SAT SneakPeek

Getting Ready for the SATs

Featuring the Casio fx-9750GII
SAT Math Basics

So, you want to go to college… All colleges and universities require SAT or ACT scores to determine whether you are eligible to attend. If you are finishing 10th grade, you should have the math skills required to take the SATs. If you are not taking Algebra II or Geometry until your junior year, you may want to wait until the end of your junior year to take the exam. You will not need to memorize formulas but you will need certain math skills fresh on your mind. That’s why it is best to take the SATs in June and not at the end of your summer break - Don’t wait until August with the intentions to study for the SATs over the summer break because you probably won’t!

THE MATH PART OF THE EXAM CONSISTS OF THREE SECTIONS:

- A 25 minute section containing 8 multiple choice questions and 10 grid-in questions
- A 25 minute section will consist of 20 multiple choice questions
- A 20 minute section consists of 16 multiple choice questions

This means you will need to answer a total of 54 scored questions; forty-four of the questions will be multiple choice and 10 questions will be grid-in.

It is best to answer the questions in order since the SAT questions get harder as you go. The exam is designed to measure your skills in the areas of: Numbers and Operations, Algebra and Functions, Geometry and Measurements, and Data, Statistics and Probability.

You can earn between 200 and 800 points on the math portion of the SATs, which will account for one-third of your total score. (Yes, you get 200 points for showing up and putting your name on the test!) The average score in 2008 was a 515. Not too bad!

A FEW THINGS TO KNOW ABOUT THE SCORING FOR THE SATs:

1. You receive a point for each correct answer. You are penalized only one-fourth of a point for a wrong answer. You are not penalized if you leave an answer blank. With that being the case, it is much better to guess, if you can eliminate at least one wrong choice on the multiple choice questions.

2. Write in your test booklet! Write down your calculations, your calculator answers, formulas that you used, and cross out obvious wrong answers. To also help save some time, you should wait to transfer your answers to the scantron sheet at the end of each section.

3. Keep in mind that the questions are in order from easy to hard, so try to slow down and be more accurate with the easier questions. There will probably be more distracters in the easier problems to throw you off, like substituting a negative number for a positive number or changing the slope and y-intercept in an equation to graph a line.

4. Statistics prove that your first answer choice is correct, so don’t go back through the test changing your answers!
SAT Subject Tests

SAT Subject Tests are sometimes referred to as the SAT II. This can be confusing because it sounds like it is just one test, when it is actually a group of 20 different tests. (Don’t worry! You do not have to take all 20 tests. Check with your college or university to see which tests are required.) Two of the tests are the Mathematics Level 1 and the Mathematics Level 2 exams.

The SAT II questions are based directly on high school curriculum. The questions are more straightforward than and not as confusing as the SAT I.

The Mathematics Level I test assumes that you have taken 2 years of Algebra and 1 year of Geometry. The Mathematics Level 2 test assumes that in addition to the 3 years of Algebra and Geometry, you have also taken Trigonometry and Pre-Calculus.

Each test is 60 minutes and is scored between 200 – 800 points. Each test measures your skills in Numbers and Operations, Algebra and Functions, Geometry and Measurements, and Data, Statistics and Probability. The following table gives the percentage of each. Geometry and Measurement is divided into Plane Euclidean, Coordinate, Three-dimensional, and Trigonometry.

<table>
<thead>
<tr>
<th>MATHEMATICS LEVEL I</th>
<th>MATHEMATICS LEVEL II</th>
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<tbody>
<tr>
<td>10% - 14%</td>
<td>Numbers and Operations</td>
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<tr>
<td>38% - 42%</td>
<td>Algebra and Functions</td>
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<tr>
<td>38% - 42%</td>
<td>Geometry and Measurement</td>
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<tr>
<td>18% - 22%</td>
<td>Plane Euclidean</td>
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<td>8% - 12%</td>
<td>Coordinate</td>
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<td>4% - 6%</td>
<td>Three-dimensional</td>
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<td>6% - 8%</td>
<td>Trigonometry</td>
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<td>6% - 10%</td>
<td>Data Analysis, Statistics, and Probability</td>
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The Casio fx-9750GII is truly the best calculator you can use to take the SAT or SAT II tests. Hopefully you have used it all year long in your classes and have become very familiar with the buttons. It is extremely important that you not waste time finding buttons or learning how to use a calculator on a timed test.

