A

TREATISE

ON

LAND-SURVEYING,

IN SEVEN PARTS.

PART I.
Contains Definitions and Problems in Geometry.

PART II.
Rules for finding the Content of Land without using a Chain, but by stepping the dimensions, by which any Husbandman who knows the first five Rules of Arithmetic may find the Content of his own work.

PART III.
To survey with the Chain and Cross.

PART IV.
To survey with the Chain only.

PART V.
Rules for parting off any given portion of a Field, in form of a Triangle, Square, or Parallelogram.

PART VI.
A full explanation of the method used by the most eminent Surveyors, in measuring and planning a Farm or a Lordship, with a Chain only. Illustrated with Five Copper-Plates, and an engraved Fac simile of a Field-Book. The Plates exhibit the progressive steps of planning a small Farm, and point out the appearances of the Plan in six different Stages.

PART VII.
To Survey by measuring the Angles and Lines.

By THOMAS DIX, of Oundle, Northamptonshire.

THE WHOLE ILLUSTRATED WITH

TWO HUNDRED DIAGRAMS,

AND ELEVEN COPPER-PLATES.

THE SECOND EDITION.

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1802.

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TO THE WORSHIPFUL

The Company of Grocers, London,

THIS TREATISE

ON LAND-SURVEYING,

COMPOSED

FOR THE USE OF THE PUPILS BELONGING TO THE

SCHOOL,

UNDER THEIR PATRONAGE,

IN OUNDLE,

IS HUMBLY DEDICATED,

BY THEIR MOST OBEDIENT,

AND DEVOTED SERVANT,

THOMAS DIX,

ASSISTANT AT THE SAID SCHOOL.

ADVERTISEMENT.

IN the following Treatise, the Author does not pretend to any new Discovery, or to convey Instruction to the experienced Land-Surveyor; his only aim is to supply the deficiency of a Book, proper to be introduced into Schools, to instruct Boys in the first rudiments of Land-surveying by the Chain and Cross: and as he wishes to render it as useful as possible to young people, he will thankfully receive any information, from persons conversant in subjects of this nature, to render another Edition more complete.

In PART IV, the Student will find a repetition of a few of the Rules before explained in PART II; but as the same occur in two distinct methods of Surveying, it was thought best to avoid a reference to former pages.

LIST OF PLATES.

A LIST of GRAPHICAL INSTRUMENTS for the Use of the Young Surveyor, as made at the lowest Prices, by W. and S. JONES, *Mathematical, &c. Instrument Makers*, 30, Lower Holbourn, London.

	£.	s.	d.
One-foot box feather-edged Plotting Scale, divided at the edges in various parts of the inch, to order, each	0	3	0
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Parallel Rulers, 12 inches long, 4s. double bar	0	9	0
One-foot Pentagraph, for copying Plans, best	2	12	6
Two-feet ditto ditto	4	14	6

CONTENTS.

PART II.

PART III.

PART IV.

PART THE FIRST.

PRACTICAL GEOMETRY.

Definitions.

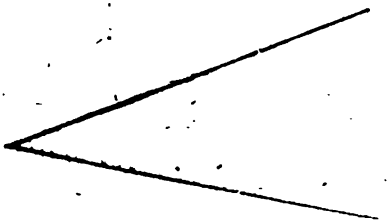
1. A Point is the beginning of magnitude, and has neither length, breadth, nor thickness.

2. A Line is length without breadth.

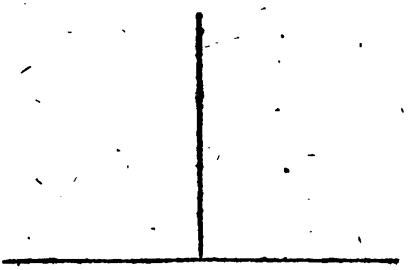
3. A Straight Line is the shortest which can be drawn from one point to another.

4. Parallel Straight Lines are equally distant in all their parts, and if produced ever so far both ways would never meet.

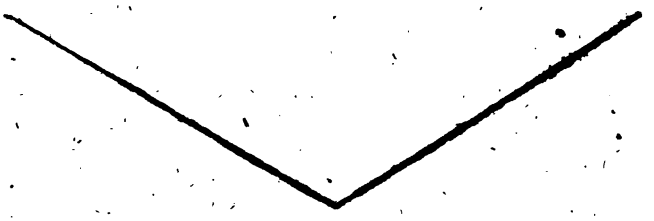
5. An Angle is the meeting of two lines in a point, but not so as to form one straight line.



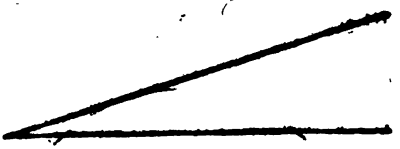
6. When one Straight Line stands on another and makes the angles on each side equal, both angles are right angles, and that line which stands on the other is a perpendicular to it.



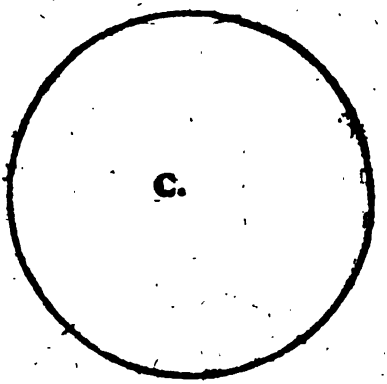
7. An Obtuse Angle is greater than a right angle.



8. An Acute Angle is smaller than a right angle.



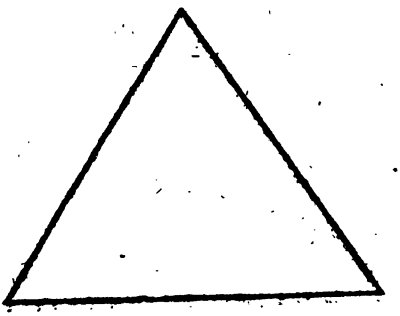
9. A Circle is a plain figure, bounded by one curved line which is called the circumference, and is every where equally distant from the point C within the circle, called the centre.



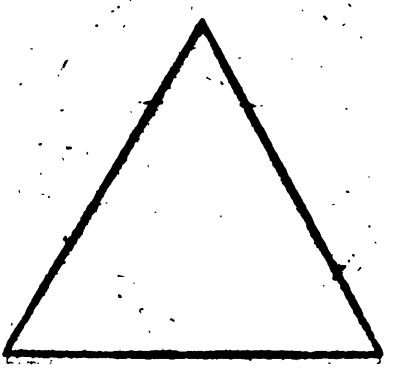
15. A Straight Line cutting off any portion of a circle, greater or less than a semicircle, and bounded by the circumference is called a Chord, as A B.—*(Last Figure.)*

16. And the part of the circumference which is cut off by it is called an Arc, as A B C.—*(Last Figure.)*

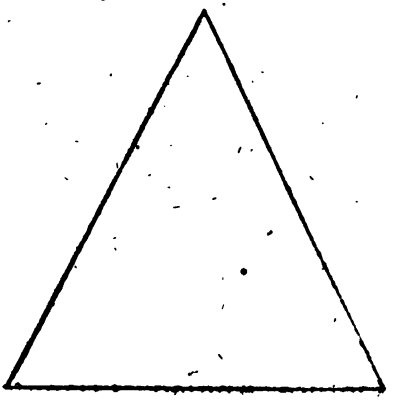
17. All figures contained by three straight lines are called Triangles.



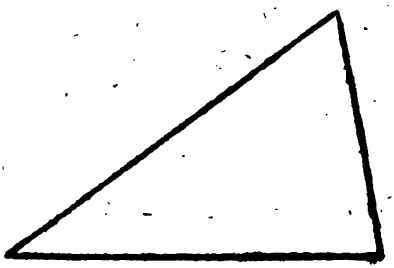
18. An Equilateral Triangle has all its sides and all its angles equal.



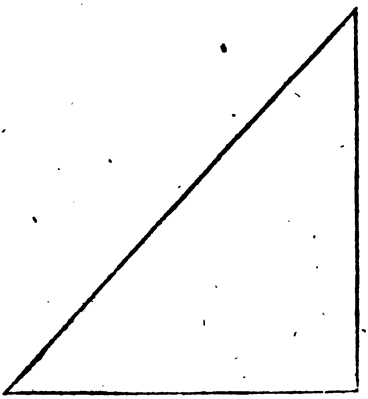
19. An Isosceles Triangle has two of its sides and two of its angles equal.



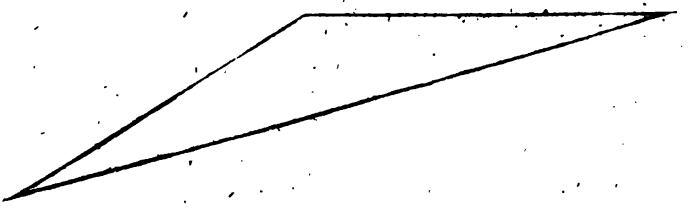
20. A Scalene Triangle has all its sides and all its angles unequal.



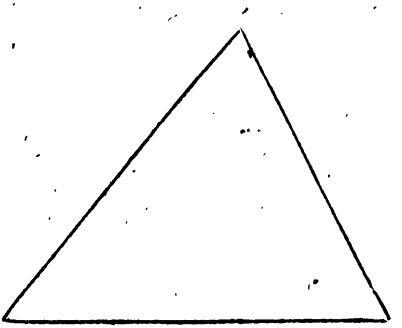
21. A Right Angled Triangle has one right angle.



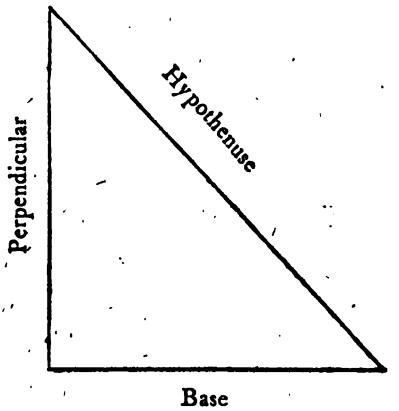
22. An Obtuse Angled Triangle has one obtuse angle.



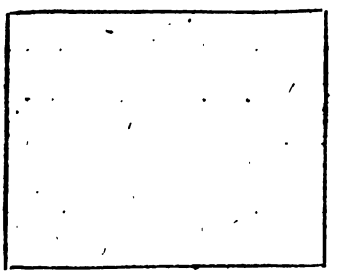
23. An Acute Angled Triangle has three acute angles.



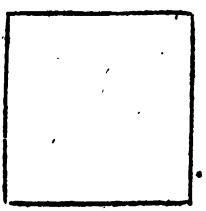
24. An Hypothenuse is the longest side of a right angled triangle, the bottom side is the Base, and the other side the Perpendicular.



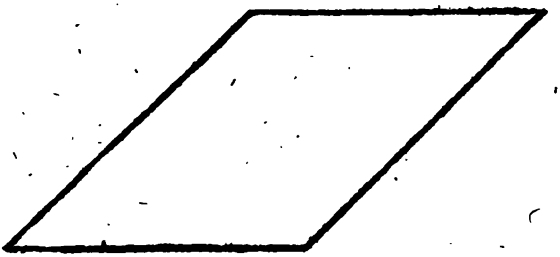
25. All figures contained by four straight lines are called Quadrangles or Quadrilaterals.



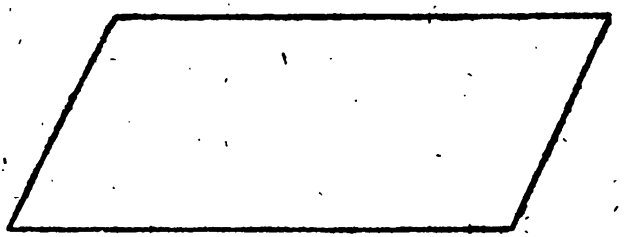
26. A Square has all its sides equal, and its angles right angles.



27. A Rhombus has all its sides equal, but its angles not right angles.



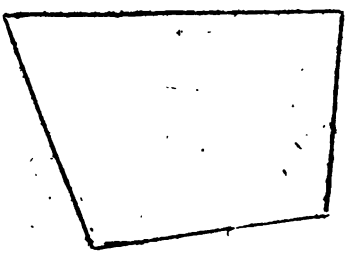
28. A Parallelogram has its opposite sides parallel.



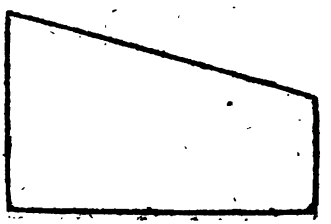
29. A Rectangle is a Parallelogram whose angles are all right angles.

30. A Rhomboid is a Parallelogram whose angles are not right angles.

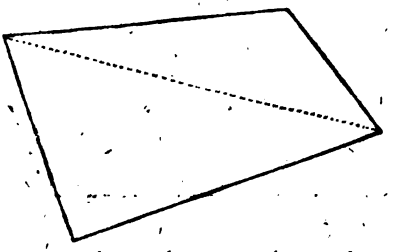
31. All other four sided figures are called Trapeziums.



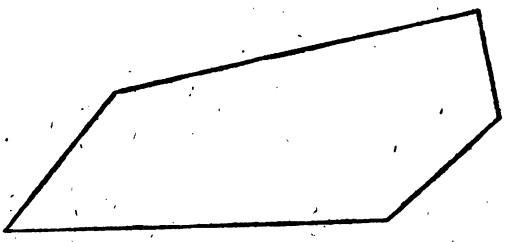
32. A Trapezoid is a Trapezium that has two of its sides parallel to each other.



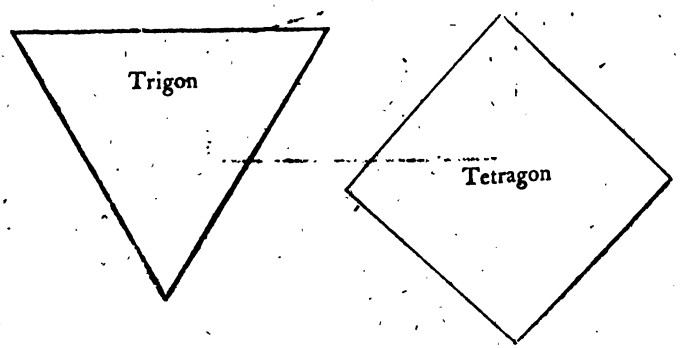
33. A Line drawn from one angle of a figure to another is called the Diagonal.

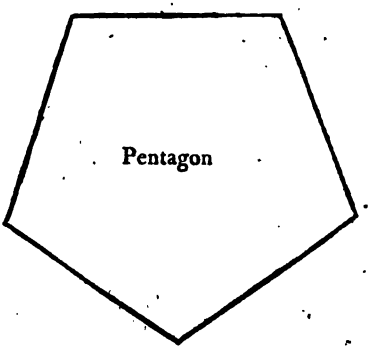


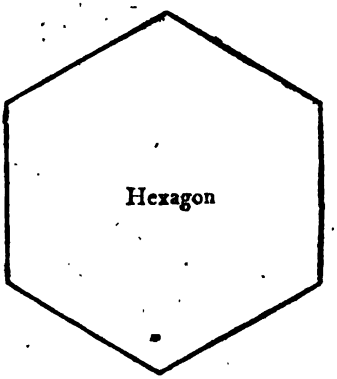
34. All figures contained by more than four sides are called Polygons.

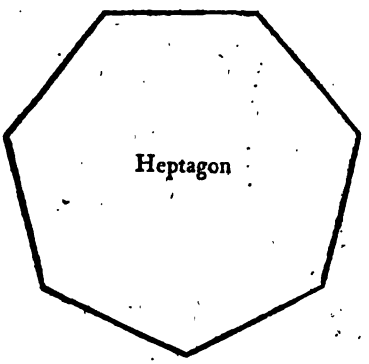


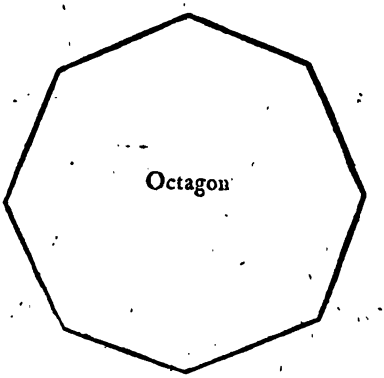
35. All Regular Polygons are named according to the number of lines they are contained by:—

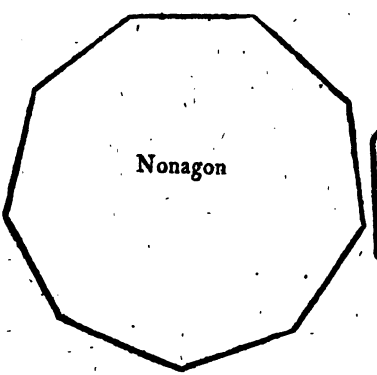


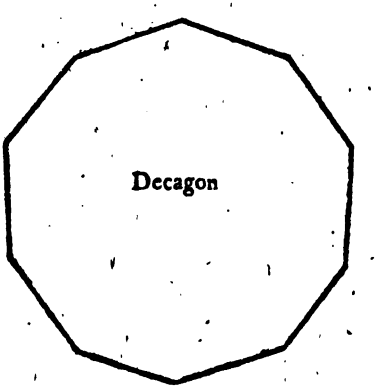

Pentagon


Hexagon


Heptagon


Octagon

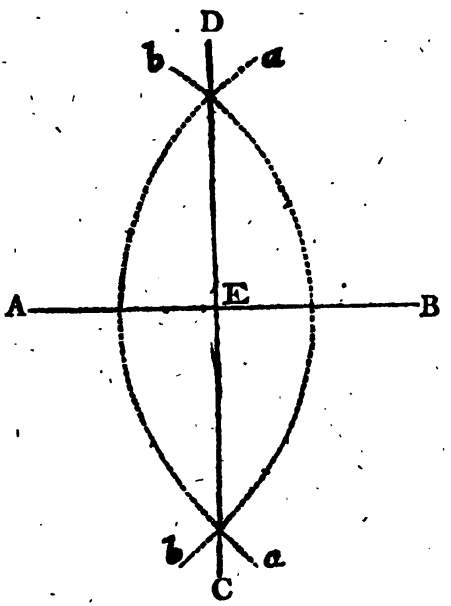

Nonagon


Decagon

PROBLEMS.

