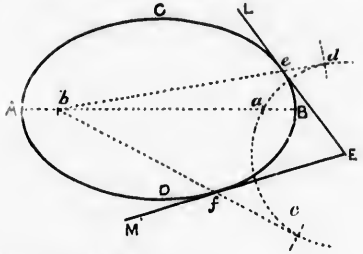
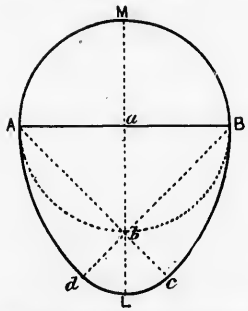
PROBLEM 68.—To Draw a Tangent to an Ellipse from a Given External Point E.



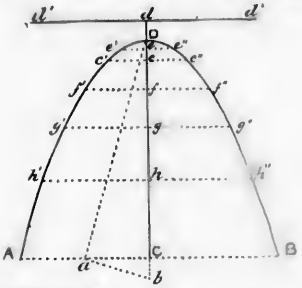
Find the foci **a** and **b**, of the ellipse.
From **E** as centre with radius **Ea**, describe the arc **c a d**.
From **b** as centre with radius **AB**, describe another arc cutting the former in **d** and **c**.
Join **bd** and **bc**, cutting the curve in the joints **e** and **f**, which will be the tangent points.
Draw the tangents **EeL**, **EfM**.

PROBLEM 69.—To Construct an Egg-shaped Oval on a Given Diameter **A B**.



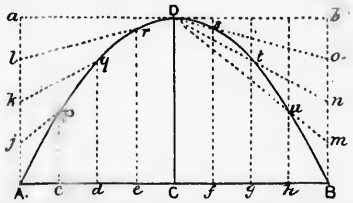
Bisect **AB** in **a**. Draw **ab** at right angles to **AB** and equal to **aA** or **aB**.
Join **Ab**, **Bb**, and produce them.
With **A** and **B** as centres and **AB** as radius, describe the arcs **Bc**, **Ad**.
With **a** as centre and **aA** as radius, describe the semicircle **AMB**. With **b** as centre and radius **bc**, describe the arc **dLc**, completing the required figure **AMBL**.

PROBLEM 70.—To Draw a Parabola on a Given Axis **CD** and having at the Point **C** the Given Ordinates **AC**, **CB**.



Bisect one of the ordinates **AC** in **a**.
Join **aD** and draw **ab** perpendicular to **aD**, meeting **DC** produced in **b**.
Make **Dc**, and **Dd**, on **CD** and its production, equal to **Cb**.
The line **d' d''** drawn through **d**, parallel to **A B**, is the directrix, and **e** is the focus of the parabola.
Divide the axis into any parts in the points **e**, **c**, **f**, **g**, etc., and through these draw lines parallel to **AB**.
From **e** as centre, with **de** as radius, describe arcs cutting the parallel line through **e** in **e'** and **e''**.
Similarly from **c** as centre, with **dc**, **df**, **dg**, etc., as radii, describe arcs cutting the parallel lines in **c'** and **c''**, **f'** and **f''**, **g'** and **g''**, etc.
The points so found will be in the curve of the parabola, which is to be drawn free-hand through them.

PROBLEM 71. The Base or Double Ordinate **AB** and the Axis or Height **CD** of a Parabola Being Given, to Draw the Curve.



Draw **Aa** and **Bb** parallel and equal to **CD**, and join **ba**.
Divide **AC** and **CB** into any number of equal parts in the points **c**, **d**, etc.
Divide also **Aa** and **Bb** into the same number of equal parts in **m**, **n**, **o** and **j**, **k**, **l**.
Draw lines through **c**, **d**, etc., parallel to **CD** or perpendicular to **AB**.
Join **D** to the points **j**, **k**, **l** and **m**, **n**, **o**, meeting the vertical lines in **p**, **q**, **r**, **s**, **t**, **u**, which will be points in the required parabola.