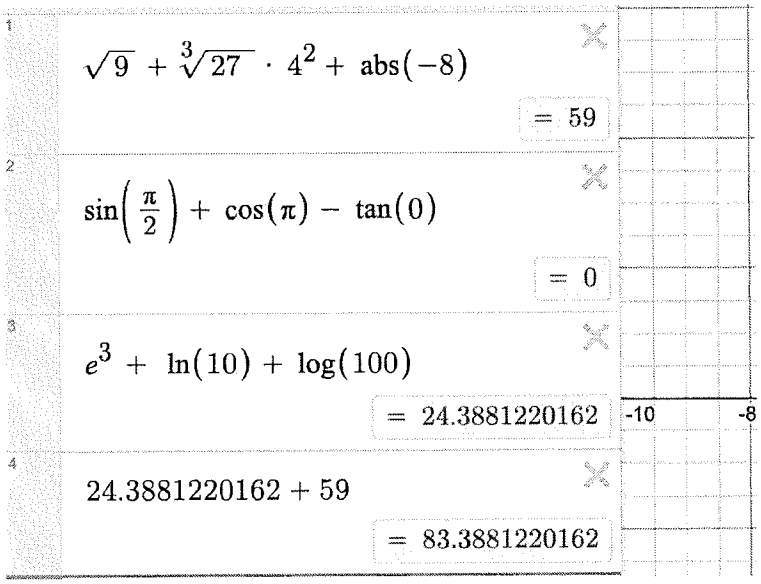
When tackling the algebraic challenges of the SAT, the Desmos calculator emerges as a powerful ally, mirroring the familiar functionalities of the classic TI-84 calculator. As you navigate through the exam, you'll find that inputting calculations into Desmos is a straightforward process: simply type your expression on the left side of the screen, keeping the order of operations firmly in mind. The answer will conveniently appear directly below your input.

Efficiency at Your Fingertips

One of the standout features of the Desmos calculator is its ability to enhance your workflow through the copy-paste function, allowing you to reuse previous calculations. Additionally, the expansive screen real estate means that you can view a comprehensive history of your past calculations without the need to scroll, allowing you to reference previous work.

Navigating Desmos: A Quick Guide

See below for how to execute common calculator functions, tailored specifically for the SAT algebra section, covering basic arithmetic operations to more advanced functions such as square roots, exponents, and trigonometric calculations.



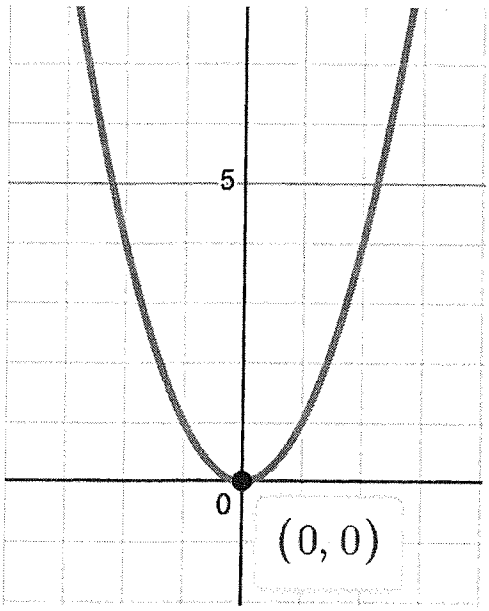
Graphing

Graphing Mastery

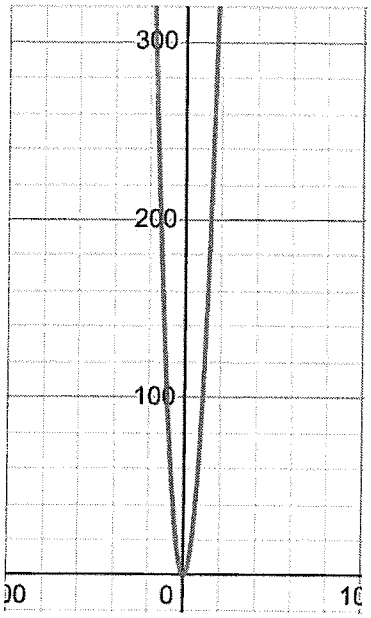
Embarking on the graphing section of the SAT, you'll find that the Desmos calculator offers an innovative approach, distinct from traditional graphing calculators. Desmos provides an expansive, infinite graphing canvas, ensuring that you are never confined by screen limitations. This feature is particularly advantageous for visualizing the behavior of functions across a wide range of values. Zooming in and out is achieved with a simple scroll of your mouse or touchpad, allowing for precise examination or a broader overview as needed.

Inputting graphing equations is seamlessly integrated into the Desmos interface. You can enter equations for graphing in the same area where you perform algebraic calculations, starting with \(y = \) or another dependent variable. The Desmos calculator immediately generates a vivid, color-coded graph on the right side of the screen, providing a clear visual representation within the infinite 2-D graphing space. This color-coding is especially helpful when dealing with multiple functions, as it allows for quick and easy differentiation between graphs.

The Desmos calculator revolutionizes the way you find key features of graphs. Unlike traditional calculators, which may require a series of button presses and menu navigations, Desmos enables you to interact directly with the graph using your mouse or touchscreen. Simply click on or hover over key points on the graph to reveal their coordinates, intersection points and roots, and other important information. Additionally, Desmos assists in locating and understanding the maximum or minimum points of a graph, crucial for analyzing the behavior of various functions.



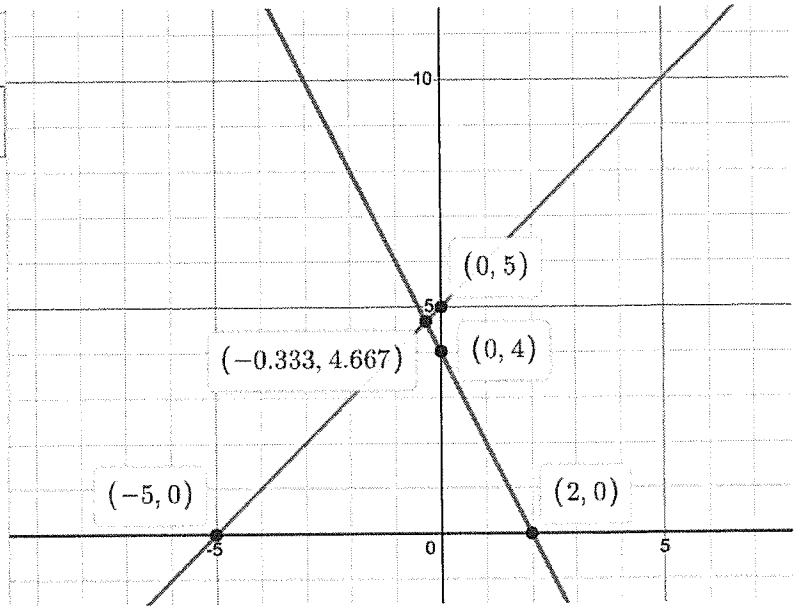
⇐ Same Graph ⇒



WEEK0.3

$y = x + 5$

$y = -2x + 4$



* Here I can see all important points on the graphs like intersections and intercepts