PROBLEM I.

To *bisect a given line* A B.



On the centre B with any radius greater that half the line, describe the arc *a a*.

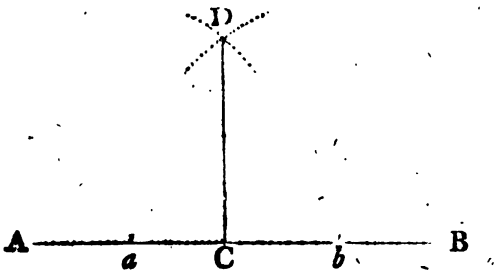
With the same radius, and A as a centre, describe the arc *b b*.

Through the points of intersection draw the line C D, which will divide the given line into two equal parts.

N. B. E D is a perpendicular raised in the middle of the line A B.

PROBLEM II.

To erect a perpendicular from a given point C *in a given right line* A B.



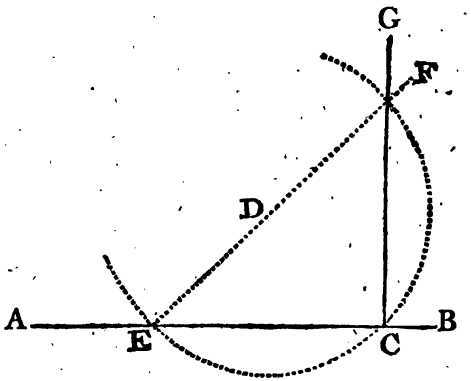
When the given point is near the middle of the line, set off two equal distances from it on the line A B, as C *a* and C *b*.

With any radius greater than *a* C, and *a* as a centre, describe an arc.

With the same radius, and *b* as a centre, describe another arc cutting the former in D.

Draw the line C D, which will be the perpendicular required.

When the given point C *is at the end of the line or near the end.*

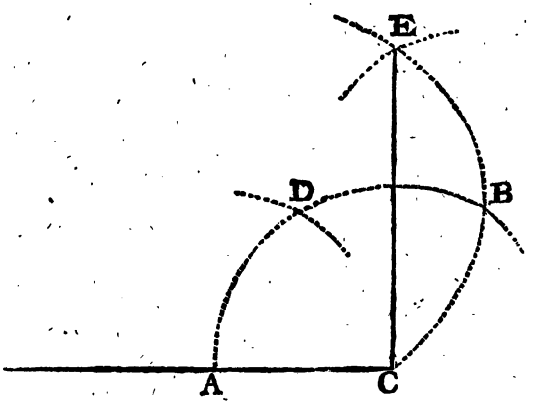


Take any point as D for a centre, and with the radius D C, describe an arc cutting A B in E and C.

Draw the line E F through the point D, cutting the arc in F.

Through the intersection F draw the line C G, which will be the perpendicular required.

Another Method.



With the given point C for a centre, and any convenient radius, describe the arc A B.

With the same radius, and A for a centre, cross the arc in D.

With the same radius, and D for a centre, describe the arc E B C cutting the arc A D B in B.

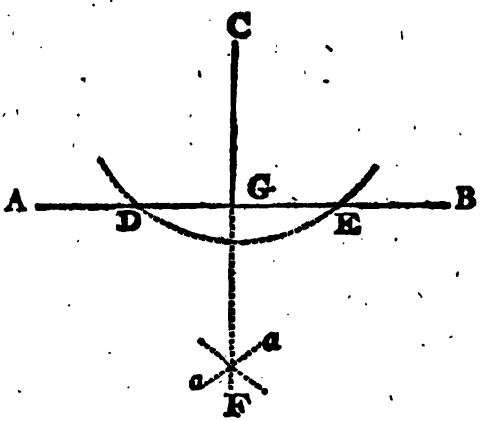
With the same radius, and B for a centre, cross the last arc in E.

Draw the line E C, which will be the perpendicular required.

PROBLEM III.

To let fall a perpendicular from a given point C, *on a given right line* A B.

CASE I.—*When the point is nearly opposite the middle of the line.*



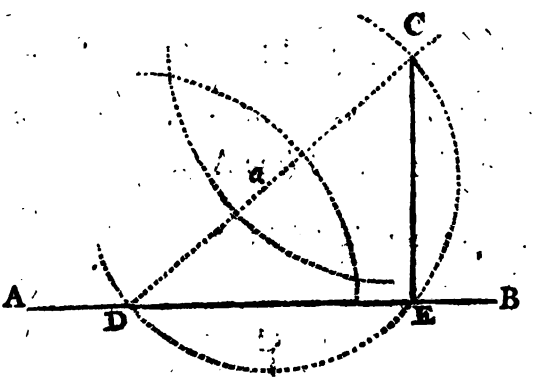
With C as a centre, describe an arc cutting the given line in two places, D and E,

With D as a centre, and a radius longer than D G, describe the arc *a a*.

With the same radius, and E as a centre, describe an arc cutting the first in F.

Draw the line C F.——C G is the perpendicular required.

CASE II.—*When the given point* C *is nearly opposite the end of the line.*



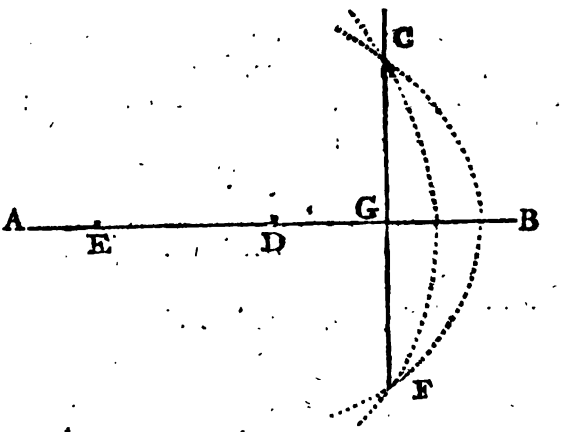
From the point C, draw a line touching the given line in D.

Bisect C D in *a*.

With the radius *a* C, and *a* as a centre, describe the arc C E D.

Draw the line C E, which will be the perpendicular required.

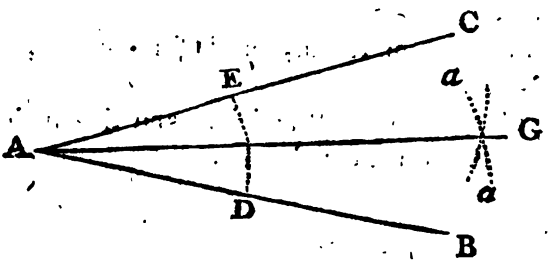
ANOTHER METHOD.



Take two points D and E, in the given line.
On D, with the radius D C, describe an arc.
On E, with the radius E C, describe another.
Through the points of intersection C and F draw a line.——C G will be the perpendicular required.

PROBLEM IV.

To divide a given angle BAC *into two equal parts.*



On the centre A; describe the arc D E.

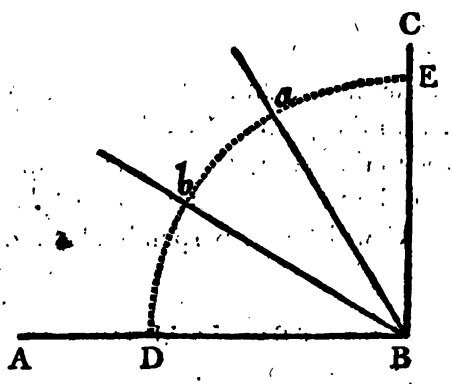
On the centre D, with any radius longer than half of D E, describe the arc *a a*.

On the centre E, with the same radius, describe another arc cutting the former in G.

Draw the line A G, which will divide the angle B A C into two equal parts.

PROBLEM V.

To divide a right angle A B C, *into three equal parts.*



With B for a centre, describe an arc D E.

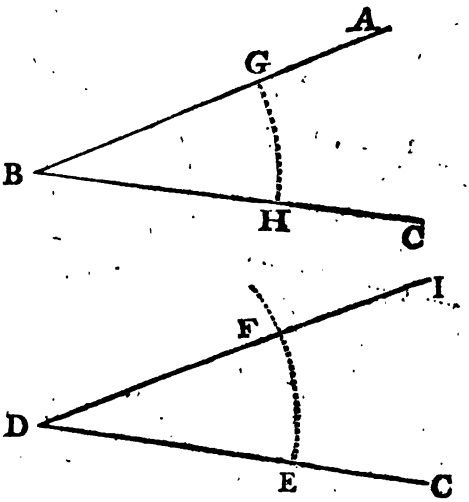
With the same radius, and E for a centre, cross the arc in *b*.

With the same radius, and D for a centre, cross the arc in *a*.

Draw the lines *a* B and *b* B, and the angle will be divided into three equal parts.

PROBLEM VI.

To make an angle equal to a given angle A B C.



Draw the line C D.

With D for a centre, draw an arc E F.

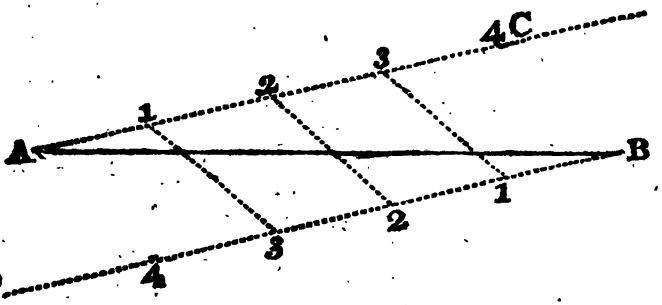
With the same radius, and B for a centre, draw the arc G H.

Set the distance G H off from E to F.

Through F, draw the line D I, and you will have the angle required.

PROBLEM VII.

To divide a given line A B *into any number of equal parts.*



Draw the line A C.

Make an angle at B, equal to that at A.

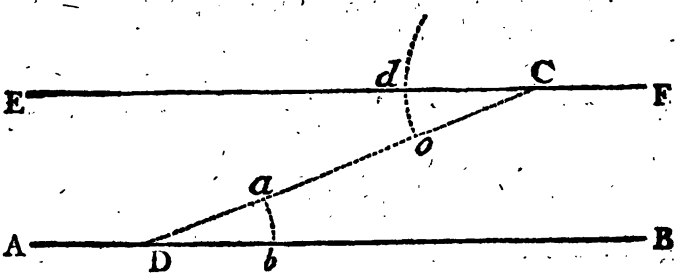
With any convenient distance, set off the number of parts required (suppose 4,) from A towards C.

With the same distance, set off the number of parts from B towards D.

Draw the lines (1. 3) 2. 2) &c. which will divide the line AB as was required.

PROBLEM VIII.

To draw a line parallel to a given line A B, *which shall pass through a given point* C.



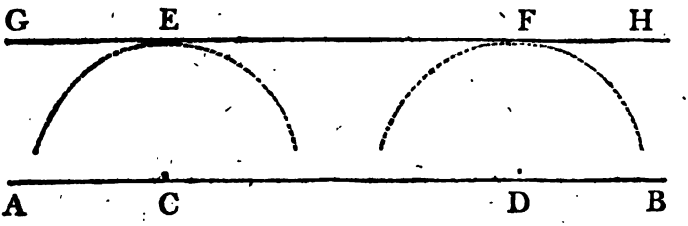
Take any point D, in the line A B, and draw the line D C.

Make the angle E C D equal to C D B.

The line E F will be parallel to A B.

PROBLEM IX.

To draw a line parallel to a given line, at a given distance.



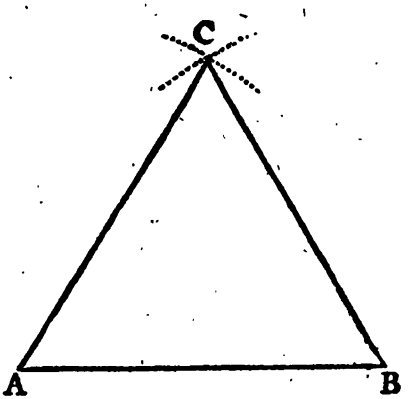
Take two points C and D, in the given line.

Take the given distance for a radius, and with C and D as centres, describe the arcs E and F.

Draw the line G H, touching both arcs without cutting them, which will be parallel to A B.

PROBLEM X.

Upon a given right line **A B**, *to make an equilateral Triangle.*



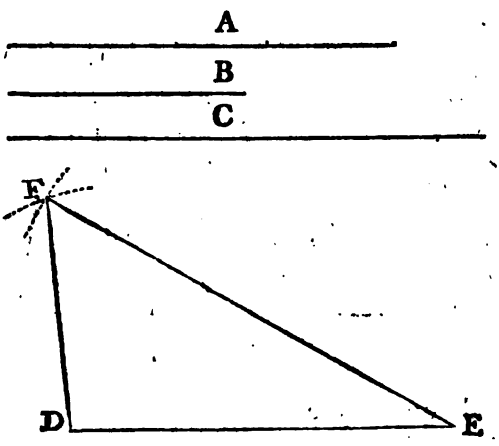
With the radius A B, and A as a centre, describe an arc.

With the same radius, and B as a centre, cross the first arc in C.

Draw the lines C A and C B, which will complete the triangle A B C.

PROBLEM XI.

To make a Triangle whose three sides shall be equal to three given straight lines, if any two of the given lines are greater than the third. Let A, B, C, *be the three given lines.*



Draw the line D E, equal to A.

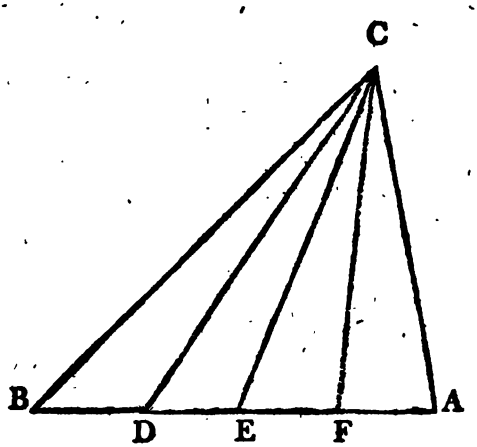
With a radius equal to B, and D as a centre, describe an arc.

With a radius equal to C, and E as a centre, cross the first arc in F.

Draw the lines F D, F E, which will complete the triangle required.

PROBLEM XII.

To divide a given Triangle A B C, *into any number of equal parts, (suppose* 4.)

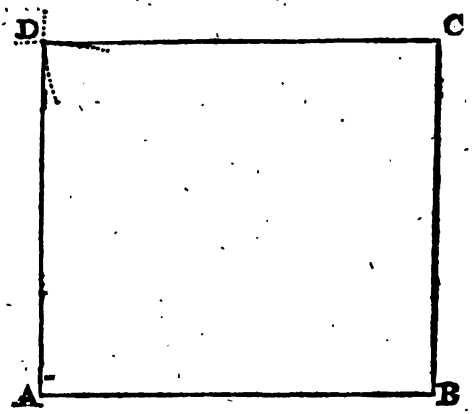


Divide one of the sides into as many equal parts as the triangle is to be divided into.

Draw lines from the opposite angle to the points of division D, E, F, which will divide the triangle as was required.

PROBLEM XIII.

To describe a Square, upon a given line A B.



Raise a perpendicular, at one end of the given line.

Make the perpendicular B C, equal to A B.