Using a calculator is not necessary for about 50% of the SAT test and 35% of the SAT II Level 2 test. In fact, using the calculator on some problems can be a disadvantage because you will be wasting precious time! The Casio fx-9750GII calculator is a graphing calculator which means you will have an advantage over students using scientific calculators. In fact, the Mathematics Level 2 test was designed for graphing calculator use.

A FEW CALCULATOR TIPS:

1. Make sure your calculator has fresh batteries and is working correctly before going to the test. Bring extra batteries to the test center because they will not have extra batteries for you. If your batteries die during the test, you will not be allowed to share a calculator with your neighbors. If your calculator does die during the test, tell the supervisor immediately and you will be given the option of canceling your scores on the test.

2. Don’t waste time using the calculator if you don’t need to use it.

3. Round your final answer only! If you start rounding at the beginning of your calculations, this can change your final answer slightly. Sometimes it will be enough to give you the wrong answer, if all your answer choices are close.

4. Don’t start calculating a problem that you think they are asking you. Read the problem carefully! Be sure you know what is actually being asked of you. Think about how you want to solve the problem so you won’t wastes time using the calculator when it isn’t necessary.

5. Make sure your calculator is in degree mode. The only time you will need the calculator to be in radian mode is if you are taking the Level 2 test.
Numbers and Operations

THIS SECTION INCLUDES THE FOLLOWING CONCEPTS:

• Arithmetic and problems (including percent, ratio, and proportion)
• Properties of integers (even, odd, prime numbers, divisibility, etc.)
• Sets (union, intersection, elements)
• Counting Techniques
• Sequences and series (including exponential growth)
• Elementary number theory

CAUTION... Math Ahead!

HERE ARE SOME PROBLEMS YOU MIGHT SEE:

When working with percent word problems, remember 3 things:
• “of” means multiply
• “is” means equals
• Always change percents to decimals! (Move the decimal 2 places to the left, just like the Beyoncé song. “To the left, to the left.”)

EXAMPLE 1:

Mary finished her meal which cost $35.00. She wants to leave a 15% tip.

How much should Mary leave for tip?

Since the tip is 15% of $35.00, use the tips from above to get

\[
\text{tip} = 0.15 \times 35
\]

The tip amount that Mary will need to leave is $5.25.

1. Press the \( \text{ON} \) button to turn your calculator on.

   (I know that sounds stupid, but you have no idea how many times we get that question: “How do you turn it on?” Usually it’s from adults who are still asking you guys how to program their VCR for them, while you’re trying to get them out of the Stone Age hoping they’d buy a Blu-Ray player. Nice try.)

2. When your calculator first gets powered on out of the package, it should display the Main Menu. If for some reason yours doesn’t, just press the \( \text{MENU} \) button.

3. Since you want to do a basic calculation, make sure the \( \text{SOLVE} \) icon is highlighted and press \( \text{EXE} \).

   (Shortcut: just press the \( \text{1} \) key.)

4. Press \( + \) \( 1 \) \( 5 \) \( \times \) \( 3 \) \( 5 \) \( \text{EXE} \)

5. The tip amount that Mary will need to leave is $5.25.
WHEN WORKING WITH PERCENT OF INCREASE OR PERCENT OF DECREASE PROBLEMS, SET THEM UP AS A PROPORTION.

\[
\frac{\text{increase or decrease}}{\text{original}} = \frac{x}{100}
\]

EXAMPLE 2:

If the price of a $58.00 shirt was on sale for $40.00, what percent was the price of the shirt decreased?