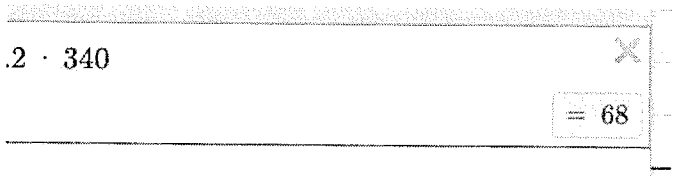
Function	How to Get
Square Root	Type **sqrt** then whatever you want inside it then the right arrow key to get out from under the radical
Cube Root	Type **cbrt** then whatever you want inside it then the right arrow key to get out from under the radical
Exponent	Use **Shift + 6** to get into the exponent and use the right arrow key to get out of the exponent
Sine	Type **Sin** then input what you want the sine of making sure to use parenthesis
Cosine	Type **Cos** then input what you want the cosine of making sure to use parenthesis
Tangent	Type **Tan** then input what you want the tangent of making sure to use parenthesis
e	Just type out **e** regularly and using proper order of operations, Desmos will recognize it as the constant number 2.718
Log / Ln	Just like the trig functions type **Log or Ln** followed by what you are looking for in parentheses
Pi	Just type out **pi** and it will turn into π
Absolute Value	Type **abs** and put what you want in parentheses to get the absolute value function

WEEK0.3

Some Example Question Uses

1. What is 20% of 340 ?

A) 30
B) 20
C) 34
D) 68

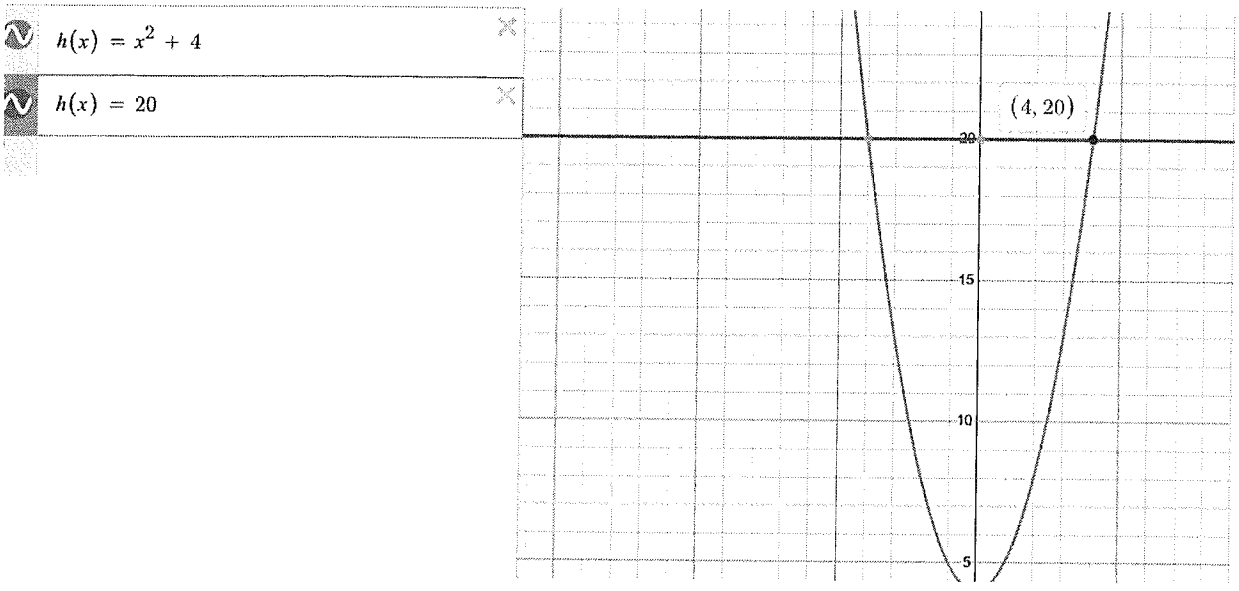


2. The function h is defined by $h(x) = x^2 + 4$. For which **Solution**

Type 20% as a number which means moving the decimal over 2 places to get .2. Then multiply this number by 340 and you will get answer D) 68.

h value of x is $h(x) = 20$?

A) 2
B) 3
C) 4
D) 5

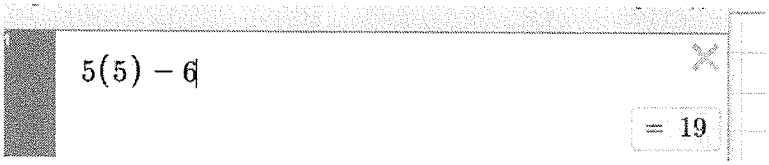


Solution

First plot the graph $h(x)$ in DESMOS then plot the line we want the function to equal. Then hover over the intersection to see where the two lines intersect and see what the x value is which in this case is C) 4.

3. The function f is defined by the equation $f(x) = 5x - 6$. What is the value of $f(x)$ when $x = 5$?

A) 19
B) 21
C) 25
D) 30



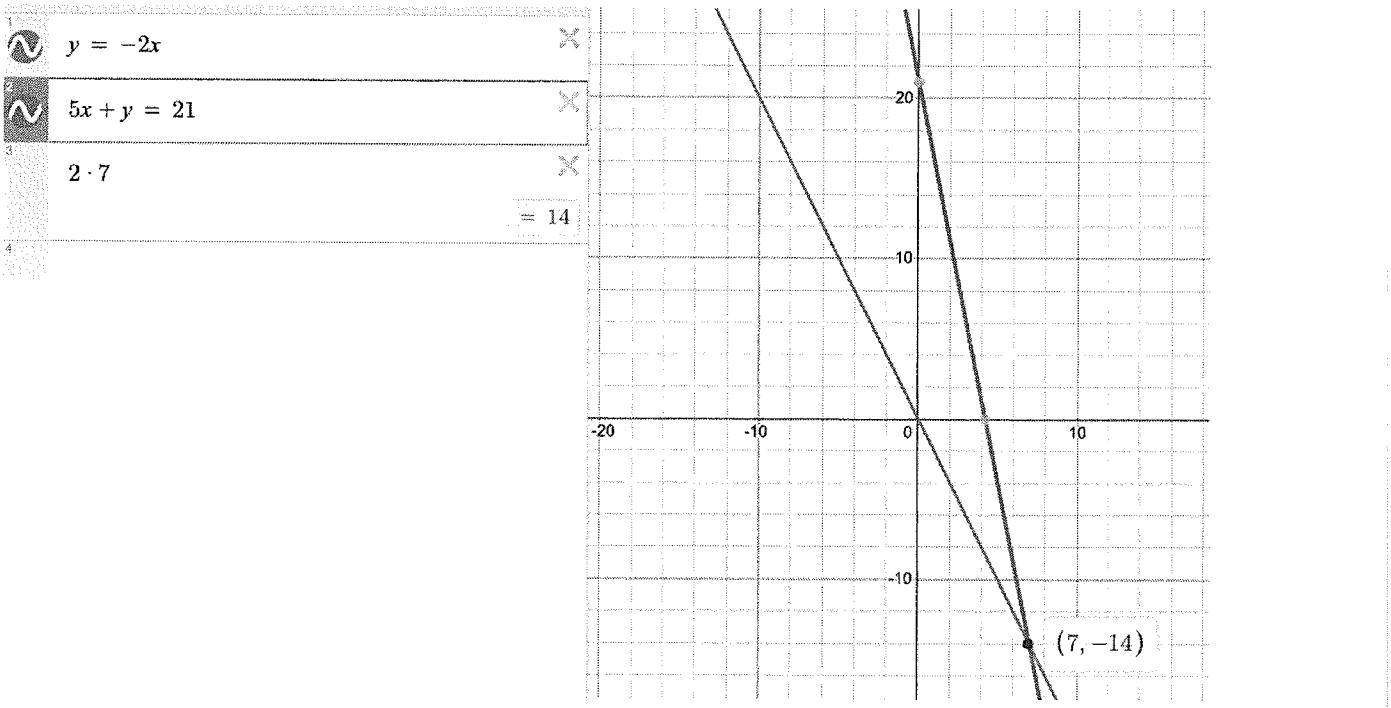
Solution

Since we know what we want x to equal and we have the function, we can just plug 5 into our function for x and figure out what the corresponding $f(x)$ value should be, which is A) 19.

