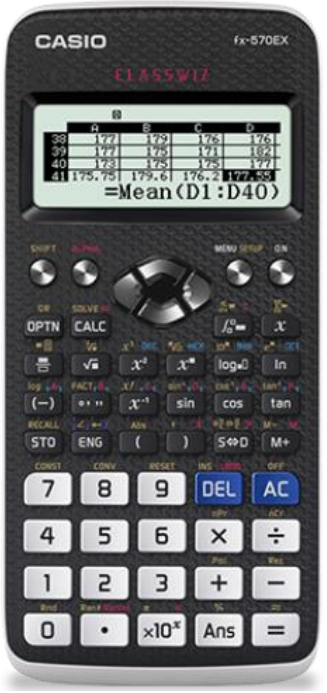
CASIO



Workshop: How to Solve Mathematics Problems Using Casio fx-570EX

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Factors and Multiples

To determine a prime number

- Example:

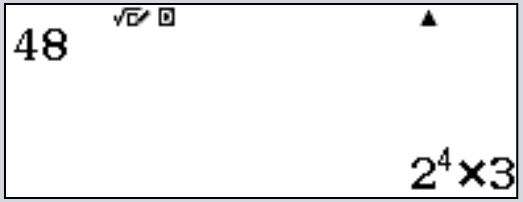
  Determine whether each of the following numbers are a prime number.

  (a) 48

  (b) 113

Solution

(a) 48

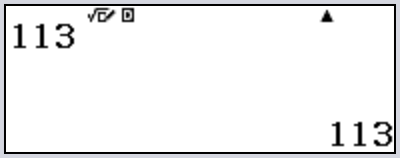
Command	Screenshot
4 8 = SHIFT °,,,	

* If the answer is displayed in the form of prime factorization, then the number has some factors including 1 and the number itself.

Answer:

Not a prime number because 48 can be divided by number other than 1 and 48 itself.

(b) 113

Command	Screenshot
1 1 3 = SHIFT °,,,	

* If the answer is unchanged, then the number has factors of 1 and the number itself.

Answer:

Yes, it is a prime number because 113 can not be divide by other numbers except 1 and 113 itself.

Let's Try!

- State whether each of the following numbers are prime number.
  (a) 46
  (b) 61
  (c) 89
  (d) 117

Answer: (a) No **(b) Yes**
(c) Yes **(d) No**

To determine a prime factor of a number

- To determine the prime factor of a number by using the Casio fx-570EX, the way of use is the same as in determining prime numbers.
- **Example:**

  List all the prime factors of 78.

  Solution:

Command	Screenshot
7 8 = SHIFT °,,,	78 2×3×13

Thus, the prime factors of 78 are 2, 3 and 13.

Let's Try!

- List the prime factors for each of the following numbers.
  (a) 25
  (b) 129
  (c) 429
  (d) 23 985

Answer: (a) 5 **(b) 3 and 43**
(c) 3, 11 and 13 **(d) 3, 5, 13 and 41**

To determine the Highest Common Factor (HCF)

- There are three methods for determining HCF.
  (a) Listing common factor
  (b) Repeated division
  (c) Prime factorization

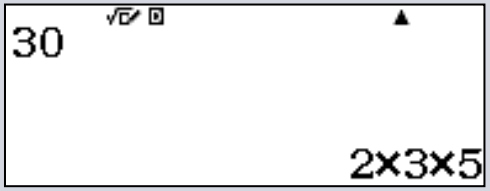
Solution by using Casio fx-570EX

- To find HCF of 30 and 36, use the prime factorization method.

Step 1:

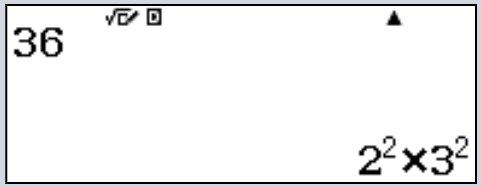
Find the prime factor of 30 and 36.

Prime factor of 30:

Command	Screenshot
3 0 = SHIFT °,,,	

$\therefore\ 2 \times 3 \times 5$

Prime factor of 36:

Command	Screenshot
3 6 = SHIFT °,,,	

$\therefore\ 2^2 \times 3^2 = 2 \times 2 \times 3 \times 3$

Step 2:

Multiply all the common prime factor.

30	=	2			×	3			×	5
36	=	2	×	2	×	3	×	3		
		↓				↓				
		2			×	3				

Thus, HCF of 30 and 36:

$= 2 \times 3 = 6$

Let's Try!

- Find the highest common factor (HCF) for each of the following.
  (a) 12 and 20
  (b) 63 and 108

Answer: (a) 4 **(b) 9**

To determine Lowest Common Multiple (LCM)

- There are three methods for determining LCM
  (a) Listing the common multiple
  (b) Repeated division
  (c) Prime factorization

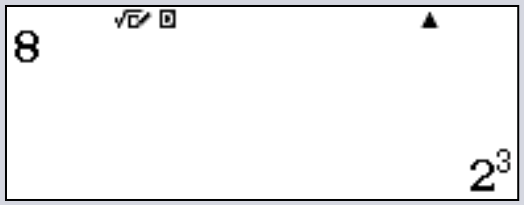
Solution by using Casio fx-570EX

- To find the LCM of 8 and 20, use the prime factorization method.

  Step 1:

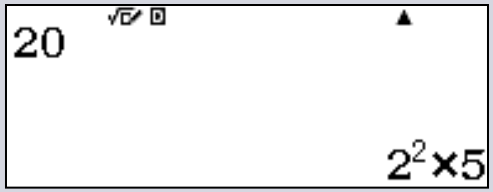
  Find the prime factors of 8 and 20.

  Prime factor of 8:

Command	Screenshot
8 = SHIFT °,,,	

$\therefore\ 2^3 = 2 \times 2 \times 2$

Prime factor of 20:

Command	Screenshot
2 0 = SHIFT °,,,	

$\therefore\ 2^2 \times 5 = 2 \times 2 \times 5$

Step 2:

Multiply all the common prime factor.

8	=	2	×	2	×	2		
20	=	2	×	2			×	5
		↓		↓		↓		↓
		2	×	2	×	2	×	5

Thus, LCM of 8 dan 20:

$= 2 \times 2 \times 2 \times 5 = 40$

Let's Try!

- Find the lowest common multiple (LCM) for each of the following.
  (a) 6 and 8
  (b) 12 and 27

Answer: (a) 24 **(b) 108**

Squares, Square Roots, Cubes and Cube Roots

- **Example:**

  Solve each of the following.

  (a) $\sqrt{3^2 + 27}$

  (b) $\left(\frac{2}{3}\right)^2 - \sqrt[3]{-3\frac{3}{8}}$

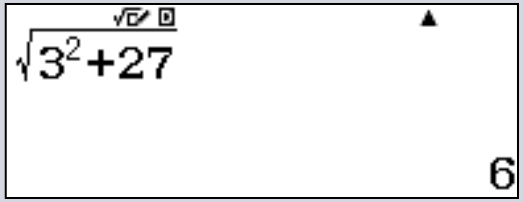
  (c) $\left(5 - \sqrt{36}\right)^3$

*__Additional info__

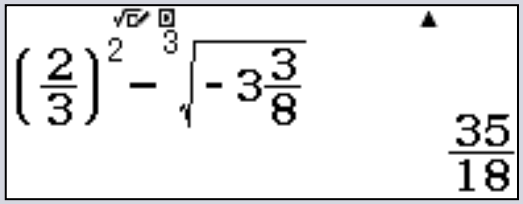
– Use button $\boxed{x^{\blacksquare}}$ for enter the value of with power of other than 2 and 3.

Solution:

(a) $\sqrt{3^2 + 27}$

Command	Screenshot
√ 3 x^2 + 2 7 =	

(b) $\left(\frac{2}{3}\right)^2 - \sqrt[3]{-3\frac{3}{8}}$

Command	Screenshot
(MATH 2 ▶ 3 ▶) x^2 − SHIFT √ SHIFT MATH (−) 3 ▶ 3 ▶ 8 =	

(c) $\left(5-\sqrt{36}\right)^3$

Command	Screenshot
(5 − √ 3 6 ▶) SHIFT x^2 =	$(5-\sqrt{36})^3$ -1

Let's Try!

- Solve each of the following.

(a) $\sqrt{0.04} + \left(-\frac{2}{3}\right)^3$

(b) $\sqrt[3]{-\frac{8}{343}} \times \left(\sqrt{6\frac{1}{4}} + 0.5^2\right)$

Answer: (a) $\mathbf{-\frac{13}{135}}$ **(b)** $\mathbf{-\frac{11}{14}}$

Ratios, Rates and Proportions

- **Example:**

  The price of 3 kg durians is RM18. Calculate the price of 11 kg durians.

- **Solution:**

$$\frac{3\text{ kg}}{\text{RM}18} = \frac{11\text{ kg}}{x}$$

3 kg : RM18 = 11 kg : x

Command	Screenshot
Converts 'Menu' to 'Ratio'. MENU x^{-1} 2	1 : A : B=X : D 2 : A : B=C : X
Enter the value. 3 = 1 8 = 1 1 =	3: 18 = 11: X 11
Find the value of x. =	X= 66

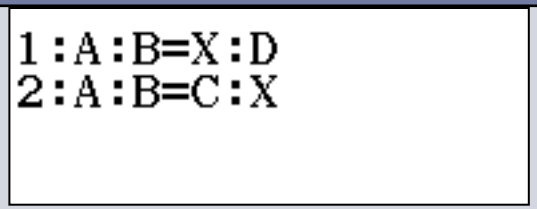
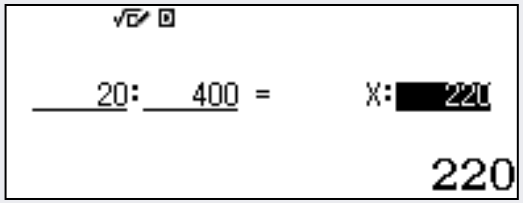
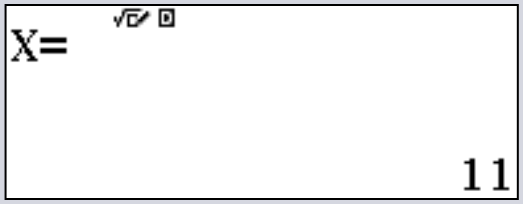
- **Example:**

  A car uses 20 litres of petrol to travel 400 km. Find the volume of petrol required, if the car is traveling 220 km.

- **Solution:**

$$\frac{20 \text{ litres}}{400 \text{ km}} = \frac{x}{220 \text{ km}}$$

20 litres : 400 km = x : 220 km

Command	Screenshot
Converts 'Menu' to 'Ratio'. MENU x^{-1} 1	
Enter the value. 2 0 = 4 0 0 = 2 2 0 =	
Find the value of x. =	

Let's Try!

- Solve each of the following.
  (a) A farmer planted three lime trees per 1.5 m^2. How many lime trees can be planted by the farmer in an area of 75 m^2?
  (b) The price of 2 kg tea is RM18. What is the price of 10 kg tea?

Answer: (a) 150 lime trees (b) RM90

Linear Equations

Linear Equation in One Variable

- Example:

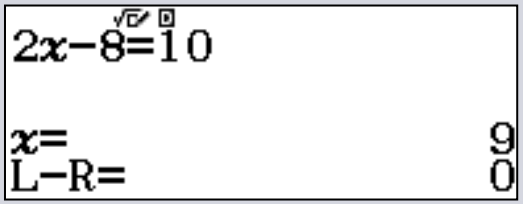
  Solve each of the following linear equations.

  (a) $2x - 8 = 10$

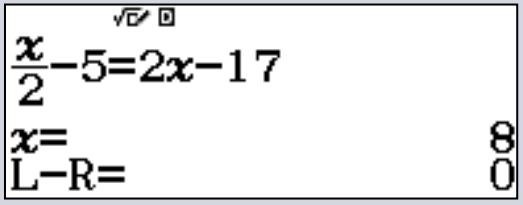
  (b) $\frac{x}{2} - 5 = 2x - 17$

Solution

(a) $2x - 8 = 10$

Command	Screenshot
2 x − 8 ALPHA CALC 1 0 SHIFT CALC =	

(b) $\frac{x}{2} - 5 = 2x - 17$

Command	Screenshot
x ▶ 2 ▶ − 5 ALPHA CALC 2 x − 1 7 SHIFT CALC =	

Let's Try!

- Solve each of the following linear equations.

  (a) $6x - \frac{1}{2} = x$

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

  (c) $5 + \frac{x-2}{7} = 8$

Answer: (a) $x = \frac{1}{10}$ **(b)** $x = 9$ **(c)** $x = 23$

Simultaneous Linear Equations in Two Variables

- Example:

  Solve the following simultaneous linear equations.

  (a) $x + 2y = 3$

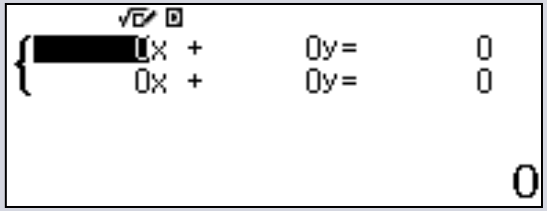
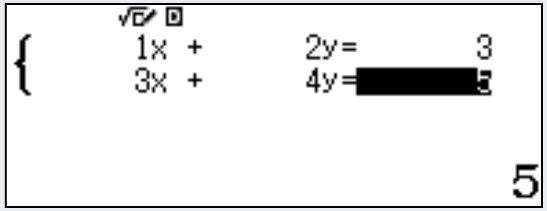
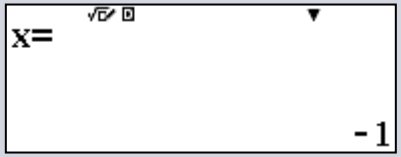
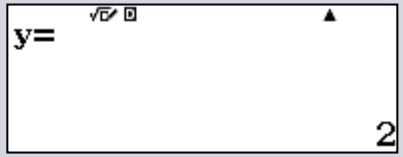
  $3x + 4y = 5$

  (b) $2x + y = 3$

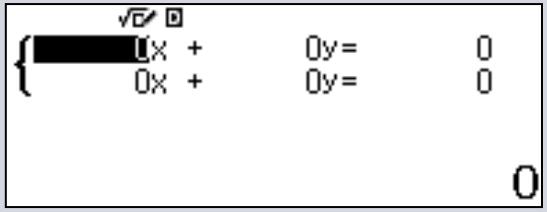
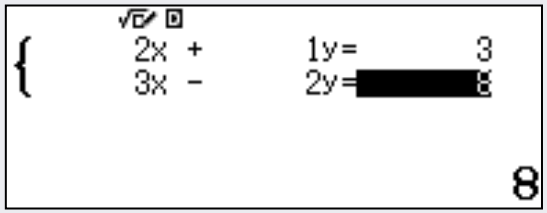
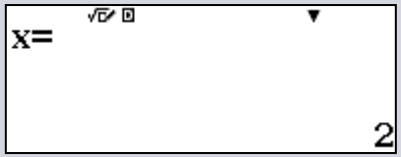
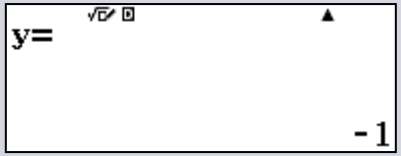
  $3x - 2y = 8$

Solution

(a) $x + 2y = 3; 3x + 4y = 5$

Command	Screenshot
Converts 'Menu' to 'Equation/Function'. MENU (−) 1 2	
Enter the coefficient of the equations. 1 = 2 = 3 = 3 = 4 = 5 =	
Obtain the values of *x* and *y*. = =	 

(b) $2x + y = 3; 3x - 2y = 8$

Command	Screenshot
Converts 'Menu' to 'Equation/Function'. MENU (–) 1 2	
Enter the coefficient of the equations. 2 = 1 = 3 = 3 = (–) 2 = 8 =	
Find the values of x and y. = =	 

Let's Try!

- Solve the following simultaneous linear equations.

(a) $4x + 3y = 2$

$x + 2y = 3$

(b) $2x + 3y = 7$

$3x + y = 7$

(c) $2x - 3y = 10$

$3x + 4y = -2$

Answer: (a) $x = -1, y = 2$ (b) $x = 2, y = 1$ (c) $x = 2, y = -2$

Indices

To find a value without using a calculator

- Example:

  Calculate the value of each of the following without using a calculator.

  (a) $\sqrt{3} \times 12^{\frac{3}{2}} \div 6$

  (b) $4^{\frac{1}{3}} \times 50^{\frac{2}{3}} \times 10^{\frac{5}{3}}$

Solution

- First, change all bases in the operation to prime factors.

(a) $\sqrt{3} \times 12^{\frac{3}{2}} \div 6$

Change 12 and 6 into a form of prime factor.

Command	Screenshot
1 2 = SHIFT ◦,,,	12 → $2^2 \times 3$
6 = SHIFT ◦,,,	6 → 2×3

$= (3)^{\frac{1}{2}} \times (2^2 \times 3)^{\frac{3}{2}} \div (2 \times 3)^1$

$= 2^{3-1} \times 3^{\frac{1}{2}+\frac{3}{2}-1}$

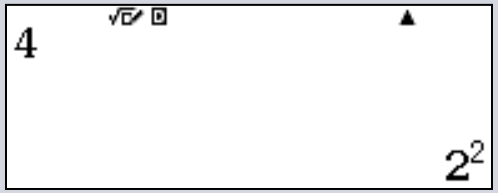
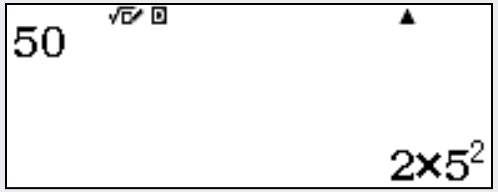
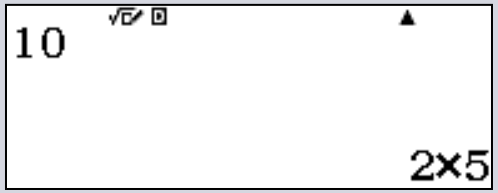
$= 2^2 \times 3^1$

$= 12$

- First, change all bases in the operation to prime factors.

