ACT Mathematics Test

60 minutes

60 questions

Before you take the Act test read the instructions included below and found on act.org.

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

Intro

This test generally increases in difficulty as the question numbers get higher. Keep in mind every test is different and some easy questions can be at the end. The first problems are generally the easiest and include geometry, finding the mean, unit conversions, slope, absolute value, trig that can be solved with SOH CAH TOA, and basic word problems. Once you get to roughly question 30, that is where the problems mix in more algebra two and precalculus.

Some ACT tests have a block of questions that all have to do with one word problem. Your test will say something like, “use the following information to answer questions 27-31.” For this block, I would suggest ensuring you read carefully before answering any questions. Take note of how many questions go with that information. Some block questions include geometry, statistics, graphs, and functions.

Around question 35, the content is harder and you may need more time on each problem. Towards the end of the test (questions 45-60), there is normally vector, matrix word problems, stats, sequences and series, law of sines and cosines, difficult factoring, and factorials. Some of this mathematics is in Secondary Math 3, but the last ten problems include things discussed in Precalculus.

FAQ when studying…

Yes, you can do well on the math portion even if you struggle in math class.

I am on my ACT. I have no idea how to solve this problem…

Do not stare for a few minutes at a problem you do not know how to solve. Move on and come back later if you have time. This was discussed during my ACT prep sessions. “Take the loss” or “do not try to teach yourself a new type of math on your ACT” were important things I learned during ACT prep. Guess. There is no penalty for guessing.

Should I take a minute per question?

No. Try to go faster at the beginning and leave more time towards the end. I recommend dividing your ACT math practice test into sections e.g. 1-11, 11-20, 20-35, 35-50, 50-60 and seeing how long you need for each section. If you know you cannot finish all 60 questions in the allotted time, I recommend knowing how many you can finish. If you try to rush through everything you might end up getting the problems you know how to do incorrect.

For example, I knew I could get to question 50. I got to question 47 by the 5-minute call. Then, I marked all the answers to any questions. *Never leave a question blank on your ACT*. Next, I did the problems I knew how to do that were in the last 13 questions. This way I had the option to look at all the problems and answer to the best of my ability. I found this strategy led me to score better than trying to rush, getting easy questions wrong, leaving some blank, and never seeing the last ten questions on my exam.

Do what works for you. For some students you may not be able to get to 50, you may get a lower question number. It is possible to get through all 60 questions but you will need to practice time management. I recommend taking multiple ACT math practice tests.

I am a Junior so all the math I need to know was covered in my classes, right?

No. Disclaimer: All the content including any units you have not done in Secondary Math 3 may be on the ACT. Knowing certain concepts from Pre-Calculus is helpful for the last 10 problems, but you do not need to know it to score college ready (22) on the math portion.

I am getting problems incorrect on practice tests but I know how to do them in class!

Do you love taking notes while testing? Are you allowed to use notes on your exams? Do you write down every problem in detail before you do it? Are you taking notes during your ACT math studying because you *might* need them?

If so, you may need to practice solving problems without writing down the entire problem before doing it. I recommend making sure you still take notes especially during word problems but try not writing the whole problem down.

Practice with a timer and focus on efficiently solving problems.

The ACT book seems to solve the problems the long way. Is that true?

Yes, sometimes they do solve the problems the long way. I recommend taking specific problems to your teacher, looking up a YouTube video, or using Khan Academy. For example, if you keep getting unit conversion wrong look for a resource to help you. You do not need show your work on your ACT so solve it the fastest and confident way humanly possible.

I keep getting the same old types of problems incorrect on my ACT practice test?!?

Noticing these problems now will save you on your ACT! Get help with that concept. For example, if you get every stats problem wrong ask yourself the following questions: Do you need to review the recordings of the stat unit in math class? (This is super helpful.) Do you ever like watching YouTube? (Because there is some great math videos for ACT). Can you go to In and Out and ask for your favorite math teacher? (Yes!)

I have never even seen an ellipse, or a vector, or a matrix, or this odd-looking symbol that seems to be everywhere on my ACT practice math test!

If you know how to spot a vector you are doing well and must be standing in the right direction and magnitude. 😊(If this joke makes no sense go look up vectors).

Go ask someone or look it up. Even if you do not have time to understand how to solve every question on your math tests, *knowing which problems you cannot solve can save you more points than you think.* Try to know how to solve most of the problems. The ones on your ACT might be easier than the practice problems so don't lose heart.

I know how to do this kind of problem so I should focus my studies on something else…

Maybe you should but it may be beneficial to be able to do easy problems fast. For example, I became fast at logarithms. I could solve the problems correctly but decided to do "speed runs." I went to Khan Academy and practiced logs (without writing down the whole problem) with a stopwatch. While I was on my ACT, I found a log problem and solved it quickly.

Should I bring a calculator or will they give me one?