The proportion you would use to solve this problem should look like this:

\[
\frac{58 - 40}{58} = \frac{x}{100}
\]

There are two ways you can solve this proportion on the calculator:

1. Remember that to solve proportions, you will need to cross multiply. So, you will result in \(100(58 - 40) = 58x\).

   Then, you will need to divide both sides by 58.

2. Your other option is to use the Equation Solver feature on your calculator.
   - Press \(\text{ MENU}\) to return to the Main Menu.
   - Arrow over and down to the \(\text{STO}\) icon or just press \(8\).
   - Press \(e\) for Solver.
   - Press \(\text{SHIFT} \rightarrow \text{LOG} \rightarrow 1 \rightarrow 0 \rightarrow 0 \rightarrow \text{EXE}\) to input your proportion.
   - Press \(\text{F6}\) to solve. You can also press \(\text{EXE}\).
   - The answer is already in percents, so the percent decrease is 31%.
WHEN WORKING WITH AVERAGE SPEED, REMEMBER THE FORMULA:

\[
\text{Average speed} = \frac{\text{total distance}}{\text{total time}}
\]

EXAMPLE 3:

Bryan drove 5 hours at 60 miles per hour and then 4 hours at 75 miles per hour. What was Bryan’s average speed?

To solve this problem you first must figure out the total distance and total time.

Total distance = \((60 \, \text{mi/h} \times 5 \, \text{h}) + (75 \, \text{mi/h} \times 4 \, \text{h}) = (300 \, \text{mi}) + (300 \, \text{mi}) = 600 \, \text{mi}\)

Total time = 5 hours + 4 hours = 9 hours

1. Press the \(\text{[MODE]}\) button and then press 1 for the \(\text{[CALC]}\) icon.
2. Press \(\{6\,0\,x\,5\}\) + \(\{7\,5\,x\,4\}\) EXE.
3. Press \(\text{[SUM]}\) \(\text{[9]}\) EXE.
4. Press \(\text{[SHIFT]}\) \(\text{[3]}\) to change your answer to a mixed number.
5. Bryan’s average speed was 66 \(\frac{2}{3}\) miles per hour.

SEQUENCES AND SERIES

- Arithmetic sequence: a list of numbers where the same number is added to each previous term. The number that is added is the common difference \((d)\).
- Geometric sequence: a list of numbers where the same number is multiplied to each previous term. The number that is multiplied is the common ratio \((r)\).
- To find the \(n\)th term of an arithmetic sequence, use:
  \[a_n = a_1 + (n - 1)d\]
- To find the \(n\)th term of a geometric sequence, use:
  \[g_n = g_1 \cdot r^{n-1}\]
- To find the sum of an arithmetic sequence, use:
  \[
  \frac{(a_1 + a_n)n}{2}
  \]
• To find the sum of a geometric sequence, use:

\[ S_n = \frac{g_1(1-r^n)}{1-r} \]

• To find the sum of an infinite geometric sequence, use:

\[ S = \frac{g_1}{1-r}, \text{ if } -1 < r < 1 \]

THE FOLLOWING SPECIAL SERIES FORMULAS WILL BE NEEDED IF YOU WILL BE TAKING THE LEVEL 2 EXAM:

• Sum of the first \( n \) odd numbers = \( n^2 \)

• Sum of the first \( n \) perfect squares = \( \frac{n(n + 1)(2n + 1)}{6} \)

• Sum of the first \( n \) perfect cubes = \( \frac{(1 + n)n^2}{4} \)

EXAMPLE 4:

Find the sum of the arithmetic sequence 2, 4, 6, 8 ..., 18.

Use the formula: \( \frac{(a_1 + a_n)n}{2} \); where \( a_1 = 2 \), \( a_n = 18 \), and \( n = 9 \).