(b) $4^{\frac{1}{3}} \times 50^{\frac{2}{3}} \times 10^{\frac{5}{3}}$

Change 4, 50 and 10 into a form of prime factor.

Command	Screenshot
4 = SHIFT ∘,,,	
5 0 = SHIFT ∘,,,	
1 0 = SHIFT ∘,,,	

$= (2^2)^{\frac{1}{3}} \times (2 \times 5^2)^{\frac{2}{3}} \times (2 \times 5)^{\frac{5}{3}}$

$= 2^{\frac{2}{3}+\frac{2}{3}+\frac{5}{3}} \times 5^{\frac{4}{3}+\frac{5}{3}}$

$= 2^3 \times 5^3$

$= 1000$

Let's Try

- Calculate the value of each of the following without using a calculator.

  (a) $60^{\frac{1}{2}} \times 125^{\frac{2}{3}} \div \sqrt{15}$

  (b) $\sqrt{49} \times 3^{-2} \div \left(\sqrt{81}\right)^{-1}$

Answer: (a) 50 (b) 7

Standard Form

To round off a number correct to n significant figures

- Example:

  Round off each of the following number correct to the number of significant figures (s.f.) stated.

  (a) 6 287 (2 s.f.)

  (b) 24 071 (3 s.f.)

  (c) 56.87 (3 s.f.)

  (d) 23.15 (2 s.f.)

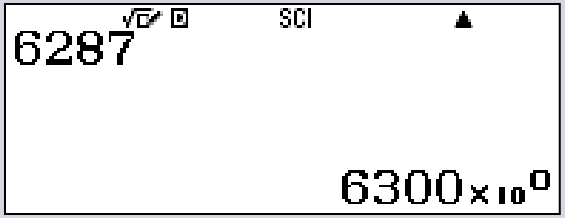
  (e) 0.0124 (2 s.f.)

  (f) 0.0003245 (3 s.f.)

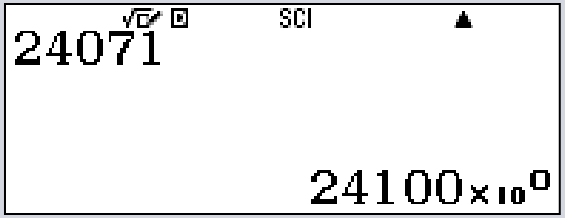
Solution

To round off a number correct to *n* significant figures, convert 'Setup' as 'Number Format'.

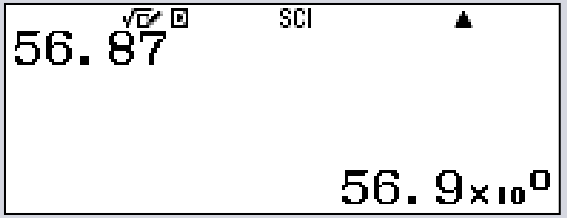
(a) 6 287 (2 s.f.)

Command	Screenshot
SHIFT MENU 3 2 2 6 2 8 7 = ENG ENG	

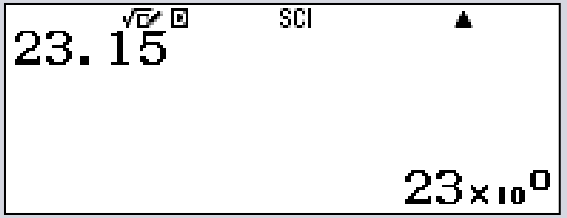
(b) 24 071 (3 s.f.)

Command	Screenshot
SHIFT MENU 3 2 3 2 4 0 7 1 = ENG ENG	

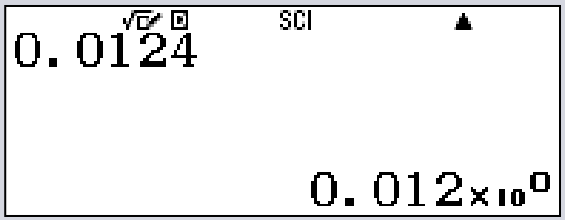
(c) 56.87 (3 s.f.)

Command	Screenshot
SHIFT MENU 3 2 3 5 6 • 8 7 = S⇔D ENG	

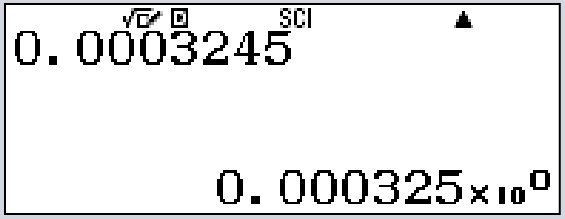
(d) 23.15 (2 s.f.)

Command	Screenshot
SHIFT MENU 3 2 2 2 3 • 1 5 = ENG	

(e) 0.0124 (2 s.f.)

Command	Screenshot
SHIFT MENU 3 2 2 0 • 0 1 2 4 = S⇔D SHIFT ENG	

(f) 0.0003245 (3 s.f.)

Command	Screenshot
SHIFT MENU 3 2 3 0 • 0 0 0 3 2 4 5 = SHIFT ENG SHIFT ENG	

Converts a number to a standard form and vice versa

- Example:

  Convert each of the following numbers in standard form.

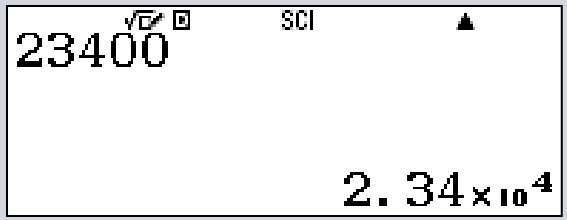
  (a) 23 400 (b) 2 478

  (c) 0.451 (d) 0.001045

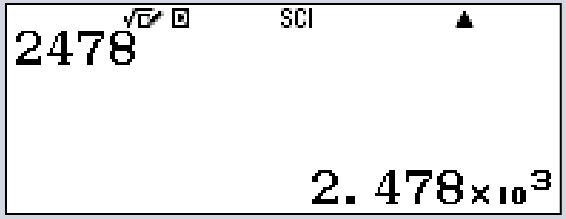
Solution

To convert a number in standard form, convert 'Setup' as 'Number Format'.

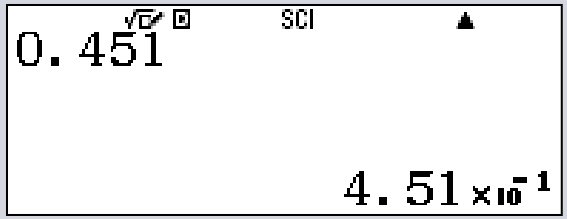
(a) 23 400

Command	Screenshot
2 3 4 0 0 = SHIFT MENU 3 2 3 =	

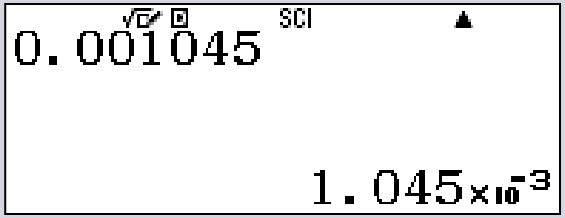
(b) 2 478

Command	Screenshot
2 4 7 8 = SHIFT MENU 3 2 4 =	

(c) 0.451

Command	Screenshot
0 • 4 5 1 = SHIFT MENU 3 2 3 S⇔D	

(d) 0.001045

Command	Screenshot
0 • 0 0 1 0 4 5 = SHIFT MENU 3 2 4 S⇔D	

Converts a standard form as a single number

- Example:

  Convert each of the following as a single number.

  (a) 2.47×10^{3}

  (b) 9.04×10^{6}

  (c) 3.71×10^{-2}

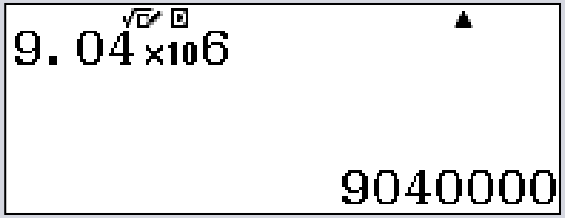
  (d) 8.42×10^{-4}

Solution

(a) 2.47×10^3

Command	Screenshot
2 • 4 7 ×10^x 3 =	

(b) 9.04×10^6

Command	Screenshot
9 • 0 4 ×10^x 6 =	

(c) 3.71×10^{-2}

Command	Screenshot
3 • 7 1 ×10^x (−) 2 = S⇔D	3.71×10-2 0.0371

(d) 8.42×10^{-4}

Command	Screenshot
8 • 4 2 ×10^x (−) 4 = S⇔D SHIFT MENU 3 3 2 S⇔D S⇔D	8.42×10-4 0.000842

Let's Try!

- Round off each of the following number correct to the number of significant figures (s.f.) stated.

  (a) 143 125 (3 a.b.) (b) 0.0264 (2 a.b.)

  Answer: (a) 143 000 (b) 0.026

- Convert each of the following numbers in standard form.

  (a) 65 389 (b) 0.002106

  Answer : (a) 6.5389×10^4 (b) 2.106×10^{-3}

- Convert each of the following as a single number.

  (a) 5.13×10^4 (b) 6.21×10^{-5}

  Answer : (a) 51 300 (b) 0.0000621

To solve an operation in standard form

- Example:

  Solve each of the following.

  (a) $4.5 \times 10^{11} + 2.8 \times 10^{12}$

  A 3.25×10^{11} **C** 4.78×10^{11}

  B 3.25×10^{12} **D** 4.78×10^{12}

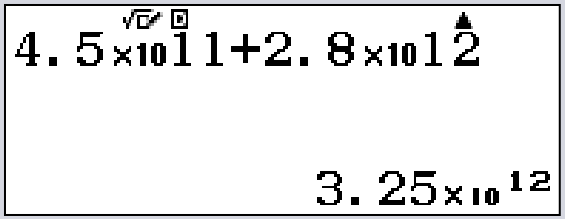
  (b) $0.000038 - 2.7 \times 10^{-6}$

  A 1.1×10^{-6} **C** 1.1×10^{-5}

  B 3.53×10^{-6} **D** 3.53×10^{-5}

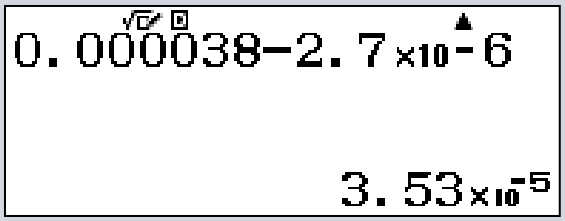
Solution

(a) $4.5 \times 10^{11} + 2.8 \times 10^{12}$

Command	Screenshot
4 • 5 ×10^x 1 1 + 2 • 8 ×10^x 1 2 =	

Answer: **B**

(b) $0.000038 - 2.7 \times 10^{-6}$

Command	Screenshot
0 • 0 0 0 0 3 8 − 2 • 7 ×10^x (−) 6 =	

Answer: **D**

- Example:

Solve each of the following.

(a) $\frac{0.0078}{2.4\times10^{-8}}$

A	3.25×10^{-11}	**C**	3.25×10^{5}
B	3.25×10^{11}	**D**	3.25×10^{6}

(b) $\frac{5.8\times10^{-5}}{0.02}$

A	2.9×10^{2}	**C**	2.9×10^{-2}
B	2.9×10^{3}	**D**	2.9×10^{-3}

Solution

(a) $\dfrac{0.0078}{2.4\times10^{-8}}$

Command	Screenshot
0 • 0 0 7 8 ▤ 2 • 4 ×10^x (−) 8 =	$\frac{0.0078}{2.4\times10^{-8}}$ 325000
Converts to a standard form. SHIFT MENU 3 2 3 =	SCI $\frac{0.0078}{2.4\times10^{-8}}$ 3.25×10^{5}

Answer: **C**

Solution

(b) $\dfrac{5.8\times10^{-5}}{0.02}$

Command	Screenshot
5 • 8 ×10^x (−) 5 ▭ 0 • 0 2 = S⇔D	$\frac{5.8\times10^{-5}}{0.02}$ 2.9×10^{-3}

Answer: **D**

Let's Try!

Solve each of the following.

(a) $6.2 \times 10^9 - 3 \times 10^8$

A 4.2×10^8 **C** 5.9×10^8

B 4.2×10^9 **D** 5.9×10^9

(b) $0.000086 - 3.7 \times 10^{-5}$

A 4.9×10^{-4} **C** 4.9×10^{-6}

B 4.9×10^{-5} **D** 4.9×10^{-7}

(c) $\frac{1.4 \times 10^{-5}}{0.064}$

A 2.1875×10^{-6} **C** 2.1875×10^{-4}

B 2.1875×10^{-5} **D** 2.1875×10^{-3}

Answer: (a) D (b) B (c) C

Quadratic Equations

To solve a quadratic equation

- Example:

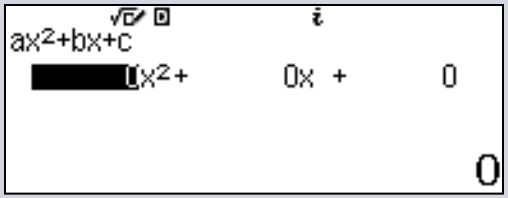
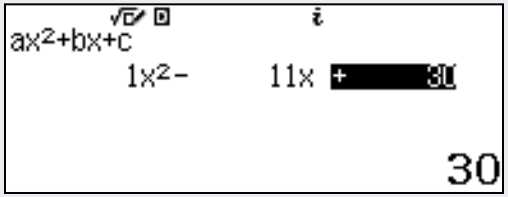
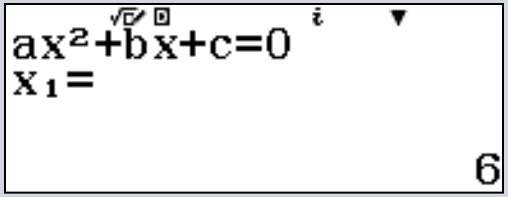
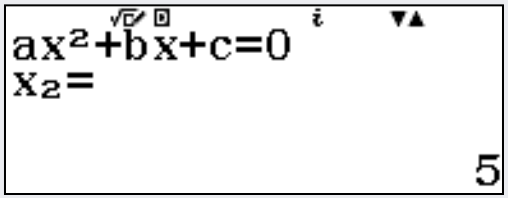
  Solve each of the following quadratic equations.

  (a) $x^2 - 11x + 30 = 0$

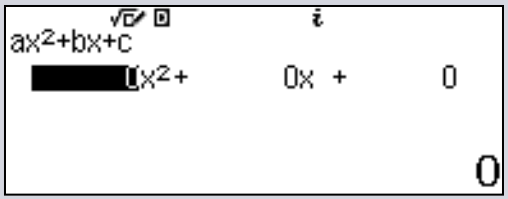
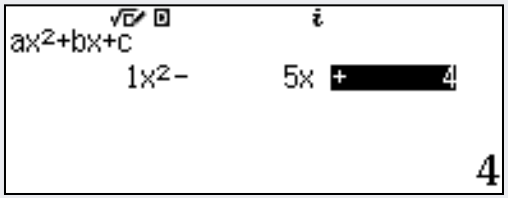
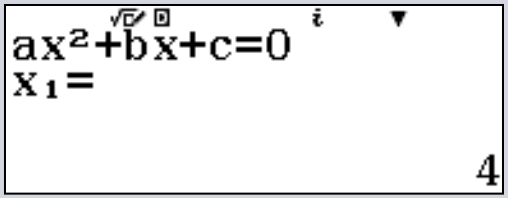
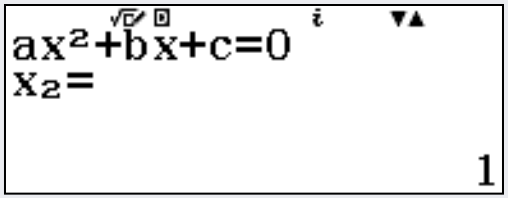
  (b) $x(x - 2) = 3x - 4$

Solution

(a) $x^2 - 11x + 30 = 0$

Command	Screenshot
Converts 'Menu' to 'Equation/Function'. MENU ALPHA (−) 2 2	
Enter the coefficient of the equation. 1 = (−) 1 1 = 3 0 = =	
Obtain the values of x. =	
=	

(b) $x(x-2) = 3x - 4 \Rightarrow x^2 - 5x + 4 = 0$ (General form)

Command	Screenshot
Converts 'Menu' to 'Equation/Function'. MENU ALPHA (−) 2 2	
Enter the coefficient of the equation. 1 = (−) 5 = 4 =	
Obtain the values of *x*. =	
=	

Let's Try!

Solve each of the following quadratic equations.

(a) $2x^2 - 9x + 10 = 0$

(b) $x(2 + 3x) = 16$

(c) $\frac{3x^2 - 2}{x} = 5$

Answer: (a) $x = \frac{5}{2}, x = 2$ **(b)** $x = 2, x = -\frac{8}{3}$ **(c)** $x = 2, x = -\frac{1}{3}$

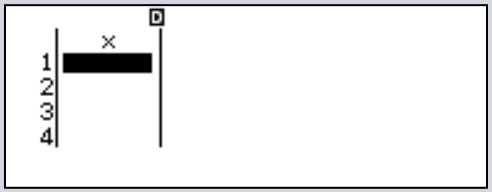
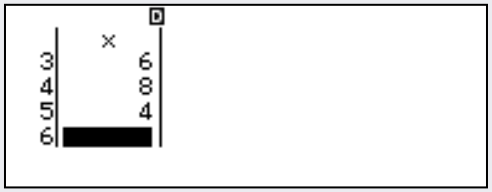
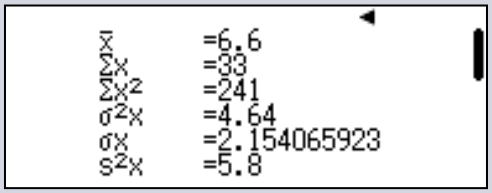
Statistics

To determine the mean of an ungrouped data

- **Example:**

  Find the mean, median and mode for a set data 5, 10, 6, 8 and 4.

