

Topic: The locus of a parabola

1. Warm-up:



(1) Watch this clip and state what this experiment is about?

(2) Check these words

English	中文	圖示	
Parabola			
parabolic			
	焦點		
vertex			
	準線		
	對稱軸		

#

2. The locus of a parabola.

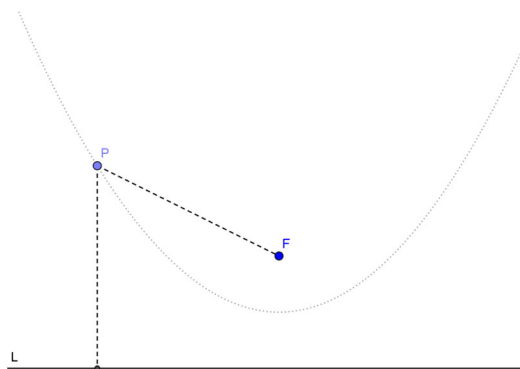
條件：given a fixed-line  $L$ , a fixed point  $F$

規則：P is a moving point satisfy equidistant from the fixed-line, and the fixed point.

定義：

A parabola is the set of all points  $(x,y)$  in a plane that are equidistant from a fixed line, the directrix, and a fixed point, the focus, not on the line.

The vertex is the midpoint between the focus and the directrix. The axis of the parabola is the line passing through the focus and the vertex.



3. 拋物線的名詞要素：

(1) Focus :

(2) Vertex :

(3) Directrix :

(4) Symmetric axis :

(5) focal length/focal distance :

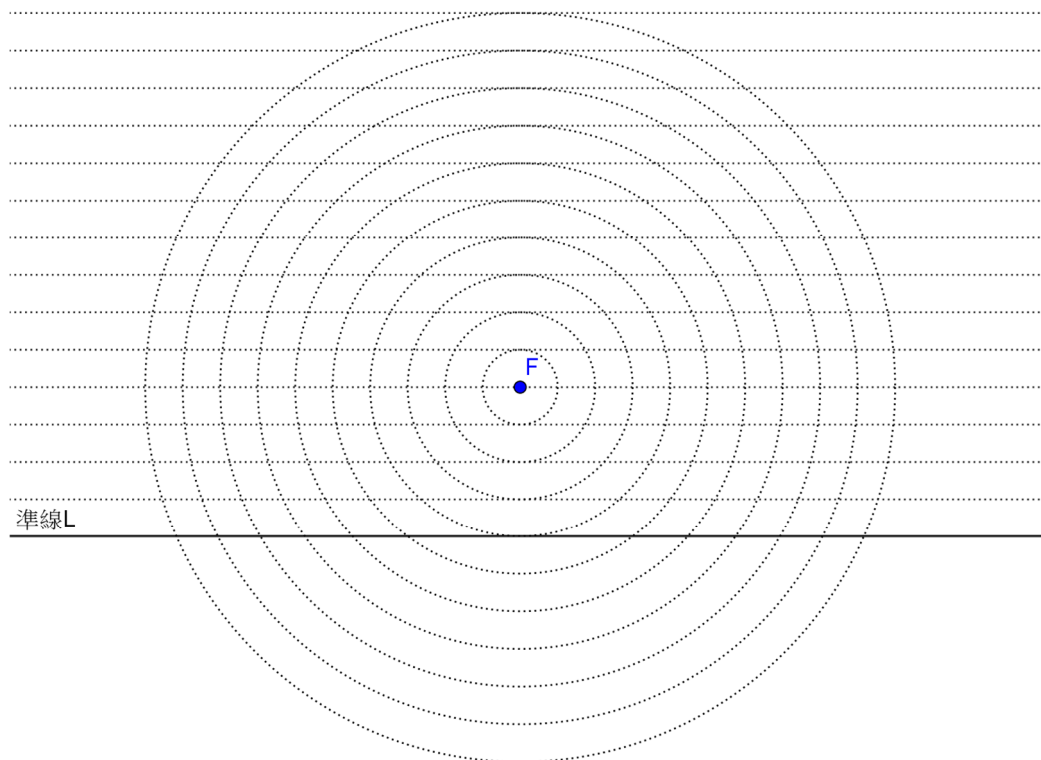
(6) Latus rectum :

<https://youtu.be/LT3DZQ5Mw38>

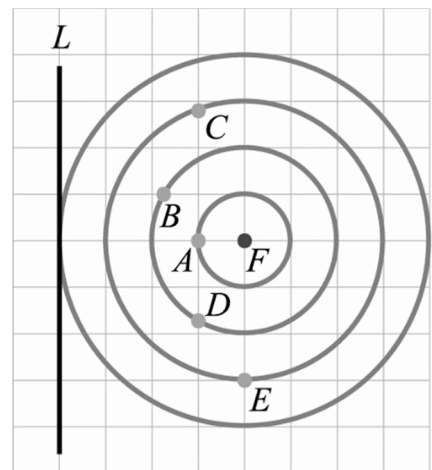


4. The property of the latus rectum : \_\_\_\_\_

5. The diagram below shows several concentric circles centered at point  $F$ . The radius of each circle is one unit away from the adjacent circle. The horizontal lines are also spaced 1 unit apart, with each line (except the one passing through  $F$ ) tangent to a circle. The bold line as the directrix, and point  $F$  as the focus. Use the definition of a parabola to sketch a parabola.



