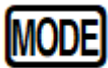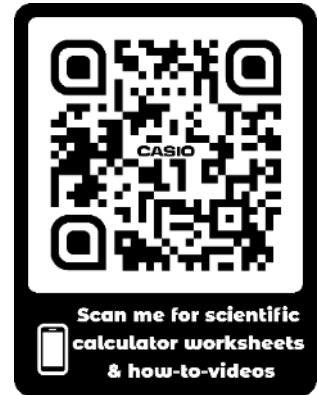# CASIO.
FX-82ZA PLUS
TECHNICAL MATHS

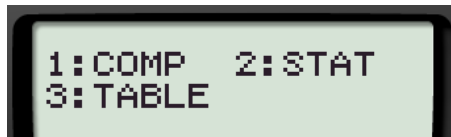**LIKE US ON**

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Scan me for scientific calculator worksheets & how-to-videos

MODE

1. Computational – normal scientific calculations
2. Statistics – data handling & regression
3. Table – graph work & functions

```
1:COMP  2:STAT
3:TABLE
```

How to CLEAR (Initialise) your calculator:

[SHIFT] [9] [3] [=] [AC]

This returns the MODE & SETUP to the initial default settings & clears the MEMORY.

MODE 1: Computational

A. COMMON FRACTIONS

Example:

$$\frac{9}{5} + . \frac{1}{4}$$

$$= \frac{41}{20} \text{ Improper fraction}$$

$$= 2,05 \text{ Decimal}$$

$$= 2\frac{1}{20} \text{ Mixed number}$$

Calculator Key:

Conversion between improper fraction and decimal [S⇔D]

Conversion between improper fraction or decimal to mixed number [SHIFT] [S⇔D]

1. $\dfrac{8}{3} \times \dfrac{7}{2}$

=............. OR .... OR ....

2. $\dfrac{1}{2} \div \dfrac{1}{3}$

=............. OR .... OR ....

B. MIXED NUMBERS

1. $2\dfrac{3}{4} \times 4\dfrac{5}{12}$ =............ OR .... OR	Calculator Keys: [SHIFT] [▭]
2. $-1\dfrac{1}{2} - 3\dfrac{1}{4}$ =............ OR .... OR	Calculator Key: [(−)] leading minus sign

### C. EXPONENTS	Calculator Keys: [x^2] [x^3] [$x^■$]

1. $(4^2)^5$ =.............   2. $2^6 + 3^4$ =.............

### D. SURDS	Calculator Keys: [√■] [SHIFT] [√■] [SHIFT] [$x^■$]

1. $\sqrt{\dfrac{9}{4}}$ =............ OR .... OR ....   2. $\sqrt[3]{729} - \sqrt[3]{19683}$ =.............

3. $\sqrt[7]{78125} - \sqrt[6]{1000}$ =.............   4. $\sqrt{13^{\frac{1}{2}} - 2} \times \sqrt{13^{\frac{1}{2}} + 2}$ =.............
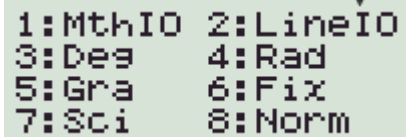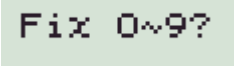

Casio Scientific Technology Tip
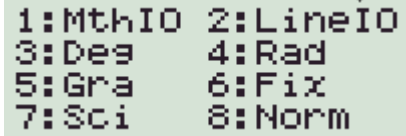ONLY use [ON] when switching the scientific calculator on.
To clear your screen, rather use [AC] this saves your calculator's temporary memory
(see the ▲ in the top right corner of the screen)
Use ⊙ ⊙ to review previous calculations.
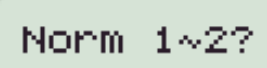
How to set your calculator to round off to 2 decimal places

1:MthIO 2:LineIO 3:Deg 4:Rad 5:Gra 6:Fix 7:Sci 8:Norm	**Key Sequence:** [SHIFT] [MODE] [6] Now select decimal places [2]	Fix 0~9?

How to clear your calculator from rounding off to 2 decimal places

1:MthIO 2:LineIO 3:Deg 4:Rad 5:Gra 6:Fix 7:Sci 8:Norm	**Keys Sequence:** [SHIFT] [MODE] [8] **Select** [2]	Norm 1~2?