- **Solution:**

Command	Screenshot
MENU 6 1	
Enter the data. 5 = 1 0 = 6 = 8 = 4 =	
Obtain the mean, median and mode of the data. OPTN 3	

To determine the mean of a grouped data (Without class interval)

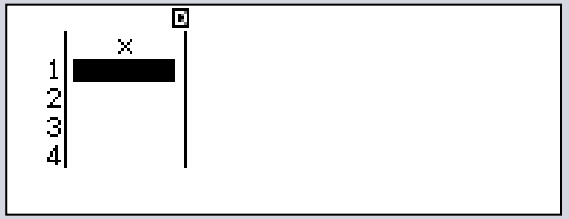
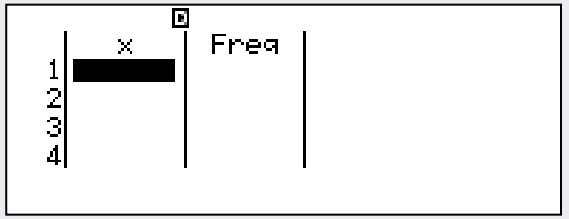
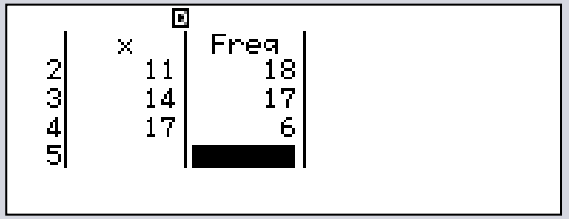
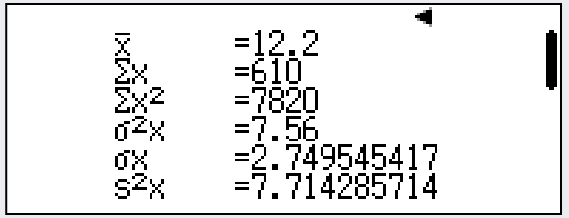
- Example:

  The frequency table below shows the marks for Mathematics test of 40 students.

Marks	Frequency
50	6
55	8
60	15
65	10
70	1

Calculate the mean mark.

Solution

Command	Screenshot
MENU 6 1	
Add column 'Frequency'. SHIFT MENU ▼ 3 1	
Enter the data. 5 0 = 5 5 = 6 0 = 6 5 = 7 0 = ▶ ▲ ▲ ▲ ▲ ▲ 6 = 8 = 1 5 = 1 0 = 1 =	
Find the mean, $\bar{x}$. OPTN 3	

To determine the mean of a grouped data (With class interval)

- Example:

  The frequency table below shows the heights of 50 seedlings.

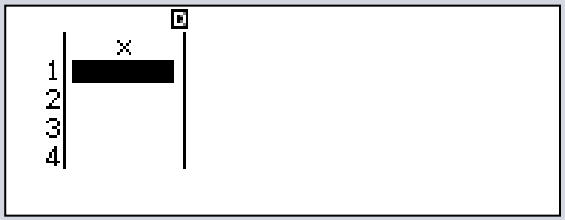
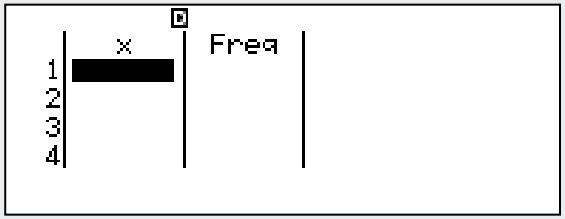
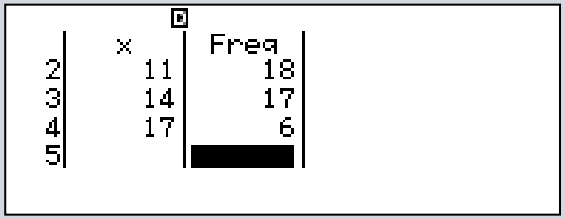
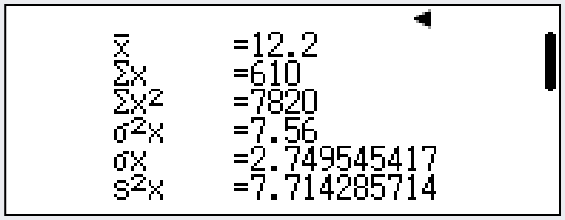
Height (cm)	Frequency
7 – 9	9
10 – 12	18
13 – 15	17
16 – 18	6

  Calculate the mean height, in cm, of a seedling.

Solution

- Add a column for midpoints.

Height (cm)	Frequency	Midpoint, *x*
7 – 9	9	8
10 – 12	18	11
13 – 15	17	14
16 – 18	6	17

Command	Screenshot
MENU 6 1	
Add column 'Frequency'. SHIFT MENU ▼ 3 1	
Enter the data. 8 = 1 1 = 1 4 = 1 7 = ▶ ▲ ▲ ▲ ▲ 9 = 1 8 = 1 7 = 6 =	
Find the mean, $\bar{x}$. OPTN 3	

Let' Try!

(a) The table below shows the points scored by 45 students in a Mathematics quiz.

Points	Frequency
5	7
10	8
15	14
20	10
25	6

Calculate the mean point.

Answer: (a) 15

(b) The table below shows the masses of a number of a number of boxes.

Mass (kg)	Frequency
10 – 19	2
20 – 29	4
30 – 39	10
40 – 49	8
50 – 59	6

Calculate the mean mass, in kg, of a box.

Answer: (a) 38.7

Trigonometry

To find the value of sin θ, cos θ and tan θ

- Example:

  Find the value for each of the following.

  (a) $\sin 56°$

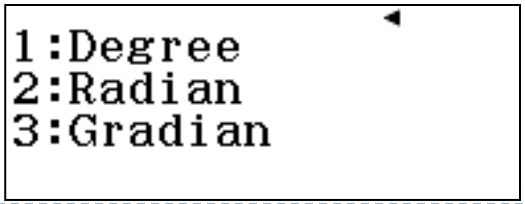
  (b) $\cos 88°$

  (c) $\tan 70°$

Solution

		Command	Screenshot
(a)	$\sin 56°$	sin 5 6) =	sin(56) 0.8290375726
(b)	$\cos 88°$	cos 8 8) =	cos(88) 0.0348994967
(c)	$\tan 70°$	tan 7 0) =	tan(70) 2.747477419

Note: To convert the unit of angle, press SHIFT MENU 2.



To find the value of θ ($\sin^{-1}\theta$, $\cos^{-1}\theta$ and $\tan^{-1}\theta$)

- Example:

  Find the value of θ for each of the following equations for $0 \leq \theta \leq 90°$.

  (a) $\sin\theta = \frac{3}{4}$

  (b) $\cos\theta = 0.561$

  (c) $\tan\theta = \frac{5}{12}$

Solution

		Command	Screenshot
(a)	$\sin\theta = \frac{3}{4}$ $\theta = \sin^{-1}\frac{3}{4}$	SHIFT sin ▼ 3 ▼ 4 ▶) =	$\sin^{-1}\left(\frac{3}{4}\right)$ 48.59037789
(b)	$\text{kos}\,\theta = 0.561$ $\theta = \text{kos}^{-1}\,0.561$	SHIFT cos 0 • 5 6 1) =	$\cos^{-1}(0.561)$ 55.87501735
(c)	$\tan\theta = \frac{5}{12}$ $\theta = \tan^{-1}\frac{5}{12}$	SHIFT tan ▼ 5 ▼ 1 2 ▶) =	$\tan^{-1}\left(\frac{5}{12}\right)$ 22.61986495

Number Bases

To convert a number in base two and eight to a number in base ten and vice versa

- Example:

  Express each of the following number to the base stated.

  (a) 1101_2 (Base ten)

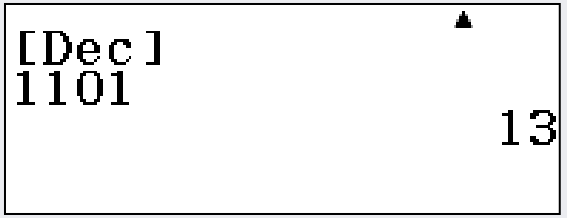
  (b) 467_8 (Base ten)

  (c) 482_{10} (Base two)

  (d) 786_{10} (Base eight)

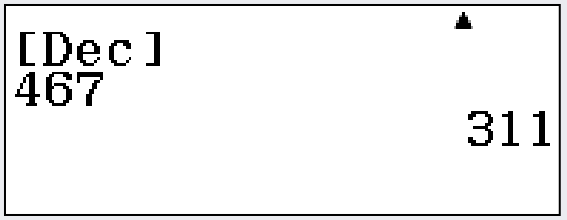
Solution

(a) 1101_2 (Base ten)

Command	Screenshot
Convert 'Menu' to 'Base-N'. MENU 3 log$_{\square}$	
Enter the value. 1 1 0 1 = x^2	

Answer: 13_{10}

(b) 467_8 (Base ten)

Command	Screenshot
Convert 'Menu' to 'Base-N'. MENU 3 In	
Enter the value. 4 6 7 = x^2	

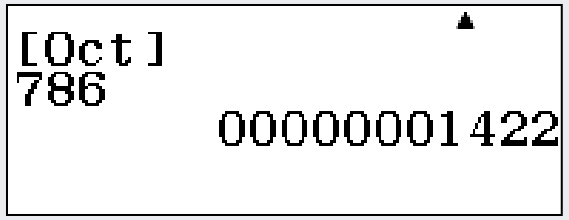
Answer: 311_{10}

(c) 482_{10} (Base two)

Command	Screenshot
Convert 'Menu' to 'Base-N'. MENU 3	[Dec]
Enter the value. 4 8 2 = log	[Bin] 482 0000 0000 0000 0000 0000 0001 1110 0010

Answer: 111100010_2

(d) 786_{10} (Base eight)

Command	Screenshot
Convert 'Menu' to 'Base-N'. MENU 3	
Enter the value. 7 8 6 = In	

Answer: 1422_8

Let' Try!

- Express each of the following number to the base stated.
  (a) 100101_2 (Base ten)
  (b) 667_8 (Base ten)
  (c) 19_{10} (Base two)
  (d) 653_{10} (Base eight)

Answer: **(a)** $\mathbf{37_{10}}$ **(b)** $\mathbf{439_{10}}$
(c) $\mathbf{10011_2}$ **(d)** $\mathbf{1215_8}$

Graphs of Functions

To complete the value table of a function

- Example:

(a) Complete the following table for the function

$y = -3x^2 + 4x + 20.$

x	–3	–2	–1	0	1	2	3	4
y								

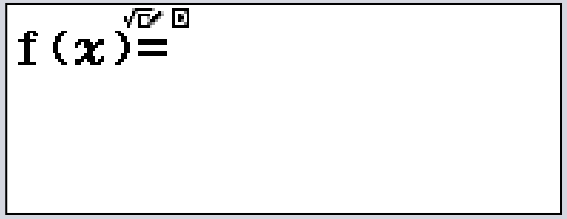
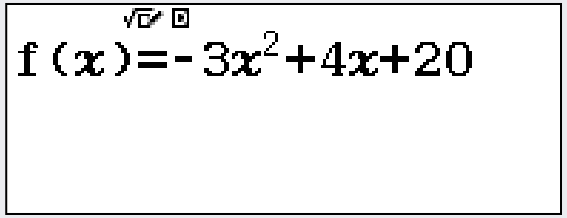
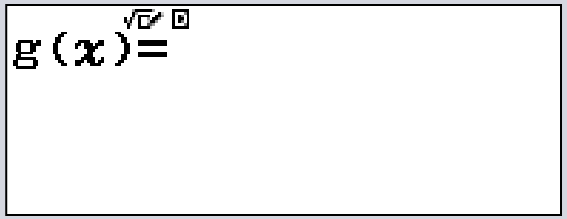
(b) Complete the following table for the function

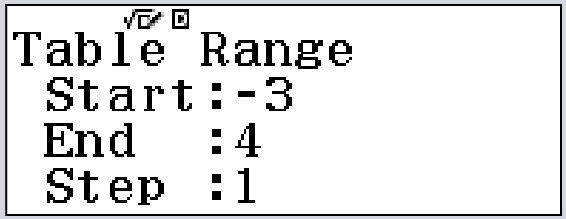
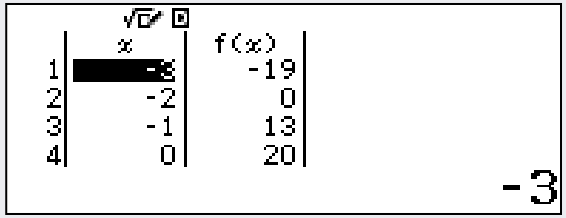
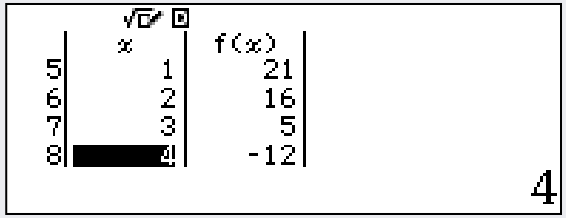
$y = -2x^3 + 10.$

x	–2	–1.5	–1	0	1	1.5	2
y							

Solution

(a) $y = -3x^2 + 4x + 20$

Command	Screenshot
Select 'Table' at 'Menu'. MENU 9	
Enter the function. (–) 3 x x^2 + 4 x + 2 0 =	
Omit the function of g(x). =	

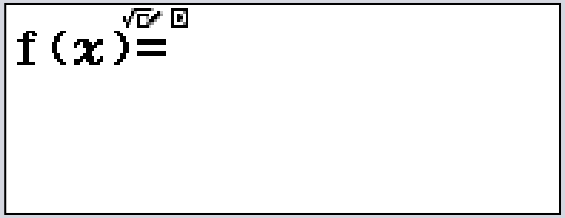
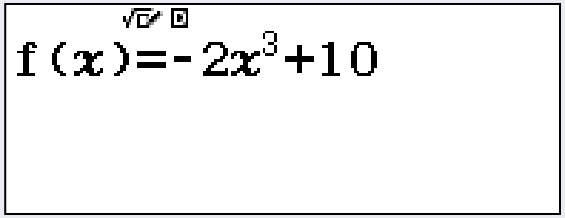
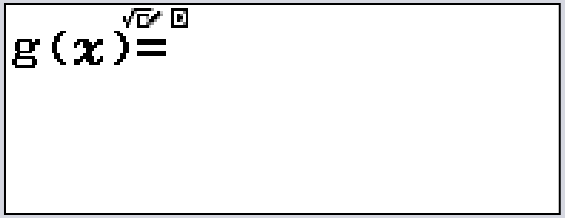
Command	Screenshot
Enter the range of the function. (–) 3 = 4 = 1 =	
Obtain the outcome. = ▼ ▼ ▼ ▼ ▼ ▼ ▼	 

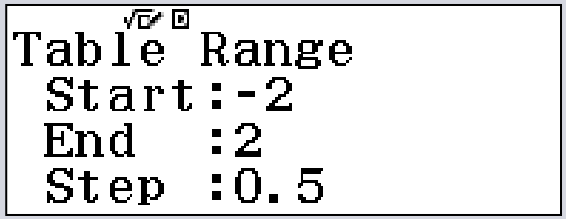
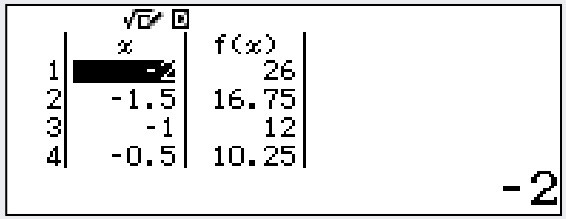
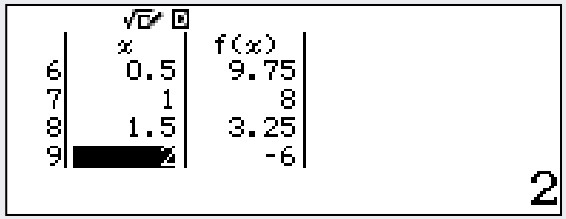
Answer:

x	–3	–2	–1	0	1	2	3	4
y	–19	0	13	20	21	16	5	–12

Solution

(b) $y = -2x^3 + 10$

Command	Screenshot
Select 'Table' at 'Menu'. MENU 9	
Enter the function. (–) 2 x SHIFT x^2 + 1 0 =	
Omit the function of g(x). =	

Command	Screenshot
Enter the range of the function. (–) 2 = 2 = 0 • 5 = =	
Obtain the outcome. = ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼	 

Answer:

x	–2	–1.5	–1	0	1	1.5	2
y	26	16.75	12	10	8	3.25	–6

Let's Try!

- Complete each of the following table based on the function stated.

(a) $y = -3x^2 + 2x + 12$

x	–3	–2	–1	0	1	2	3	4
y								

(b) $y = x^3 - 12x + 5$

x	–4	–3	–2	–1	0	1	2	3	4
y									

Answer: (a)

x	–3	–2	–1	0	1	2	3	4
y	–21	–4	7	12	11	4	–9	–28

(b)

x	–4	–3	–2	–1	0	1	2	3	4
y	–11	14	21	16	5	–6	–11	–4	21

Matrices

Addition and subtraction of matrices

- Example:

  Solve each of the following.