$$\begin{aligned} y &= -2x \\ 5x + y &= 21 \end{aligned}$$

4. The solution to the given system for equations is (x,y). What is the value of $2x$?

A) 7
B) -14
C) 14
D) 21



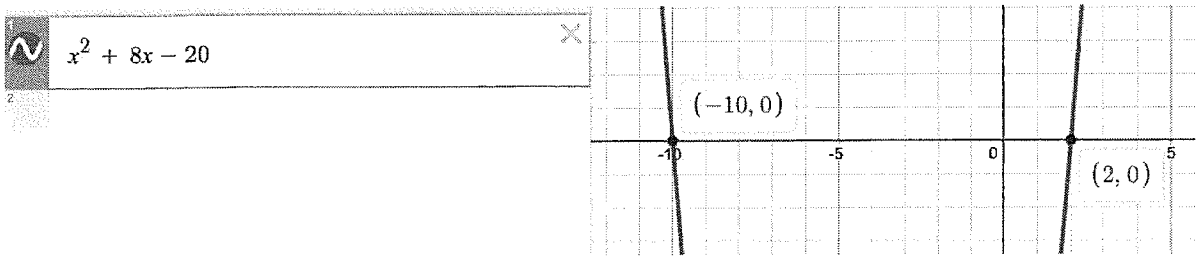
Solution

First plot the graphs in DESMOS then hover over the intersection to see where the two lines intersect and see what the x value of the intersection is which in this case is 7. Then since they ask for $2x$, we can multiply this value of 7 times 2 to get a final answer of C) 14.

$c^2 + 8c - 20$

5. What is one solution to the given equation

A) 2
B) 4
C) 8
D) 20

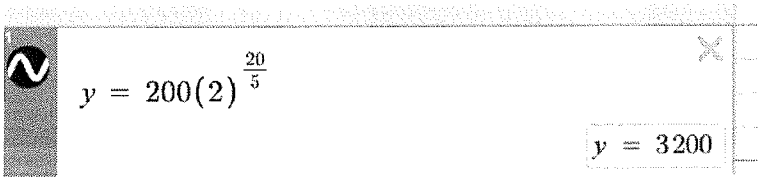


Solution

First plot the graph in DESMOS and look at the x-axis because that is where the roots/zeros/solutions will be. The variable itself does not matter so even though the question uses c, we will use x when we plug into DESMOS. Hover over these points to reveal both solutions and then look at the answer choices to see if there are any that match these points with the correct x values. The answer is A) 2.

6. Bacteria are growing in a liquid growth medium. There were 200 cells per milliliter during an initial observation. The number of cells per milliliter doubles every 5 hours. How many cells per milliliter will there be 20 hours after the initial observation?

A) 200
B) 800
C) 1000
D) 3200



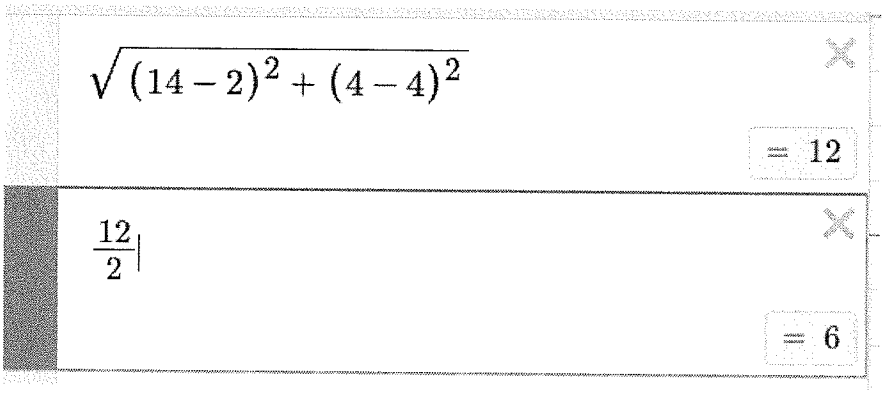
Solution

Since this is an exponential function, we can plot this in DESMOS using our traditional equation for an exponential. We know 200 is the initial value, since it doubles the rate inside the parenthesis is 2 and we know that $t = 20$ which should go into our exponent. We then see that the answer is D) 3200.

WEEK0.3

7. A circle in the xy-plane has a diameter with endpoints (4, 2) and (4, 14). An equation of this circle is $(x-4)^2+(y-8)^2=r^2$, where r is a positive constant. What is the value of r?

A) 4
B) 5
C) 6
D) 7

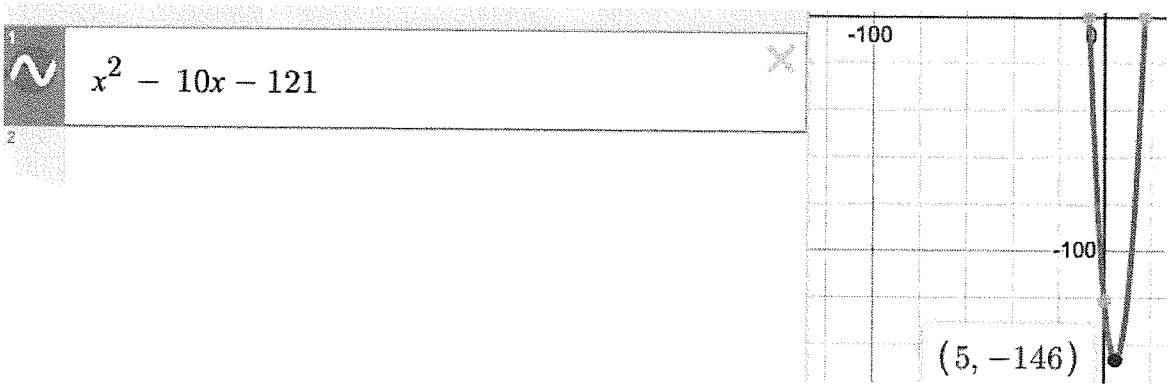


Solution

The first thing that we do is use the distance equation to find the length between the endpoints of the circle which we know will be the diameter. Once we find this, we know that the diameter is just twice the radius, so we need to divide this value (12) by 2 to get the radius C) 6.

8. In the xy-plane, the graph of the equation $y=x^2-10x-121$ intersects the line $y=c$ at exactly one point. What is the value of c?

A) -100
B) -121
C) -140
D) -146

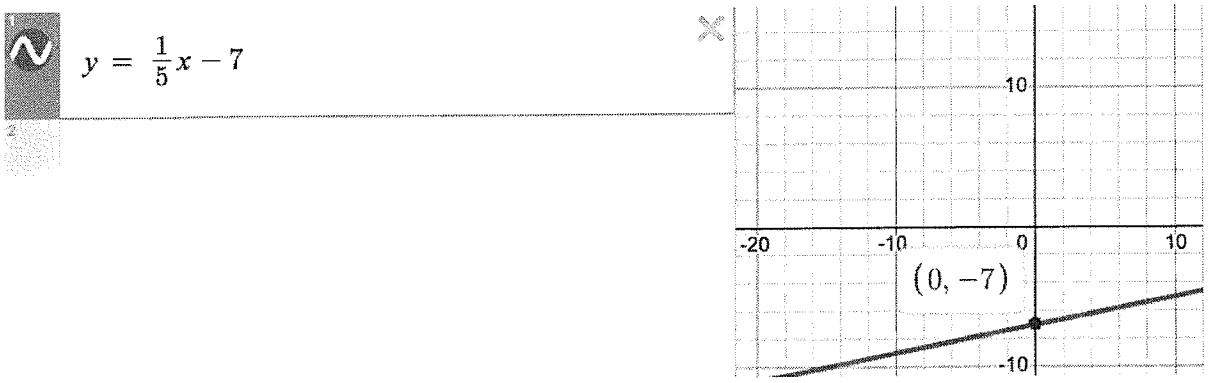


Solution

Plot this equation is DESMOS and then we know that the only time a parabola will hit a horizontal line once is at the vertex so we need to find that point. Hover over the vertex point and find the y-value associated with it and then we know that this value is the line that will only hit the parabola once, which is d) (-146).