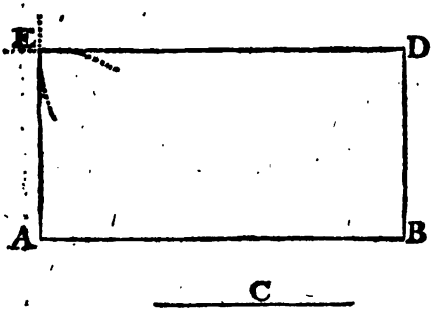
With the radius A B, and C as a centre, describe an arc.

With the same radius, and A as a centre, describe another arc crossing the first in D.

Draw the lines D C, D A, which will complete the Square required.

PROBLEM XIV.

To describe a Rectangle, whose length and breadth shall be equal to two given lines, A B *and* C.



Raise a perpendicular at one end of the longest line, as at B.

Make the perpendicular B D, equal to the shortest line C.

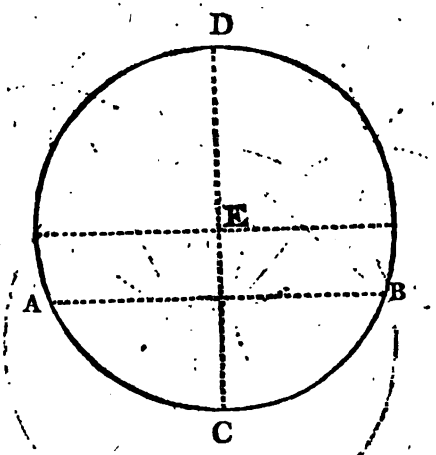
With the radius A B, and D as a centre, describe an arc.

With the radius C, and A as a centre, describe another arc crossing the first in E.

Draw the lines D E and A E, which will complete the Rectangle required.

PROBLEM XV.

To find the Centre of a given circle.

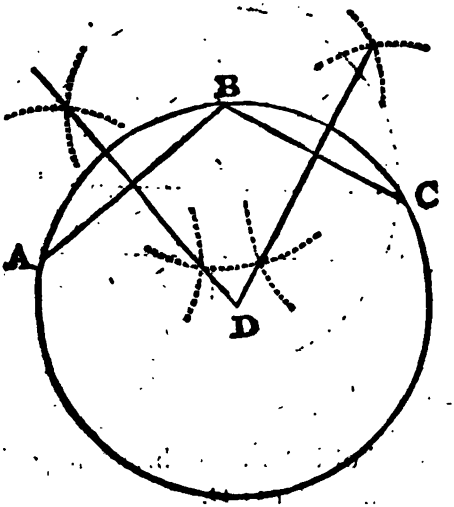


Draw any chord A B, and bisect it at right angles with the perpendicular C D.

Bisect C D in E, which will be the centre of the circle required.

PROBLEM XVI.

Through three given points A, B *and* C, *to describe the circumference of a Circle.*



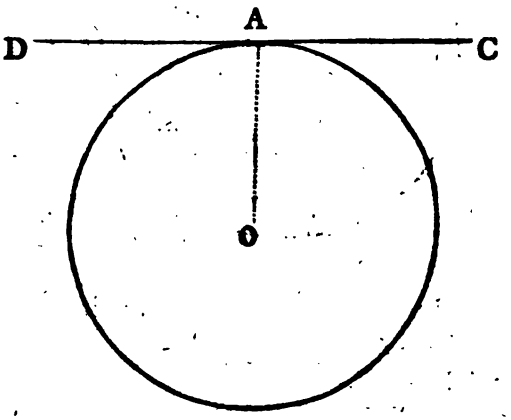
Draw two right lines A B and B C, joining the points A B and B C.

Bisect these two lines with two others drawn at right angles to them, and produce them till they meet in the point D.

With the radius D B, or DC, or D A, and D as a centre, describe a circle which will pass through the points required.

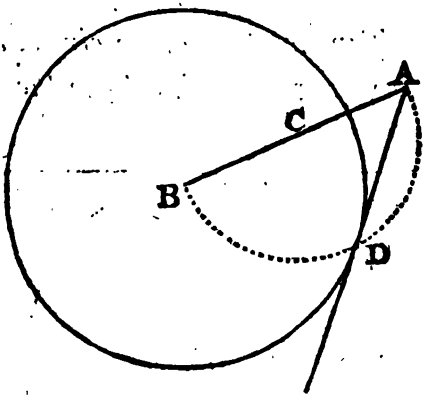
PROBLEM XVII.

To draw a Tangent to a given circle, that shall pass through a given point A, *in the circle.*



Draw the radius A O.
Erect a perpendicular at the end of it A.
Produce the perpendicular to D.
C D, will be the Tangent required.

CASE II.—*When the given point* A, *is without the circle.*



Draw the line A B from the given point, to the centre of the circle B.

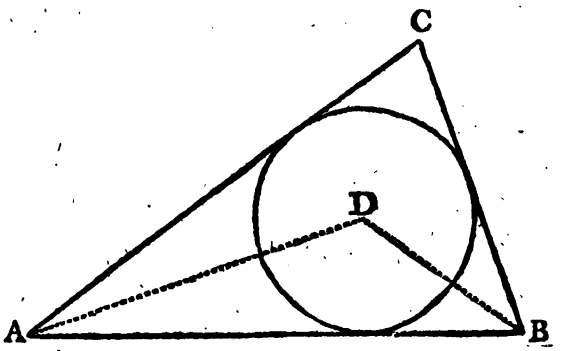
Bisect A B, in C.

With the radius C B or C A, and C for a centre, describe the semicircle A D B, cutting the given circle in D.

Draw A D, which will be the tangent required.

PROBLEM XVIII.

To inscribe a Circle, in a given triangle A B C.

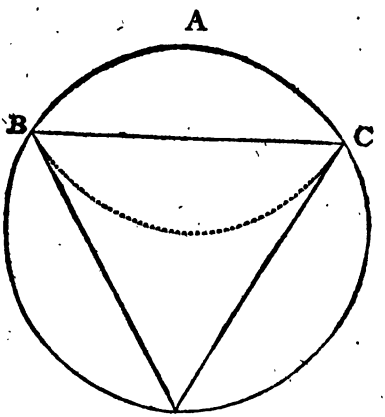


Bisect any two angles with two lines, these lines will intersect in the point D, which is the centre of the Circle.

Set one point of the compasses in D, and open them till the other point will touch any side of the triangle without passing through it; with that radius describe the Circle.

PROBLEM XIX.

To inscribe an Equilateral Triangle, in a Circle.

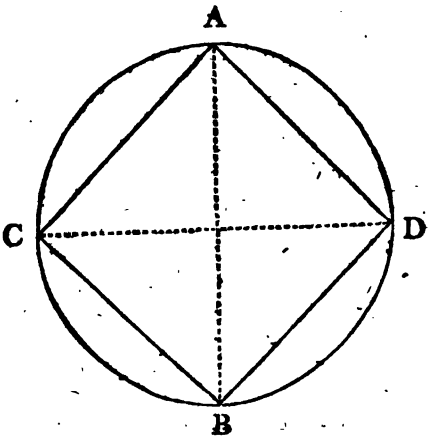


With the radius of the circle, and any point A in the circumference as a centre, describe the arc B C.

Draw the line B C, which will be the side of the Equilateral Triangle required.

PROBLEM XX.

To inscribe a Square, in a given circle **ABCD.**

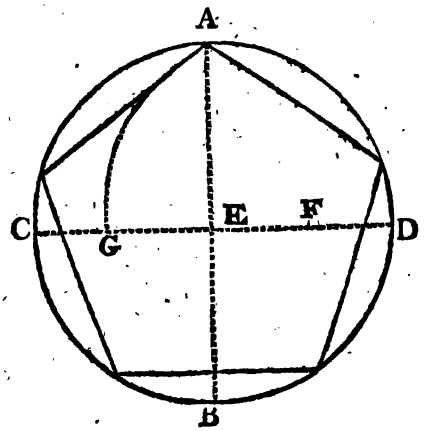


Draw two diameters A B and C D, crossing each other at right angles.

Draw the lines A D, D B, B C and A C, which will form the Square required.

PROBLEM XXI.

To inscribe a Pentagon, in a given circle.



Draw two diameters A B and C D, at right angles.

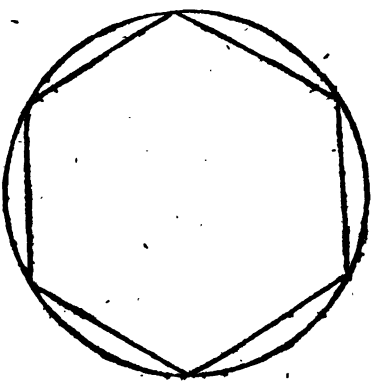
Bisect a radius E D, in F.

With the radius F A, and F as a centre, describe the arc A G.

The distance A G, is the side of the Pentagon required.

PROBLEM XXII.

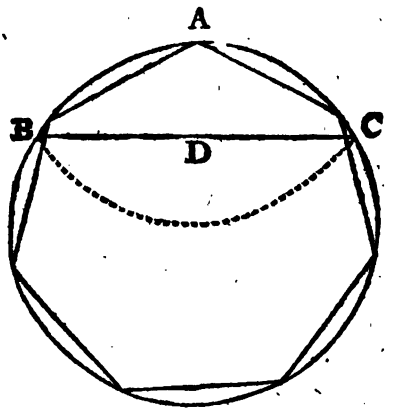
To inscribe an Hexagon, in a given circle.



Take the radius of the circle, and carry six times round the circumference.

PROBLEM XXIII.

To inscribe an Heptagon in a given circle.



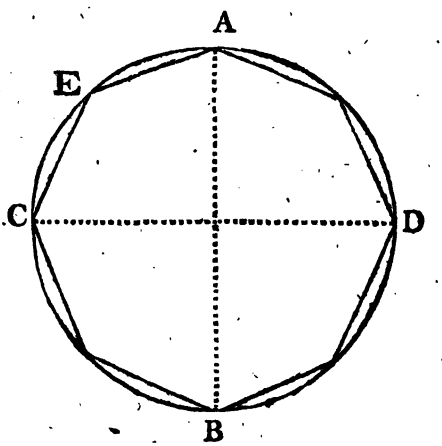
With the radius of the circle, and any point A in the circumference as a centre, describe the arc B C.

Draw the line B C, and bisect it in D.

D B or D C, is the side of the Heptagon.

PROBLEM XXIV.

To inscribe an Octagon, in a given circle.



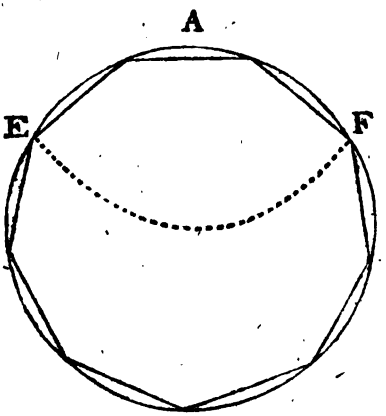
Draw two diameters A B and C D, at right angles.

Bisect the arc A C, in E.

Draw the line A E, which will be the side of the Octagon.

PROBLEM XXV.

To inscribe a Nonagon, in a given circle.



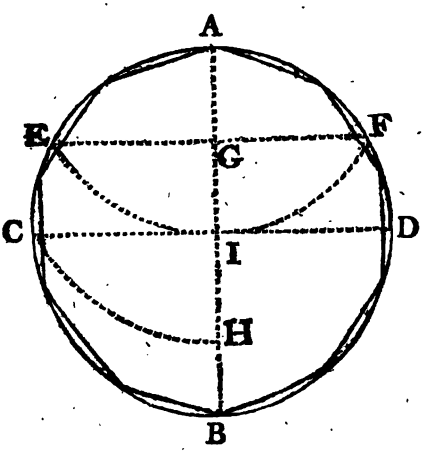
With the radius of the circle, and A as a centre, describe the arc E F.

Divide the arc E A F, into three equal parts.

The chord of any of them will be the side of a Nonagon.

PROBLEM XXVI.

To inscribe a Decagon, in a given circle.



Draw two diameters A B and C D, at right angles.

With the radius of the circle, and A as a centre, describe the arc E F.

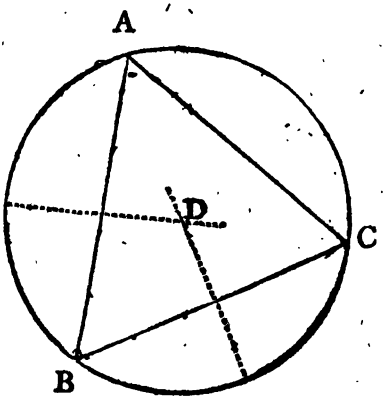
Draw the chord E F.

With the radius G C, and G as a centre, describe the arc C H.

The distance from H to the centre I, is the side of a Decagon.

PROBLEM XXVII.

To describe a circle, about a given triangle **A B C.**

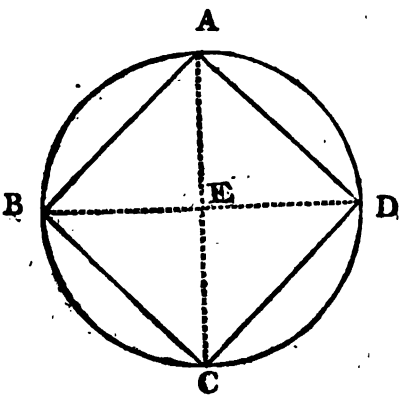


Bisect any two sides with two lines at right angles, these lines will intersect in the point D, which will be the centre of the circle.

With the radius D A, D B, or D C, describe a circle.

PROBLEM XXVIII.

To describe a circle, about a given square, ABCD.



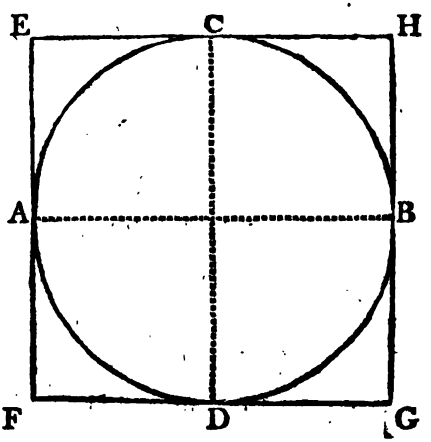
Draw the two diagonals, A C, and B D.

The intersection E is the centre, and the lines A E, B E, C E, and D E are radii, with which draw the circle.

NOTE.—The centres of all regular Polygons, may be found by bisecting two adjoining sides, or two angles with two lines, which will intersect each other in the centre.

PROBLEM XXIX.

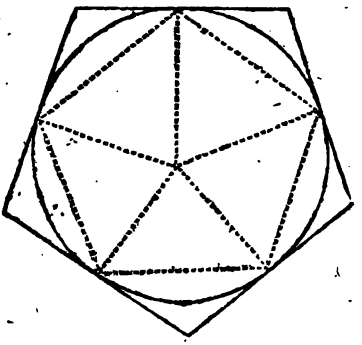
To describe a square, about a given circle.



Draw two diameters A B and C D, at right angles.
Through the point A, draw a line parallel to C D.
Do the same at B.
Through the point C, draw a line parallel to A B.
Do the same at D.
These lines will intersect in the points E F and G H, and form a square.

PROBLEM XXX.

To describe any regular Polygon about a circle.

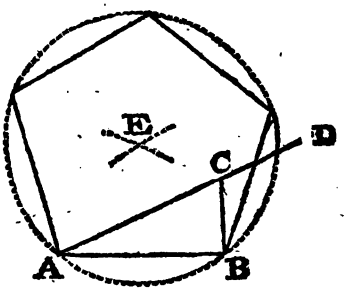


Inscribe a polygon, with the given number of sides in the circle.

Draw tangents to the circle at the angular points, which will intersect each other, and form the Polygon required.

PROBLEM XXXI.

To make a regular Pentagon, on a given line **AB.**



Draw B C perpendicular to A B, and equal to half of it.

Draw A C, and produce it till C D is equal to C B.

With the radius B D, and A as a centre, describe an arc.

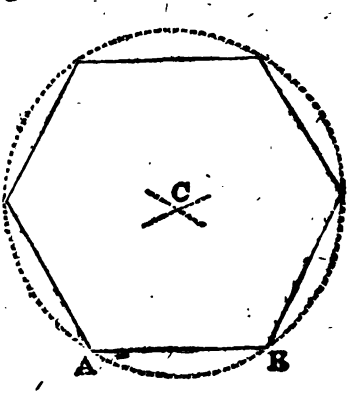
With the same radius, and B as a centre, cross the first arc in E.

With the radius E A or E B, and E as a centre, describe a circle.

Apply the given line five times round the circumference of the circle, and the Pentagon will be formed.

PROBLEM XXXII.

To make a regular Hexagon on a given line **A B.**



With the radius A B, and A as a centre, describe an arc.