1. Make sure the calculator is in the \( \sum \) function.

2. Press \( (2+18) \times 9.2 \) \( \sum \) \( 90 \)

3. Sum = 90
Algebra and Functions

THIS SECTION INCLUDES THE FOLLOWING CONCEPTS:

- Substitution and simplifying algebraic expressions
- Properties of exponents
- Algebraic word problems
- Solutions of linear equations and inequalities
- Systems of linear equations and inequalities
- Quadratic equations
- Rational and radical equations
- Equations of lines
- Absolute value
- Direct and inverse variation
- Concepts of algebraic functions
- Newly defined symbols based on commonly used operations

HERE ARE SOME PROBLEMS THAT YOU MIGHT SEE:

**EXAMPLE 1:**

What are the factors of $6x^3 + 25x^2 + 21x – 10$?

1. Press $\text{IN} \to$ to return to the Main Menu.
2. Use the arrows to navigate over to the icon, $\text{POL} \to$, or just press $8$.
3. Press $\text{F}2$ for Polynomial.
4. The calculator now needs to know the degree of the polynomial. Remember, the degree of the polynomial is the largest exponent. In this problem, 3 is the largest exponent value, so you will need to press $\text{F}2$.
5. Notice that the general equation for a 3rd degree polynomial is in the upper left corner on the screen. Now all you need to do is type in the coefficients, the numbers in front of each variable, and make sure to hit $\text{EXE}$ after each coefficient.
6 Press 6 25 2 1 EX 1 0 EX.

7 Press F1 to solve.

8 You will notice that the answers in the matrix are decimals. However, in the lower right hand corner, the calculator also gives you the fraction answer.

9 To find the factors, the denominator will always be the coefficient with x and the opposite of the numerator will be the number that is added or subtracted to x.

   The first solution is 1/3. So, the 3 goes in front of the x, which gives you 3x and the 1 becomes the opposite, so -1.
   The factor for this solution would be (3x – 1).

   The next solution is -2 or -2/1. So the coefficient of x is 1 and -2 becomes 2.
   The factor for this solution would be (x + 2).

   The last solution is -5/2. So the coefficient of x is 2 and -5 becomes 5. The factor for this solution would be (2x + 5).

10 Therefore, the factors of 6x^3 + 25x^2 + 21x – 10 = (3x – 1)(2x + 5)(x + 2)

EXAMPLE 2:

What is the domain and range of the function f(x) = x^2 – 9?

You will need to remember that domain represents the x-values and range represents the y-values.

1 Press 6 to return to the Main Menu. From there, you want to graph the function, so press 3.

2 Press 6X → 9 EX.

3 To view the graph, press F6 (Draw).

4 You will notice that the graph continues infinitely in both the positive and negative directions for x. Therefore, the domain = All Real Numbers.
If this is the first graph that you are graphing, you will notice that you can’t see the vertex. To move the graph down, to see the vertex, all you need to do is just arrow down $\downarrow$. You will notice that the graph continues up infinitely but does not go below -9. Therefore, the range $= \{y \geq -9\}$

**EXAMPLE 3:**

Solve the following system of equations:

$$\begin{cases} 5x + 2y = 13 \\ 7y - 4x = 27 \end{cases}$$

1. Press \textcolor{red}{[HR]} to return to the Main Menu. From there, you want to go to the \textcolor{red}{a} function, so press 8.

2. Press \textcolor{red}{F1} (Simultaneous).

3. The calculator will now ask you for the number of unknowns. Basically, how many different variables do you have in your system? For this problem, you have 2 unknowns, so press \textcolor{red}{F1}.

4. Press \textcolor{red}{5} \textcolor{red}{EX} \textcolor{red}{2} \textcolor{red}{EX} \textcolor{red}{1} \textcolor{red}{3} \textcolor{red}{EX} for the first equation.

5. Press \textcolor{red}{EX} \textcolor{red}{4} \textcolor{red}{EX} \textcolor{red}{7} \textcolor{red}{EX} \textcolor{red}{2} \textcolor{red}{7} \textcolor{red}{EX} for the second equation. Notice that the order of each variable matters when you enter them in to the calculator.