  (a) $5\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}-\begin{pmatrix}5 & 0\\ -5 & 2\end{pmatrix}=$

  A $\begin{pmatrix}0 & 10\\ 20 & 18\end{pmatrix}$ **C** $\begin{pmatrix}-4 & 2\\ 8 & 2\end{pmatrix}$

  B $\begin{pmatrix}0 & 10\\ 10 & 18\end{pmatrix}$ **D** $\begin{pmatrix}10 & 10\\ 10 & 22\end{pmatrix}$

  (b) $(7 \quad 4)-(-2 \quad 6)+\frac{1}{4}(12 \quad 4)=$

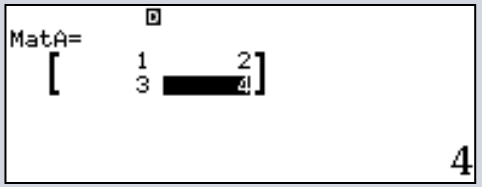
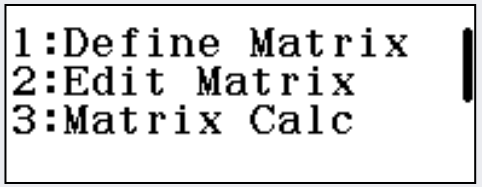
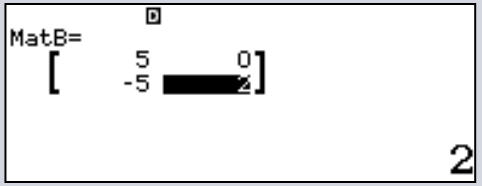
  A $(8 \quad 2)$ **C** $(12 \quad -1)$

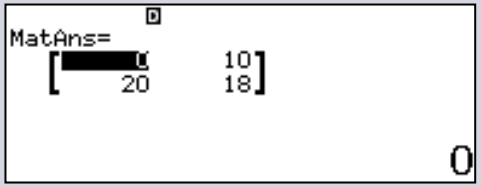
  B $(13 \quad 1)$ **D** $(21 \quad 2)$

Solution

(a) $5\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}-\begin{pmatrix}5 & 0\\ -5 & 2\end{pmatrix}=$

Command	Screenshot
Convert 'Menu' to 'Matrix'. MENU 4	Define Matrix 1:MatA 2:MatB 3:MatC 4:MatD
Choose 'MatA'. 1 State the number of rows and columns. 2	MatA Number of Rows? Select 1~4
2	MatA Number of Columns? Select 1~4

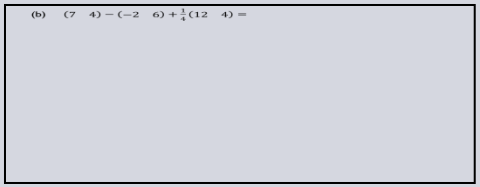
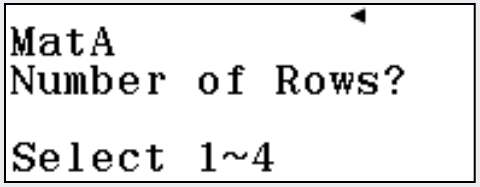
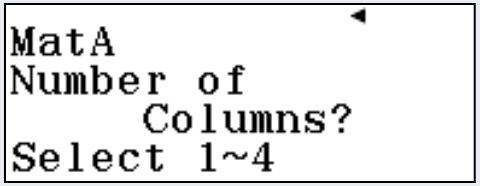
Command	Screenshot
Enter the coefficients into 'MatA'. [1] [=] [2] [=] [3] [=] [4] [=]	
To define a new matrix, which is 'MatB, press [OPTN] [1] [2]	
State the number of rows and columns. [2] [2] Enter the coefficients into 'MatB'. [5] [=] [0] [=] [(–)] [5] [=] [2] [=]	

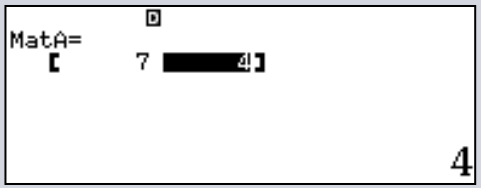
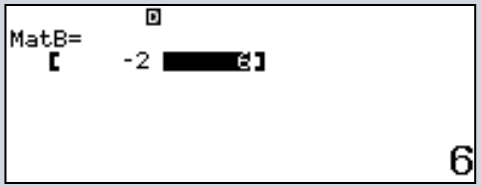
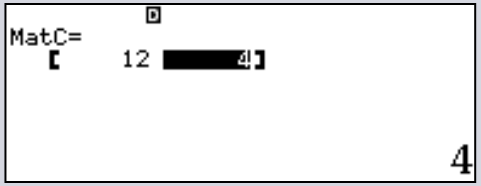
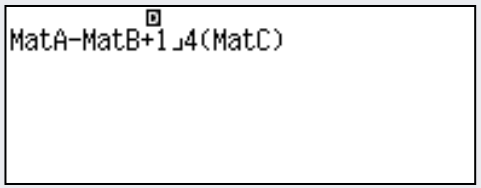
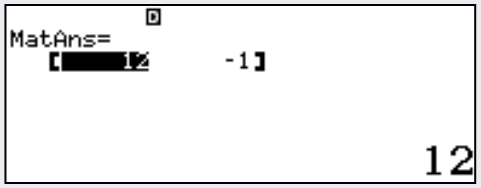
Command	Screenshot
Solve the operation. OPTN 3 5 OPTN 3 − OPTN 4 =	

Answer: B

Solution

(b) $(7 \quad 4) - (-2 \quad 6) + \frac{1}{4}(12 \quad 4) =$

Command	Screenshot
Convert 'Menu' to 'Matrix'. MENU 4	
Choose 'MatA'. 1 State the number of rows and columns. 1 2	 

Command	Screenshot
Enter the coefficients: 'MatA'. 7 = 4 = 'MatB' OPTN 1 2 1 2 (−) 2 = 6 = 'MatC' OPTN 1 3 1 2 1 2 = 4 =	  
Solve the operation. OPTN 3 OPTN 3 − OPTN 4 + 1 ▣ 4 (OPTN 5) =	 

Answer: C

Multiplication of two matrices

- Example:

(a) $\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}\begin{pmatrix} -2 \\ 5 \end{pmatrix} =$

A $\begin{pmatrix} 1 \\ 7 \end{pmatrix}$ **C** $\begin{pmatrix} -4 & -2 \\ -8 & 15 \end{pmatrix}$

B $\begin{pmatrix} 9 \\ 23 \end{pmatrix}$ **D** $\begin{pmatrix} -4 & -8 \\ 1 & 15 \end{pmatrix}$

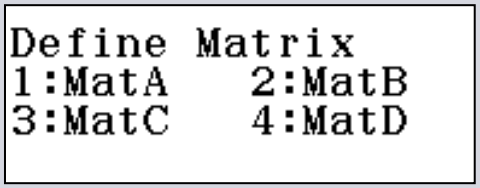
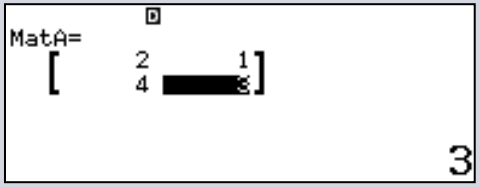
(b) $\begin{pmatrix} 1 \\ 3 \end{pmatrix}(2 \quad -1) =$

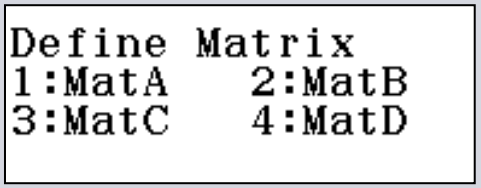
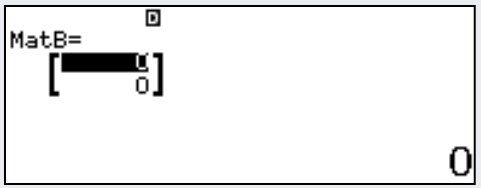
A (-1) **C** $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$

B $(2 \quad -3)$ **D** $\begin{pmatrix} 2 & -1 \\ 6 & -3 \end{pmatrix}$

Solution

(a) $\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}\begin{pmatrix} -2 \\ 5 \end{pmatrix} =$

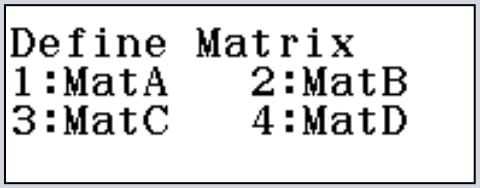
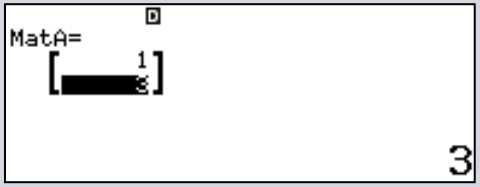
Command	Screenshot
Convert 'Menu' to 'Matrix'. MENU 4	
Choose 'MatA' and state the number of rows and columns. 1 2 2	
Enter the coefficients in 'MatA'. 2 = 1 = 4 = 3 =	

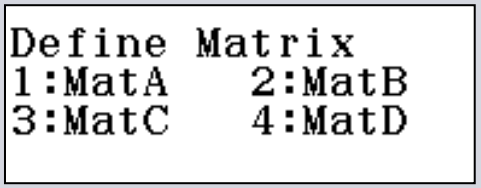
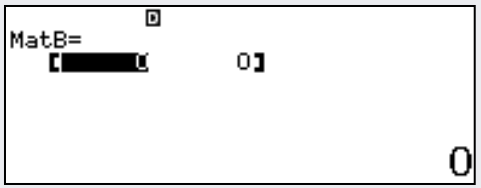
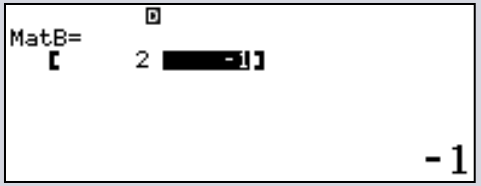
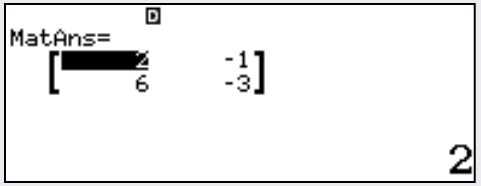
Command	Screenshot
Define new matrix as 'MatB'. OPTN 1 2	
State the number of rows and columns. 2 1	
Enter the coefficients in 'MatB'. (–) 2 = 5 =	
Solve the operation. OPTN 3 OPTN 3 × OPTN 4 =	

Answer: A

Solution

(b) $\begin{pmatrix}1\\3\end{pmatrix}(2 \quad -1) =$

Command	Screenshot
Convert 'Menu' to 'Matrix'. MENU 4	
Choose 'MatA' and state the number of rows and columns. 1 2 1	
Enter the coefficients in 'MatA'. 1 = 3 =	

Command	Screenshot
Define a new matrix as 'MatB'. OPTN 1 2	
State the number of rows and columns. 1 2	
Enter the coefficients in 'MatB'. 2 = (–) 1 =	
Solve the operation. OPTN 3 OPTN 3 × OPTN 4 =	

Answer: D

Let's Try!

- Solve each of the following.

(a) $2(1 \quad -4) + \frac{2}{3}(-12 \quad 3) =$

A $(-11 \quad -1)$ **C** $(-6 \quad -6)$

B $(-10 \quad -5)$ **D** $(-7 \quad -3)$

(b) $(-2 \quad 4)\begin{pmatrix} 6 & -3 \\ 1 & -5 \end{pmatrix} =$

A $(16 \quad -26)$ **C** $(-8 \quad -26)$

B $(-8 \quad -14)$ **D** $(-16 \quad -26)$

Answer: (a) C **(b) B**

Inverse matrices

- Example:

(a) Given that $\begin{pmatrix} -2 & 1 \\ 7 & -4 \end{pmatrix}\mathbf{P} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, find the matrix **P**.

A $\begin{pmatrix} -4 & -1 \\ -7 & -2 \end{pmatrix}$

B $\begin{pmatrix} -2 & 1 \\ 7 & -4 \end{pmatrix}$

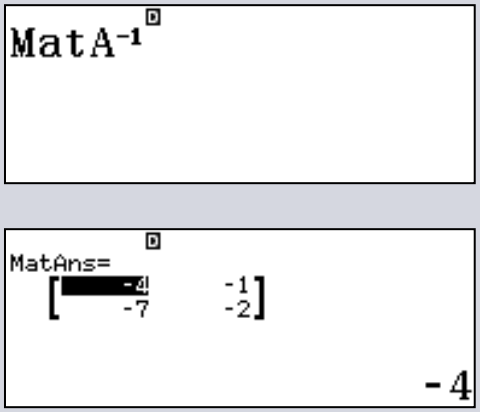
C $\begin{pmatrix} 2 & 1 \\ 7 & 4 \end{pmatrix}$

D $\begin{pmatrix} -1 & -\frac{1}{2} \\ -\frac{7}{2} & -2 \end{pmatrix}$

Solution

(a) $\mathbf{P} = \begin{pmatrix} -2 & 1 \\ 7 & -4 \end{pmatrix}^{-1}$

Command	Screenshot
Convert 'Menu' to 'Matrix'. MENU 4	Define Matrix 1:MatA 2:MatB 3:MatC 4:MatD
Choose 'MatA' and state the number of rows and columns. 1 2 2	MatA= [0 0 0 0] 0
Enter the coefficients in 'MatA'. (–) 2 = 1 = 7 = (–) 4 =	MatA= [-2 1 7 -4] -4

Command	Screenshot
Find the inverse matrix of **P**. OPTN 3 OPTN 3 x^{-1} =	

Answer: A

- Example:

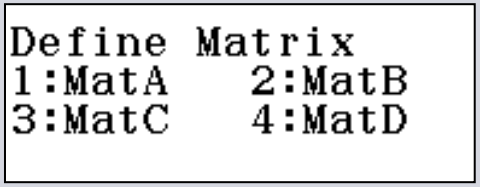
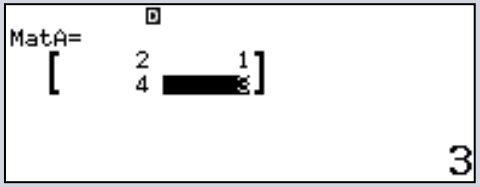
(b) (i) Find the inverse matrix of $\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$.

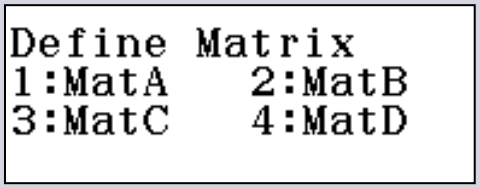
(ii) Hence, calculate the values of x and y that satisfies the following matrix equation:

$$\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$$

Solution

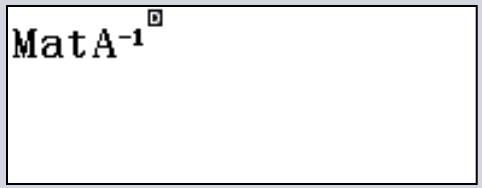
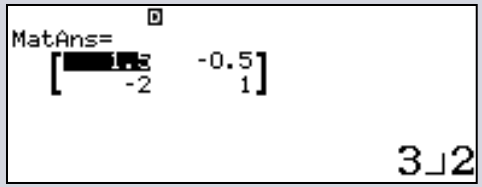
Define $\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$ as 'MatA' and $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$ as 'MatB'.

Command	Screenshot
Convert 'Menu' to 'Matrix'. MENU 4	
Choose 'MatA' and state the number of rows and columns. 1 2 2	
Enter the coefficients in 'MatA'. 2 = 1 = 4 = 3 =	

Command	Screenshot
Define a new matrix as 'MatB'. OPTN 1 2	
State the number of rows and columns. 2 1	
Enter the coefficients in MatB'. 3 = 5 =	

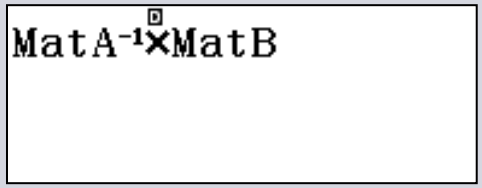
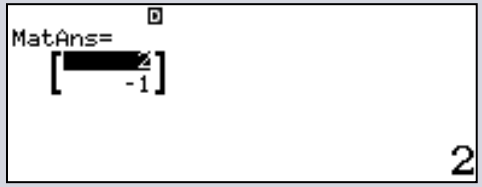
Solution

(i) Find $\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}^{-1}$.

Command	Screenshot
OPTN 3 OPTN 3 x^{-1}	
=	

Answer: $\begin{pmatrix} \frac{3}{2} & -\frac{1}{2} \\ -2 & 1 \end{pmatrix}$ or $\frac{1}{2}\begin{pmatrix} 3 & -1 \\ -4 & 2 \end{pmatrix}$

(ii) $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}^{-1} \begin{pmatrix} 3 \\ 5 \end{pmatrix}$

Command	Screenshot
OPTN 3 x^{-1} ✕ OPTN 4	
=	

Answer: $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$. Thus, $x = 2$ and $y = -1$.

Let's Try!

(a) Given that $\begin{pmatrix} 3 & 1 \\ -4 & 2 \end{pmatrix} - \mathbf{A} = \begin{pmatrix} -4 & 2 \\ -3 & 1 \end{pmatrix}$, find the matrix **A**.

A $\begin{pmatrix} -7 & 1 \\ 1 & -1 \end{pmatrix}$

B $\begin{pmatrix} 7 & -1 \\ -1 & 1 \end{pmatrix}$

C $\begin{pmatrix} 1 & 3 \\ -7 & 3 \end{pmatrix}$

D $\begin{pmatrix} 1 & -3 \\ 7 & -3 \end{pmatrix}$

(b) Given that $\mathbf{B} = \begin{pmatrix} 2 & -1 \\ 3 & 0 \end{pmatrix}$, find the matrix $\mathbf{B}^2$.

A $\begin{pmatrix} 4 & 1 \\ 9 & 0 \end{pmatrix}$

B $\begin{pmatrix} 1 & -2 \\ 6 & -3 \end{pmatrix}$

C $\begin{pmatrix} 1 & 6 \\ 1 & 6 \end{pmatrix}$

D $\begin{pmatrix} 4 & -2 \\ 6 & 0 \end{pmatrix}$

Answer: (a) B **(b) B**

(c) Find the values of x and y in the following equation:

$$\begin{pmatrix} 1 & -1 \\ 3 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$$

A $x = 1; y = 2$ **C** $x = 3; y = 0$

B $x = -2; y = -5$ **D** $x = 3; y = -1$

(d) The inverse function of $\begin{pmatrix} 2 & -2 \\ 4 & -3 \end{pmatrix}$ is $\begin{pmatrix} q & 1 \\ -2 & p \end{pmatrix}$.

(i) Find the values of p and q.

