CASIO EDUCATION

SUPPORT MATERIALS

NYS REGENTS EXAM
ALGEBRA 2/TRIGONOMETRY
## SAMPLE QUESTIONS

1.   The expression $(3 - 7i)^2$ is equivalent to

(1)   −40 + 0*i*   (3)   58 + 0*i*
(2)   −40 − 42*i*   (4)   58 – 42*i*

This question is designed to asses whether or not a student can multiply two binomials with imaginary numbers. If a student does not remember how to distribute two binomials or is unable to simplify the resulting expression, they can use the *fx-9750GII* to simplify the imaginary expression.

a)   To select the RUN mode from the Icon Main Menu, press 1 or ◀ ▶ ▲ ▼ to the desired icon and press EXE.

b)   To input the expression, enter the following:

• (3 − 7 SHIFT 0) x^2 EXE
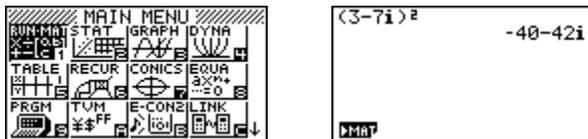
The correct answer choice is **(2)**.

2.   If $f(x) = \dfrac{1}{2}x - 3$ and g(x) = 2x + 5, what is the value of $(g \circ f)(4)$?

(1)   −13   (3)   3
(2)   3.5   (4)   6

To evaluate this composite function, a student could substitute 4 into the expression $\dfrac{1}{2}x - 3$, take the resulting answer and substitute it into 2x + 5. A student can use the Table mode of the *fx-9750GII* to evaluate this composite function in much the same way.

a)   To select the TABLE mode from the Icon Main Menu, press 5.
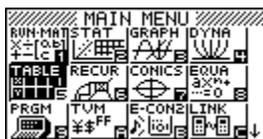
b)   From the initial Table screen, input the f(x) equation for **Y1:** by entering:

- $\boxed{1}$ $\boxed{a\frac{b}{c}}$ $\boxed{2}$ $\boxed{X,\theta,T}$ $\boxed{-}$ $\boxed{3}$ $\boxed{\text{EXE}}$

Table Func :Y=	Table Func :Y=
Y1: ...	Y1▆1⏜2X-3

c)   To input the g(x) equation for **Y2:**, enter the following:

- $\boxed{2}$ $\boxed{X,\theta,T}$ $\boxed{+}$ $\boxed{5}$ $\boxed{\text{EXE}}$

Table Func   :Y=
Y1▆1⏜2X-3
Y2▆2X+5

d)   To view the table for both functions, press $\boxed{\text{F6}}$ (TABL).

X	Y1	Y2
1	-2.5	7
2	-2	9
3	-1.5	11
4	-1	13
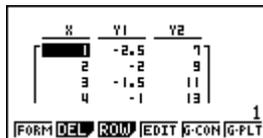
e)   With the cursor in the *x*-column, enter $\boxed{4}$ $\boxed{\text{EXE}}$ to see the value of $\frac{1}{2}x - 3$, when *x* is 4.

X	Y1	Y2
4	-1	13
2	-2	9
3	-1.5	11
4	-1	13
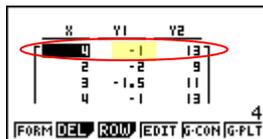
f)   When *x* is 4, $\frac{1}{2}x - 3$ is equal to –1. With the cursor in the *x*-column enter $\boxed{(-)}$ $\boxed{1}$ $\boxed{\text{EXE}}$ to see the value of 2x + 5 when *x* = –1.

| X	Y1	Y2
4	-1	13
-1	-3.5	3
3	-1.5	11
4	-1	13
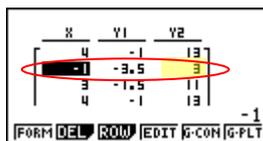
The value of the second equation (**Y2**) is 3, so the answer choice is (**3**).

3.   What are the values of α in the interval $0° \leq \alpha < 360°$ that satisfy the equation $\tan \alpha - \sqrt{3} = 0$?

(1)   60°, 240°

(3)   72°, 108°, 252°, 288°

(2)   72°, 252°

(4)   60°, 120°, 240°, 300°

Students who do not know how to solve this equation or students who want to check their work can utilize the Equation Editor on the *fx-9750GII* for problems like this.

a)   To select the EQUATION mode from the Icon Main Menu, press **8**.
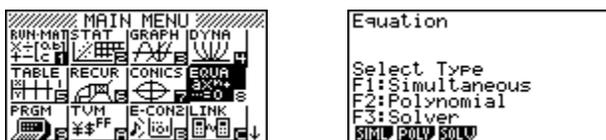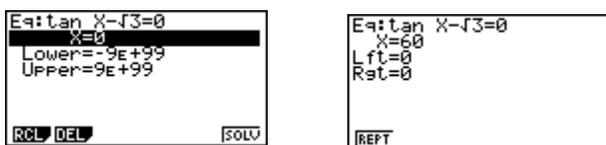

b)   Before the equation can be solved, press $\boxed{\text{SHIFT}}$ $\boxed{\text{MENU}}$ **(SET UP)** ▽ ▽ ▽ $\boxed{\text{F2}}$ $\boxed{\text{EXIT}}$ to change the angle setting to degrees.