Norm 1 is the **default setting** and gives answers in scientific notation. e.g. $1 \div 50\,000 = 2 \times 10^{-5}$
Norm 2 is **generally preferred** as answers are only expressed in scientific notation when they are too big to fit on the screen. e.g. $1 \div 50\,000 = 0.00002$

SCIENTIFIC NOTATION

A. CONVERTING FROM SCIENTIFIC NOTATION TO A WHOLE NUMBER OR DECIMAL

Convert the following to ordinary notation:

1. $3 \times 10^4 =$...................

2. $4,69 \times 10^{-5} =$...................

Calculator Key: **×10ˣ**

B. CONVERTING TO SCIENTIFIC NOTATION

Convert the following numbers to scientific notation with four significant digits:

1. $1267 =$...................

2. $148\ 501\ 000 =$...................

SET UP

```
1:MthIO  2:LineIO
3:Deg    4:Rad
5:Gra    6:Fix
7:Sci    8:Norm
```
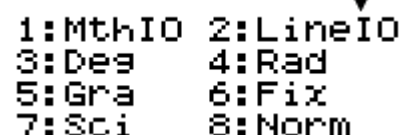
SHIFT **MODE** **7**
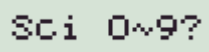
Now select the **significant digits**

`Sci 0~9?` **4**

C. ENGINEERING KEY

ENG

Transforms a displayed value to engineering notation
(x10 to the power of multiples of 3)

ENG shifts the decimal point to the right.
SHIFT ENG shifts the decimal point to the left.

POLAR & RECTANGULAR CONVERSIONS

Pol **Rec**

+ **−**

Pol converts rectangular coordinates to polar coordinates. Pol $(x, y) = (r, \theta)$

To convert rectangular coordinates $(\sqrt{2}, \sqrt{2})$ to polar coordinates **SHIFT** **+** **√▪** **2** **▶** **SHIFT** **)** **√▪** **2** **▶** **)** **=**	Math ▲ $\text{Pol}(\sqrt{2}, \sqrt{2})$ $r=2, \theta=45$
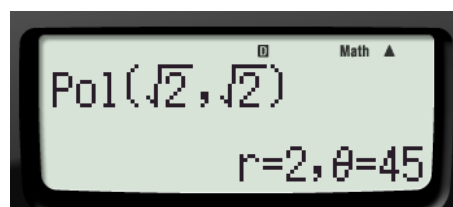
Rec converts polar coordinates to rectangular coordinates. Rec $(r, \theta) = (x, y)$

To convert polar coordinates $(\sqrt{2}, 45°)$ to rectangular coordinates **SHIFT** **−** **√▪** **2** **▶** **SHIFT** **)** **4** **5** **)** **=**	Math ▲ $\text{Rec}(\sqrt{2}, 45)$ $X=1, Y=1$

Technical Maths
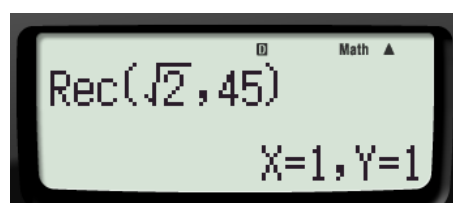
CIRCLES, ANGLES & ANGULAR MOVEMENT

Angles

A. Converting from Decimal Degree notation to Degree-Minute-Second (D-M-S) notation

Express 236,345° in D-M-S notation:


```
236.345
           236°20'42"
```
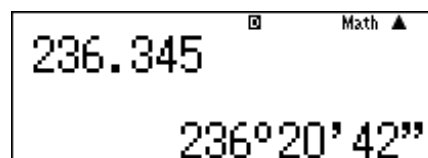
B. Converting from D-M-S notation to Decimal Degree notation