6. Press \textcolor{red}{F1} (Solv).

7. Therefore, the solution is \((0.8604, 4.3488) = \left(\frac{37}{43}, \frac{187}{43}\right)\)
Geometry and Measurements

THIS SECTION INCLUDES THE FOLLOWING CONCEPTS:

• Area and Perimeter of a polygon
• Area and circumference of a circle
• Volume of a prism, cube, and cylinder
• Pythagorean Theorem and special properties of isosceles, equilateral, and right triangles.
• Properties of parallel and perpendicular lines
• Coordinate geometry
• Geometric visualization
• Slope
• Similarity
• Transformations

HERE ARE SOME FORMULAS THAT WILL BE HELPFUL IN THIS SECTION:

• Distance between two points \((x_1, y_1)\) and \((x_2, y_2)\)
  \[
  \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}
  \]

• Sum of the interior angles in an \(n\)-sided polygon:
  \[180(n - 2)\]

• Number of diagonals in an \(n\)-sided polygon:
  \[
  \text{Diagonals} = \frac{n(n - 3)}{2}
  \]

• Common Pythagorean Triples
  
  3, 4, 5
  5, 12, 13
  7, 24, 25
  8, 15, 17

• Common Right Triangles
  
  30°-60°-90° respective sides have a ratio of \(1 : \sqrt{3} : 2\)
  45°-45°-90° respective sides have a ratio \(1:1: \sqrt{2}\)

• Area Formulas:
  
  \[
  \text{Square} = s^2
  \]
  \[
  \text{Circle} = \pi r^2
  \]
  \[
  \text{Triangle} = \frac{1}{2}bh
  \]
  \[
  \text{Rhomus} = \frac{d_1d_2}{2}
  \]
  \[
  \text{Heron’s Formula for scalene triangles} = \sqrt{s(s - a)(s - b)(s - c)} \quad \text{where} \quad s = \frac{a + b + c}{2}
  \]
  \[
  \text{Trapezoid} = \frac{(b_1 + b_2)h}{2}
  \]
  \[
  \text{Regular Hexagon} = \frac{3s^2\sqrt{3}}{2}
  \]
  \[
  \text{Regular Triangle} = \frac{s^2\sqrt{3}}{2}
  \]
• Volume Formulas

Sphere = \( \frac{4\pi r^3}{3} \)  
Cube = \( s^3 \)  
Right Cone = \( \frac{\pi r^2 h}{3} \)

Circle = \( \pi r^2 \)  
Rectangular Prism = \( lwh \)

• Lateral Surface Area Formulas

Sphere = \( 4\pi r^2 \)  
Cylinder = \( 2\pi rh \)  
Cube = \( 6s^2 \)  
Rectangular Prism = \( 2(lw) + 2 lh + 2(wh) \)

Right Cone = \( \pi r \sqrt{r^2 + h^2} \)

• Formulas found only on the Mathematics Level 2 Exam

– Distance from a point \((x_1, y_1)\) to a line \(ax + by = c\)

\[ \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}} \]

– Angle between two lines

\[ \tan \theta = \frac{m_2 - m_1}{1 + m_1 m_2} \]

– Law of Sines

\[ \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \]

– Law of Cosines

\[ c^2 = a^2 + b^2 - 2ab \cdot \cos C \]

**EXAMPLE 1:**

If the surface area of a rectangular prism is 114 in\(^2\), the length is 5 in, and the height is 3 in, what is the width?

1. Press [MENU] to return to the Main Menu.
   For this problem, you want to use the Equation Solver, so press [8].
2 Press $\text{F3}$(Solver).

3 Type the formula in to the calculator.
   Press [ALPHA][AT] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPHA] [ALPA
Data Analysis, Statistics, and Probability

THE SECTION INCLUDES THE FOLLOWING CONCEPTS:

- Data interpretations (tables and graphs)
- Descriptive statistics (mean, median, and mode)
- Probability

HERE ARE SOME PROBLEMS THAT YOU MIGHT SEE:

EXAMPLE 1:

Tom’s grades on his test were 54, 62, 78, 84, 62, 74, 80, and 71. Find the mean, mode, median and standard deviation.