c)   From there, input the equation, enter the following:

- $\boxed{\text{F3}}$ $\boxed{\text{tan}}$ $\boxed{\text{X},\theta,\text{T}}$ $\boxed{-}$ $\boxed{\text{SHIFT}}$ $\boxed{x^2}$ $\boxed{3}$ $\boxed{\text{SHIFT}}$ $\boxed{\cdot}$ $\boxed{0}$ $\boxed{\text{EXE}}$ $\boxed{\text{F6}}$

Note: The variable x was used instead of α.

d)   The answer is 60; answer choice (1) and (4) could be possibilities. Solve the equation again by pressing $\boxed{\text{F1}}$ (REPT), using x = 240.
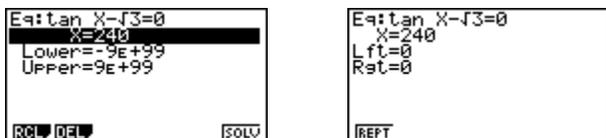
Any other answer choice substituted for *x*, would result in an answer > 360°,   therefore the answer is **(1)**.

4. The expression $\log_8 64$, is equivalent to

(1) 8   (3) $\dfrac{1}{2}$

(2) 2   (4) $\dfrac{1}{8}$

Most calculators can perform base 10 logarithms; however, the *fx-9750GII* can just as easily calculate logarithms with different bases.

a) From the RUN mode, enter the following:

- [OPTN] [F4] [F6] [F4] [8] [,] [6] [4] [)] [EXE]

The correct answer choice is **(2)**.

5. The expression cos 4*x* cos 3*x* + sin 4*x* sin 3*x* is equivalent to

(1) sin *x*   (3) cos *x*

(2) sin 7*x*   (4) cos 7*x*

A student can use the TABLE mode of the *fx-9750GII* to help evaluate this problem. The given expression, along with each answer choice, can be entered to see if the resulting tables are equal.

a) To enter the expression, from the initial TABLE screen, enter the following:

- [cos] [(] [4] [X,θ,T] [)] [cos] [(] [3] [X,θ,T] [)] [+] [sin] [(] [4] [X,θ,T] [)] [sin] [(] [3] [X,θ,T] [)] [EXE]

b) To enter the first answer choice, enter the following:

- [sin] [X,θ,T] [EXE]

c)   To view the tables, select $\boxed{F6}$. If the **YI** and **Y2** columns match up, that answer choice is the correct answer.

The two columns do not match up; therefore, answer choice (1) does not work.

d)   To return to the initial Table screen, press $\boxed{F1}$ (FORM) or $\boxed{EXIT}$. Highlight **Y2:** and begin entering answer choice (2).

The two columns do not match up; therefore, answer choice (2) does not work.

e)   Repeat the above steps for answer choice (3).

The **YI** and **Y2** columns show equal values; the correct answer choice is **(3)**.

6.   The value of the expression $2\sum_{n=0}^{2}(n^2+2^n)$ is

(1) 12   (3) 24

(2) 22   (4) 26

The *fx-9750GII* can evaluate summation expressions in the RUN mode by going to the Option menu and selecting the Sigma Notation tab.

a)   To input the problem, enter the following from the Run mode:

- $\boxed{OPTN}$ $\boxed{F4}$ $\boxed{F6}$ $\boxed{2}$ $\boxed{F3}$ $\boxed{(}$ $\boxed{X,\theta,T}$ $\boxed{x^2}$ $\boxed{+}$ $\boxed{2}$ $\boxed{\wedge}$ $\boxed{X,\theta,T}$ $\boxed{)}$ $\boxed{,}$ $\boxed{X,\theta,T}$ $\boxed{,}$ $\boxed{0}$ $\boxed{,}$ $\boxed{2}$ $\boxed{)}$ $\boxed{EXE}$

The correct answer choice is **(3)**.

7.   For which equation does the sum of the roots equal $\frac{3}{4}$ and the product of the roots equal –2?

(1) $4x^2 - 8x + 3 = 0$

(2) $4x^2 + 8x + 3 = 0$

(3) $4x^2 - 3x - 8 = 0$

(4) $4x^2 + 3x - 2 = 0$

To answer this problem, a student would have to factor each polynomial, then multiply and add the roots together. To save time in a testing situation, the student could use the Polynomial mode in the Equation Editor to quickly find the roots of the equations then multiply and add the roots to see if they meet the conditions given in the question.