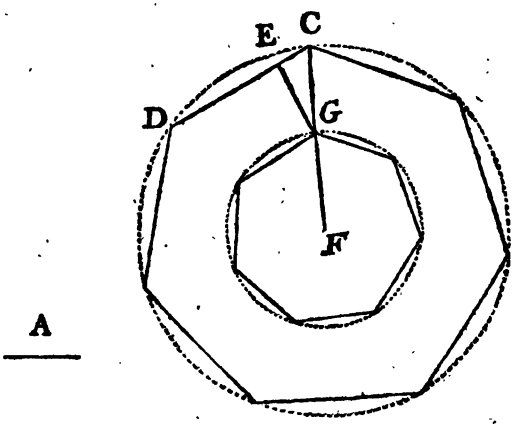
With the same radius, and B as a centre, cross the first arc in C.

With the radius C A or C B, and C as a centre, describe a circle.

Carry the line six times round the circumference of the circle, and the Hexagon will be made.

PROBLEM XXXIII.

To draw an Heptagon, whose sides shall be equal to a given line A.



Inscribe an Heptagon in a circle, larger than the one required.

Draw the radius C F.

Take half the difference of the two sides A and C D, and set off from C to E.

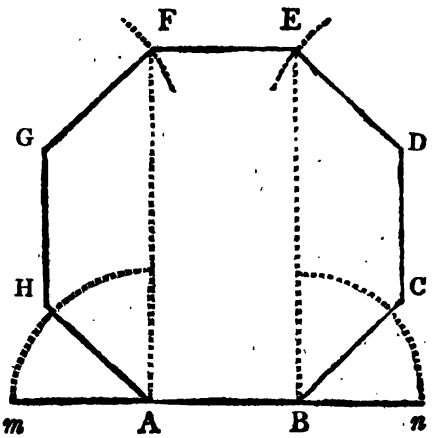
Erect a perpendicular at E, which will cut C F in G.

With the radius G F, and F as a centre, describe a circle, which will admit the line A being carried seven times round it.

NOTE—This rule will do for any other regular polygon.

PROBLEM XXXIV.

On a given line A B, *to describe an Octagon.*



On the ends of the given line A B, erect the indefinite perpendiculars A F and B E.

Produce A B both ways to *m* and *n*.

Bisect the angles *m* A F and *n* B E, with the lines A H and B C.

Make A H and B C each equal to A B.

Draw H G and C D parallel to A F or B E.

Make H G and C D each equal to A B.

On the centre G, with the radius A B, cross the line A F in F.

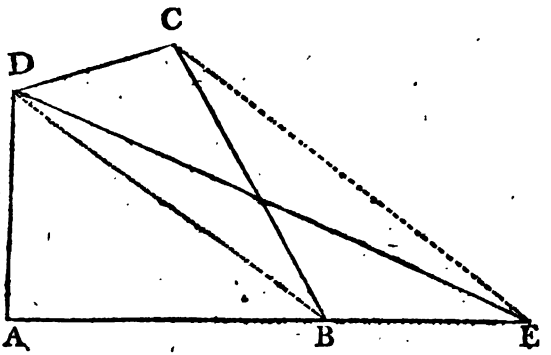
On the centre D, with the same radius, cross the line B E in E.

Draw the lines G F, F E, E D, which will complete the Octagon required.

PROBLEM XXXV.

To reduce any Rectilinear figure which has more than three sides to another equal to it, but with one side less.—For example:

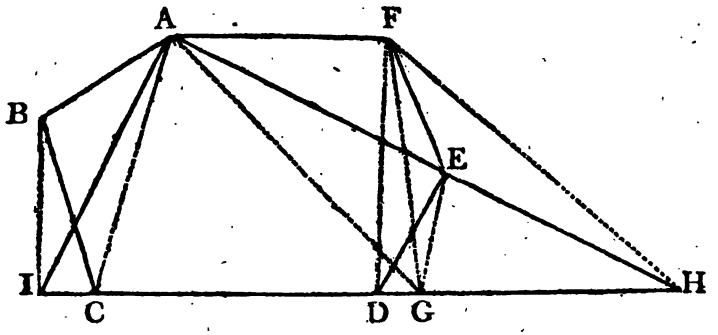
To reduce the Trapezium A B C D *to a Triangle* A D E, *which shall be equal to it.*



Draw the diagonal D B.
Draw C E parallel to D B.
Produce A B till it meets C E in E.
Draw D E.
A D E will be the triangle required.

Hence any rectilinear figure may be reduced to a triangle, by reducing it successively to a figure with one side less, until it is brought to one with only three sides.—For example:

To reduce the Polygon A B C D E F *to a Triangle* I A H *which shall be equal to it.*



Draw the diagonal D F.

Draw E G parallel to D F till it meets C D produced.

Join F G.

The polygon A B C G F is equal to the given one A B C D E F.

To reduce A B C G F.

Draw A G.

Draw F H parallel to A G till it meets C G produced.

Join A H.

The Polygon A B C H is equal to the one ABCGF.

To reduce A B C H.

Draw A C.

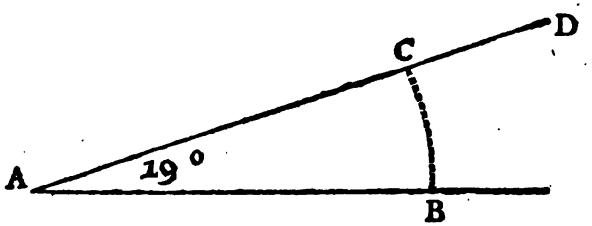
Draw B I parallel to A C till it meets H C produced.

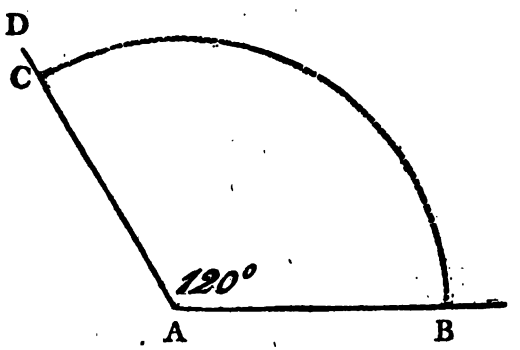
Join A I.

The triangle A H I is equal to the given Polygon A B C D E F.

PROBLEM XXXVI.

To make an angle of any proposed number of degrees.





This and the following problem are easiest to be done by a protractor, for want of which draw the line A B.

Take the first 60 degrees from a scale of chords as a radius, and with A as a centre, describe an arc B C.

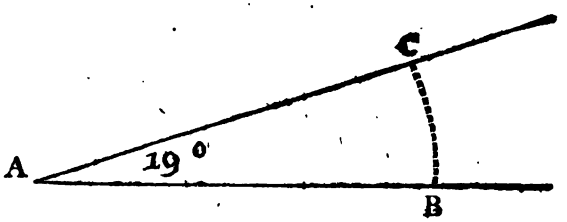
Take the proposed number of degrees from the scale of chords, and set off from B to C.

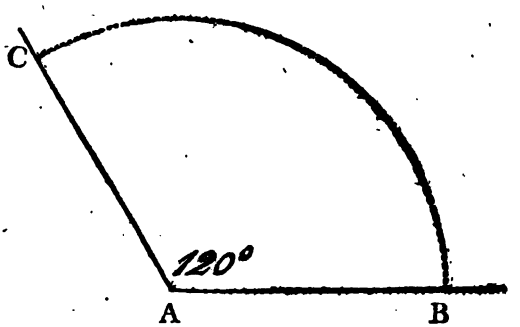
Draw the line A D, and the angle will be formed.

NOTE.—If the angle is to contain more than 90 degrees, it must be taken at twice.

PROBLEM XXXVII.

To find the number of Degrees contained in an angle B A C.





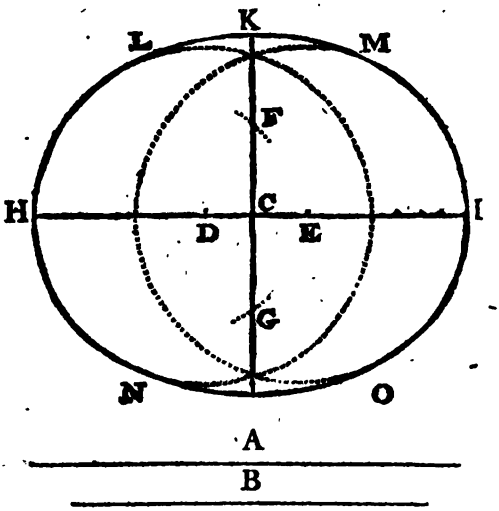
With A for a centre, and a chord of 60 degrees for a radius, describe the arc B C.

Take the distance B C and apply to the scale of chords, which will show the number of degrees.

NOTE.—If the angle contains more than 90 degrees it must be taken at twice.

PROBLEM XXXVIII.

To draw an Oval, whose two diameters shall be equal to two given lines, A *and* B.



Draw two diameters equal to the two given lines, crossing each other in the middle at right angles.

Take two thirds of the difference of the diameters, and set off from the point of intersection C, on each side the longest line at D and E.

With the radius D E, and D or E as a centre, cross the shortest diameter in F and G.

With the radius D H, and D as a centre, describe a circle.

With the same radius, and E as a centre, describe another circle.

With the radius G K, and G as a centre, describe the arc L M.

With the same radius, and F as a centre, describe the arc N O, which will complete the Oval required.

PART THE SECOND.

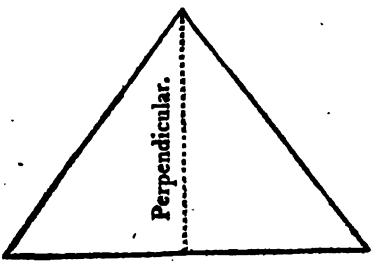
TO MEASURE LAND,

And find the *content* without *plotting*, or using *a chain.*

ANY person by half an hour's practice can ascertain what length in yards he passes over, in stepping an hundred paces, and by that means can find the length of any line, by walking over it, near enough for common occasions. This being allowed:

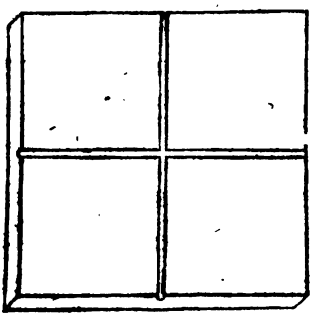
The next thing necessary to be understood, is some of the properties of a Triangle.

The lower side is called the base, and a line drawn from the angle opposite the base, and falling upon it at right angles, is called a perpendicular.

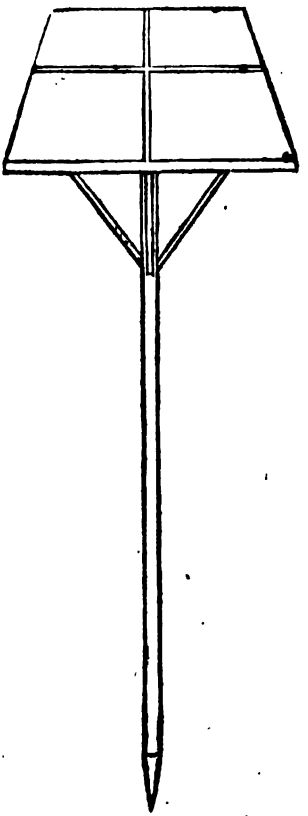


If these two be multiplied together, and the Product divided by 2, the Quotient will be the Content.

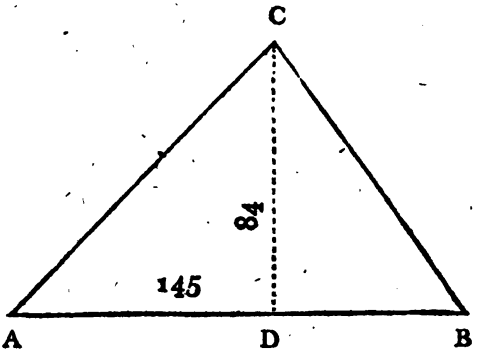
The length of the Base is easily measured, the only difficulty is in getting a true Perpendicular, to effect which procure a cross, which may be made of a square piece of wood, with two grooves cut across it at right angles.



This must be fastened on a Staff about 4 feet long.



To survey the triangle A B C.



Place marks at A B and C.

Measure from A towards B till you think you are opposite the mark at C, there place the cross at D, apply your eye to one end of the groove, and turn the cross till it is in such a position that you can see the mark at A, and the mark B when you look through the other end. Look through the other groove, if you can see the mark at C you are in the right place to measure the perpendicular; if you cannot see it you must move the cross backwards or forwards, till you are in a position to see the three marks through the grooves without moving the cross.

Allow the length of the Base to be 145 yards, and the perpendicular 84 yards, the content is found thus:

145 Base
84 Perpendicular

580
1160

2) 12180

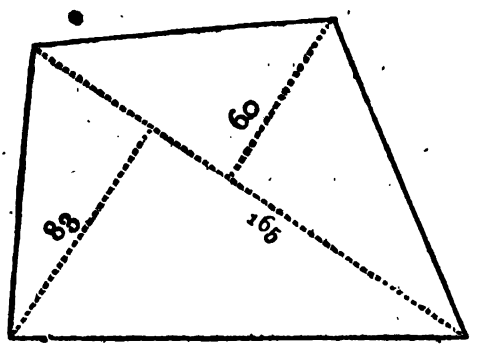
6090 Content in Yards.

Divide the content in yards by 4840, (the number of Square Yards in an Acre,) the quotient will be acres, the remainder, if any, multiply by 4, and divide as before, the quotient will be roods; multiply the remainder by 40, and divide as before, the quotient will be poles, thus:

```
484,0) 609,0 (1 Acre,)
       484
       ---
       125
         4
       ---
 484) 500 (1 Rood
      484
      ---
       16
       40
      ---
 484) 640 (1 Pole
      484
      ---
      156
```

	A	R	P
Content	1	1	1

To survey a Field with four sides.



Measure a diagonal across it, which will divide it into two triangles, and measure a perpendicular to each triangle.*

To find the Content.

RULE.—Add the perpendiculars together, multiply by the diagonal and divide by 2, the quotient will be the content in yards, which divide by 4840, &c. as before.

* NOTE. Every Trapezium will admit of two Diagonals, it is best to choose the longest.

60 } Perpendiculars
83 }

143
165 Base

715
2288

2) 23595

4840) 11797 (2 Acres
9680

2117
4

4840) 8468 (1 Rood
4840

3628
40

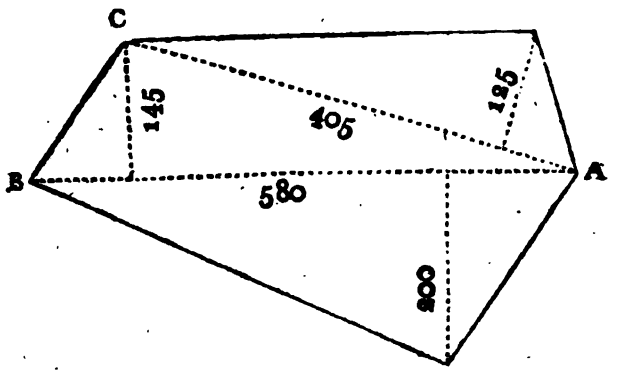
484,0) 14512,0 (29 Perches
968

4832
4356

476

	A	R	P
Ans.	2	1	29

The contents of other Fields may be found by dividing them into Triangles, and proceeding as in the two last examples.



In the above figure measure two diagonals A B and A C and three perpendiculars, two fall on the diagonal A B, which add together and multiply by the diagonal, &c. as in the last example; the other perpendicular falls on the diagonal A C, which proceed with as in the first example, the two areas will be yards, which add together and divide by 4840 as before.

200 } Perpendiculars 125 Perpendicular
145 } 405 Base

345 625
580 Base 5000

27600 2) 50625
1725 25312

2) 200100

100050 Area of the 2 Triangles
25312 Area of the 1 Triangle

4840) 125362 (25 Acres
9680

28562
24200

4362
4

4840) 17448 (3 Roods
14520

2928
40

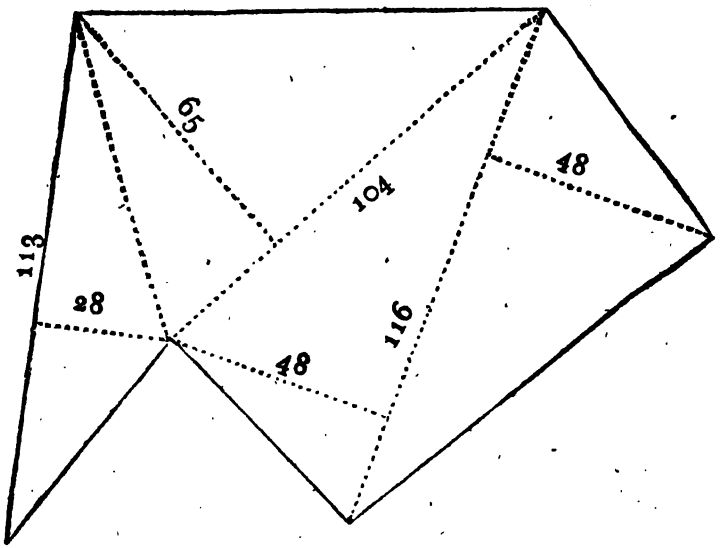
484,0) 11712,0 (24 Perches
968

2032
1936

96

A R P
Ans. 25 3 24

What is the Content of the following Field?