9. The function g is defined by $g(x) = \frac{1}{5}x - 7$. What is the y-intercept of the graph $y = f(x)$ in the xy-plane?

A) -7
B) -3
C) $\frac{1}{5}$
D) 4



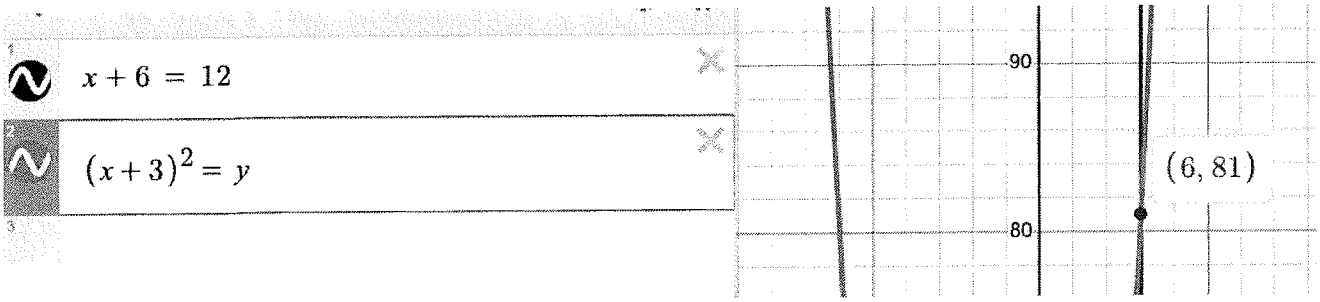
Solution

First plot the graph in DESMOS and since we are looking for the y-intercept we know that this is the value when $x = 0$. So we go down to the graph at this point to figure out what the corresponding y-value is. In this case it is answer C) -7.

$$x + 6 = 12$$
$$(x + 3)^2 = y$$

10. What ordered pair (x,y) is a solution to the given system of equations?

A) (3,36)
B) (4,49)
C) (0,0)
D) (6,81)

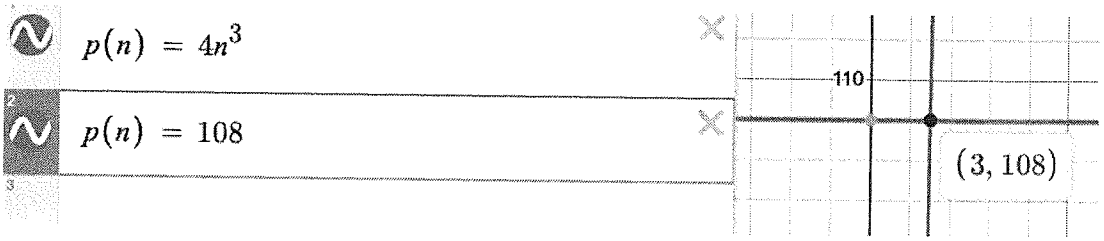


Solution

So we can plot both of these graphs just as they are in DESMOS and we are looking for the solution which is also known as the intersection point. We can highlight over this point and see the ordered pair that is the solution for this set of equations.

11. The function p is defined by $p(n) = 4n^3$. What is the value of n when $p(n) = 108$?

A) 2
B) 3
C) 4
D) 5



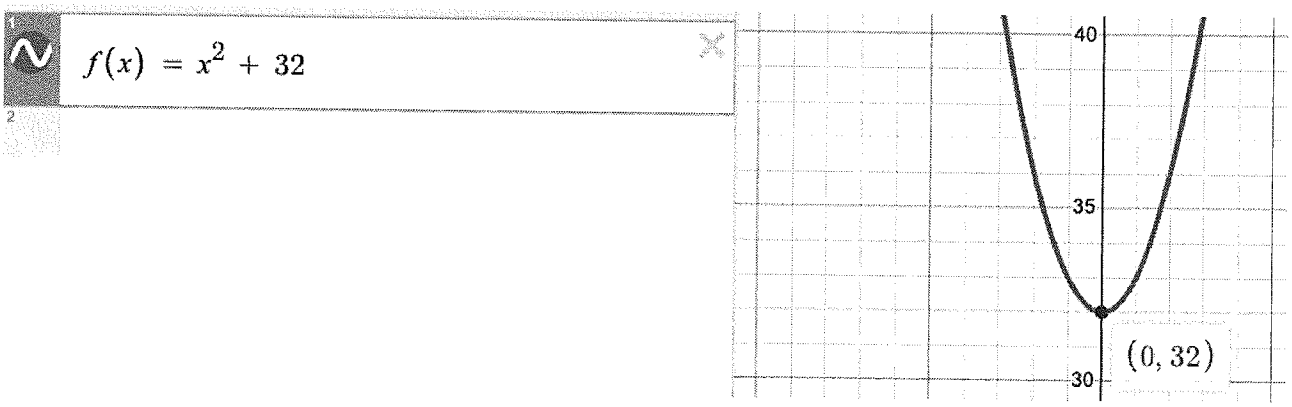
Solution

So first plot the graph $p(n)$ in DESMOS and then plot the value that we want to hit which is 108. Then we want to hover over the intersection point because this will give us the value of n where this happens, which is B) 3.

$$f(x) - x^2 + 32$$

12. What is the minimum value of the given function?

A) 0
B) 20
C) 28
D) 32



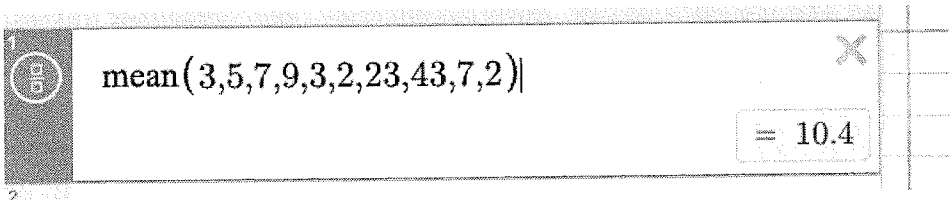
Solution

We know that the minimum value of a parabola occurs at the vertex so we are going to plot this graph to find the coordinates of the vertex. Plot this graph in DESMOS and then hover over the vertex to find the points of the vertex and see what the y-value is because that is what corresponds to the minimum value. The answer is D) 32.

3, 5, 7, 9, 3, 2, 23, 43, 7, 2

13. What is the mean of the following data?

A) 7.5
B) 8.3
C) 10.4
D) 12.2

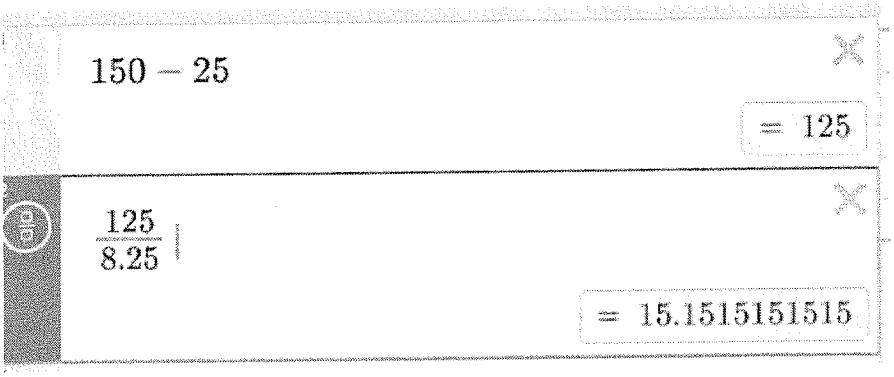


Solution

So here we can use the mean function that DESMOS has. First type mean then add a parentheses. Then add in all of the values each separated by a comma and then close the parenthesis. This function will then automatically give you the mean of the numbers. The answer is C) 10.4

14. Cory is planning a party. It costs Cory a one time fee of $25 to rent the venue and $8.25 per attendee. Cory has a budget of $150. What is the greatest number of attendees possible without exceeding the budget?