You will need to be able to recognize the symbols and abbreviations associated with each of the words.

\[ \bar{x} = \text{mean} \quad \text{Mod} = \text{Mode} \]

\[ \text{Med} = \text{median} \quad \sigma_X = \text{population standard deviation} \]

\[ s_x = \text{sample standard deviation} \]

1. Press \( \text{HOME} \) to return to the Main Menu.
   You will want to go to the \( \text{LIST} \) icon, so press \( 2 \) .

2. Put the data in List 1. Remember to press \( \text{EX} \) after each test grade is entered.

3. Press \( \text{F2} \) (CALC).

4. Press \( \text{F2} \) (1VAR).

5. Mean = 70.625
   Sample Standard Deviation = 10.405

6. Arrow down \( \downarrow \) to see the Mode and Median.
   Mode = 62
   Median = 72.5
EXAMPLE 2:

Find the best-fit line for the points:

(-4, -2) (-3, -1) (-2, -1.5) (-1.5, 0) (0, 0.5) (0.5, 0.5)  
(2, 2.5) (2.5, 2) (3, 3) (4, 3)

1. If you are currently in the **LIST** icon, press **EXIT** until it takes you back to the lists.

2. At this point in time, you have a few options. You can automatically type over the entries already in the calculator. If you press **F6 (↓)** you will see new screen options along the bottom. **F4 (DEL-A)** allows you to delete all the entries in the list completely.

3. Put the x-coordinates in List 1 and the y-coordinates in List 2. Remember to press **ENG** after each entry.

4. Press **F1 (GRPH)**.

5. Press **F1 (GPH1)**. The calculator is automatically set to graph the data as a scatterplot. If you would like to change the type of graph, press **F6 (SET)**.

6. The calculator now has displayed the scatterplot. Press **F2 (CALC)** to calculate the equation for the best-fit line.

7. Press **F2 (X)** and then **F1 (ax+b)**.

8. The equation of the best-fit line is: \( y = 0.66441187x + 0.60033821 \)

9. You should notice **F5 (Copy)** and **F6 (Draw)** at the bottom right of the screen. **F5 (Copy)** will copy the equation and allow you to enter it in to Y1 to graph. **F6 (Draw)** will draw the line on top of the points already on the graph.
PROBABILITY FORMULAS

• Probability = \( \frac{\text{successes}}{\text{total}} \)
• Probability of events A and B occurring
  \[ P(A) \cdot P(B) \]
• Probability of events A or B occurring
  \[ P(A) + P(B) - P(\text{both occurring}) \]
• Permutation of \( n \) objects arranged in a row
  \[ n! \]
• Permutation of \( r \) objects from \( n \) objects
  \[ nPr \]
• Combination of \( r \) objects from \( n \) objects
  \[ nCr \]

Probability Formula seen only on the Mathematics Level 2 Test
• Circular Permutation (\( n \) objects arranged in a circle)
  \[ (n - 1)! \]
EXAMPLE 3:

A diner serves omelets and lets the customer choose any 3 of 8 different vegetables, 2 of 4 different meats, and 2 of 5 different cheeses. How many different omelet combinations does the customer have to choose from?

Because there are multiple events, you will need to multiple each combination:

\[ \binom{8}{3} \times \binom{4}{2} \times \binom{5}{2} \]

1. Press \( \text{MENU} \) to return to the Main Menu. You will need to go be in the \( \text{MENU} \) icon, so press 1.

2. To find Combinations, Permutations, or Factorials, press \( \text{OPTN} \), 3, 4, 5, \( \text{F3} \)(PROB).

3. Press 8, F3, 3, \( \times \), 4, F3, 2, \( \times \), 5, F3, 2, \( \text{EXE} \).

4. There will be 3,360 different omelets for you to choose from. That’s a lot of food! Just think…you could eat a different omelet every day for about 9 years!