Express 75°23'54" in decimal degree notation:


```
75°23°54°
        75.39833333
```
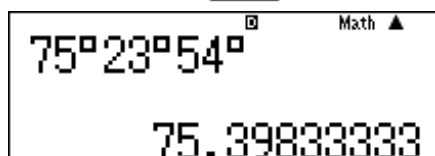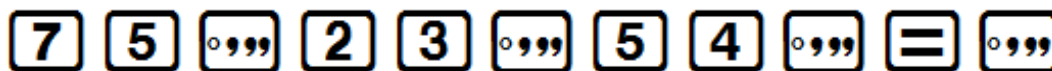
NOTE:
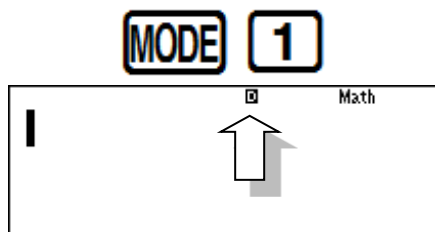- A **radian** is a measure of the size of an angle and is equal to approximately 57,3°. It is equivalent to the angle subtended at the centre of a circle by an arc equal to the length of the radius.
  $0° = 0$ rad; $90° = \frac{\pi}{2}$ rad; $180° = \pi$ rad; $270° = \frac{2\pi}{3}$ rad and $360° = 2\pi$ rad.

- A **gradian** is $\frac{1}{400}$ th of a full circle. It is also known as a 'grade' or a 'grad'.
  $0° = 0$ grad; $90° = 100$ grad; $180° = 200$ grad; $270° = 300$ grad; $360° = 400$ grad.

SHIFT

DRG ▶ PreAns
Ans

```
1:°        2:ʳ
3:ᵍ
```

C. Converting from Radians to Degrees

1) Convert $\frac{5\pi}{4}$ to degrees

[5] [SHIFT] [×10ˣ] [▯] [4] [▶] [SHIFT] [Ans] [2] [=]

```
                    Math ▲
5π ʳ
4
              225
```
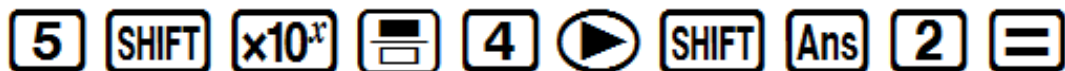
2) Convert 1,5 rad to degrees
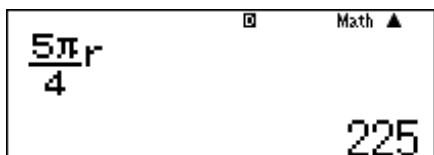
[1] [•] [5] [SHIFT] [Ans] [2] [=]

```
                    Math ▲
1.5ʳ
            85.94366927
```
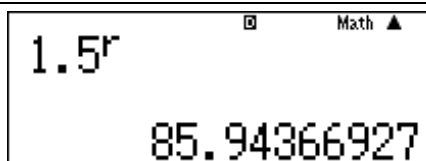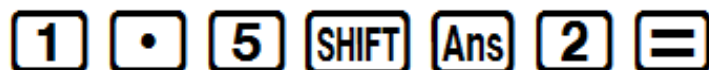
D. Converting from Degrees to Radians

SHIFT   **MODE SET UP**

```
1:MthIO 2:LineIO
3:Deg    4:Rad
5:Gra    6:Fix
7:Sci    8:Norm
```

[4]

```
            R    Math ▲
            ⬆
```

Convert 120° to radians

[1] [2] [0] [SHIFT] [Ans] [1] [=]

```
            R    Math ▲
120°
                  2
                  ─π
                  3
```
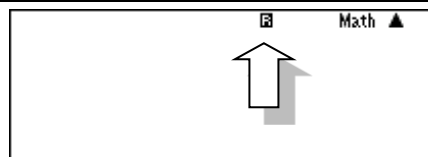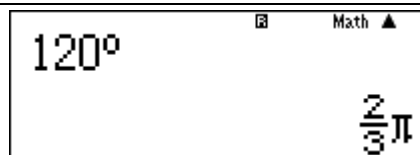
Convert:

a) 47,7° to D-M-S notation **47°42'0''**

b) 23°12' to Decimal Degree notation **23,2°**

c) $\frac{\pi}{7}$ to Decimal Degree notation **25,71428571°**

d) 2 rad to Decimal Degree notation **114,591559°**

e) 71,72° to Radians **1,25175014 rad**

Technical Maths

PRIME FACTORS

Find the prime factors of 458 631

4 5 8 6 3 1 = SHIFT °₊₉₉

458631

$3^2 \times 131 \times 389$

TRIGONOMETRY
A. FINDING THE VALUE OF TRIG IDENTITIES

Find the value of:

1. $\cos 30° = \text{.......................}$

2. $\dfrac{\sin 315°.\cos 150°}{\tan 60°.\cos 300°} = \text{....................}$ °

NB!
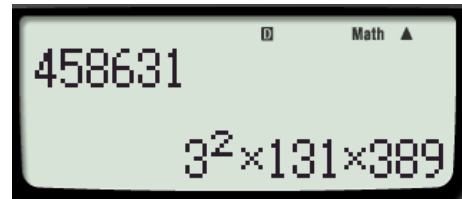You must close brackets for trig functions with more than one identity.
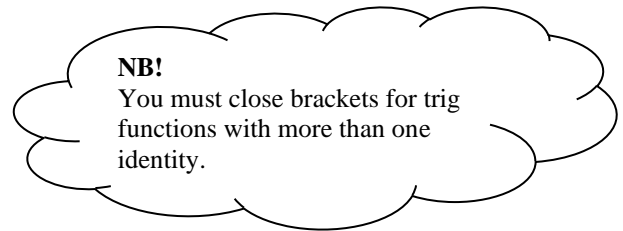
B. FINDING TRIG ANGLES

Example:	**Key Sequence:**
$\sin\theta = \dfrac{\sqrt{3}}{2}$ $\theta = 60°$	SHIFT sin ▭ √■ 3 ▶ ▶ 2 ▶) =

MEMORIES
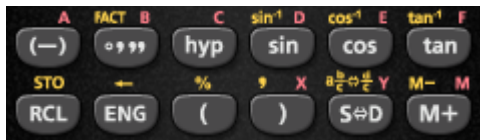
To assign the result of 3 + 5 to variable A	3 + 5 SHIFT RCL (−)
To multiply the contents of variable A by 10	ALPHA (−) × 1 0 =
To recall the contents of variable A	RCL (−)

On the calculator, financial maths calculations are done as a continuous calculation.
If you use the memory keys, you do not have to key in the same numbers repeatedly.
This helps save time and prevent confusion.

- The Memory Keys save time – less calculator keys are pressed.
- The Memory Keys do not have to be cleared to be used again. When saving a new value, it overwrites the existing value.

Technical Maths

MODE 3: Table

A. GENERATE TABLES TO SKETCH GRAPHS

1. $y = 2x + 3$ $-1 \le x \le 3$

Key Sequence:	On screen:
• Input *f(x)* formula ⊟ **to input the variable *x*:** [ALPHA] [ )] • *g(x)* = ⊟ • Set boundaries for your table: Start? [(−)] [1] [⊟] End? [3] [⊟] Step? [1] [⊟] • And the co-ordinates to plot are: (-1 ; 1)(0 ; 3)(1 ; 5)(2 ; 7)(3 ; 9)	f(X)=2X+3

Remember: [AC] returns you to the formula

2. Find the points of intersection of the straight line f(x) = x − 3 and the parabola g(x) = x² − x − 6 when x ε [- 3 ; 4]

Key Sequence:	On screen:
• Input f(*x*) formula ⊟ • Input g(*x*) formula ⊟ • Set boundaries for the table: Start? [(−)] [3] [⊟] End? [4] [⊟] Step? [1] [⊟] **Point of Intersection (-1 ; -4)** **Point of Intersection (3 ; 0)**	f(X)=X-3 g(X)=X²-X-6

Technical Maths

* ZOOM IN * and find the turning point of g(x)

Key Sequence:	On screen:
• [AC] • Change the boundaries of the table Start? [0] [=] End? [1] [=] **Reduce the STEPS/INTERVALS for a more detailed table.** Step? [.] [2] [5] [=] **Turning point of g(x): (0,5 ; -6,25)**	