A) 12
B) 13
C) 14
D) 15

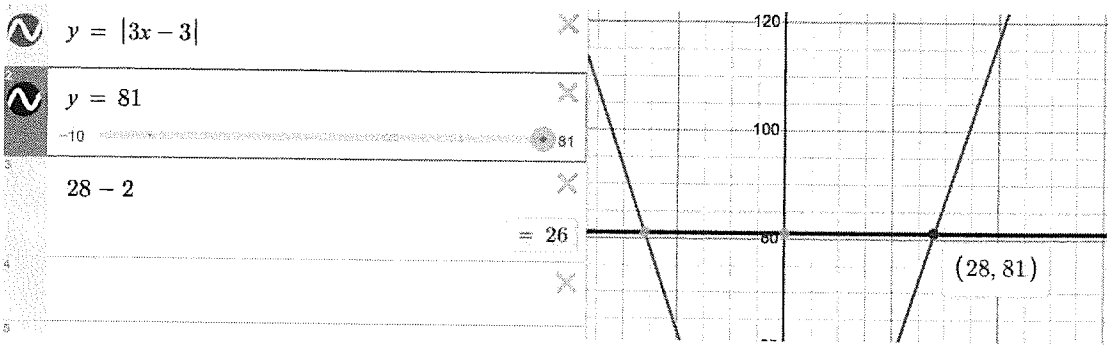


Solution

So first subtract the 25 dollars from the original 150. Then take the answer of that (125) and divide that by the amount it costs each person to attend. In this case since we cannot have a decimal amount of a person, we must round down to get an answer of 15, which is choice D.

15. If $|3x - 3| = 81$, what is the positive value of $x - 2$?

A) 20
B) 26
C) 28
D) 81

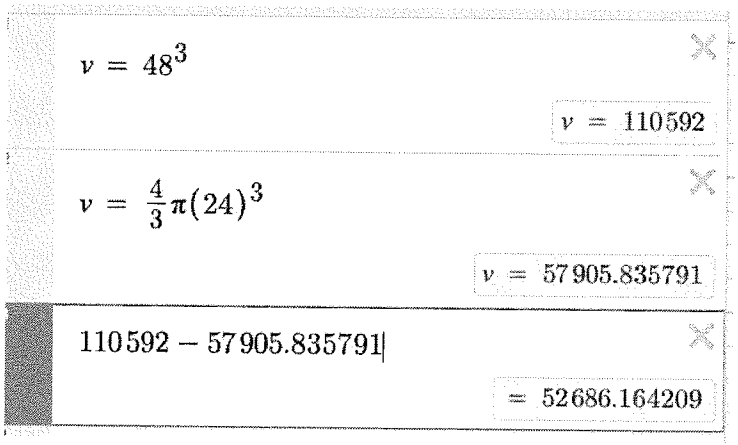


Solution

First graph the function and the value of 81 on DESMOS. Now look for the positive intersection point and hover over it to figure out the x value where this intersection happens on the positive side. Now since we want this value minus 2 we can plug that equation in below to solve for our answer, which is B) 26.

16. A cube has an edge length of 48 inches. A solid sphere with a radius of 24 inches is inside the cube, such that the sphere touches the center of each face of the cube. To the nearest cubic inch, what is the volume of the space in the cube not taken up by the sphere?

A) 516,087
B) 520,087
C) 525,243
D) 526,686



Solution

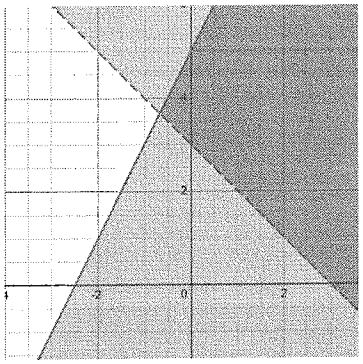
So first plug into the volume of a cube formula and then do the same thing for the volume of a sphere formula right below it. Use the numbers they give you for the components of the volumes and then subtract these two numbers to see what remaining volume is in the cube and not the sphere. The answer is choice D.

WEEK0.3

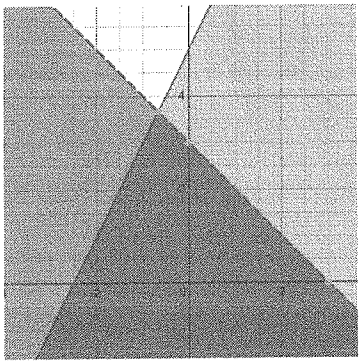
$y > -x + 3$
$y \leq 2x + 5$

17. Which graph represents the solution to the system of inequalities?

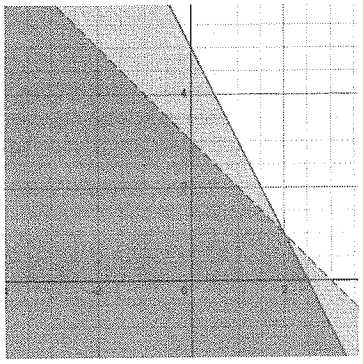
a)



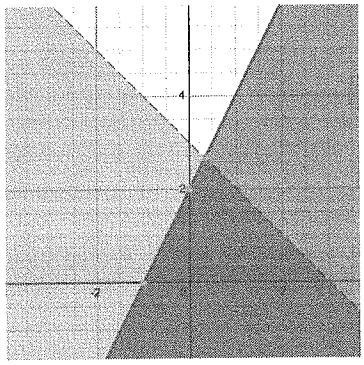
b)



c)

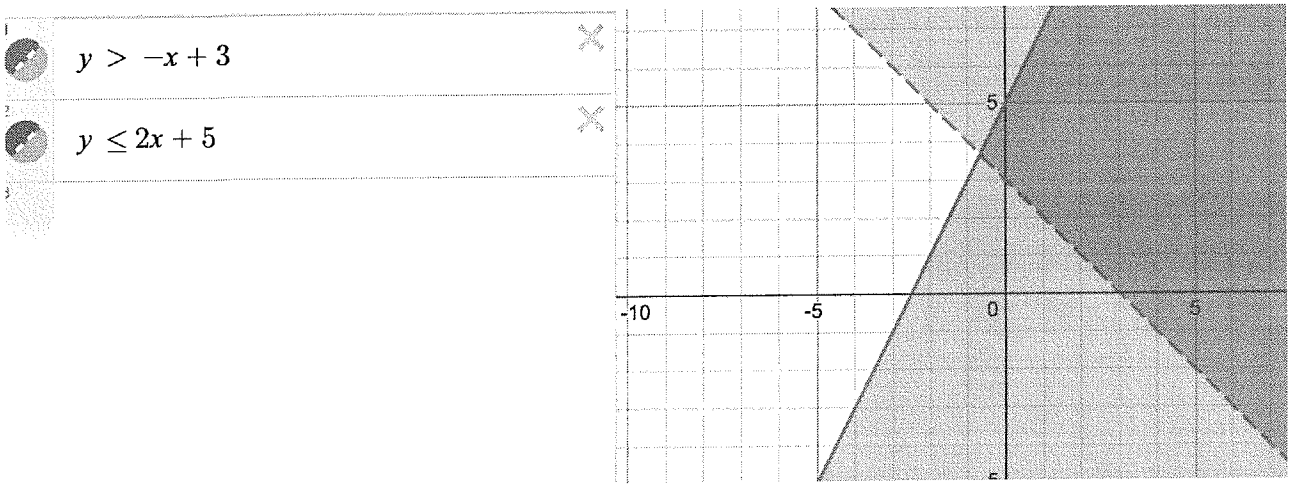


d)



Solution

When we plug the equations into DESMOS it is important to note that the signs are different and represent dotted and solid lines respectively. When we plot the system we look at the choices and see that our graph matches choice A.