Disclaimer: Any calculator tricks outlined here are in accordance with ACT rules but may not be in accordance with your math teacher's rules. All math

teachers at UCA allow the use of desmos. Do not use calculator tricks or programs unavailable on desmos during an exam without your teacher's permission.

If you are taking your ACT online you will use desmos test version. If you take the ACT on paper, I highly recommend a TI 83 or TI 84. Check act.org to ensure your chosen calculator is allowed. **Make sure you change your batteries before your test.**

Check with current ACT rules here
https://www.act.org/content/act/en/products-and-services/the-act/test-day/cas-faq.html

Certain calculator programs are currently allowed. ***Check the ACT rules before taking your ACT as they sometimes change.*** The ACT does allow programs such as the quadratic programs function. You can program your calculator yourself using instructional online information. Below is the current rule from ACT.org:

"The kinds of mathematics-related programs permitted for the ACT allow students to use the calculator capabilities to do the routine calculations yet require students to show their analysis skills by choosing the right operations and process. Mathematics-related programs are allowed if they are single-purpose – for example, finding numeric solutions to a quadratic equation. A student must choose the right program for the right purpose. This is much the same as choosing the right formula for the right purpose.

Programs must be written in the language of the calculator. Programs written in a different language, compiled, and loaded onto the calculator are not allowed. In this way, the programs can be examined on the calculator and will use calculator functions. Programs must not be lengthy. The limit is 25 logical lines of code. Programs cannot call another program. Techniques such as compressing code into a data statement are not allowed as a way of getting around this limit. Programs are allowed to change the value of system variables so that results may, for example, be graphed through the normal calculator graphing interface."

Note: If the RAM clears you will lose all your programs. Put in backup batteries. Do not change backup batteries and regular batteries at the same time. This will clear your RAM. I recommend clearing RAM before you program your calculator and clearing all lists and memory before the exam. This will help your calculator run faster.

I have no idea how to use a calculator.

Yes, this happens even to Seniors. If you are using desmos or a handheld calculator I recommend the following:

- Ask your math teacher for help. Be honest about how much you know or do not know about calculator use.

- Use YouTube or the internet to find tips about ACT calculator skills.

If you are using a handheld calculator

- Give your calculator a name before you get started.

- Change the backup batteries and regular batteries.

- In accordance with ACT rules bring extra batteries or a backup calculator.

- Use the specific name of your calculator (TI-83, TI-84 ext.) when searching the internet for how to use it. For example, "how to graph in a TI-83 calculator?" You can get information from the Texas Instruments site.

- If you ask your teacher for help, tell them what calculator you have.

Example of things on TI-83:

a. Press y= and put in function. You can view the graph and then press 2^{nd} table to get the values of the function evaluated at x. 2^{nd} window allows you to put in the number for x you want to see evaluated at the table.

b. Press Stat, edit, lists. Here you can put in points to make a scatterplot.

   You can also calculate mean, min, max, median, sum, etc. of a list (2^{nd} stat math).

   In addition, you can do the regression of points (find equation that goes through two points). Put in points then press stat, calc, and you will see several regression options.

c. Press 2^{nd} x^{-1} to solve matrix problems.

d. Press mode click 6 times on down arrow and change calculator to a+bi instead of real. Set your calculator this way before your ACT and use it to solve imaginary number problems (including foiling imaginary numbers).

e. Need to store a huge number? Press storage, then alpha, then math. Now press alpha math=that huge number.

f. I put it all in right except one decimal! Use 2^{nd} del (insert) to modify something in your entry.

g. **Set calculator to degrees and only change to radians if you need to. When you clear the RAM your calculator will automatically be in radians.**

Tips:

1. **Plug in the multiple-choice answers to help you.** Use the options to help solve the problem. For example, if a problem asks the area of a certain part of a square (and you have no idea how to get that certain area) you can calculate the entire area of the square. The entire area of the square will be listed as an option. Do not pick this answer. Is there any options that are bigger than the area of the square? Do not pick those answers. You may have now narrowed your guess to two options instead of five. Can you back solve from there?

2. **The question only has variables** and inequalities so plug in numbers for the variables. *Be sure to not pick 1 or 0 as these numbers have special properties.*

3. **To plug in the ACT multiple choice answers into your problem start with C.** (I found this trick on YouTube and it works).
   If C is too big try A or B. If A is not correct the answer is B.
   If C is too small try D. If D is not right, the answer is E.

5. **Memorize equations!**
   - The only equations you do not need memorized are the law of sines and cosines. As far as I know these equations are on the ACT with the problem. All other equations will need to be memorized by you. This video from Prep Pros has most of the ones you will need.
     https://youtu.be/vdFBe5b2M34?si=1sTt8AALBP5z3wEP

6. **Practice Foiling two binomials** with variables or with numbers (2m+z) (5z+m)

7. **Practice Area and perimeter** of squares, rectangles, and circles with emphasis on reading the problem or you will get it wrong.