(ii) Hence, by using the matrix method, find the values of x and y that satisfies the following simultaneous linear equations:

$$2x - 2y = 10$$
$$4x - 3y = 19$$

Answer: (c) B

(d) (i) $p = 1, q = -1.5$
(ii) $x = 4, y = -1$

Quadratic Functions

To determine the minimum/maximum point

- Example:

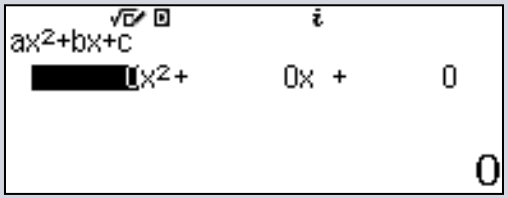
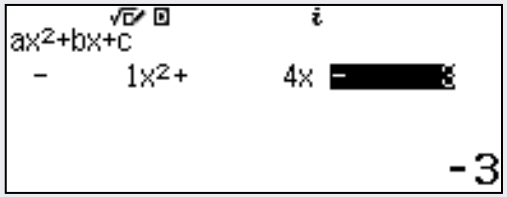
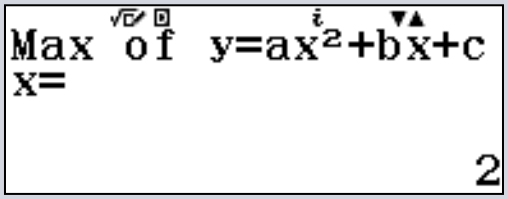
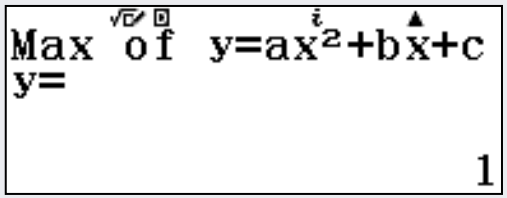
  A quadratic function of $f(x) = -x^2 + 4x - 3$ can be expressed into a form of $f(x) = a(x - h)^2 + k$, where *a*, *h* and *k* are constants.

  (a) Find the values of *a*, *h* and *k*.

  (b) State the maximum point of the graph of f(x).

  (c) Sketch the graph of *f*(*x*).

Solution

Command	Screenshot
Convert 'Menu' as 'Equation/Function'. MENU ALPHA (–) 2 2	
Enter the value of the coefficients. (–) 1 = 4 = (–) 3 =	
Obtains the value of *x* for the maximum point. = = =	
Obtains the value of *y* for the maximum point. =	

Thus, the values of x and y for the maximum point:

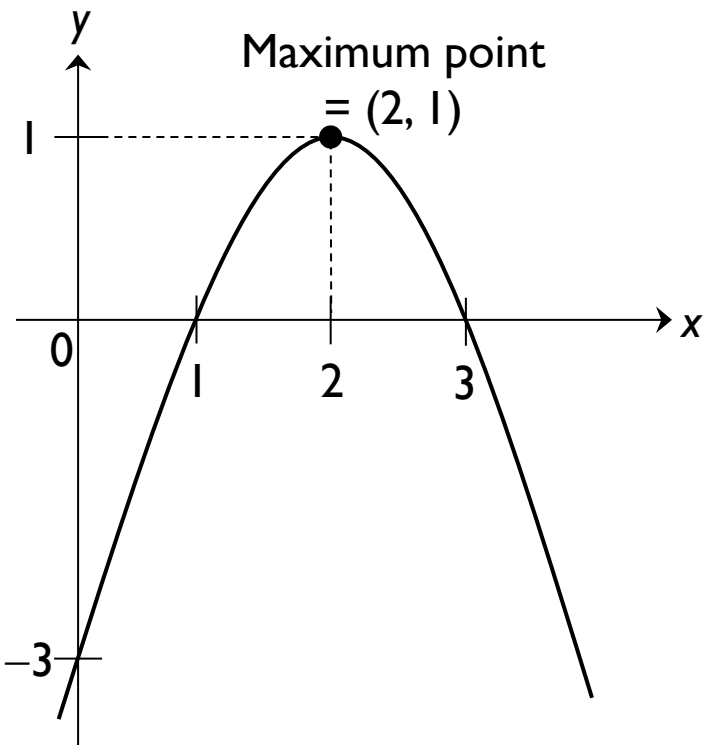
$x = 2$ and $y = 1$

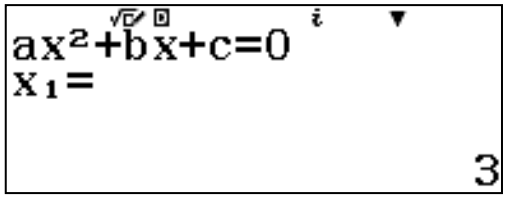
(a) $\therefore f(x) = -(x-2)^2 + 1$

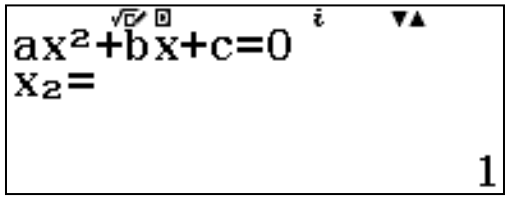
$a = -1, h = -2, k = 1$

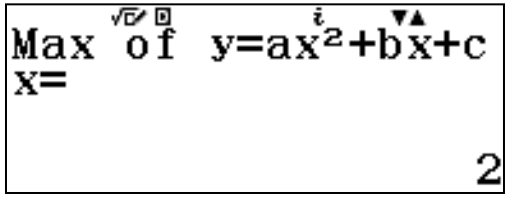
(b) Maximum point = (2, 1)

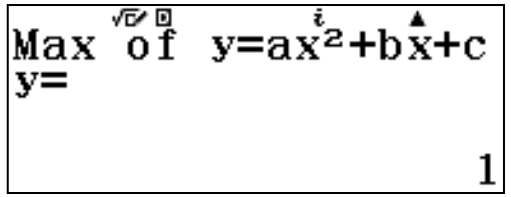
(c)


y
Maximum point
= (2, 1)
1
0
1
2
3
x
−3


ax²+bx+c=0
x₁=
3


ax²+bx+c=0
x₂=
1


Max of y=ax²+bx+c
x=
2


Max of y=ax²+bx+c
y=
1

To find a range of a quadratic inequality

- Example:
  (a) Find the range of x for $2x^2 + 5x \leq 3$.
  (b) Find the range of x for $x(x + 3) > 10$.

Solution:

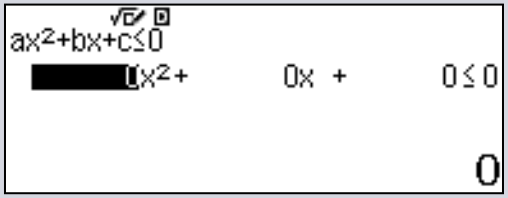
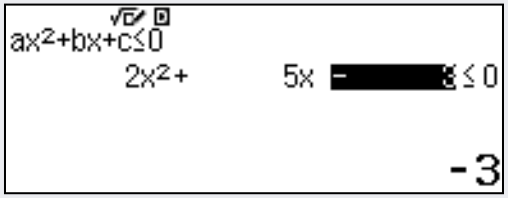
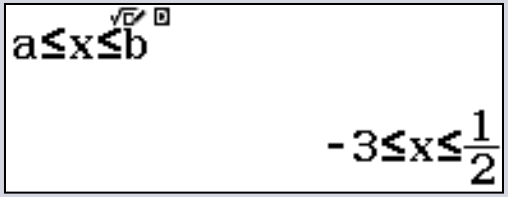
(a) $2x^2 + 5x \leq 3$

1. Converts the inequality into the form of $ax^2 + bx + c \leq 0$.

$$2x^2 + 5x \leq 3$$

$$2x^2 + 5x - 3 \leq 0$$

2. Enter the coefficients of *a*, *b* and *c*.

Command	Screenshot
Converts 'Menu' as 'Inequality'. MENU ▪,,, 2 4	
Enter the value of the coefficients. 2 = 5 = (−) 3 =	
Find the range of *x*. =	

Thus, the range of *x*:

$$-3 \leq x \leq \frac{1}{2}$$

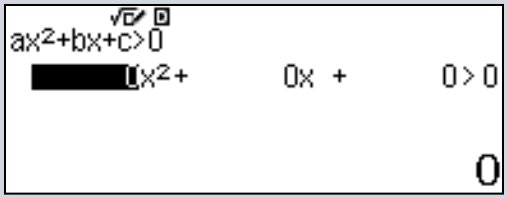
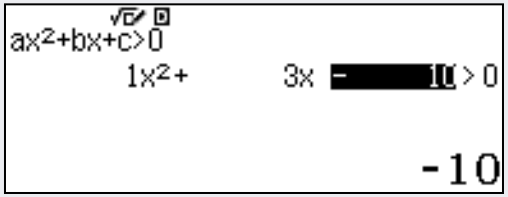
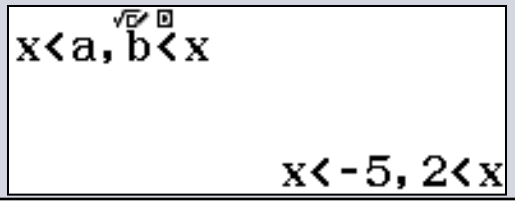
Solution:

(b) $x(x+3) > 10$

1. Converts the inequality into the form of $ax^2 + bx + c > 0$.

$$x(x+3) > 10$$
$$x^2 + 3x - 10 > 0$$

2. Enter the coefficients of *a*, *b* and *c*.

Command	Screenshot
Converts 'Menu' as 'Inequality'. MENU ◦,,, 2 1	
Enter the value of the coefficients. 1 = 3 = (–) 1 0 =	
Find the range of *x*. =	

Thus, the range of *x*:

$x < -5$ and $x > 2$

Let's Try!

(a) A quadratic function of $f(x) = 2x^2 + 20x + 47$ can be expressed into a form of $f(x) = a(x - h)^2 + k$, where *a*, *h* and *k* are constants.

(i) Find the values of *a*, *h* and *k*.

(ii) State the minimum value of the graph *f*(*x*).

(iii) Find the equation of symmetry axis for *f*(*x*).

Answer: (a) (i) $a = 2, h = 5, k = -3$
(ii) –3
(iii) $x = 5$

(b) Find the range of x for

$3x^2 - 5x - 16 \geq x(2x + 1)$.

(c) Given $f(x) = -3x^2 + 2x + 13$, find the range of x for $f(x) < 5$.

Answer: (b) $x \leq -2$, $x \geq 8$ **(c) $x < -\frac{4}{3}, x > 2$**

Equation System

Simultaneous Linear Equations in Three Variables

- Example:

  Solve the following simultaneous linear equations.

  (a) $2x + 5y + 2z = -38$

  $3x - 2y + 4z = 17$

  $-6x + y - 7z = -12$

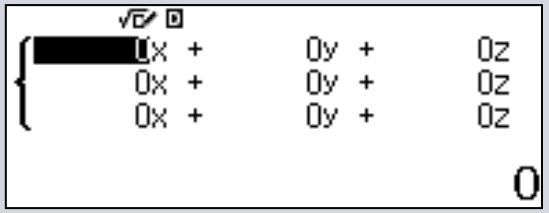
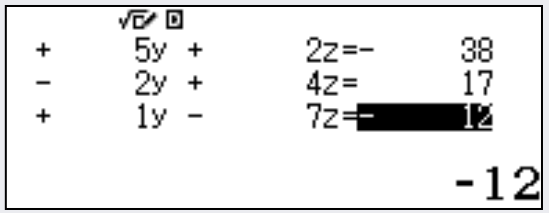
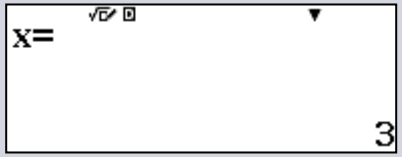
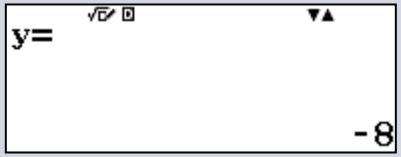
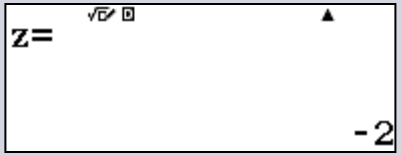
  (b) $3x - 9z = 33$

  $7x - 4y - z = -15$

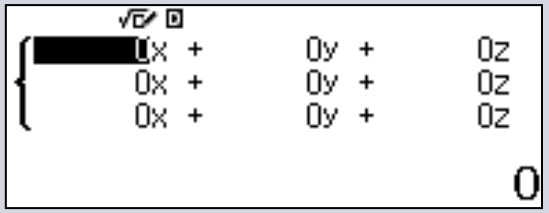
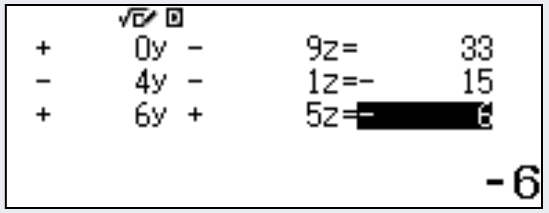
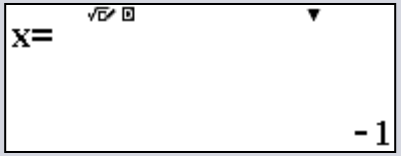
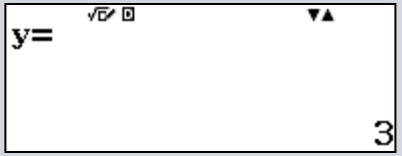
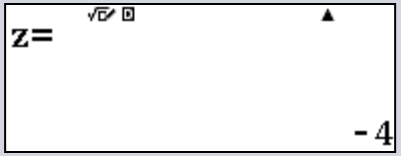
  $4x + 6y + 5z = -6$

Solution

(a)

Command	Screenshot
Converts 'Menu' to 'Equation/Function'. MENU (–) 1 3	
Enter the coefficient of the equations. 2 = 5 = 2 = (–) 3 8 = 3 = (–) 2 = 4 = 1 7 = (–) 6 = 1 = (–) 7 = (–) 1 2 =	
Obtain the values of *x* and *y*. = = =	  

(b)

Command	Screenshot
Converts 'Menu' to 'Equation/Function'. MENU (–) 1 3	
Enter the coefficient of the equations. 3 = 0 = (–) 9 = 3 3 = 7 = (–) 4 = (–) 1 = (–) 1 5 = 4 = 6 = 5 = (–) 6 =	
Obtain the values of *x* and *y*. = = =	  

Simultaneous Equations (Involving a linear equation and a non-linear equation)

Solving Simultaneous Equations in Two Unknowns

- **Example:**

  Solve the following simultaneous equations:

$$3x + y = 1$$
$$5x^2 + y^2 + 4xy - 5 = 0$$

- **Solution:**

1. Choose an equation with 1 as the highest power of variables.
2. Choose any variable as subject.

$$y = 1 - 3x$$

3. Substitute y into $5x^2 + y^2 + 4xy - 5 = 0$.

Command	Screenshot
5 x x^2 + (1 − 3 x) x^2 + 4 x (1 − 3 x) − 5 ALPHA CALC 0	$5x^2+(1-3x)^2+4x(1-3x)-5=0$
Obtain the value of x when its positive infinity (Key-in "1000".) SHIFT CALC 1 0 0 0 = =	$5x^2+(1-3x)^2+4x(1-\triangleright$ $x=$ 2 L−R= 0
Obtain the value of x when its negative infinity (Key-in "−1000".) = (−) 1 0 0 0 = =	$5x^2+(1-3x)^2+4x(1-\triangleright$ $x=$ -1 L−R= 0

Thus, $x = 2$ and $x = -1$.

To obtain the value of y, substitute the values of x into one of the equations.

When $x = 2$,

$$3(2) + y = 1$$
$$6 + y = 1$$
$$y = -5$$

When $x = -1$,

$$3(-1) + y = 1$$
$$-3 + y = 1$$
$$y = 4$$

Answer:

$x = 2, y = -5$

$x = -1, y = 4$

Let's Try

(a) Solve the following simultaneous equations:

$$y - 2x + 1 = 0$$
$$4x^2 + 3y^2 - 2xy = 7$$

(b) Solve the following simultaneous equations:

$$x - 3y = 1$$
$$x^2 + 3xy + 9y^2 = 7$$

Answer: (a) $x = 1.129, y = 1.258$ and $x = -0.295, y = -1.590$

(b) $x = 2, y = \frac{1}{3}$ and $x = -1, y = -\frac{2}{3}$

Indices, Surds and Logarithms

Finding logarithm values using a calculator

- Example:

  Solve for each of the following by using a calculator.

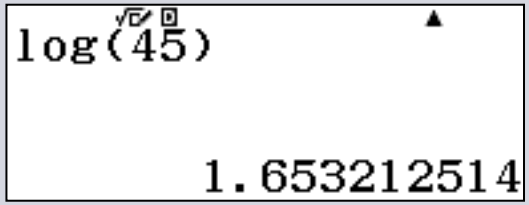
  (a) $\log_{10} 45$

  (b) $\log_9 27$

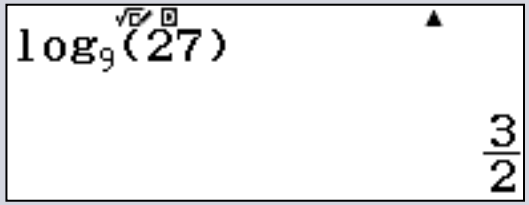
  (c) $\log_3 \frac{7}{9} - \log_3 \frac{35}{81} + \log_3 \frac{5}{27}$

Solution

(a) $\log_{10} 45$

Command	Screenshot
SHIFT (−) 4 5) =	

(b) $\log_9 27$

Command	Screenshot
log▪□ 9 ▶ 2 7 =	

(c) $\log_3 \frac{7}{9} - \log_3 \frac{35}{81} + \log_3 \frac{5}{27}$

Command	Screenshot
log 3 ▶ 7 ▼ 9 ▶ ▶ − log 3 ▶ 3 5 ▼ 8 1 ▶ ▶ + log 3 ▶ 5 ▼ 2 7 =	$\log_3\left(\frac{7}{9}\right)-\log_3\left(\frac{35}{81}\right)$ -1

Let's Try!

Solve for each of the following by using a calculator.