To enter polynomial equations in the *fx-9750GII*, they must be in standard form, and only the coefficients and constant are entered.

a)   From the initial Equation Editor screen, select F2 for Polynomial, then F1 to enter a second degree polynomial equation.

b)   To enter the first equation, input the following:

- 4 EXE (–) 8 EXE 3 EXE F1
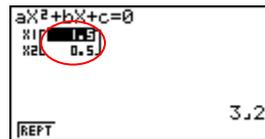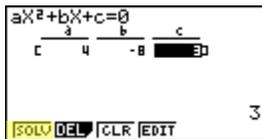
c)   Since 1.5 + 0.5 does not equal $\frac{3}{4}$, continue to enter each answer choice. Press EXIT or F1 (REPT) to return to the previous screen.

d) $4x^2 - 3x - 8 = 0$ has roots that when added, equal $\frac{3}{4}$ and when multiplied equal –2.
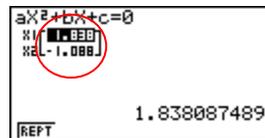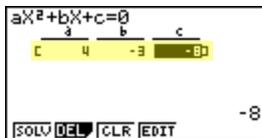
The correct answer choice is **(3)**.

8.   Matt places $1,200 in an investment account earning an annual rate of 6.5%, compounded continuously. Using the formula $v = Pe^{rt}$, where *V* is the value of the account in *t* years, *P* is the principal initially invested, *e* is the base of a natural logarithm, and *r* is the rate of interest, determine the amount of money, to the *nearest cent*, that Matt will have in the account after 10 years.

The student must be able to correctly substitute values into the given formula. Using the *fx-9750GII*, the student can quickly substitute values into a formula and check their work.

From the Icon Main Menu, select 8 for the Equation Mode. From the initial Equation Editor screen, select F3 for Solver. From here, formulas can be entered using ALPHA to enter the desired letters.

To input the formula, enter the following:

- ALPHA 2 SHIFT • ALPHA 4 SHIFT In ((ALPHA 6 ALPHA ÷)) EXE
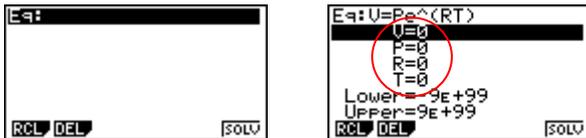
From here, assign the appropriate values to the given variables, move the cursor to the unknown value and solve by entering the following:

- ▼ 1 2 0 0 EXE 0 • 0 6 5 EXE 1 0 EXE ▲ ▲ ▲ ▲ F6
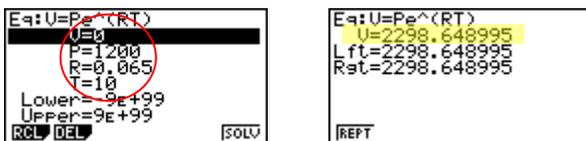
The correct answer is **$2298.65**.

9.   Solve the equation $8x^3 + 4x^2 - 18x - 9 = 0$ algebraically for all values of x.

A student could use the *fx-9750GII* to check their solutions or use the answers to factor the cubic function for a portion of the points.

a)   From the initial Equation Editor screen, select F2 for Polynomial, then F2 for a third degree polynomial equation.

b)   To input this polynomial and solve, enter the following:

- 8 EXE 4 EXE (−) 1 8 EXE (−) 9 EXE F1
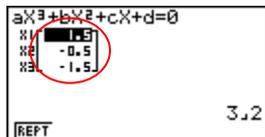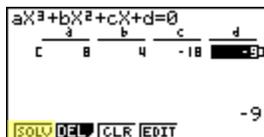
The answer is **x = 1.5**, **x = −0.5**, and **x = −1.5**.

10.   The table below shows the results of an experiment involving the growth of bacteria.

| Time (x) in minutes	1	3	5	7	9	11
Number of Bacteria (y)	2	25	81	175	310	497

Write a power regression equation for this set of data, rounding all values to *three decimal places*. Using this equation, predict the bacteria's growth, to the *nearest integer*, after 15 minutes.

In the STAT mode of the *fx-9750GII*, the student can enter lists of data, graph the data, view two-variable statistical calculations or perform ten different types of regressions.

a)   From the Icon Main Menu, select 2 for the Statistics mode. From the initial List Editor Screen, enter Time in List 1, pressing EXE after each entry. After the last entry, press ▶ and begin entering the Number of Bacteria, pressing EXE after each entry.
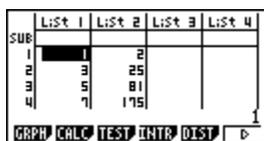
b)   To calculate power regression, enter F2 (CALC), F3 (REG), F6 (▷), then F3 (Pwr).
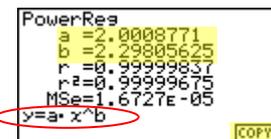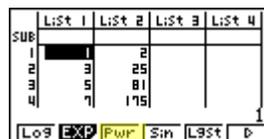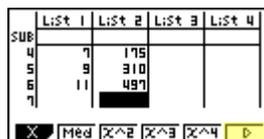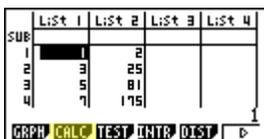
c)   To copy this equation to the Table mode, press [F6] (COPY), then [EXE].

d)   Press [MENU] for the Icon Main Menu and [5] for Table mode. The power regression
      equation is displayed; press [F1] to select it, then [F6] to display the table.

e)   To display the number of bacteria after 15 minutes, enter [1] [5] [EXE] anywhere in the
      x-column.

The correct answer is **1009 bacteria**.