48 } Perpendiculars
48 }

96
116 Base

696
1044

11136
6760
3164

2) 21060

484,0) 1053,0 (2A
968

85
4

340 (0R
40

484) 13600 (28P
968

3920
3872

48

65 Perpendicular
104 Base

520
624

6760

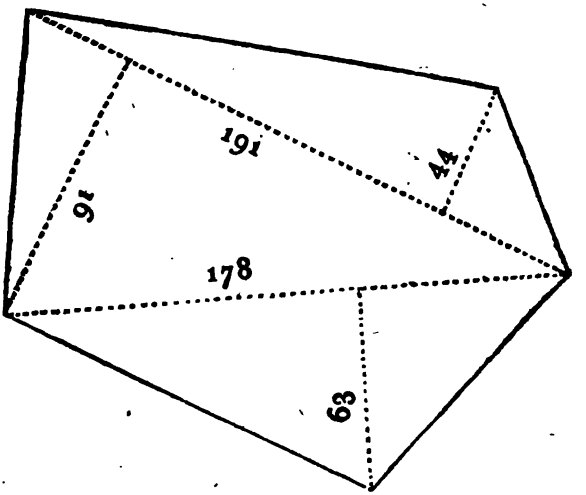
28 Perpendicular
113 Base

364
28

3164

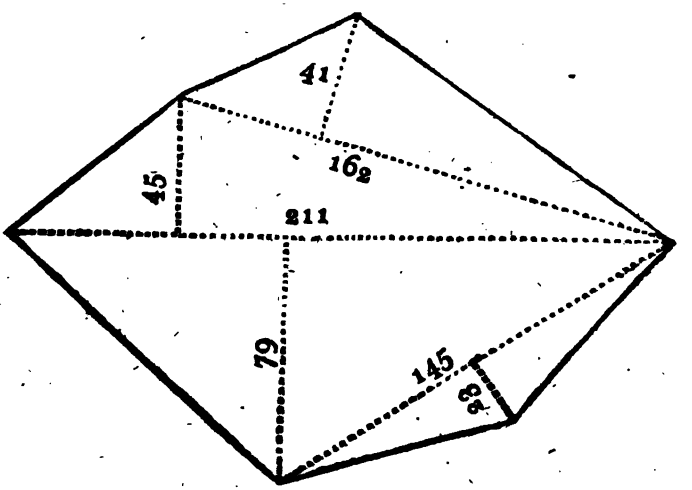
	A	R	P
Ans.	2	0	28

The Content of the following Field is required.



A R P
Content 3 3 11

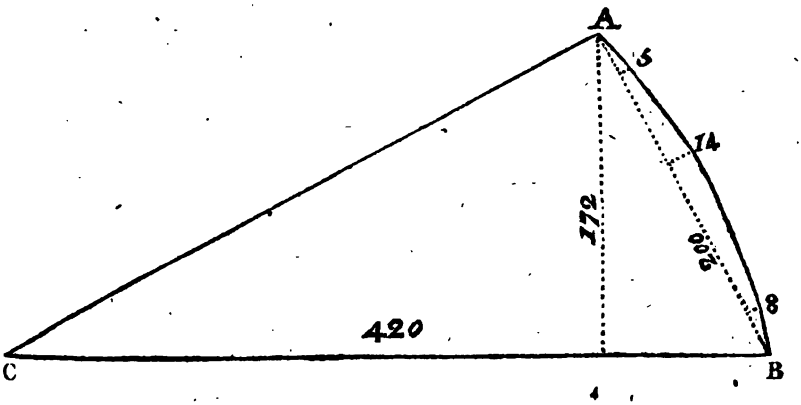
The Content of the following Field is required.



A R P
Content 3 2 37

When the Fences are not straight, observe the following directions.

If they have regular curves as A B, proceed in a straight line from A to B, and every 40 or 50 yards take the distance from the straight line to the fence, as 5, 14, &c. these are called Offsets.



Rule for finding the Area of Offsets. Set each offset down twice, except the first and last, which set down once, add them together, and multiply by the straight line, divide the product by the number of offsets set down, the quotient will be the content in yards, let this be added to the area of the triangles, and divide by 4840, &c.

Note. The foregoing Rule will do very well for rough calculations, but a more correct one, though not so expeditious, is given in Part the Third.

172
420

3440
688

2) 72240

36120 Area of Triangle
1350 Area of Offsets

484,0) 3747,0 (7A
3388

359
4

484) 1436 (2R
968

468
40

484) 18720 (38P
1452

4200
3872

328

0
5
5
14
14
8
8
0

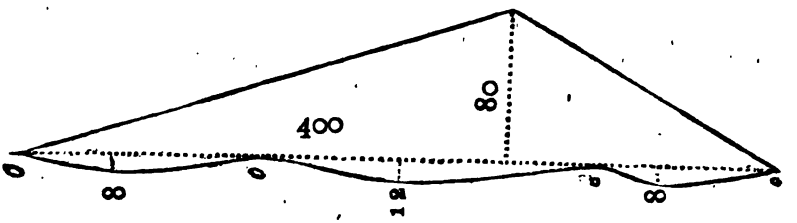
54
200

8) 10800

1350 Yards, Area of Offsets

A R P
Ans. 7 2 38

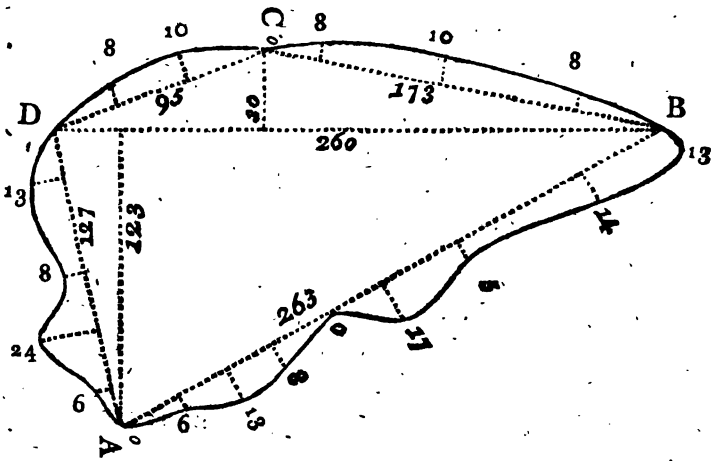
If the Fence has not a regular curve, take the distance at every remarkable bend, thus:



400	Base	0
80	Perpendicular	8
		8
2) 32000		0
		0
16000		12
1866	Area of Offsets	12
		0
4840) 17866 (3 A		0
14520		8
		8
3346		0
4		
		56
4840) 13384 (2 R		400
9680		
		12) 22400
3704		
40		1866
484,0) 14816,0 (30 P		
1452		
296		

	A	R	P
Ans.	3	2	30

The Content of the following Field is required.



123
30

153
260

9180
306

2) 39780

19890

Offsets { 2284 = AB
1295 = DA
570 = CD
1124 = BC

4840) 25163 (5 A
24200

963
4

3852 (0 R
40

484,0) 15408,0 (31 P
1452

888
484

404

A B
13
14
14
5
5
17
17
0
0
8
8
13
13
6
6
0

139
263

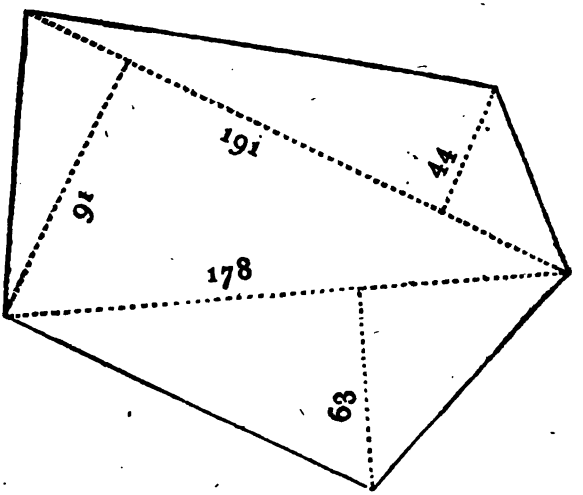
417
834
278

4) 36557

4) 9139

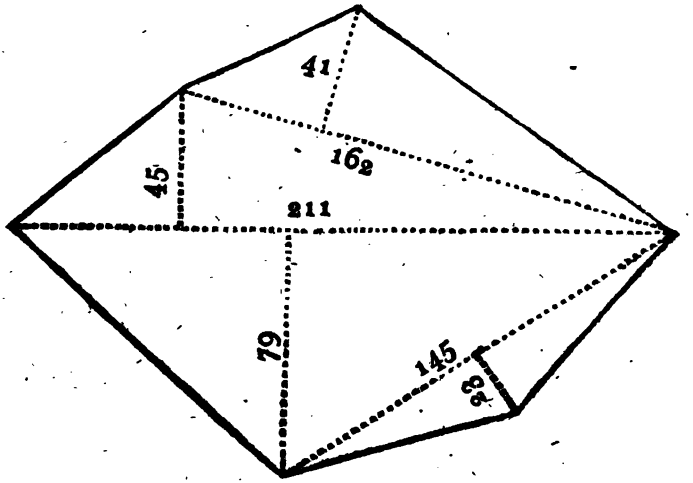
2284

The Content of the following Field is required.



	A	R	P
Content	3	3	11

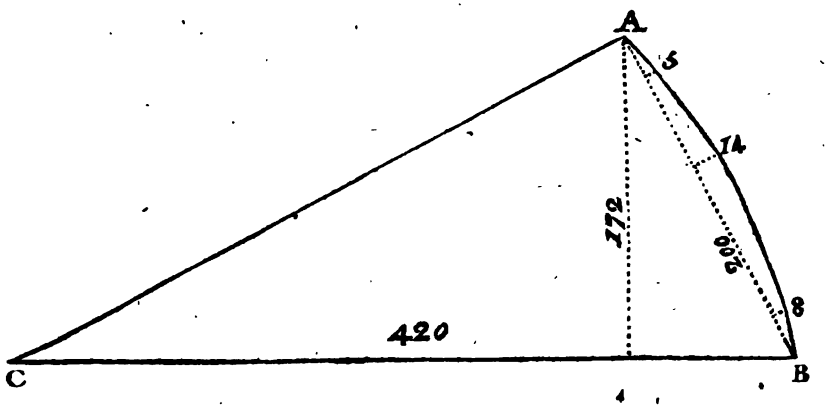
The Content of the following Field is required.



	A	R	P
Content	3	2	37

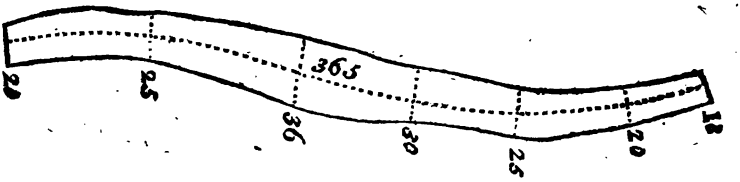
When the Fences are not straight, observe the following directions.

If they have regular curves as A B, proceed in a straight line from A to B, and every 40 or 50 yards take the distance from the straight line to the fence, as 5, 14, &c. these are called Offsets.



Rule for finding the Area of Offsets. Set each offset down twice, except the first and last, which set down once, add them together, and multiply by the straight line, divide the product by the number of offsets set down, the quotient will be the content in yards, let this be added to the area of the triangles, and divide by 4840, &c.

Note. The foregoing Rule will do very well for rough calculations, but a more correct one, though not so expeditious, is given in Part the Third.

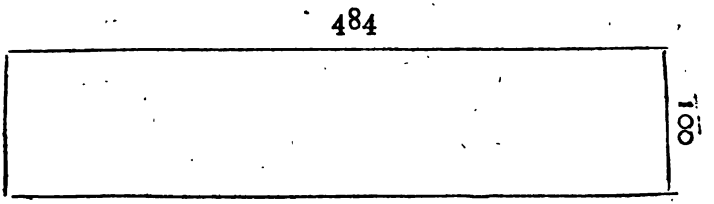


18	310
20	365
20	
25	3650
25	1095
30	
30	12) 113150
36	
36	4840) 9429 (1 A
25	4840
25	
20	4589
	4
310	
	4840) 18356 (3 R
	14520
	3836
	40
	484,0) 15344,0 (31 P
	1452
	824
	484
	340

A R P

Ans. 1 3 31

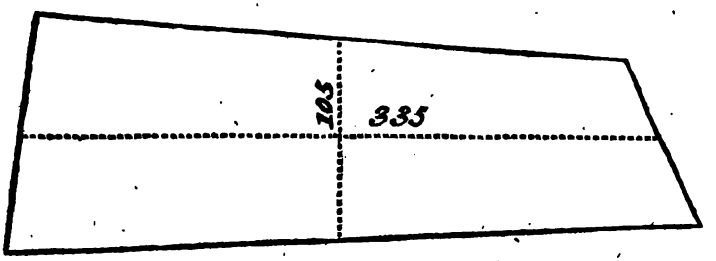
If a piece of land is of a regular width from one end to the other, multiply the length by the breadth, the product will be the Area.



484
100

4840) 48400 (10 Acres
48400

If the Fences are straight, but the Field wider at one end than the other, measure the length and breadth across the middle, which being multiplied together, will give the Area.



335
105

1675
3350

4840) 35175 (7 Acres
33880

1295
4

484,0) 518,0 (1 Rood
484

34
40

484) 1360 (2 Perches
968

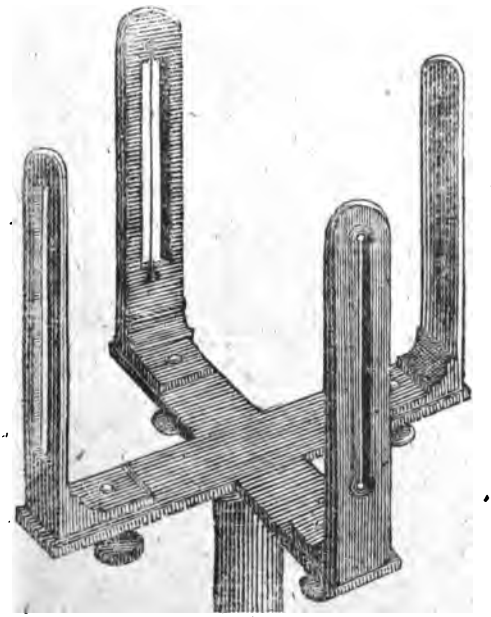
392

	A	R	P
Ans.	7	1	2

PART THE THIRD.

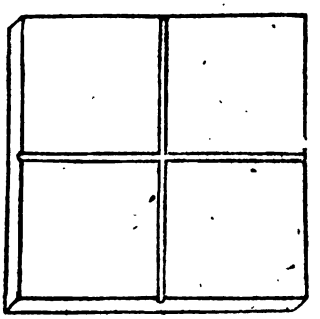
To Survey with the Chain and Cross.

PROCURE a Surveying Chain, which must contain 100 links, and be 22 yards, or 4 poles in length; 10 iron rods about 2 feet long of thick wire, fixed in wooden handles painted red. An Offset-staff 10 links long, divided into links. Several staffs about 6 feet long for marks. A Cross, which consists of 2 pair of sights placed at right angles to each other, and strongly fixed on a brass cross:

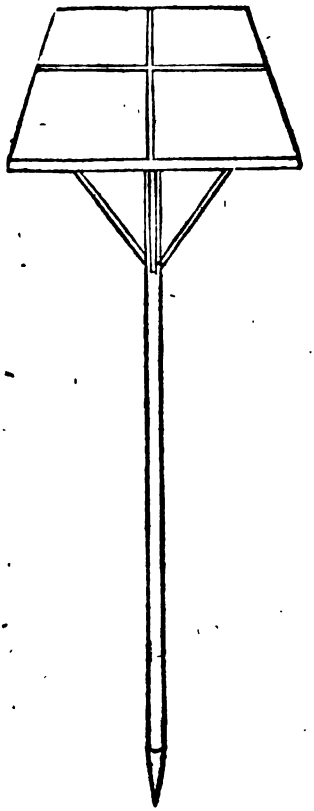


this when in use, is screwed on a staff about $4\frac{1}{2}$ feet long, having a sharp point at the bottom to stick in the ground; the four sights screw off, to make the Instrument convenient for the pocket; and the staff unscrews into three parts to go into a portmanteau. The accuracy of this Instrument depends on the sights being exactly at right angles to each other:—It may be proved by looking at one object through two of the sights, and observing at the same time, without moving the instrument, another object through the other two sights; then turning the cross upon the staff, look at the same objects through the opposite sights: if they are accurately in the direction of the sights it is correct.