(a) $2\log_{10} 80 - \log_{10} 30$

(b) $\log_2 \frac{1}{7}$

(c) $\log_2 3 \times \log_3 4 \times \log_4 8$

Answer: (a) 2.3291 (b) –2.8074 (c) 3

To solve an equation involving indices and logarithms

- Example:

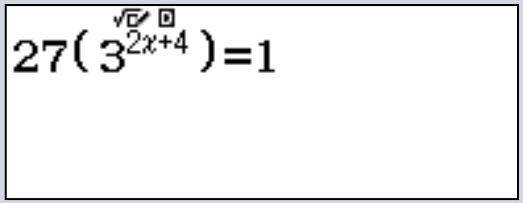
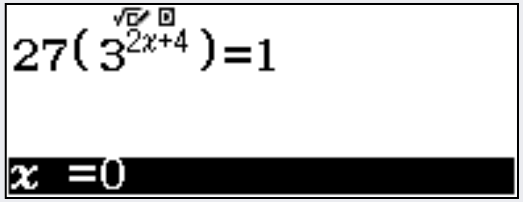
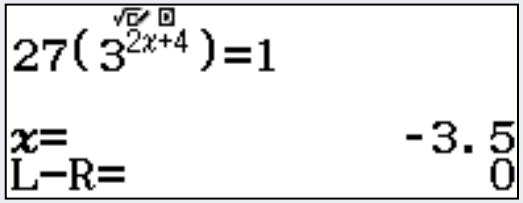
Solve the following equations.

(a) $27(3^{2x+4}) = 1$

(b) $\log_3 2 + \log_3(x-4) = 1$

Solution

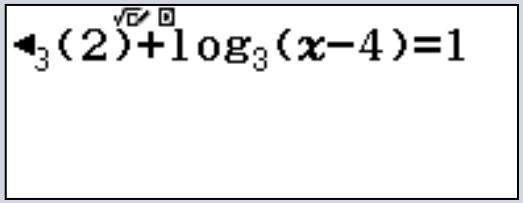
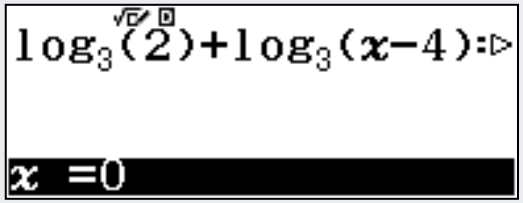
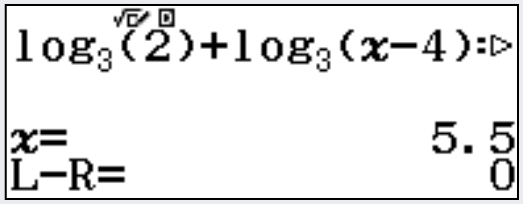
(a) $27(3^{2x+4}) = 1$

Command	Screenshot
Key-in the equation. 2 7 (3 $x^{\blacksquare}$ 2 x + 4 ▶) ALPHA CALC 1	
To obtain the value of x. SHIFT CALC	
=	

Answer: $x = -3.5 / -\frac{7}{2}$

Solution

(b) $\log_3 2 + \log_3(x-4) = 1$

Command	Screenshot
Key-in the equation. log 3 ▶ 2 ▶ + log 3 ▶ x − 4 ▶ ALPHA CALC 1	
To obtain the value of *x*. SHIFT CALC	
=	

Answer: x = 5.5 / $\frac{11}{2}$

Let's Try

Solve the following equations.

(a) $2^{3x} = 8 + 2^{3x-1}$

(b) $\log_3(2x - 5) = \log_{27}(x + 1)^3$

Answer: (a) x = 1.3333 / $\frac{4}{3}$ (b) x = 6

To simplify an expression involving surds.

- Example:

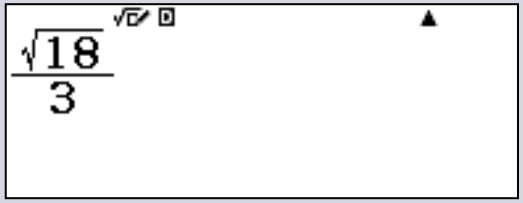
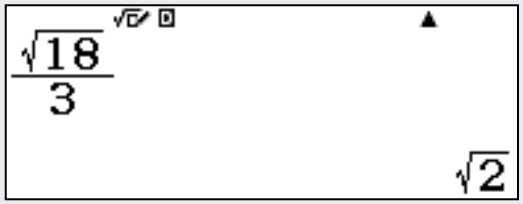
  Simplify for each of the following.

  (a) $\frac{\sqrt{18}}{3}$

  (b) $\frac{1}{7\sqrt{2}+5\sqrt{3}}$

Solution

(a) $\dfrac{\sqrt{18}}{3}$

Command	Screenshot
Key-in the expression. [▤] [√■] [1] [8] [▶] [▶] [3]	
To obtain the value of *x*. [=]	

Answer: $\sqrt{2}$

Solution

(b) $\dfrac{1}{7\sqrt{2}+5\sqrt{3}}$

Command	Screenshot
Key-in the expression. [▭] [1] [▶] [7] [√■] [2] [▶] [+] [5] [√■] [3]	$\dfrac{1}{7\sqrt{2}+5\sqrt{3}}$
To obtain the value of *x*. [=]	$\dfrac{1}{7\sqrt{2}+5\sqrt{3}}$ $\quad \dfrac{-5\sqrt{3}+7\sqrt{2}}{23}$

Answer: $\dfrac{-5\sqrt{3}+7\sqrt{2}}{23}$

Let's Try

Solve the following expressions.

(a) $\sqrt{18} - \sqrt{8}$

(b) $\frac{1}{5\sqrt{3}}$

Answer: (a) $\sqrt{2}$ **(b)** $\frac{\sqrt{3}}{15}$

Differentiation

To find the gradient of the tangent to a curve

- Example:

  (a) The point $P(1, -5)$ lies on the curve $y = 3x^2 - 8x$. Find the gradient of the tangent to the curve at point P.

  (b) Given the equation of a curve is:

$$y = x^2(3 - x) + \frac{1}{2}$$

  The curve passes through the point $A(-1, 3)$. Find the gradient of the curve at A.

Solution

(a) $y = 3x^2 - 8x, P(1, -5)$

Command	Screenshot
SHIFT ∫	$\frac{d}{dx}(\square)\Big\|_{x=\square}$
Enter the function of the curve and the value of x. 3 x x^2 − 8 x ▶ 1	$\frac{d}{dx}(3x^2-8x)\Big\|_{x=1}$
Obtain the gradient of the curve. =	$\frac{d}{dx}(3x^2-8x)\Big\|_{x=1}$ -2

Answer: −2

(b) $y = x^2(3 - x) + \frac{1}{2}, A(-1, 3)$

Command	Screenshot
SHIFT $\int$	$\frac{d}{dx}(\square)\Big\|_{x=\square}$
Enter the function of the curve and the value of x. x x^2 (3 − x) + 1 ▼ 2 ▶ ▶ (−) 1	$\frac{d}{dx}\left(x^2(3-x)+\frac{1}{2}\right)\Big\|_{x=-1}$
Obtain the gradient of the curve. =	$\frac{d}{dx}\left(x^2(3-x)+\frac{1}{2}\right)\Big\|_{x=-1}$ -9

Answer: −9

Let's Try

- Solve each of the following.

(a) It is given the equation of the curve is $y = 2x(1 - x)^4$ and the curve passes through $P(2, 4)$. Find the gradient of the curve at point P.

(b) The curve $y = x^3 - 6x^2 + 9x + 1$ passes through the point $A(2, 3)$. Find the gradient of the curve at A.

Answer: (a) 18 (b) –3

Integration

To determine a value of finite integration

- Example:

  Solve each of the following.

  (a) $\int_1^2 2x \ dx$

  (b) $\int_1^2 (3x-2)^2 \ dx$

  (c) $\int_4^5 \frac{10}{(x-3)^2} \ dx$

  (d) $\int_0^1 6(x+2)^{-3} \ dx$

Solution

(a) $\int_1^2 2x \ dx$

Command	Screenshot
∫ 2 x ▲ 2 ▼ 1 =	$\int_1^2 2x\,dx$ = 3

Answer: 3

(b) $\int_1^2 (3x-2)^2 \ dx$

Command	Screenshot
∫ (3 x − 2) x^2 ▲ 2 ▼ 1 =	$\int_1^2 (3x-2)^2\,dx$ = 7

Answer: 7

(c) $\int_4^5 \frac{10}{(x-3)^2}\,dx$

Command	Screenshot
∫ ▭ 1 0 ▼ (x − 3) x² ▲ ▲ 5 ▼ 4 =	$\int_4^5 \frac{10}{(x-3)^2}\,dx$ = 5

Answer: 3

(d) $\int_0^1 6(x+2)^{-3}\,dx$

Command	Screenshot
∫ 6 (x + 2) $x^{\blacksquare}$ (−) 3 ▲ 1 ▼ 0 =	$\int_0^1 6(x+2)^{-3}\,dx$ = $\frac{5}{12}$

Answer: $\frac{5}{12}$

Let's Try!

- Solve each of the following.

(a) $\int_0^3 4x^3 \ dx$

(b) $\int_1^3 (4x - 3x^2) \ dx$

(c) $\int_0^1 16(2 + 4x)^3 \ dx$

(d) $\int_2^3 \frac{24}{(3x-5)^3} \ dx$

Answer: (a) 81 **(b) −10**

(c) 1 280 **(d) $\frac{15}{4}$**

Linear Law

To determine the y-intercept and the gradient of a graph

- Example:

Two variables, x and y are related by the equation $\frac{x}{y} = k + hx$, where k and h are constants. A set of data x and y was obtained and shown in table below.

x	0.80	1.00	1.25	2.00	2.50	5.00
y	0.36	0.45	0.59	1.04	1.43	5.00

(a) Based on the table above, construct a table for the values of $\frac{1}{x}$ and $\frac{1}{y}$.

(b) Plot $\frac{1}{y}$ against $\frac{1}{x}$, using a scale of 2 cm to 0.2 unit on the $\frac{1}{x}$-axis and 2 cm to 0.5 unit on the $\frac{1}{y}$-axis. Hence, draw the line of best fit.

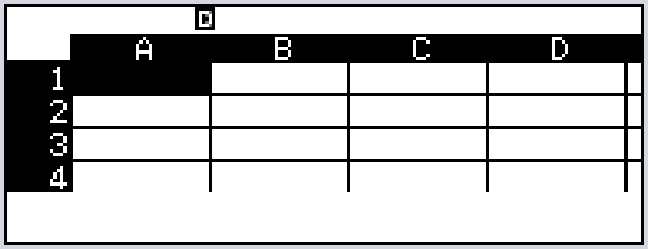
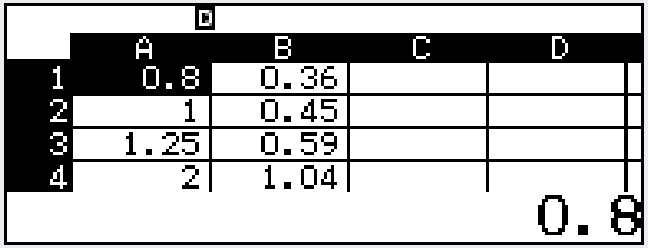
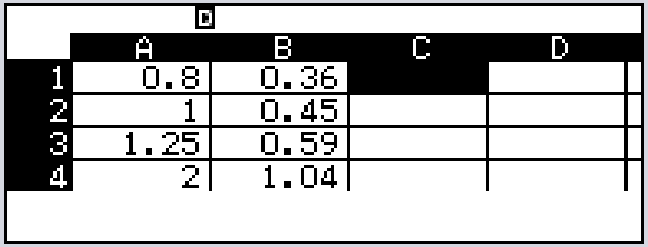
(c) Use the graph in (b) to find the value of

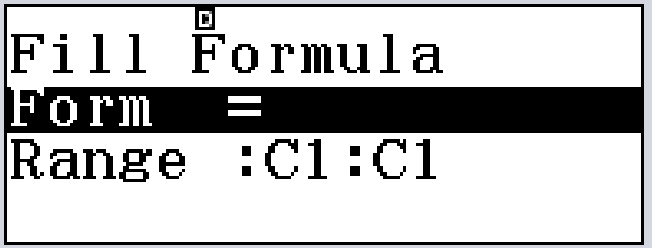
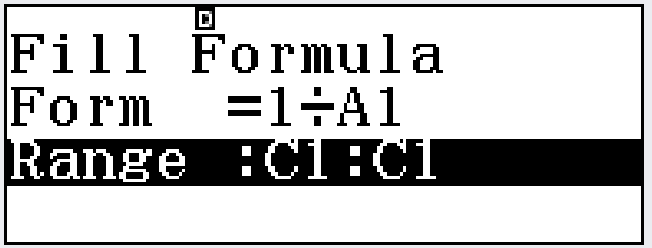
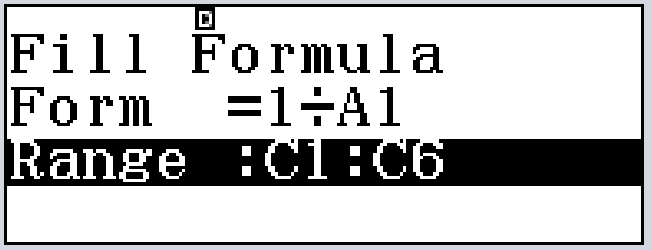
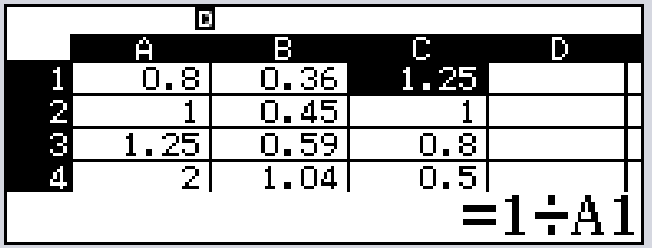
(i) h,

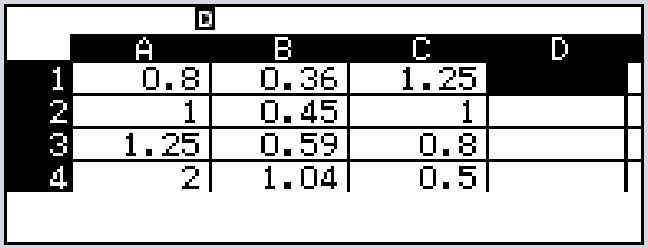
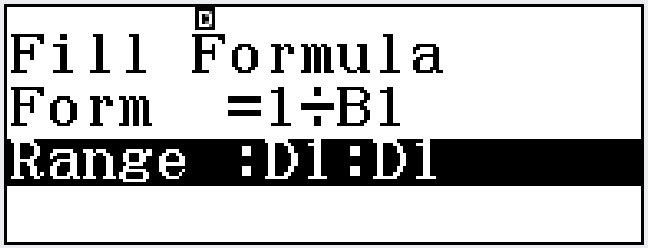
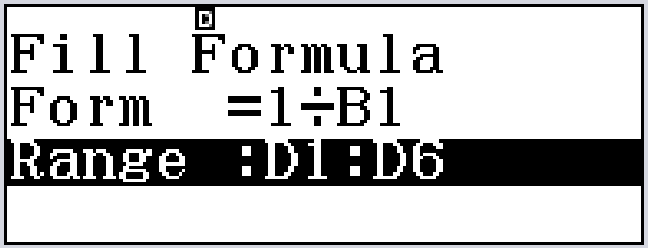
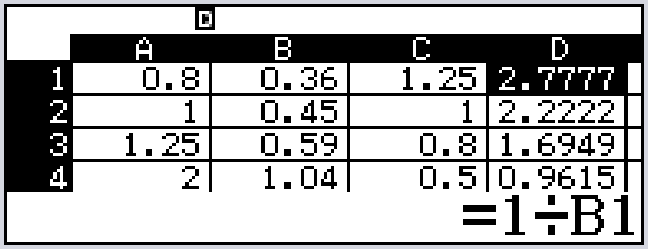
(ii) k.

Solution

(a)

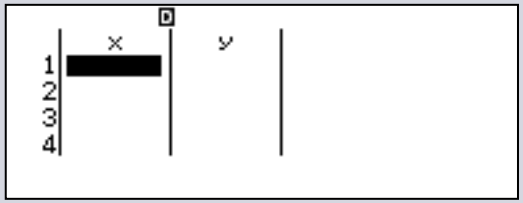
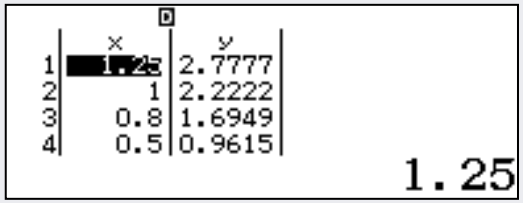
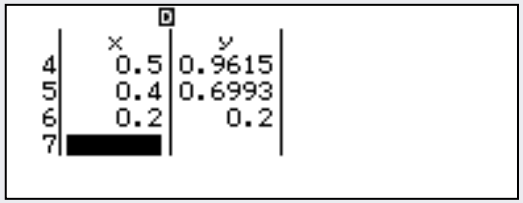
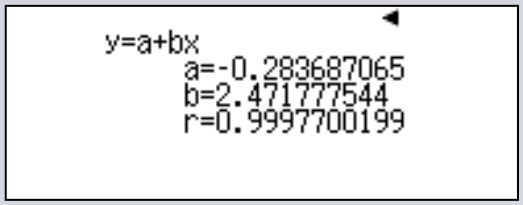
Command	Screenshot
Select 'Spreadsheet' at 'Menu'. MENU 8 Assume values of **x as Column A**, values of **y as Column B**, values of $\frac{1}{x}$ **as Column C** and values of $\frac{1}{y}$ **as Column D**.	
Fill up the values of x and y. 0 • 8 = 1 = 1 • 2 5 = 2 = 2 • 5 0 = 5 = ▶ ▲ ▲ ▲ ▲ ▲ ▲ 0 • 3 6 = 0 • 4 5 = 0 • 5 9 = 1 • 0 4 = 1 • 4 3 = 5 =	
Go to cell C1 to calculate the values of $\frac{1}{x}$.	

