

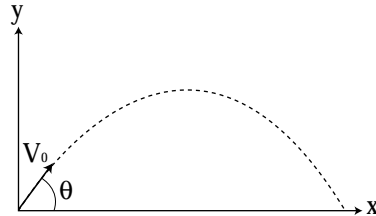
Calculating Parabolic Motion

Display on a graph the altitude change and the horizontal distance over a period of time when an object is thrown at initial velocity V_0 and angle θ , and find the horizontal distance and altitude after t seconds. Specify the angle in Deg.

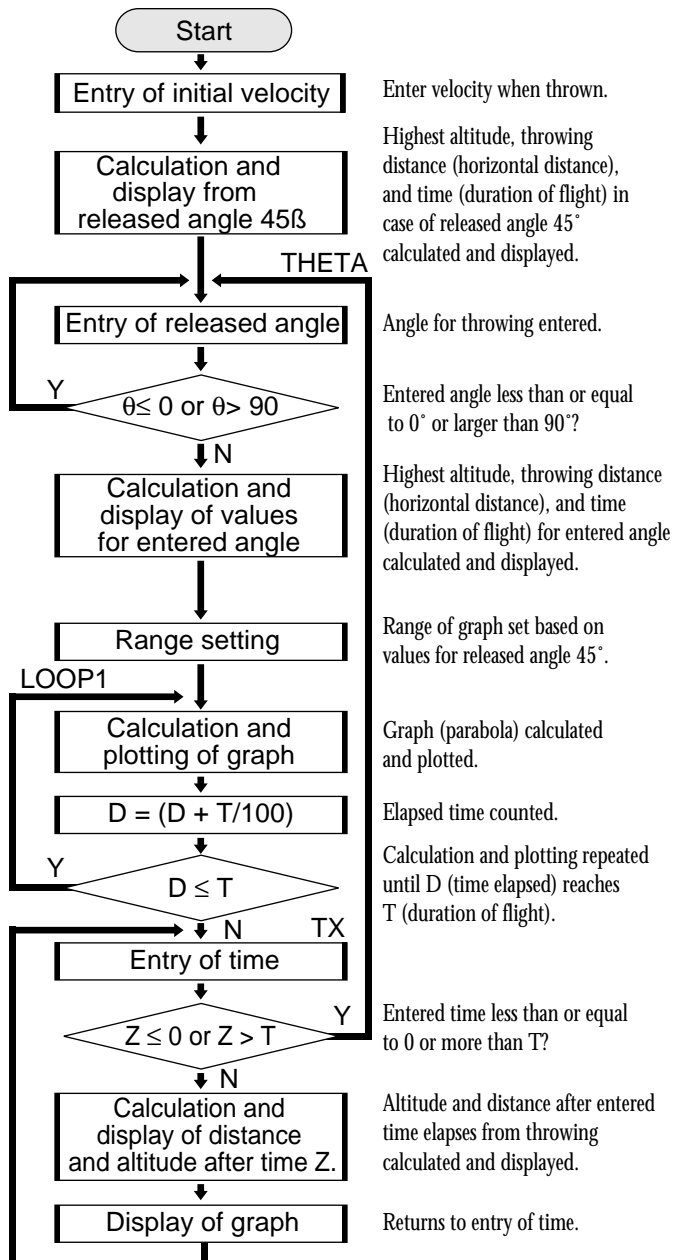
Calculation

$$X = V_0 \cdot \cos \theta \cdot T \quad Y = V_0 \cdot \sin \theta \cdot T - \frac{1}{2} gT^2$$

Initial velocity V_0 [m/s]
 Angle θ [°]
 Gravitational acceleration $g = 9.8$ [m/s²]
 Time T [s]



FLOWCHART



PROGRAMME LIST (REAL MODE)

```

Title : PARABOLA
Deg
Print "V0 (M÷S),θ,T(S)
Print "Input V0
Input V
2*V*sin 45/9.8⇒A
V²/9.8⇒B
V²/19.6⇒C
Print "HMAX=
Print C
Print "LMAX=
Print B
Print "TMAX=
Print A
Wait
Label TX
Print "Input TX
Input Z
If Z≤0 Goto THETA
If Z>T Goto THETA
V*cos θ*Z ⇒X
V*sin θ*Z-(0.5*9.8*Z²) ⇒Y
Print "X=
Print X
Print "Y=
Print Y
Wait
Goto TX
    
```

PARAMETERS

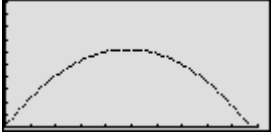
Name of parameter	Content	Name of parameter	Content
H	highest altitude	Xscl	scale of x-coordinate
L	horizontal distance	Z	input of time period
T	time	V	initial velocity (V_0)
X	distance (after time Z)	θ	angle (released angle)
Y	altitude (after time Z)	C	highest altitude when released at 90°
D	time elapsed	B	horizontal distance when released at 45°
Yscl	scale of y-coordinate	A	time period when released at 45°

Exercise

Find the horizontal distance and altitude three seconds after an object is thrown, when the initial velocity is 25m/sec and the angle is 52° .

Set up condition: angle unit in Deg mode, and decimal point in Float Pt mode.

2ndF **SETUP** **B** **1** **C** **1** **E** **1** **CL**

Step	Key Operation	Display
1 Specify the programme mode. Select the title PARABOLA.	PRGM A	PARABOLA V0(M+S),θ,T(S) Input V0 V=
2 Enter the value of the initial velocity. (Highest altitude when released at 90°) (Distance when released at 45°) (Time when released at 45°)	2 5 ENTER	V= 25 HMAX= 31.8877551 LMAX= 63.7755102 TMAX= 3.607687659
3	ENTER	25 HMAX= 31.8877551 LMAX= 63.7755102 TMAX= 3.607687659 θ=?
4 Enter the angle value. (Display of highest altitude) (Display of horizontal distance) (Display of time until dropping of object)	5 2 ENTER	θ= 52 H= 19.80105063 L= 61.88110499 T= 4.020463029
5 (Display of graph of parabola)	ENTER	
6	ENTER	H= 19.80105063 L= 61.88110499 T= 4.020463029 Input TX Z=?
7 Enter the value of time period Z. (Display of distance after Z seconds) (Display of altitude after Z seconds)	3 ENTER	Input TX 4.020463029 Z= 3 X= 46.17461065 Y= 15.00080652
8 (Altitude and distance after Z seconds are displayed on the parabola graph.)	ENTER	