An inferior instrument, as described in Part II, may be made of a square piece of wood, with two groves cut in it at right angles:

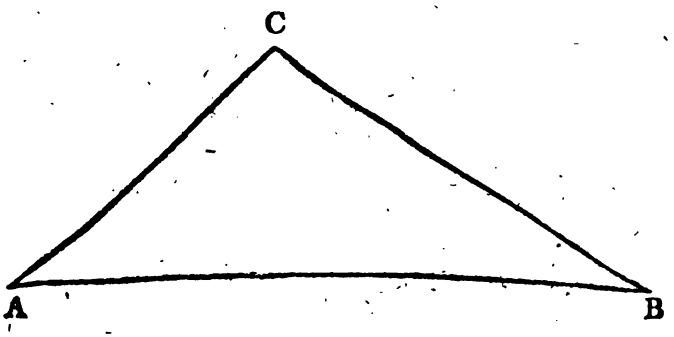


this must be fastened on a staff of the same length as the other.



To survey the Triangle A B C.

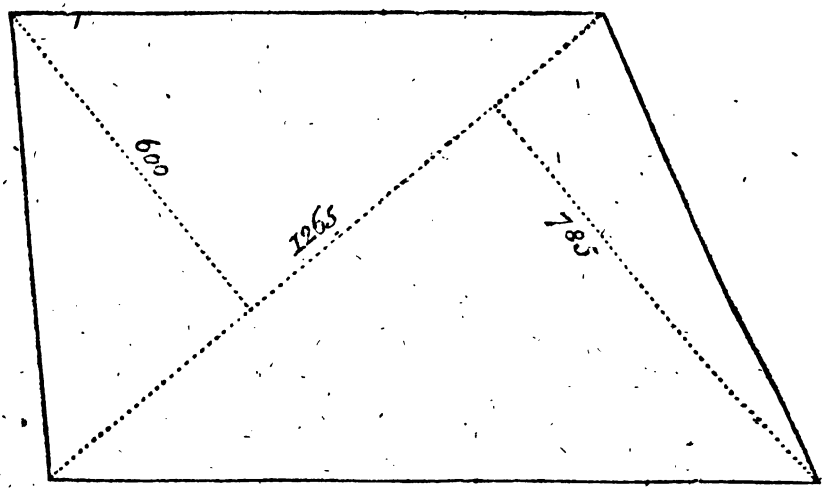
Draw a rough sketch in the field-book, thus,



To find the Content.

Add the two perpendiculars together, multiply by the diagonal, and divide by 2, the quotient will be the content in links, which divide by 100000 &c. as before.

What is the Content of the following Field?



600 } Perpendiculars
785 }
1385

1385 } Diagonal
1265

6925
8310
16620

2) 1752025

8,76012
4

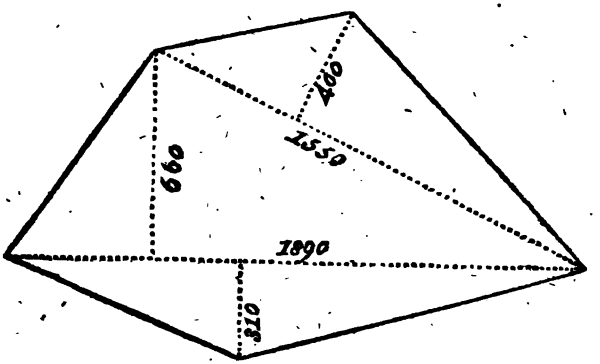
3,04048
40

1,61920

	A	R	P
Ans.	8	3	1

All other Fields may be surveyed by dividing them into Trapeziums and Triangles, and their Contents found as in the two last examples.

The Content of the following Field is required.



1550
400

620000

660
310

970
1890

132300
17010

1833300
620000

2) 2453300

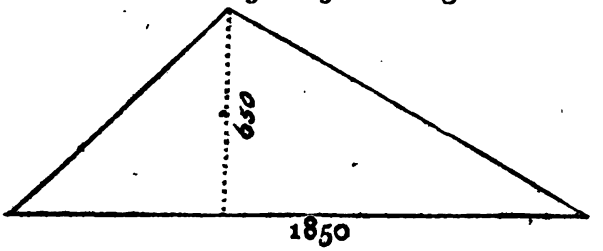
12,26650
4

1,06600
40

2,64000

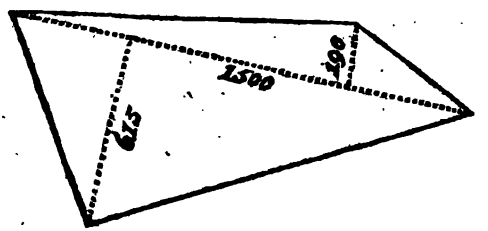
A R P
Ans. 12 1 2

What is the Content of the following Field?



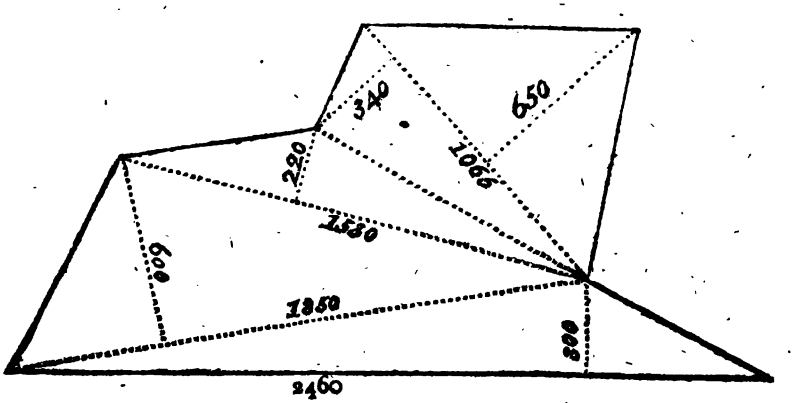
A R P
Ans. 6 0 2

What is the Content of the following Field?



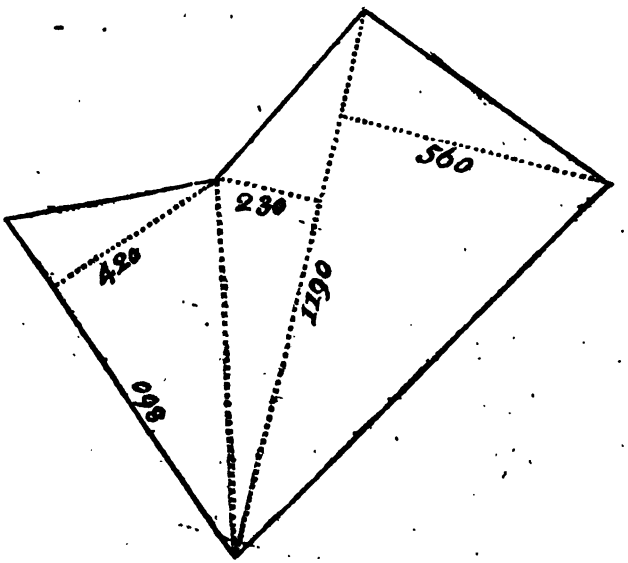
A R P
Ans. 6 0 6

Required the Content of the following Field.



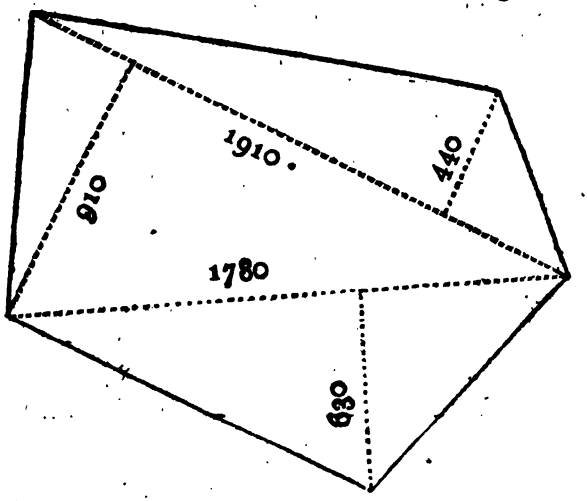
A R P
Ans. 16 0 31

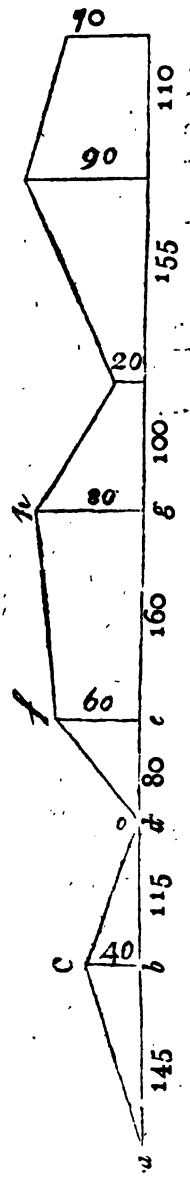
What is the Content of the following Field?



	A	R	P
Ans.	6	2	1

The Content of the following Field is required.





When a Boundary is not straight, a straight line must be measured as near to it as can be, and offsets measured in a perpendicular direction from the chain line to the boundary, at every angle or corner.

The offsets will form right angled triangles, as *a b c*, or trapezoids as *e f g h*.

Rule for computing the Contents of Offsets.

For a triangle, multiply the perpendicular and base together, and for a trapezoid multiply the sum of the two perpendiculars by the base, add all the products together and divide by 2, the quotient will be the content.—NOTE. When one perpendicular belongs to two triangles, as *b c*, treat them as one triangle, and multiply *a d* into *b c*.

In measuring a line which has offsets, note down in the rough sketch the distance of each offset, from that end of the line you began to measure from.

The length of each base may then be found, by substracting the first distance from the second, the second from the third, &c. &c. This will be easily understood, by inspecting the annexed figure, and the following work.

90	90	20
70	20	80
160	110	100
110	155	100
17600	17050	10000

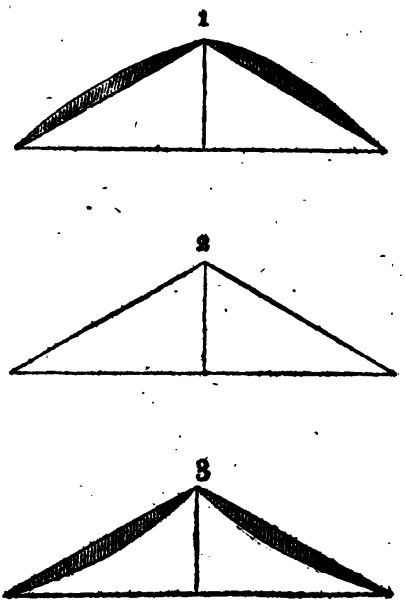
60	60	260
80	80	40
140	4800	10400
160		
22400		

17600
17050
10000
22400
4800
10400

2) 82250

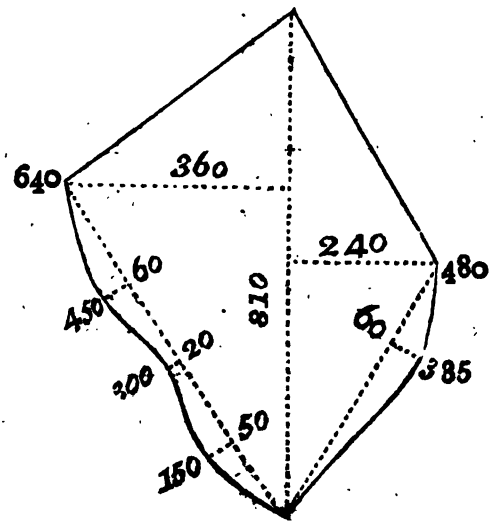
41125 Content in Links.

The foregoing rule will produce the exact content when the angles are formed with straight lines; but if the lines are curved ones, there will be a little variation, as appears by the three following figures:



which will all produce the same content; though the first is more than the second, and the third less than the second, by their shadowed parts. See more on this subject, Part the Sixth.

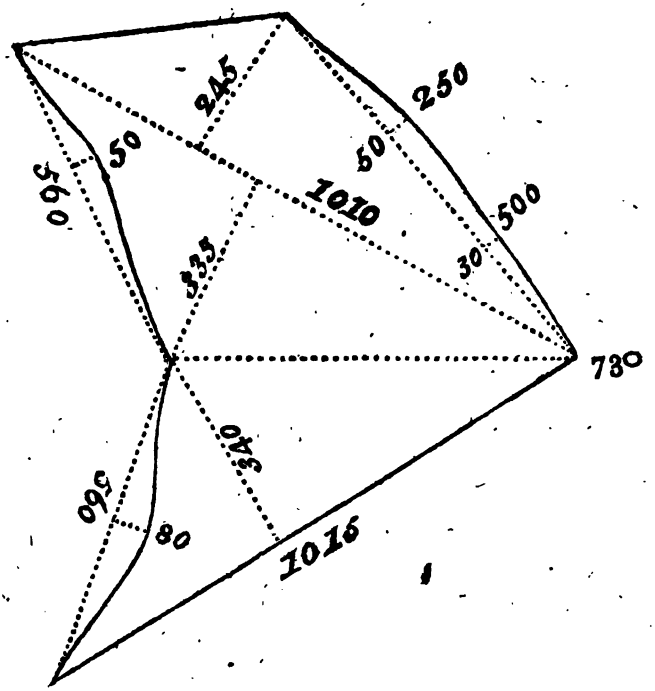
To find the Content of the following Field.



360	60	150	50
240	480	50	20
600	28800	7500	70
810			150
486000			10500
28800			
7500			
10500			
12000			
11400	20	60	
	60	190	
2) 556200			
	80	11400	
2,78100	150		
4			
	12000		
3,12400			
40			
4,96000			

	A	R	P
Ans.	2	3	5

It is frequently most convenient to go out of bounds and measure an offset, which must be subtracted as in the following example:


245
250
50
50
560
1010
500
335
30
730
340
560
80
1016

245	1015	250	50	230
335	340	50	30	30
580	40600	12500	80	6900
1010	3045		250	
5800	345100		20000	
5800				

585800
345100
12500
20000
6900 } Offsets added

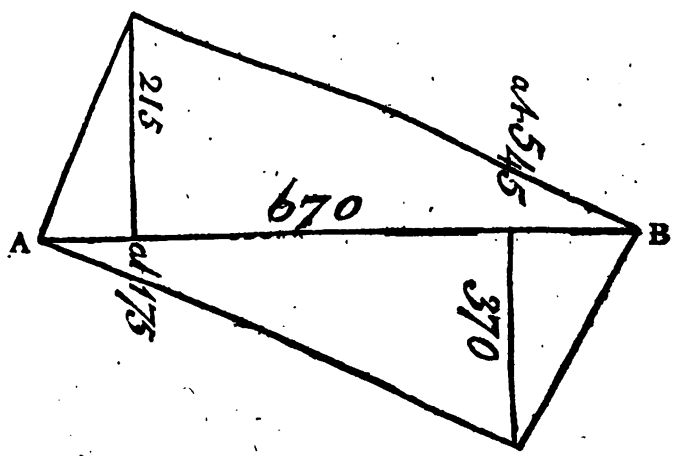
970300
72800 Offsets subtracted

2) 897500	560	560
	80	50
4,48750		
4	44800	28000
		44800
1,9500		
40		72800
38,00		

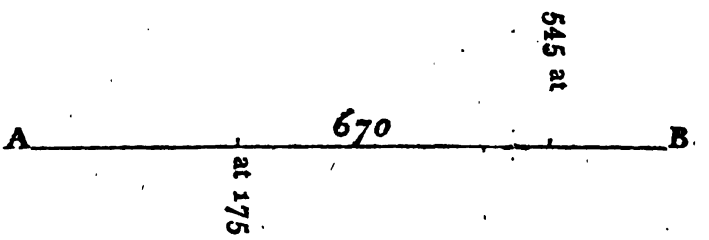
	A	R	P
Ans.	4	1	38

The foregoing rules are designed to find the content of any piece of land, without drawing the plot; but the plot may be drawn from the same memorandums, by noting in what part of the base-line the perpendiculars are raised, thus:

Suppoſe the following rough sketch to be taken in the Field.



With a pair of compasses take the length of the diagonal A B 670 off a plotting scale, and draw it on paper.