3. Compare: y = sin x **and** y = cos x   **x ε [0° ; 360°]**
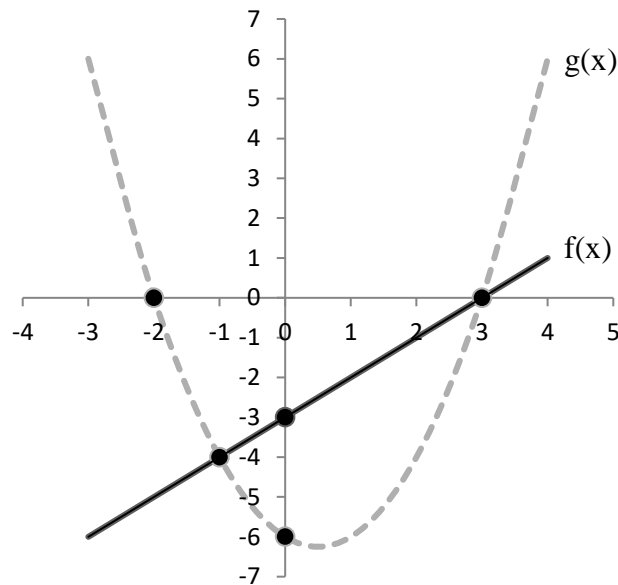
Key Sequence:	On screen:
• Input *f(x)* formula [=] • Input *g(x)* formula [=] • Set boundaries for your table: Start? [0] [=] End? [3] [6] [0] [=] **You need to carefully select the STEPS (or INTERVALS) for your graph.** **Consider the equations as a guideline.** Step? [9] [0] [=]	f(X)=sin(X) g(X)=cos(X)
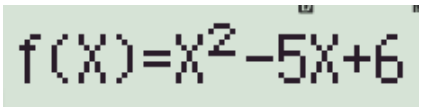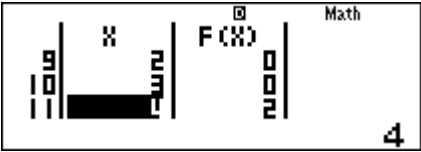
B. SOLVING EQUATIONS IN TABLE MODE

Quadratic equation $\qquad\qquad x^2 - 5x + 6 = 0$

Generate a TABLE for the equation & read off the x value where f(x) = 0

Key Sequence:	On screen:
• Input f(x) equation ⊜ **to input the variable x:** ALPHA ⟩ • $g(x) = $ ⊜ • Set boundaries for your table: Start? ⊟ 6 ⊜ End? 6 ⊜ Step? 1 ⊜ $f(x) = 0 \; at \; x = 2 \; or \; x = 3$	$f(X) = X^2 - 5X + 6$

DOMAIN: **Negative & positive values of the constant**

STEPS: **Reciprocal of the co-efficient of the highest power of x**

DON'T FORGET
$f(x)$ & $g(x) - 20 \; x \; values$
$f(x) - 30 \; x \; values$

HOW TO CHANGE:

SHIFT MODE ▼
```
1:ab/c   2:d/c   ▲
3:STAT   4:TABLE
5:Disp   6:APO
7:◄CONT►
```
4
```
Select Type?
1:f(x)
2:f(x),g(x)
```

C. FINANCIAL MATHS IN TABLE MODE

R1 000 is invested at a compound interest rate of 10% per annum.
Calculate the value of the investment after:

i. 1 year
ii. 2 years
iii. 3 years
iv. 4 years $\qquad$ *It is useful to do this in TABLE mode because n is changing.*

Given:

P = 1000	$i = 10\% = \dfrac{10}{100} = 0{,}1$	$n = x$	A = ?
$$A = 1000\,(\,1 + 0{,}1\,)^{n}$$			

Key Sequence:	**On screen:**

- Input *f(x)*formula ▣   *g(x) =* ▣   - Set boundaries for your table:
Start? ① ▣
End? ④ ▣
Step? ① ▣
   i. 1 year; A = R1 100,00
  ii. 2 years; A = R1 210,00
 iii. 3 years; A = R1 331,00
 iv. 4 years; A = R1 464,10
	f(X)=1000(1+.1)▸
	
	f(X)=◀00(1+.1)^X
	
		X		F(X)

1	1	1100
2	2	1210 | | X		F(X)
3	3	1331
4	4	1464.1
5			

Check out our website www. casio.jamesralphedu.co.za

for more calculator educational resources