WEEK0.3

CALCULATOR TIPS AND TRICKS

PERMITTED CALCULATORS ON THE SAT

Most students use some type of TI-83 or TI-84, which is allowed by the College Board on the SAT exam. Curvebreakers recommends the TI-84 Plus CE. For more information about using calculators on the SAT, read Curvebreakers' detailed blog posts online at curvebreakerstestprep.com/blog.

PROHIBITED DEVICES

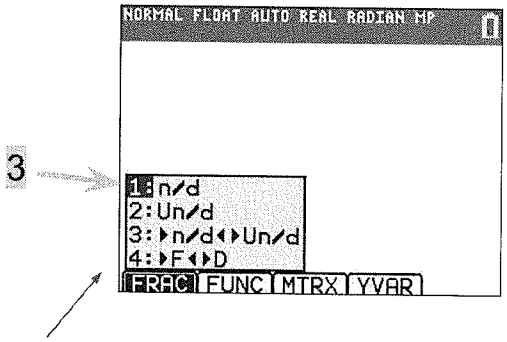
Unless students have an accommodation approved by the College Board, they can't access these items during the test or breaks:

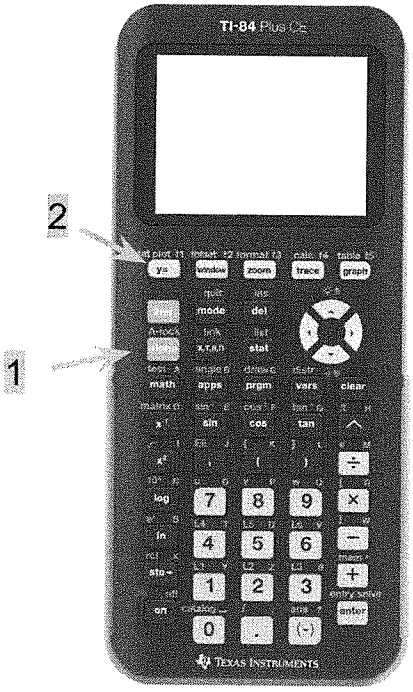
- Phones smartwatches, fitness trackers, or other wearable technology
- Audio players, Bluetooth devices (like wireless earbuds/headphones), or any other electronic devices (except your testing device)
- Detachable privacy screens
- External keyboards for use with laptops or Chromebooks (keyboards for iPads are allowed)
- Stylus for iPad
- Any cameras, recording device, or timer
- Notes, books, or any other reference materials
- Compasses, rulers, protractors, or cutting devices
- Headphones, earbuds, or earplugs
- Unacceptable calculators that have computer-style (QWERTY) keyboards, use paper tape, make noise, or use a power cord

HOW TO USE A GRAPHING CALCULATOR

Inputting A Fraction

1) Press "alpha"
2) Press "y="
3) Press "enter" to select "1: n/d"





NOTE: There are several other functions you'll see in this list.

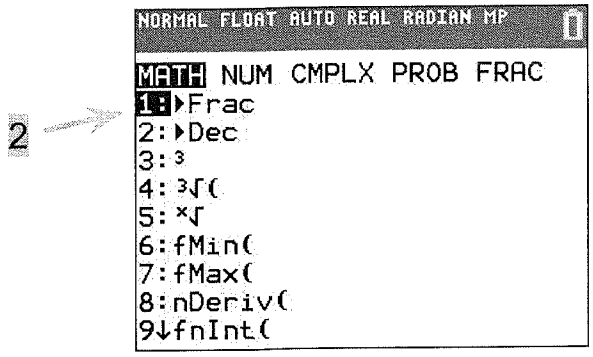
- "2: Un/d" will allow you to input a mixed number
- "3: ▶ n/d ◀ ▶Un/d" will change a fraction into a mixed number

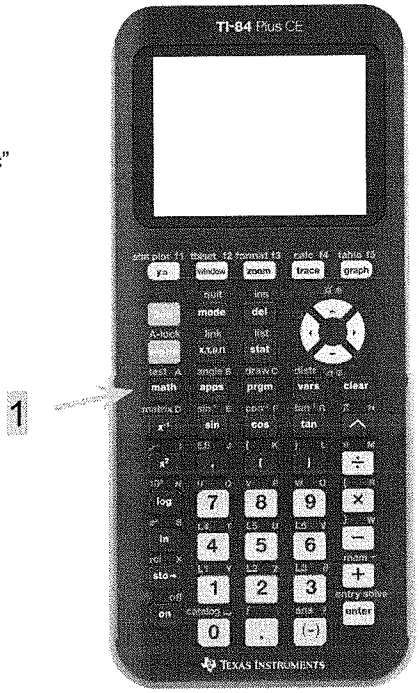
WEEK0.3

To get a decimal in fraction form:

1) Press "math"
2) Press "enter" to select "1: ▸ Frac"
3) Press "enter"

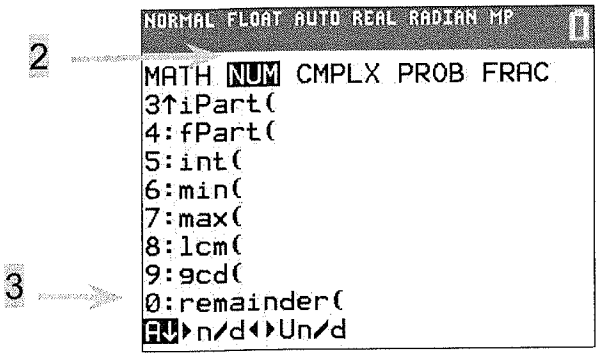
*To get from fraction form into decimal, repeat the procedure, but select "2: ▸ Dec"

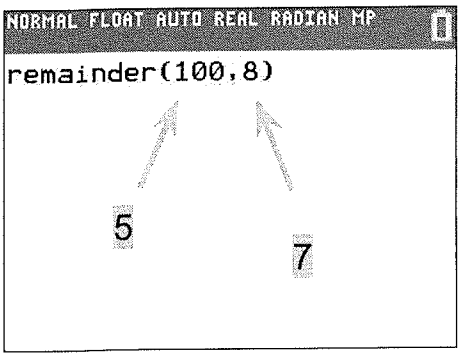


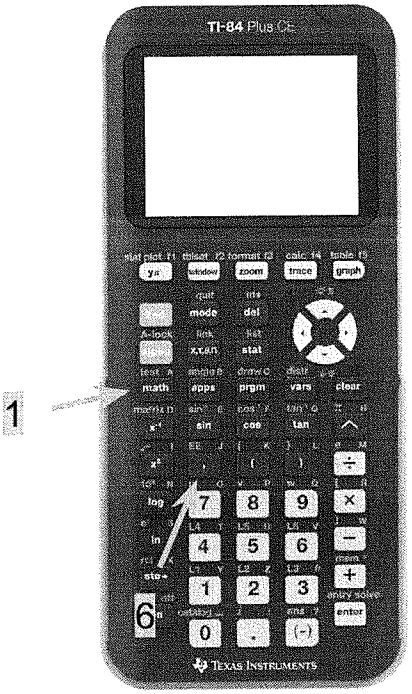


Calculating A Remainder:

1) Press "math"
2) Scroll right to "num"
3) Scroll down to "0: remainder("
4) Press "enter"
5) Input your dividend (what you're dividing)
6) Input a comma
7) Input your divisor (what you're dividing by)
8) Close parentheses and press "enter"







NOTE: There are several other functions you'll see in this list that can be calculated with the same steps.