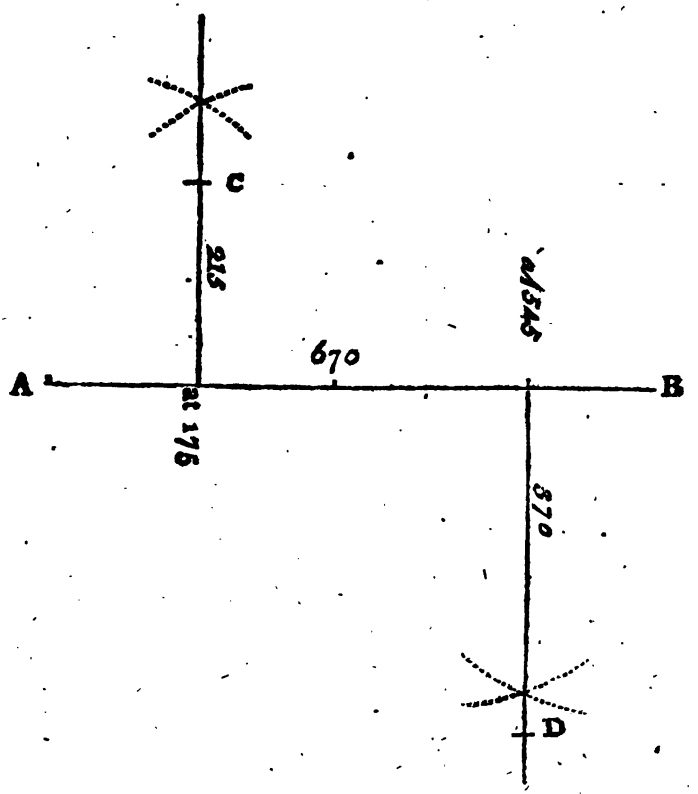


Take the distance of the first perpendicular 175, and set off from A towards B.

Take the distance of the second, and set off in the same manner.

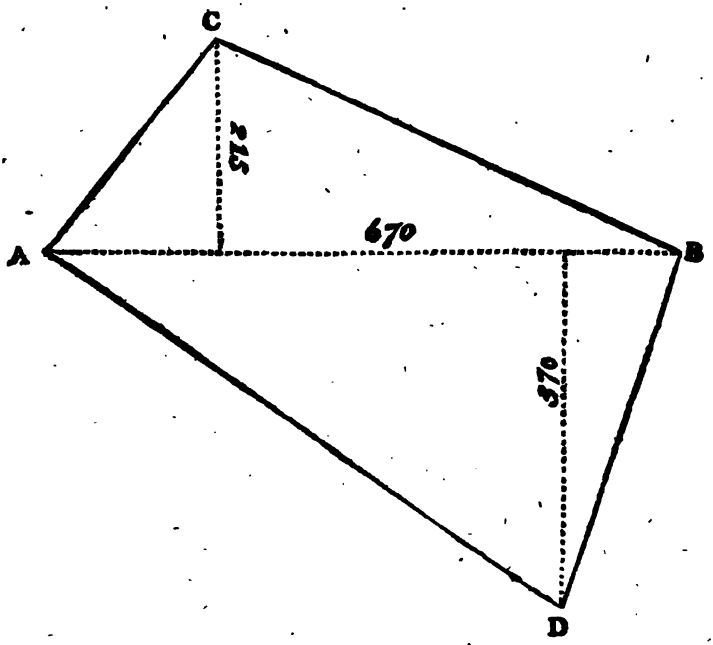
From each of these points draw a perpendicular by Problem 2d, or with a small square, made of brass or wood.

Make the first perpendicular 215, and the second 870.



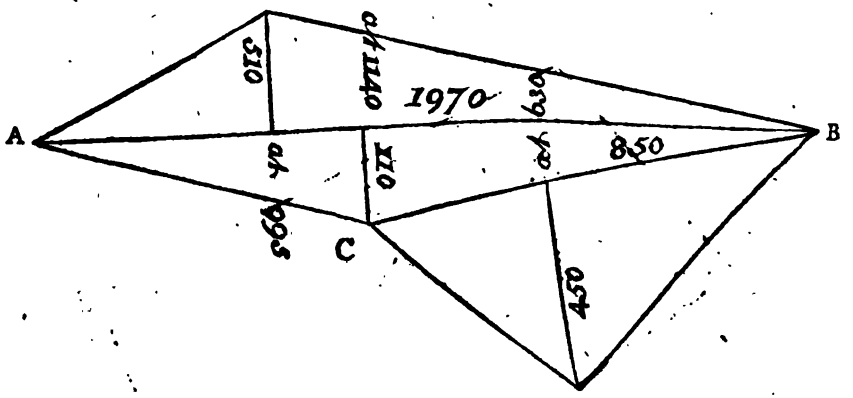
Draw the lines AC and CB.
And the lines AD and DB.

The Plot will appear thus:

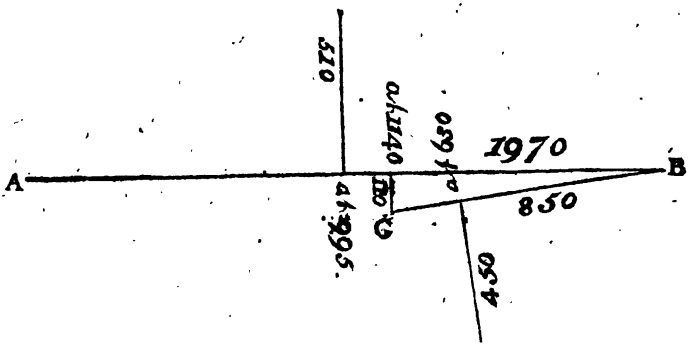


	A	R	P
Ans.	1	3	33

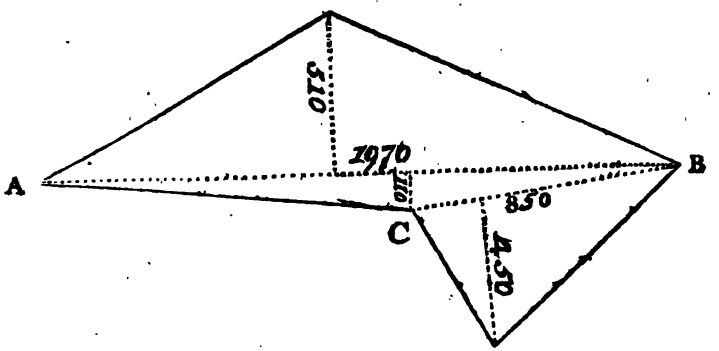
It is required to draw the Plan and find the Content of a Field, from the following rough sketch.



FIRST OPERATION.

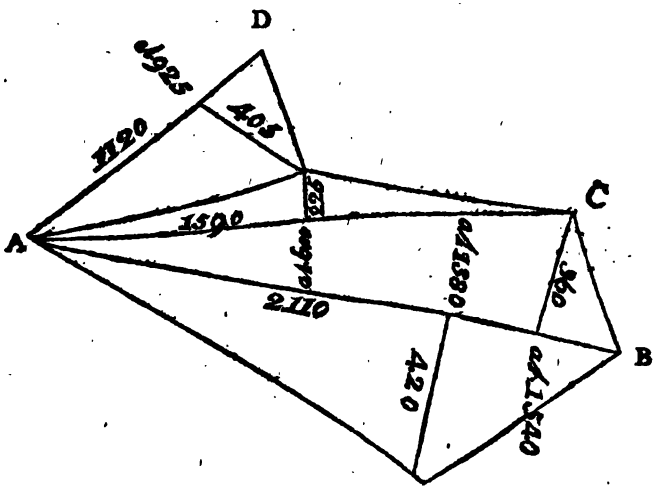


SECOND OPERATION.

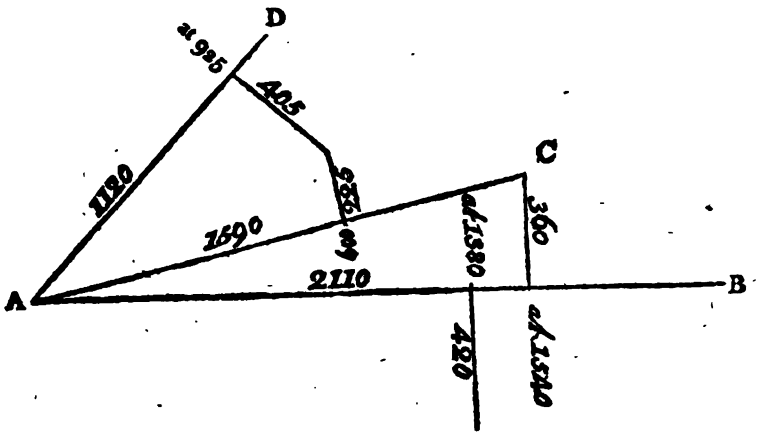


	A	R	P
Content	8	0	3

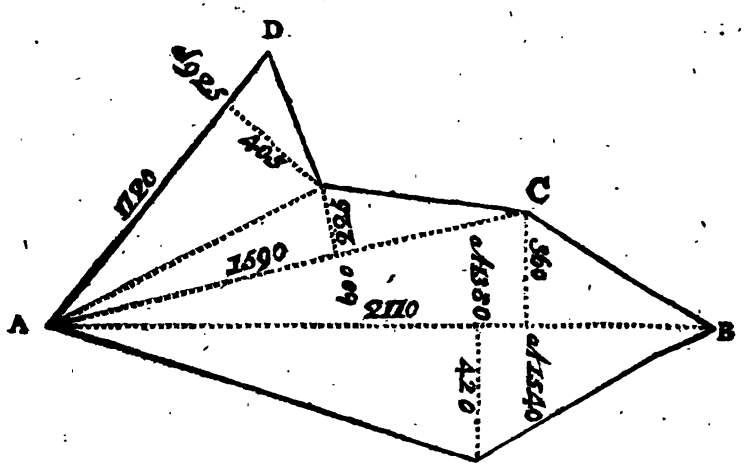
It is required to draw a Plan, and find the Content of a Field, from the following rough sketch.



FIRST OPERATION.



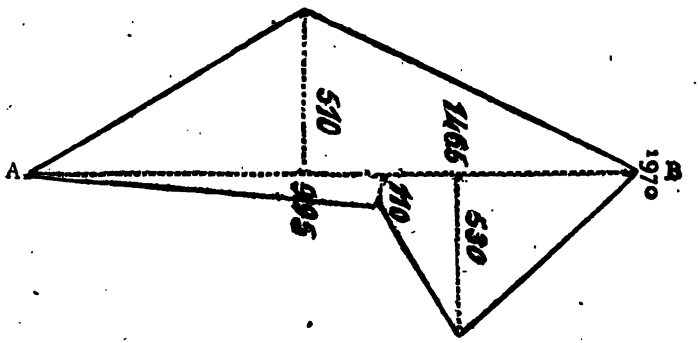
SECOND OPERATION.



	A	R	P
Ans.	12	1	5

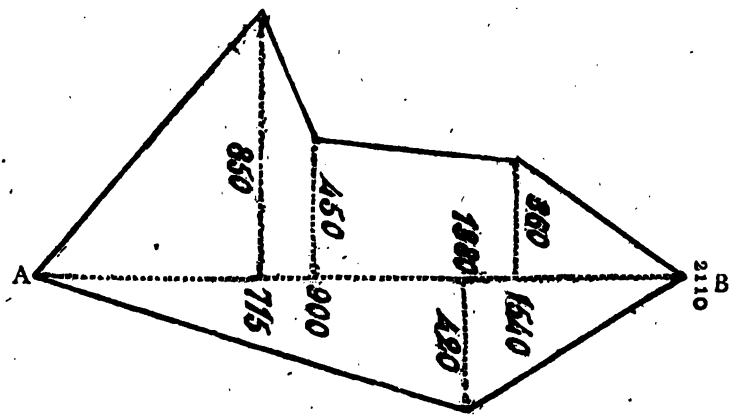
Many Fields may be surveyed by measuring one diagonal to each, and perpendiculars from it to the angles on each side, which will divide it into right angled Triangles or Trapezoids, the content of which can be found by the Off-set-rule.

Examples of the two last Fields surveyed by this method.



1970			
510			
19700	1140	110	530
9850	110	530	505
1004700	125400	640	2650
125400		325	26500
208000			
267650		13000	267650
		1950	
2) 1605750		208000	
8,028875			
4			
3,115000			
40			
4,600			

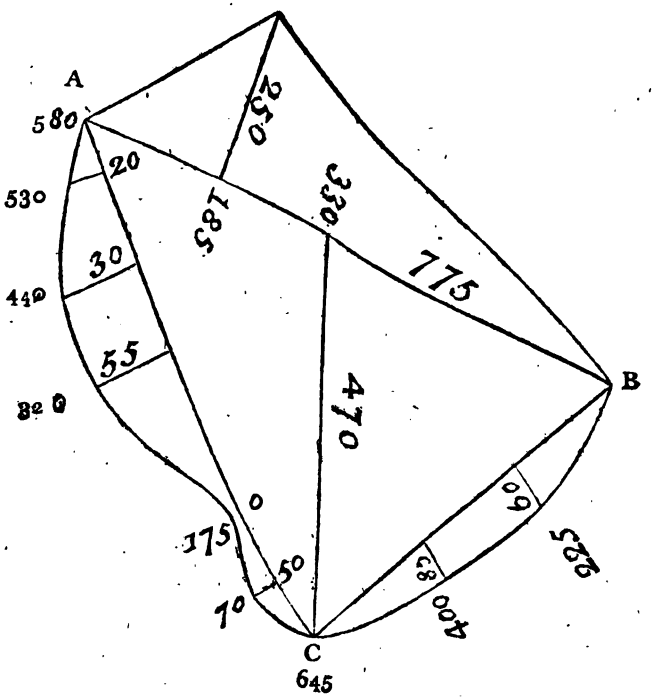
A R P
Content 8 0 4



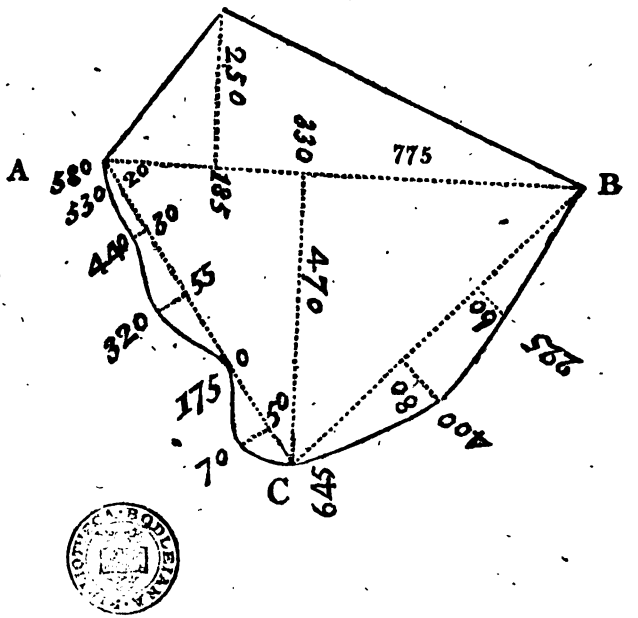
A R P.
Content 12 1 6

If the Field has Offsets, the lines to which they belong must be measured as before directed; and in the rough ſketch, note down the distance of each Offset from that end of the line you began to measure from, thus:

ROUGH SKETCH.



The foregoing when plotted will appear thus:



Draw a Plan, and find the Content of a Field, from the annexed rough sketch: Plate 2d.

	A	R	P
Content	19	1	32

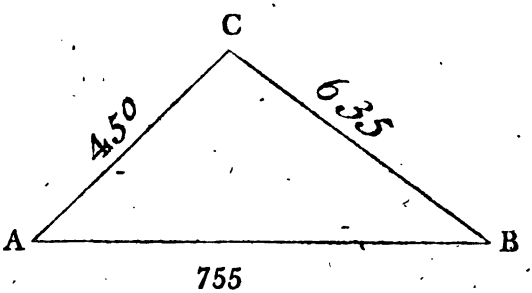
PART THE FOURTH.

TO SURVEY

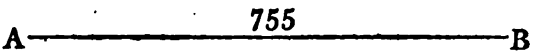
WITH THE CHAIN.

DRAW a rough sketch of the Field on paper, either by going round it, or by drawing the lines as they are measured.

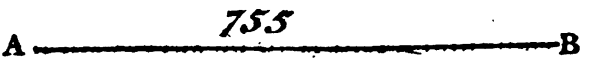
If a triangular Field is to be surveyed, measure the three sides, and note down the length of each in the rough sketch, thus :



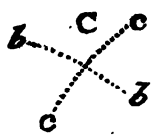
This must be accurately plotted before the content be found. To do which, take the length of the longest side off the scale with the compasses, and draw it on paper.

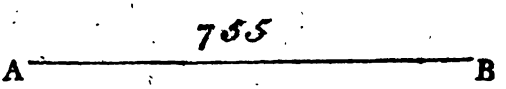


Take the length of another line, AC 450, set one point of the compaſſes on A, and draw the arc *b b*.