6. 下圖中是以  $F$  為圓心的同心圓，  
 判斷下列各點 是否 在以  $F$  為焦點， $L$  為準線的拋物線上？  
 A    B    C    D    E



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主題: 拋物線的幾何定義

### 1. Warm-up

[教學活動安排]

讓學生能透過影片中的實驗，看到拋物面鏡及焦點，引發學生想更深入認識拋物線的元素。

[可參考英文問句/提問/開場]

- what is this experiment about?
- Where did the man place the match?
- 猜猜看，焦點的英文怎麼說？拋物線怎麼說？
- Today, We are going to learn about 'parabola' and the focus of a parabola. The curve of the mirror is an example of a parabola.

### 2. Check these words

[教學活動安排]

讓學生兩兩一組，用手機上網查這些將會使用到的單字、關鍵字及發音並完成表格  
表格中圖示的部分則是等到本小節學習完成後再填寫，目的是讓學生複習且加深印象

### 3.幾何定義

[教學活動安排]

在說明定義時，將定義拆解成條件跟規則，讓學生能理解定義。

[可參考的英文說明]

-推薦觀看 Eddie woo 老師的教學影片 <https://youtu.be/uxsOL0U5538>

### 3. 拋物線名詞要素

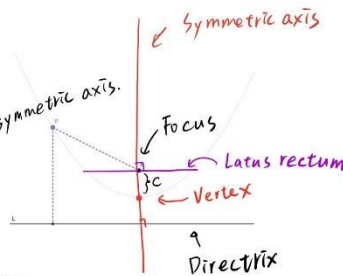
[教學活動安排]

介紹並說明，如附圖。

3. 拋物線的名詞要素：

- (1) Focus : point  $F$
- (2) Vertex : The intersection of the parabola and symmetric axis.
- (3) Directrix :  $L$
- (4) Symmetric axis :
- (5) focal length/focal distance :  $C$
- (6) Latus rectum :

<https://youtu.be/LT3DZQ5Mw38>



### 4.正焦弦長的性質

[教學活動安排]

- 教師可選擇自行說明。
- 也可以運用這個短片，讓學生練習從英文語境中學習數學。

<https://youtu.be/LT3DZQ5Mw38>

- The property of the latus rectum : The length of the latus rectum of a parabola is equal to 4 times its focal length.

[可參考的英文說明]

Think-pair-share

Share with your partner what the clip said. Draw one student share to the class.

5. 練習-利用同心圓及定義畫出拋物線

[教學活動安排]

讓學生練習且透過此活動可以驗收學生對拋物線定義是否掌握

6. 練習-驗收學生對拋物線定義是否掌握

[教學活動安排]

本題是中文,希望學生在英文語境中的學習,也能在中文語境中運用。

## 參考資料

參考資料：1. <https://www.intmath.com/plane-analytic-geometry/4-parabola.php>

2. Precalculus with Limits. Ron Larson.

每個單元都有像這樣的單字練習,教師可以自行參考運用

## 10.2 Exercises

See [CalcChat.com](http://CalcChat.com) for tutorial help and worked-out solutions to odd-numbered exercises.

**Vocabulary:** Fill in the blanks.

1. A \_\_\_\_\_ is the intersection of a plane and a double-napped cone.
2. When a plane passes through the vertex of a double-napped cone, the intersection is a \_\_\_\_\_.
3. A \_\_\_\_\_ of points is a collection of points satisfying a given geometric property.
4. A \_\_\_\_\_ is the set of all points  $(x, y)$  in a plane that are equidistant from a fixed line, called the \_\_\_\_\_, and a fixed point, called the \_\_\_\_\_, not on the line.
5. The line that passes through the focus and the vertex of a parabola is the \_\_\_\_\_ of the parabola.
6. The \_\_\_\_\_ of a parabola is the midpoint between the focus and the directrix.
7. A line segment that passes through the focus of a parabola and has endpoints on the parabola is a \_\_\_\_\_.
8. A line is \_\_\_\_\_ to a parabola at a point on the parabola when the line intersects, but does not cross, the parabola at the point.

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