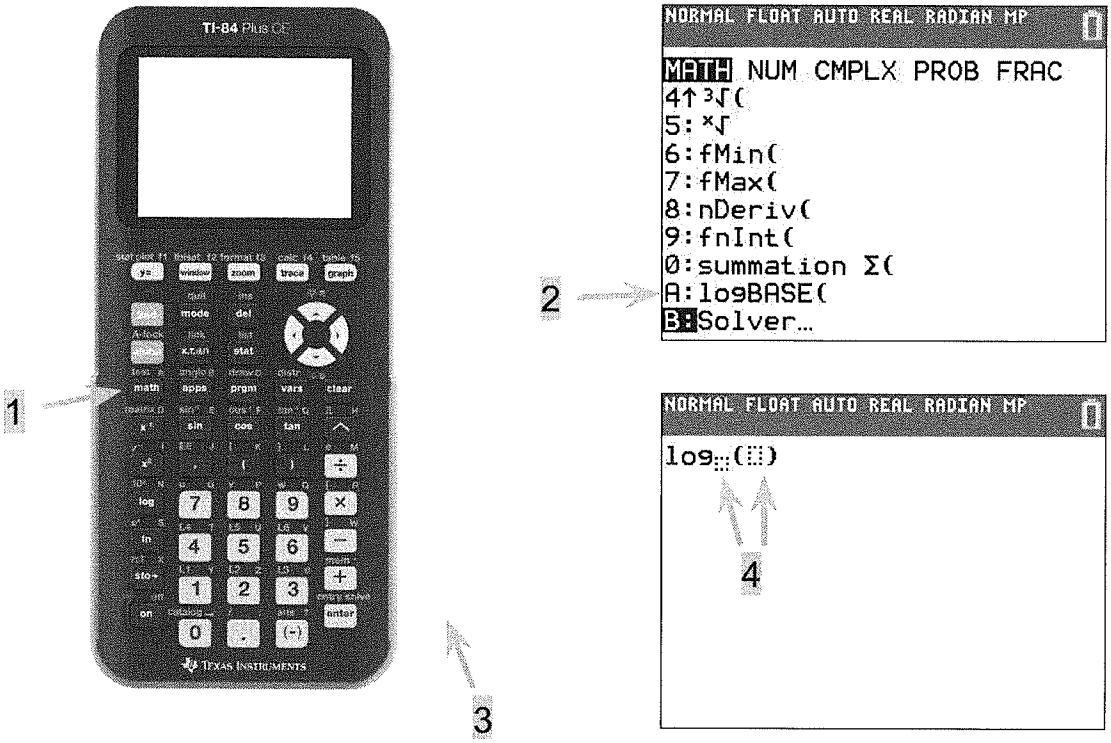
- 8: lcm(" will calculate a least common multiple
- 9: gcd(" will calculate a greatest common divisor

*Place commas between your terms.

WEEK0.3

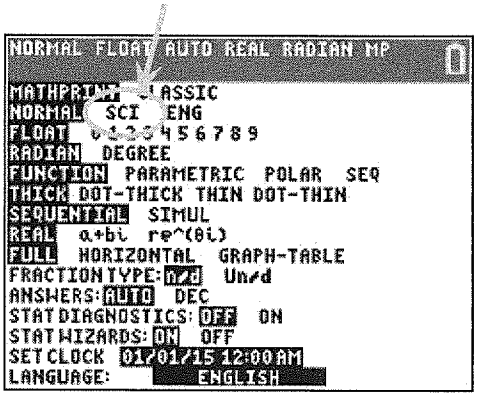
Logarithm with a Base not equal to 10:

1) Press “math”
2) Scroll down to “A: LogBASE(”
3) Press “enter”
4) Input base and what you are calculating the logarithm of



Scientific Notation

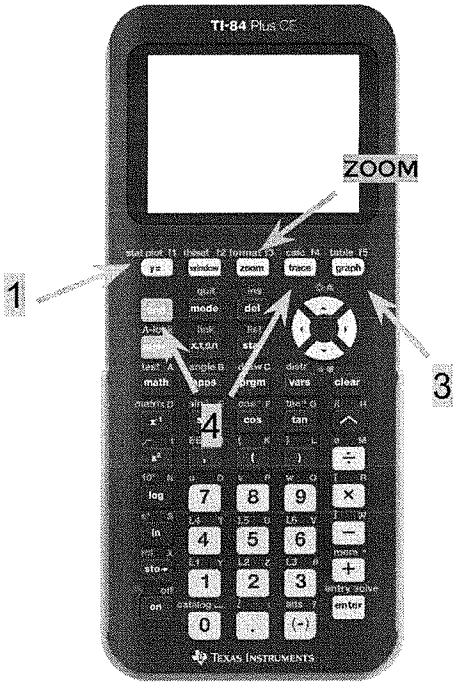
1) Press “mode”
2) Scroll down to second row and select “SCI”
3) Quit (Press 2nd and then “mode” to quit)



WEEK0.3

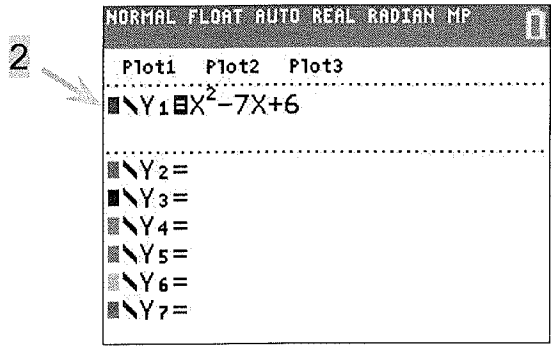
To find a zero (solution or root) by graphing:

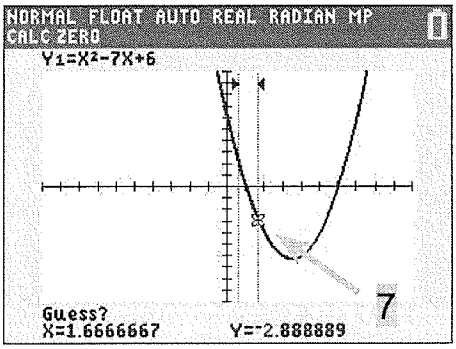
1) Press "y="
2) Input function into Y1=
3) Press "graph" (the graph will appear in your window; if it does not, try zooming out by pressing "zoom" and scrolling down to "3: zoom out")
4) Press "2ND" and then "trace"
5) Scroll down to "2: zero" and press "enter"
6) Move the cursor to a spot on the curve to the LEFT of the zero. Push "enter"
7) Move the cursor to a spot on the curve to the RIGHT of the zero. Push "enter"
8) Push "enter" a third time
9) The x and y coordinates will appear at the bottom of the screen

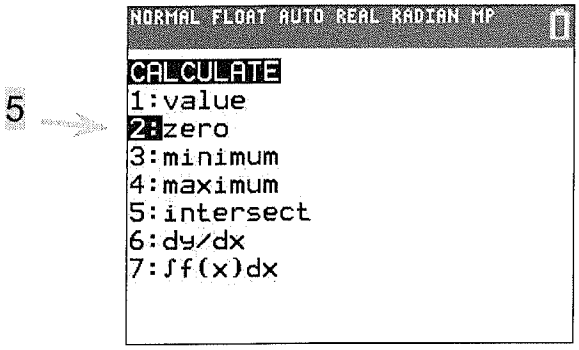


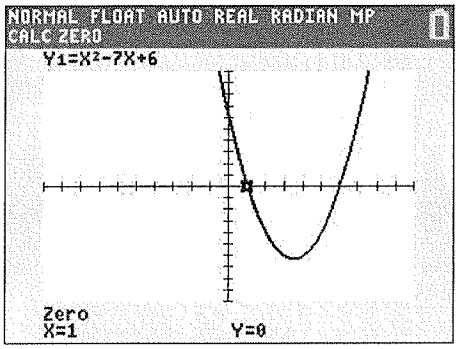
NOTE: You can find a maximum or minimum with the same procedure.
In step 5, select:

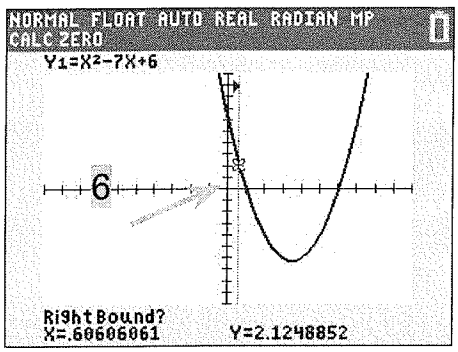
- "3: minimum" to trace a minimum
- "4: maximum" to trace a maximum









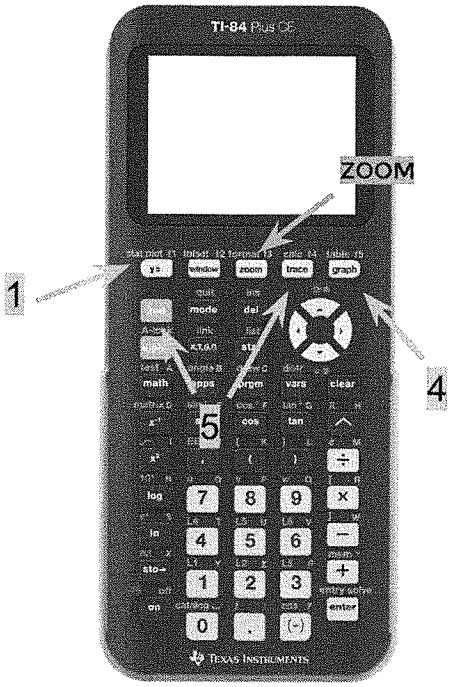


9

WEEK0.3

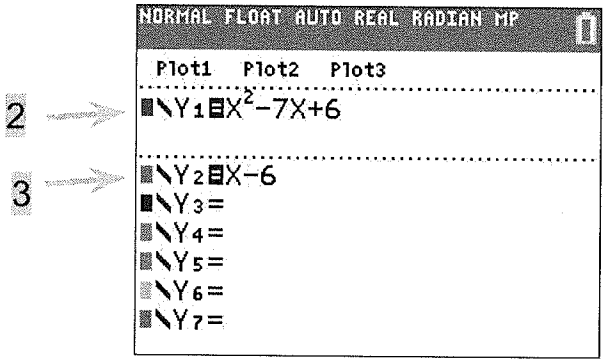
To find a point of intersection:

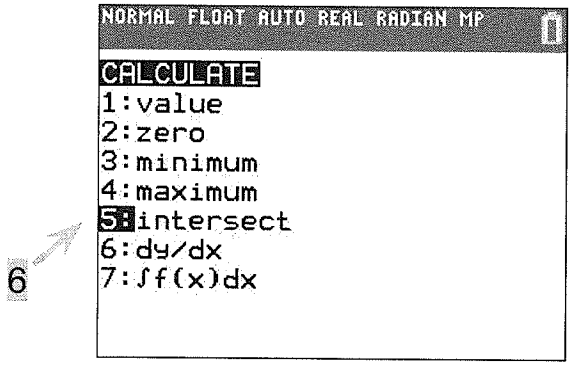
1) Press "y="
2) Input first function into Y1=
3) Input second function into Y2=
4) Press "graph" (both graphs will appear in your window; if they do not, try zooming out by pressing "zoom" and scrolling down to "3: zoom out")
5) Press "2ND" and then "trace"
6) Scroll down to "5: intersect" and press "enter"
7) Move the cursor to a spot near the intersection on the FIRST curve. Push "enter"
8) Move the cursor to a spot near the intersection on the SECOND curve. Push "enter"
9) Push "enter" a third time
10) The x and y coordinates will appear at the bottom of the screen

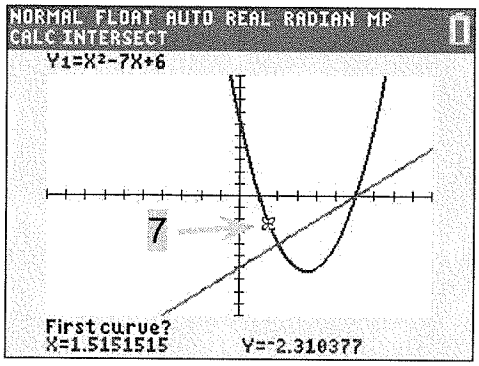


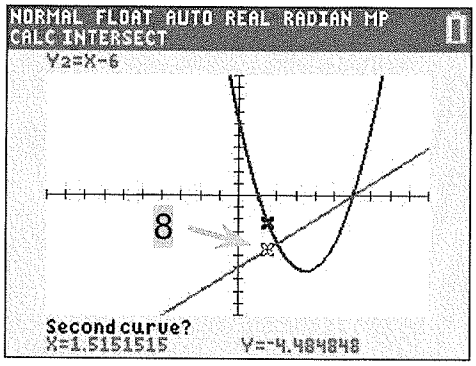
NOTE: This is a great way to solve equations that are difficult to solve by hand.

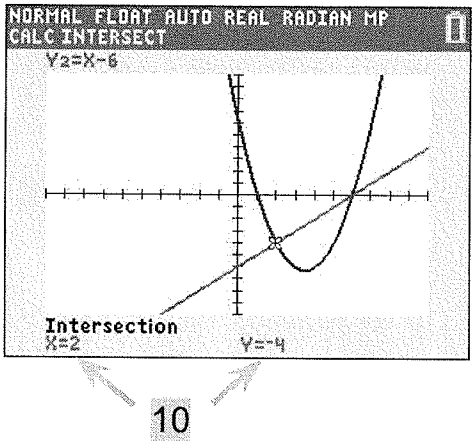
- Put one side of the equation into Y1=
- Put the other side of the equation into Y2=
- Trace the intersection







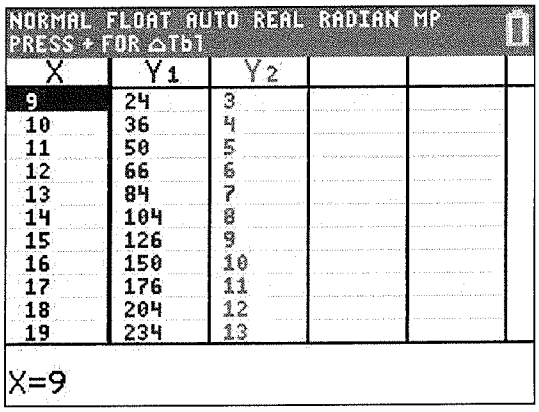




NOTE: A great way to test for **equivalency** (without needing to do the algebra) is to use the graphing component. Put one expression into Y1 and the other expression into Y2 and graph them both. If the functions are truly equivalent, they will have the same graphs.

They will also have the same table values. Viewing the table might be quicker than letting the calculator graph the entire functions.
To locate a table:

1) Press "2nd"
2) Press "graph"



NOTE: The physical graphs, trace functions, and table values can help you determine several features about a function without needing to perform any operations by hand. You can simply *observe* them. These features include:

1) Y- Intercepts and X- Intercepts (zeros)
2) Maximums & Minimums
3) Points of Intersection
4) Points of Discontinuity
5) Asymptotes
6) Limits
7) Equivalencies to other functions

To determine the factors of a number:

1) Press "y="
2) Input that number divided by x into Y1
3) Press "2ND" and then "graph" to bring you to the table
4) Any x-y pairs that are whole numbers are factors of that initial value

2 →