Command	Screenshot
As we see, cell A1 filled by 1. To calculate $\frac{1}{x}$, press [OPTN] [1].	
Insert formula $\frac{1}{A1}$ by using "Grab" function. [1] [÷] [OPTN] [2] [◀] [◀] [=] [=]	
Then, state the required range by according to number of data, 6. Hence, fill in as **C1:C6.** [▶] [▶] [▶] [▶] [▶] [▶] [DEL] [6] [=] Then, press [=]. Column of $\frac{1}{x}$ shown.	 

Command	Screenshot
Go to cell D1 to calculate the values of $\frac{1}{y}$.	
Insert formula $\frac{1}{\text{B1}}$ by using "Grab" function. OPTN 1 1 ÷ OPTN 2 ◀ ◀ = =	
Then, state the required range by according to number of data, 6. Hence, fill in as **D1:D6.** ▶ ▶ ▶ ▶ ▶ ▶ DEL 6 = Then, press =. Column of $\frac{1}{y}$ shown.	 

Solution

(c)

Command	Screenshot
Change 'Menu' as 'Statistics'. Choose 'y = a + bx'. MENU 6 2	
Assume x as $\frac{1}{x}$ and y as $\frac{1}{y}$. Enter the value of $\frac{1}{x}$ and $\frac{1}{y}$ by base on the table constuct in (a).	 
To obtain the y-intercept and the gradient of the graph, press OPTN 4.	

Answer

$k = -0.28$

$h = 2.47$

Let's Try

Two variables, x and y are related by the equation $y = \frac{p}{x} + qx$, where p and q are constants. A set of data x and y was obtained and shown in table below.

x	1	2	3	4	5	6
y	5.60	6.55	8.53	10.38	13.12	15.52

(a) Based on the table above, construct a table for the values of x^2 and xy.

(b) Plot xy against x^2, using a scale of 2 cm to 5 units on the x^2-axis and 2 cm to 10 units on the xy-axis. Hence, draw the line of best fit.

(c) Use the graph in (b) to find the value of

(i) p,

(ii) q.

Answer: (c) **(i) p = 2.85** **(ii) q = 2.5**

Vector

To solve adding/subtracting vectors and hence, find the unit vector

- Example:

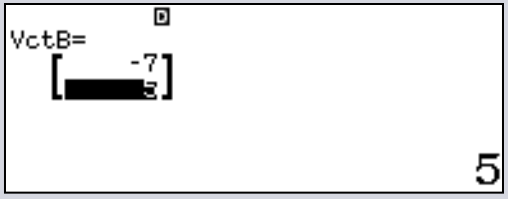
  Given that $\overrightarrow{AB} = -3\underline{i} + 2\underline{j}$ and $\overrightarrow{AC} = -7\underline{i} + 5\underline{j}$. Find

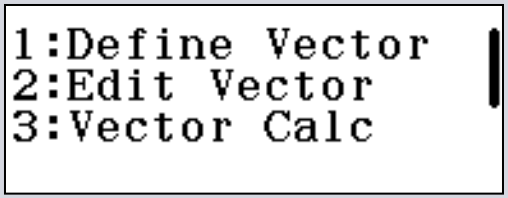
  (a) $\overrightarrow{BC}$.

  (b) unit vector in direction of $\overrightarrow{BC}$.

Solution

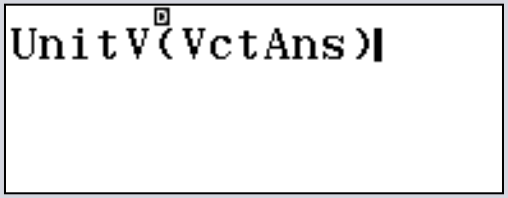
(a) $\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AC} = -\overrightarrow{AB} + \overrightarrow{AC}$

Command	Screenshot
Converts 'Menu' as 'Vector'. MENU 5 1 2	
Define $\overrightarrow{AB}$ as 'VctA'. (–) 3 = 2 =	
Define $\overrightarrow{AC}$ as 'VctB'. OPTN 1 2 2 (–) 7 = 5 = =	

Command	Screenshot
Change mode 'Vector Calculator'. OPTN 3	
Calculate $\overrightarrow{BC}$. (−) OPTN 3 + OPTN 4 =	

Answer: $\overrightarrow{BC} = -4\underline{i} + 3\underline{j}$

(b) Unit vector of $\overrightarrow{BC}$

Command	Screenshot
OPTN ▼ 4 OPTN 3)	
Find the unit vector. =	

Answer: Unit vector of $\overrightarrow{BC} = -0.8\underline{i} + 0.6\underline{j}$

Let's Try!

Given that $\overrightarrow{PQ} = 4\underline{i} - 8\underline{j}$ and $\overrightarrow{QR} = -2\underline{i} - 3\underline{j}$.

Calculate each of the following. Hence, find the unit vector for each vector.

(a) $\overrightarrow{AB} = \frac{1}{2}\overrightarrow{PQ} - 3\overrightarrow{QR}$

(b) $\overrightarrow{CD} = \overrightarrow{QP} - 2\overrightarrow{RQ}$

Answer: (a) $\overrightarrow{AB} = 4\underline{i} - 8\underline{j}$ **, Unit vector =** $\begin{pmatrix} 0.848 \\ 0.53 \end{pmatrix}$

(b) $\overrightarrow{CD} = -8\underline{i} + 2\underline{j}$ **Unit vector =** $\begin{pmatrix} -0.9701 \\ 0.2425 \end{pmatrix}$

Permutation and Combination

To solve a problem involving permutation and combination

- Example:

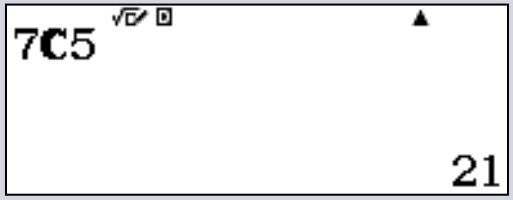
  (a) A group of 5 students are to be chosen from 9 boys and 7 girls to form a school debate team. Find the number of different ways to form the team which consists of

  (i) girls only,

  (ii) at least 4 boys.

Solution

(i) Number of ways = ${}^{7}C_{5}$

Command	Screenshot
7 SHIFT ÷ 5 =	

Answer: 21

Solution

(ii) Number of ways = $({}^{9}C_{4} \times {}^{7}C_{1}) + ({}^{9}C_{5})$

Command	Screenshot
(9 SHIFT ÷ 4 × 7 SHIFT ÷ 1) + (9 SHIFT ÷ 5) =	(9C4×7C1)+(9C5) 1008

Answer: 1 008

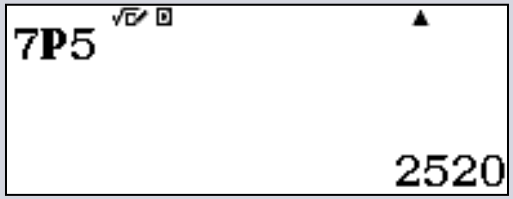
(b) A five letter code is to be formed using letters of word 'ENGLISH'. Find

(i) the number of different five letter codes that can be formed without repetition,

(ii) the number of different five letter codes which begin with a vowel and end with a consonant.

Solution

(i) Number of ways = ${}^{7}P_{5}$

Command	Screenshot
7 SHIFT × 5 =	

Answer: 2 520

Solution

(ii) Number of ways = ${}^{2}P_{1} \times {}^{5}P_{1} \times {}^{5}P_{3}$

Command	Screenshot
2 SHIFT × 1 × 5 SHIFT × 1 × 5 SHIFT × 3 =	2P1×5P1×5P3 600

Answer: 600

Let's Try!

- Solve each of the following.

(a) There are 10 different coloured marbles in a box, Find

(i) the number of ways for 3 marbles can be chosen from the box.

(ii) the number of ways that at least 8 marbles can be chosen from the box.

(b) Samad has five different card with labelled B, O, L, E and H respectively. Calculate the number of different ways to arrange all the cards in a row if

(i) there is no restriction,

(ii) the first card and the last card are consonants.

Answer: (a) (i) 120 (ii) 56
(b) (i) 120 (ii) 36

Probability Distribution

To solve a problem involves Binomial distribution

- Example:

  It is found that 70% of the students from a certain class obtained grade A in Mathematics in final year examination. If 10 students from the class are selected at random, find the probability that

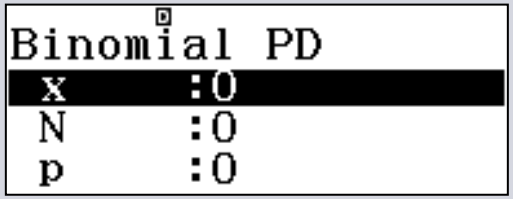
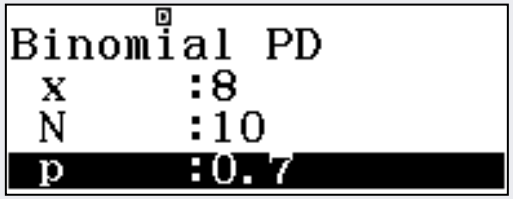
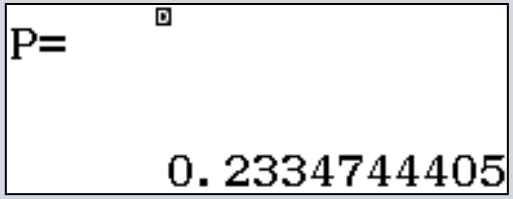
  (a) exactly 8 students obtained grade A,

  (b) not more than 8 students obtained grade A,

  (c) at least 4 students obtained grade A.

Solution

(a) $P(X = 8); x = 8, N = 10, p = 0.7$

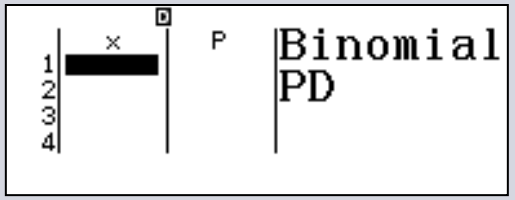
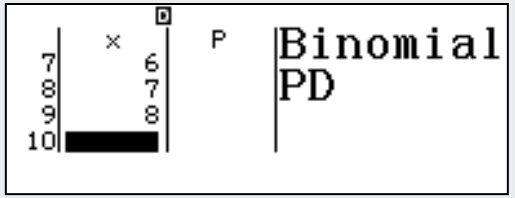
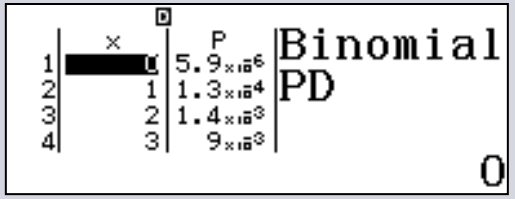
Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Binomial PD' MENU 7 4 2	
Enter the value. 8 = 1 0 = 0 • 7 =	
Obtain the probability. =	

Answer: 0.2335

(b) **Method 1: Using Binomial Probability Density (PD), 'List'**

$P(X \leq 8) = P(X = 0) + P(X = 1) + \ldots + P(X = 8)$

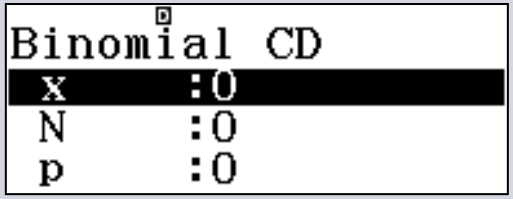
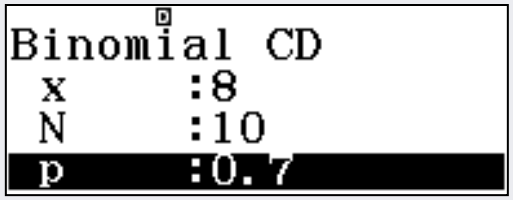
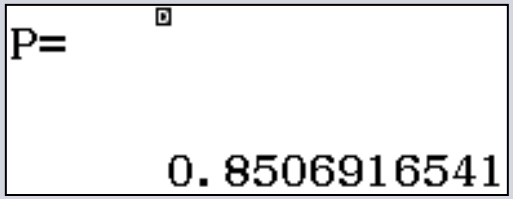
$N = 10, p = 0.7$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Binomial PD' MENU 7 4 1	
Enter the value. 0 = 1 = 2 = 3 = 4 = 5 = 6 = 7 = 8 =	
Obtain the probability. = 1 0 = 0 • 7 = = Then, add all the probabilities.	

Answer: 0.8507

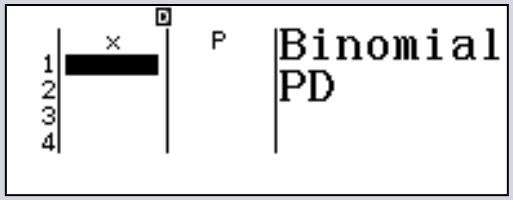
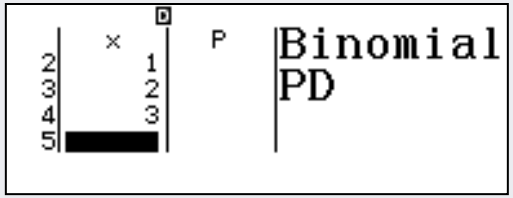
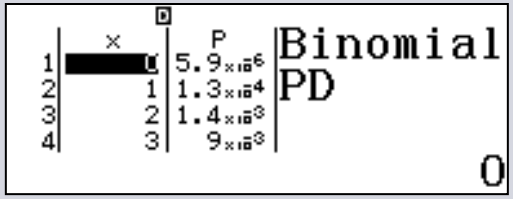
(b) **Method 2: Using Binomial Cumulative Distribution (CD), 'Variable'**

$P(X \leq 8)$; $x = 8$, $N = 10$, $p = 0.7$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Binomial CD' MENU 7 ▼ 1 2	
Enter the value. 8 = 1 0 = 0 • 7 =	
Obtain the probability. =	

Answer: 0.8507

(c) $P(X \geq 4) = 1 - P(X \leq 3)$; $N = 10$, $p = 0.7$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Binomial PD'. MENU 7 4 1	
Enter the value of $P(X \leq 3)$. 0 = 1 = 2 = 3 =	
Enter the value of N and p. = 1 0 = 0 • 7 = = Then, obtain $P(X \leq 3)$ by add all the probabilities.	

$P(X \leq 3) = 0.0000 + 0.0001 + 0.0014 + 0.0090$

$= 0.0105$

$P(X \geq 4) = 1 - P(X \leq 3) = 1 - 0.0105 = 0.9895$

Answer: 0.9895

Let's Try!

- Solve each of the following.

It is found that 20% of the students from Kampung Aman walk to school. If 8 students from Kampung Aman are chosen randomly, find the probability that

(a) exactly 3 of them walk to school,

(b) more than 3 of them walk to school,

(c) not more 5 of them walk to school.

Answer: (a) 0.1468 (b) 0.0563 (c) 0.9988

To determine the probability of Normal Distribution

- Example:

  Find the value for each of the following.

  (a) $P(Z > 1.32)$

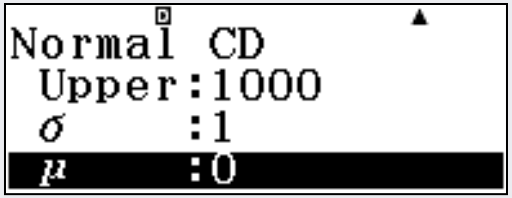
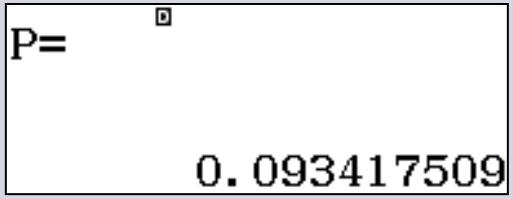
  (b) $P(Z < 1.28)$

  (c) $P(Z < -1.862)$

  (d) $P(1.4 < Z < 2.8)$

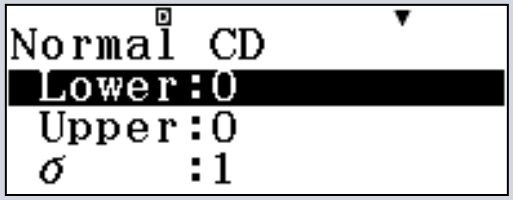
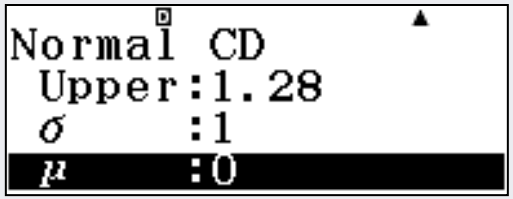
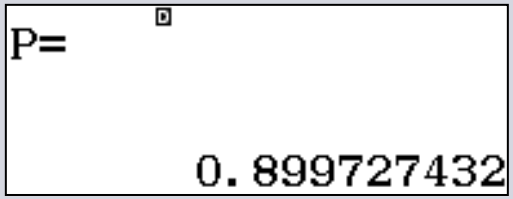
Solution

(a) $P(Z > 1.32)$; $\sigma = 1, \mu = 0$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Normal CD'. MENU 7 2	
Enter the value 1 • 3 2 = 1 0 0 0 = 1 = 0 =	
Obtains the probability. =	

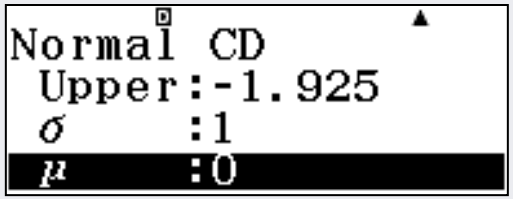
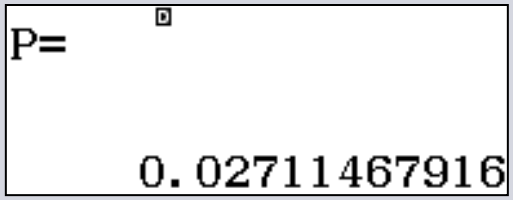
Answer: 0.0934