8. **Know what a Matrix is!** As far as I know, matrices are not included in Secondary Math 1, 2, or 3. I do not believe they are included in Pre-Calculus. PrepPros free trials has lectures on matrices. They are on the ACT. You will see between 2 and 4 problems. One of them may be at the beginning (addition or subtraction) and the word problems with matrixes are at the end. The ACT appreciates the use of variables in matrixes problems. If you plan on scoring above a 30 on your math ACT, ensure you understand the concept. If you do not have the time to master the concept, learn how to use your handheld calculator for basic calculations.

9. **Vectors do exist** and are covered in Pre-Calculus. They are not covered in Secondary Math 3. Vectors are easy so go check them out. (You can find recordings under the help videos on Mr. Kukorlo's website Unit 5 Precalculus B or call Mr. K).

10. **Factorials** I would expect one factorial question in the last 10 problems. Factorials are not covered in Sec Math 3. They use this □ !

11. **Law of Sines and Cosines** exist as well! They are most likely in the form of word problems and should show up in the last 20 questions.

12. **Vocabulary is essential** know words like multiple, least common multiple, collinear (points lying on the same line), bisector (line divides into two equal parts), midpoint, isosceles triangle, scalene triangle, equilateral triangle, any other triangles, supplementary angles, complementary angles, even and odd functions, one to one, vertical line test, horizontal line test, geometric series, and the meaning of mathematics. 😊

13. **Stats** Look at Unit 4, Sec Math 2 B, on Mr. Zoglman-Garcia's website and this covers most of the *calculations* you will need to know how to do. In addition, look at Unit 5 Sec Math 3 B on Mr. Kukorlo's website and be sure to focus on the *vocabulary*. This means know about random samples, normal dist, 30-60-90, etc.

14. **Logarithms** (go check out the Unit 5 loom video on Mr. Kukorlo's website).

15. **Geometry- Yes!!** This is covered extensively in Sec Math 2. Review important concepts. Practice the Pythagorean theorem.

16. **Factoring and Foiling** including perfect square trinomials, Pascal's triangle, and binomial expansion (Sec Math 3 A)

17. Trig aka the study of triangles and angles and weird looking variables...

- Knowing how to do basic SOH CAH TOA can save you a lot of points
- Word problems
- Identities like the Pythagorean identity
- Degrees and angles and radians (I did not see radians too much and did not have the unit circle memorized but it may be helpful)
- Arc length

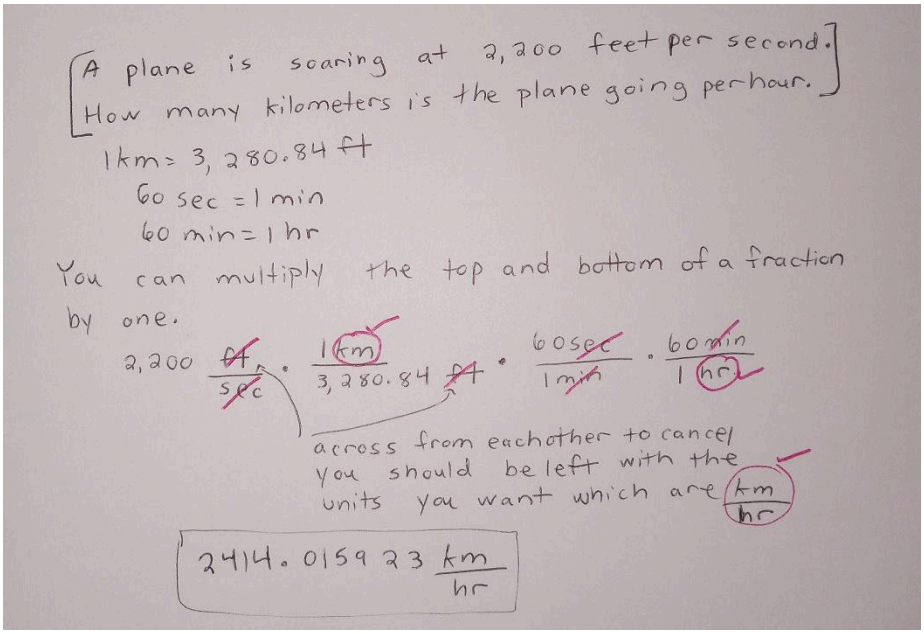
18. Rational Functions

19. Composite Functions

This is an easy precalculus concept. Look it up on Khan. The ACT generally does not include word problems where this information is required.

20. Solution sets

21. **Unit Conversions** are easy and prevalent on the ACT. Below is an example problem. You can use the steps here to solve any unit conversion. Please note: 9 minutes and 15 seconds cannot be added to 8 minutes and 14 seconds. *To perform operations, the units must be the same.*



Conclusion

The length of this guide is not to overwhelm the studier but to inform them. I wish I had a study guide like this when I studied for my ACT. I hope you find this useful and it saves you a few hours. *The math portion is easier than some of the other portions because you know you have the right answer when you have it.* Good luck from someone who improved their math exam score 4 points between the first and second time.