(b) $P(Z < 1.28)$; $\sigma = 1, \mu = 0$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Normal CD'. MENU 7 2	
Enter the value. (–) 1 0 0 0 = 1 • 2 8 = 1 = 0 =	
Obtains the probability. =	

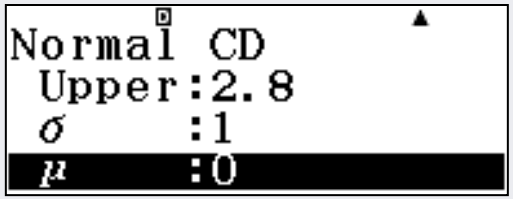
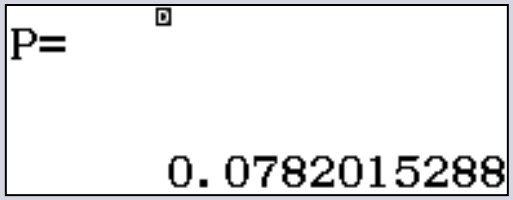
Answer: 0.8997

(c) $P(Z < -1.862)$; $\sigma = 1, \mu = 0$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Normal CD'. MENU 7 2	
Enter the value. (–) 9 ×10^x 9 9 = (–) 1 • 9 2 5 = 1 = 0 =	
Obtains the probability. =	

Answer: 0.0271

(d) $P(1.4 < Z < 2.8)$; $\sigma = 1, \mu = 0$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Normal CD'. MENU 7 2	
Enter the value. 1 • 4 = 2 • 8 = 1 = 0 =	
Obtains the probability. =	

Answer: 0.0782

Finding the value of score-z, when the value of the probability is given

- Example:

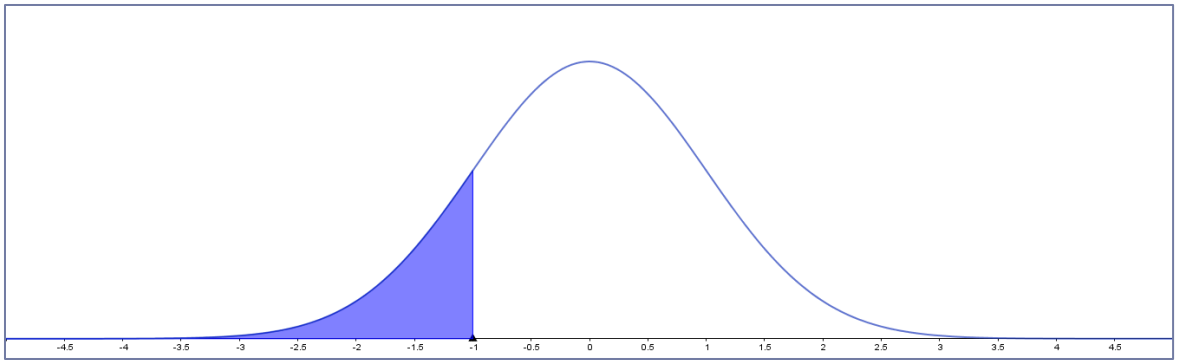
  Find the value for each of the following.

  (a) $P(Z < z) = 0.7694$

  (b) $P(Z > z) = 0.1772$

  (c) $P(Z < z) = 0.0202$

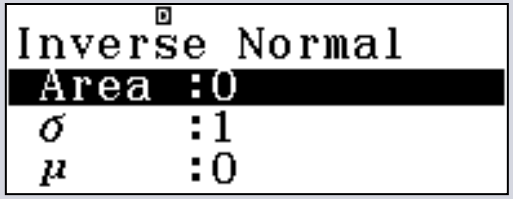
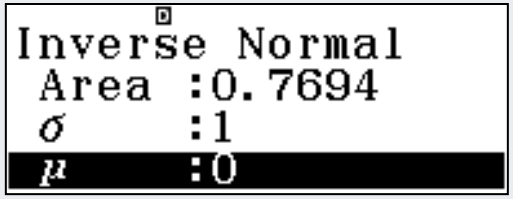
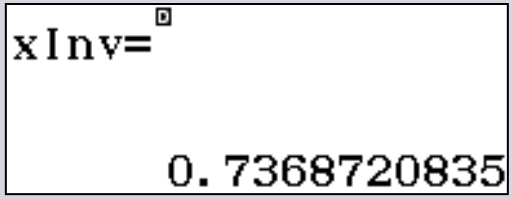
  (d) $P(Z > z) = 0.8032$



*__Note__: To solve this problem, use the Inverse Normal, which is the calculator is set-on left-tailed setting only.

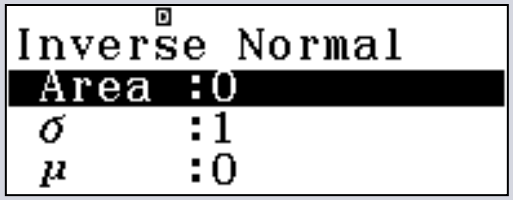
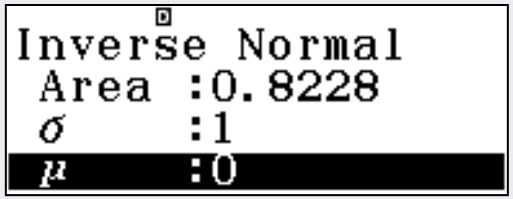
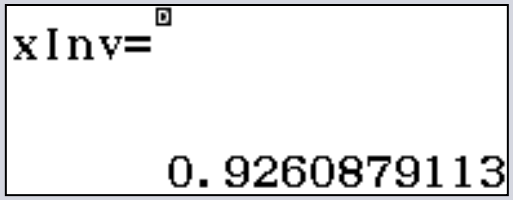
Solution

(a) $P(Z < z) = 0.7694; \sigma = 1, \mu = 0$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Inverse Normal'. MENU 7 3	
Enter the value. 0 • 7 6 9 4 = 1 = 0 =	
Obtains the value of score-z. =	

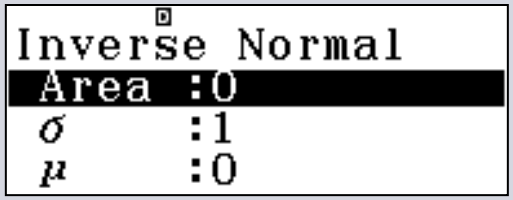
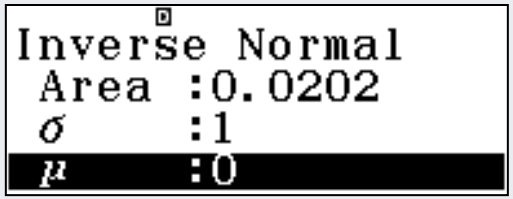
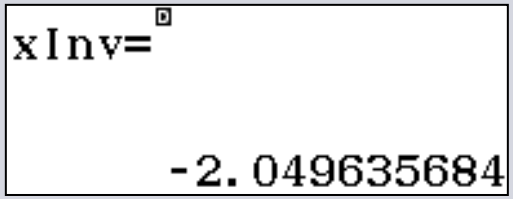
Answer: 0.737

(b) $P(Z > z) = 0.1772; \sigma = 1, \mu = 0$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Inverse Normal'. MENU 7 2	
Enter the value. 0 • 8 2 2 8 = 1 = 0 =	
Obtains the value of score-z. =	

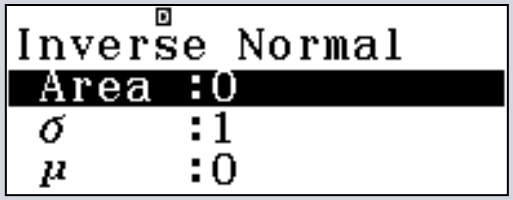
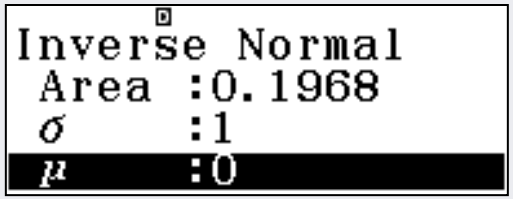
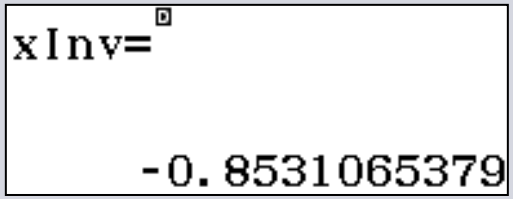
Answer: 0.926

(c) $P(Z < z) = 0.0202; \sigma = 1, \mu = 0$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Inverse Normal'. MENU 7 2	
Enter the value. 0 • 0 2 0 2 = 1 = 0 =	
Obtains the value of score-z. =	

Answer: –2.05

(d) $P(Z > z) = 0.8032; \sigma = 1, \mu = 0$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Inverse Normal'. MENU 7 2	
Enter the value. 0 • 1 9 6 8 = 1 = 0 =	
Obtains the value of score-z. =	

Answer: –0.853

Let's Try!

1 Find the value for each of the following.

(a) $P(Z > 1.64)$

(b) $P(Z < 1.51)$

(c) $P(Z < -1.12)$

(d) $P(-0.1 < Z < 0.7)$

Answer: (a) 0.0505 (b) 0.9345 (c) 0.1313 (d) 0.2979

2 Find the value for each of the following.

(a) $P(Z < z) = 0.8002$

(b) $P(Z > z) = 0.1529$

(c) $P(Z < z) = 0.0186$

(d) $P(Z > z) = 0.7948$

Answer: (a) 0.842 (b) 1.024 (c) –2.084 (d) –0.823

Solving problem involves Normal Distribution

- Example:

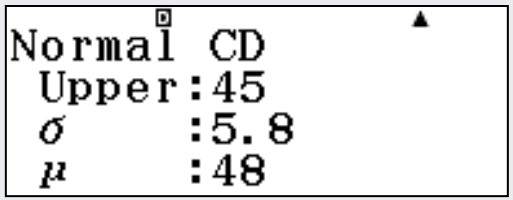
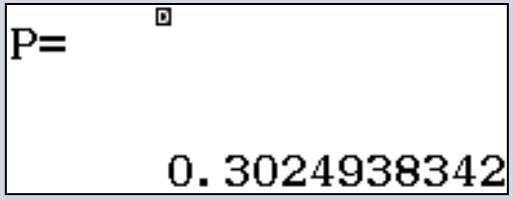
  The mass of the scout members in a school follow a normal distribution with a mean of 48 kg and standard deviation of 5.8 kg. Find

  (a) the probability that a member chosen at random from the group has a mass less than 45 kg,

  (b) the value of m, if 25% of the scout members have mass more than m kg.

Solution

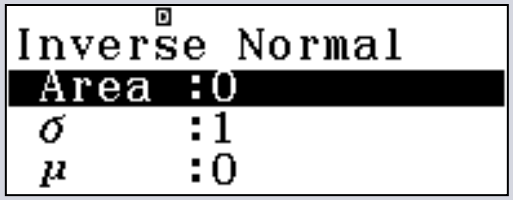
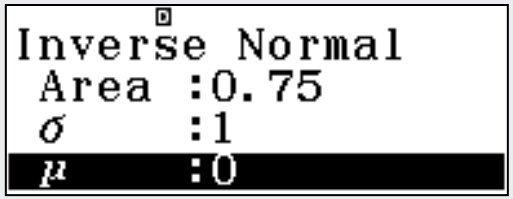
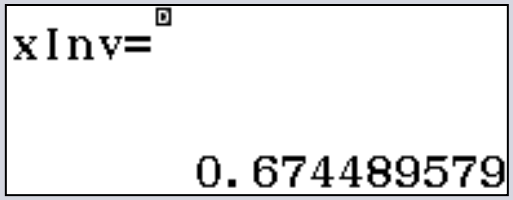
(a) $P(X < 45) = P\left(Z < \frac{45-\mu}{\sigma}\right)$; $\mu = 48, \sigma = 5.8$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Normal CD' MENU 7 2	
Enter the value. (–) 1 0 0 0 = 4 5 = 5 • 8 = 4 8	
Obtain the probability. =	

Answer: 0.3025

(b) **Method 1:**

$P\left(Z > \frac{m-\mu}{\sigma}\right) = 0.25; \mu = 48, \sigma = 5.8$

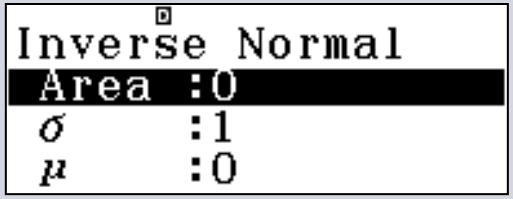
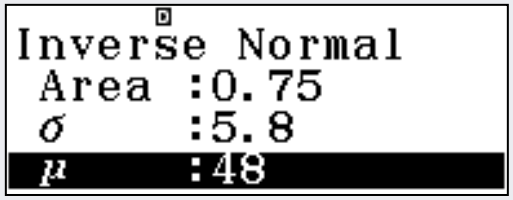
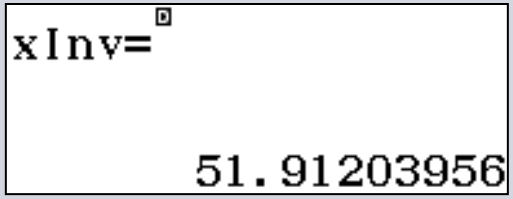
Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Inverse Normal'. MENU 7 3	
Enter the value. 0 • 7 5 = 1 = 0 =	
=	

$\therefore \quad \frac{m-48}{5.8} = 0.6745$

$\therefore \quad m = 51.9121 / 51.91$

(b) **Method 2:**

$P\left(Z > \frac{m-\mu}{\sigma}\right) = 0.25; \mu = 48, \sigma = 5.8$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Inverse Normal'. MENU 7 3	
Enter the value. 0 • 7 5 = 5 • 8 = 4 8 =	
Obtain the value of *m*. =	

Answer: *m* = 51.91

- Example:

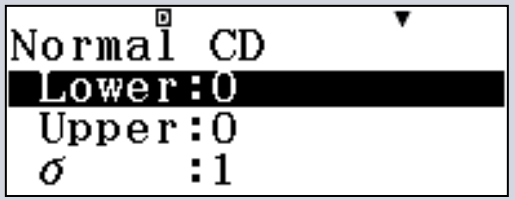
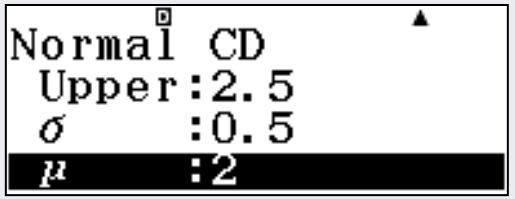
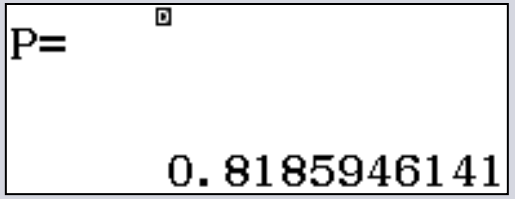
  The mass of pineapples harvested from a farm follows a normal distribution with a mean of 2 kg and a standard deviation of 0.5 kg. Given that 15.87% of the pineapples have a mass more than m kg.

  (a) Find the probability that a pineapple is chosen at random with a mass between 1.0 kg and 2.5 kg.

  (b) Calculate the value of m.

Solution

(a) $P(1.0 < X < 2.5); \mu = 2, \sigma = 0.5$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Normal CD' MENU 7 2	
Enter the value. 1 = 2 • 5 = 0 • 5 = 2 =	
Obtain the probability. =	

Answer: 0.8186

(b) **Method 1:**

$$P\left(Z > \frac{m-\mu}{\sigma}\right) = 0.1587; \mu = 2, \sigma = 0.5$$

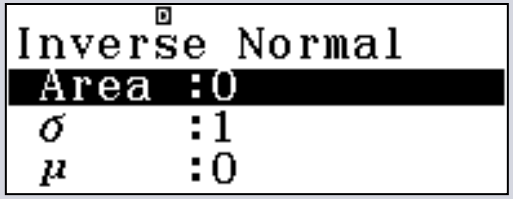
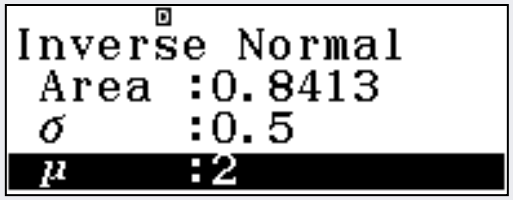
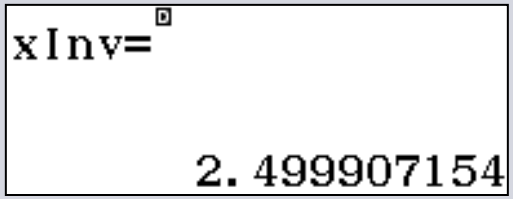
Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Inverse Normal'. MENU 7 3	Inverse Normal Area :0 σ :1 μ :0
Enter the value. 0 • 8 4 1 3 = 1 = 0 = =	Inverse Normal Area :0.8413 σ :1 μ :0
=	xInv= 0.9998143086

$\therefore \quad \frac{m-2}{0.5} = 0.9998$

$\therefore \quad m = 2.4999 / 2.5$

(b) **Method 2:**

$P\left(Z > \frac{m-\mu}{\sigma}\right) = 0.1587; \mu = 2, \sigma = 0.5$

Command	Screenshot
Change 'Menu' as 'Distribution'. Choose 'Inverse Normal'. MENU 7 3	
Enter the value. 0 • 8 4 1 3 = 0 • 5 = 2 =	
Obtain the value of *m*. =	

Answer: $m = 2.5$

Let's Try!

- Solve each of the following.

The diameters of limes from a farm have a normal distribution with a mean of 3.2 cm and a standard deviation of 1.5 cm. Calculate

(a) the probability that a lime is chosen at random from this farm has a diameter of more than 3.9 cm.

(b) the value d if 33% of the limes have diameters less than d cm.

Answer: (a) 0.3204 **(b) d = 2.54**

If any enquiries, kindly contact me..

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Thank you…