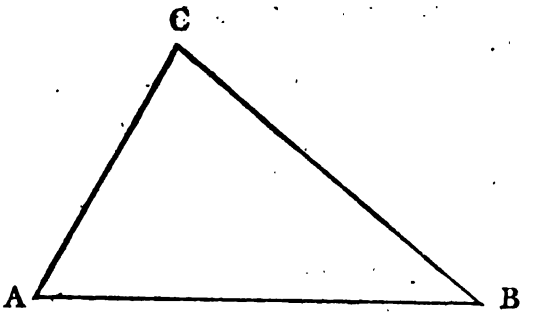


Take the length of the other line BC 635, and with B for a centre, draw the arc *c c*.

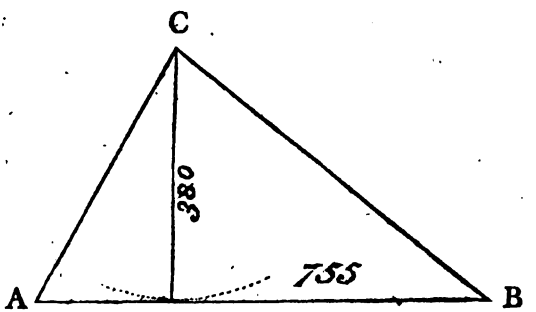




From the point of intersection C, draw the lines AC, and B C, which will complete the plot.



Then let fall a perpendicular from the point C, on the line AB, by Problem III, page 17: measure the length of the perpendicular on the plotting scale, and it will be found to be 380 links: or open the compasses to such a width as will describe an arc touching the base AB, without passing through it.

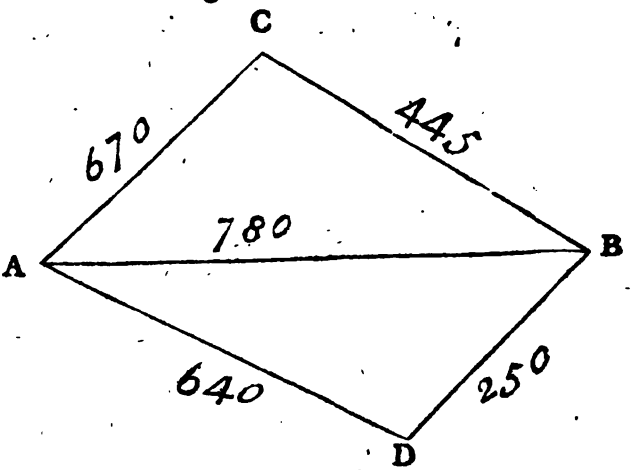


Measure that distance on the plotting-scale, and it will be found the same as before, 380 links.

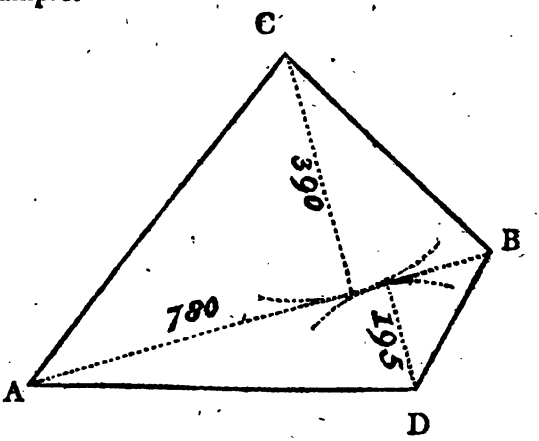
	A	R	P
Content	1	1	29

To survey a Field which has four sides.

Draw a rough sketch of the Field, and a diagonal across it. Note down the length of each side, and the diagonal thus:



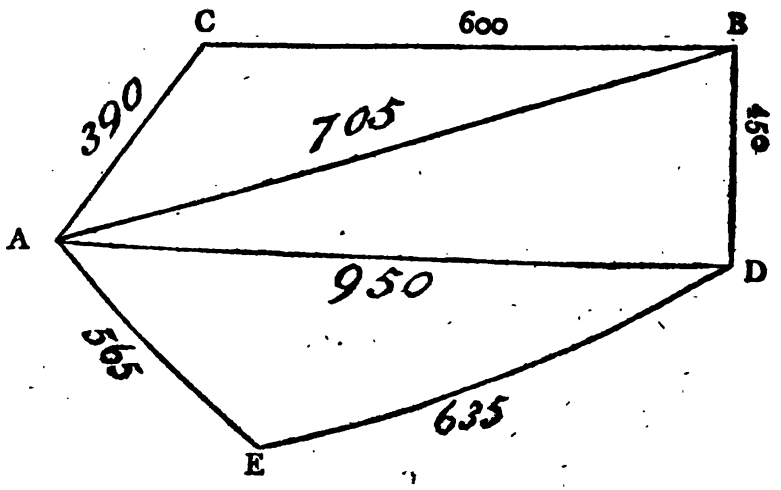
On the diagonal AB, draw the two triangles ABC, and ABD, and measure a perpendicular to each as in the last example.



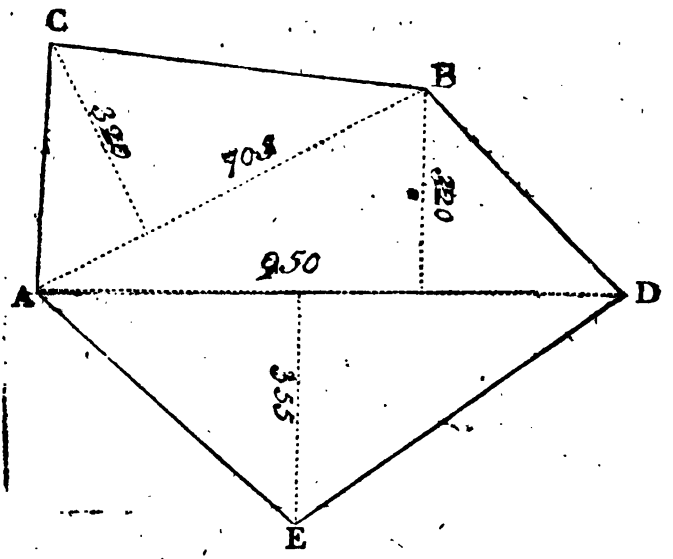
	A	R	P
The Content is	2	1	5

Any other Field may be surveyed in the same manner, by measuring as many diagonals as will divide it into triangles.

Required the Plan and Content of a Field, from the following sketch.



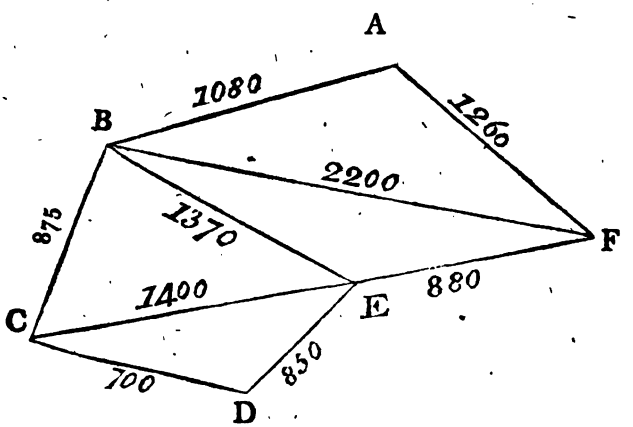
PLAN.



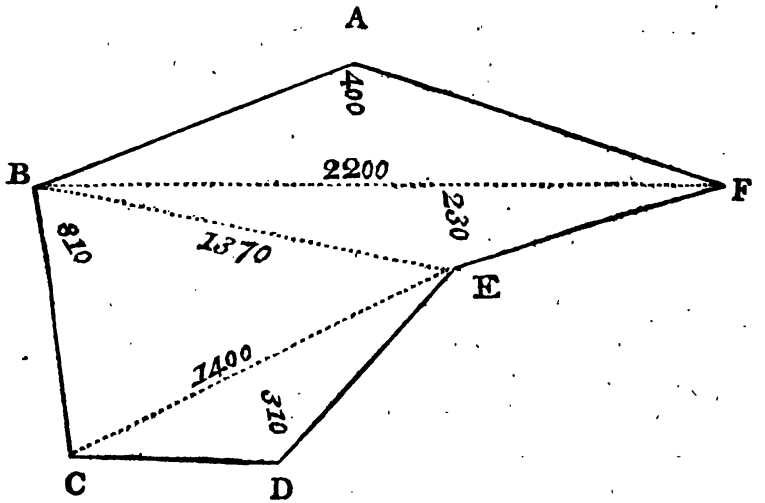
	A	R	P
Content	4	1	13

Draw a Plan, and find the Content of the following Field.

ROUGH SKETCH.



PLAN.



	A	R	P
Content	14	3	3

Draw a Plan and find the Content of a Field, from the rough sketch. Plate 3d.

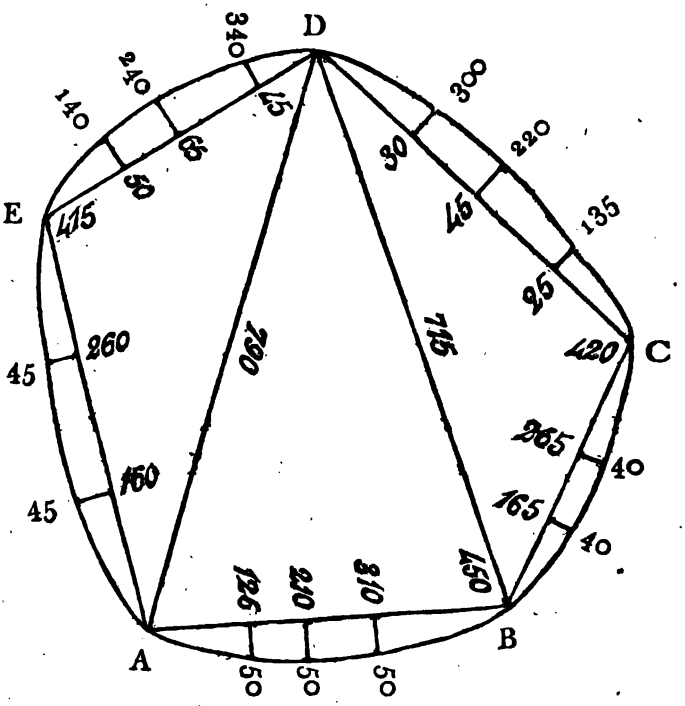
350	235	445	595
350	530	255	180
700	7050	700	107100
690	1175	700	
483000	124550	490000	
124550			
107100			
490000		B C	C D
26800=AB		300	420
12000=BC		40	60
25200=CD			
10000=E*o*		12000	25200
1278650			
42750		E *o*	*o* F
		50	30
2) 1235900		200	230
6,17950		10000	6900
4			
,71800		D	E
40			
28,72000	200	165	90
	40	90	40
	8000	14850	130
			100
			13000
			14850
			8000
			35850 D E
			6900 *o* F
			42750 Subtracted

A B			
45	190	30	30
220	40	40	100
900	7600	70	3000
90		90	6300
			9900
9900.		6300	7600
			26800=AB

	A	R	P
Content	6	0	28

Draw a Plan, and find the Content of a Field, from the rough sketch. Plate 4th.

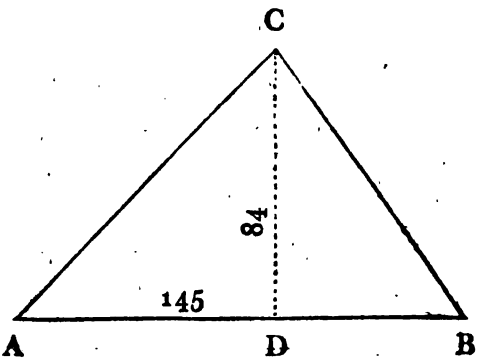
What is the Content of the following Field ?



If the dimensions are taken in yards :

Divide the content in yards by 4840, (the number of Square Yards in an Acre,) the quotient will be acres, the remainder, if any, multiply by 4, and divide as before, the quotient will be roods ; multiply the remainder by 40, and divide as before, the quotient will be poles.

What is the Content of the triangle ABC, *whose base is* 145 *yards, and perpendicular* 84 *yards?*



145 Base
84 Perpendicular

580
1160

2) 12180

484,0) 609,0 (1 Acre
484

125
4

484) 500 (1 Rood
484

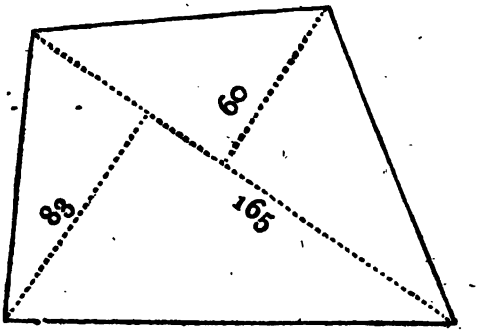
16
40

484) 640 (1 Pole
484

156

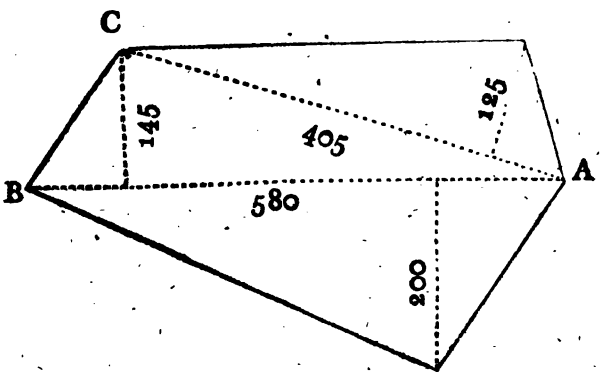
	A	R	P
Content	1	1	1

Required the Content of the following Field?



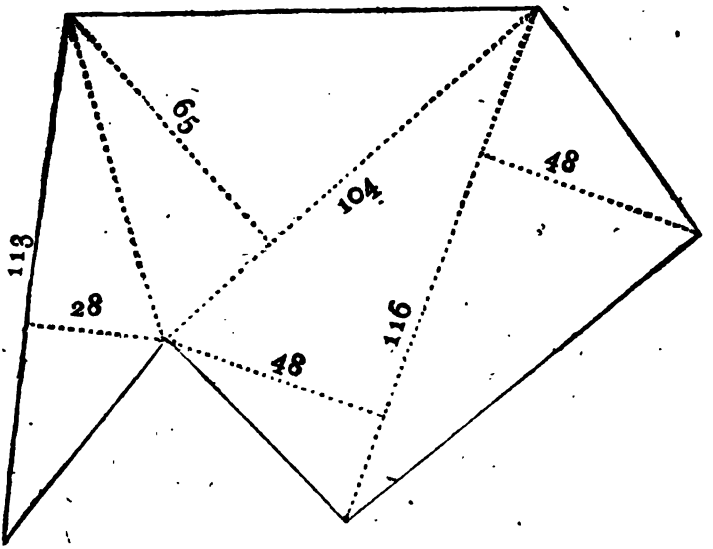
A R P
Ans. 2 1 29

What is the Content of the following Field?



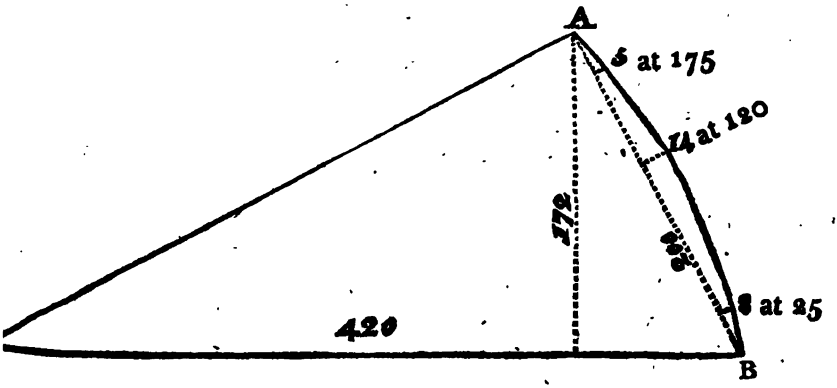
A R P
Ans. 25 3 24

What is the Content of the following Field?



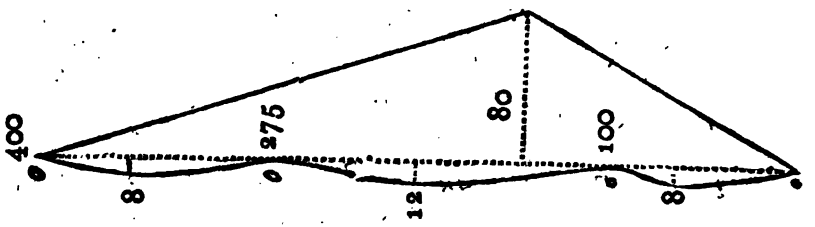
A R P
Ans. 2 0 28

The Content of the following Field is required.



A R P
Ans. 7 3 7

Find the Content of the following Field.



	A	R	P
Ans.	4	0	9

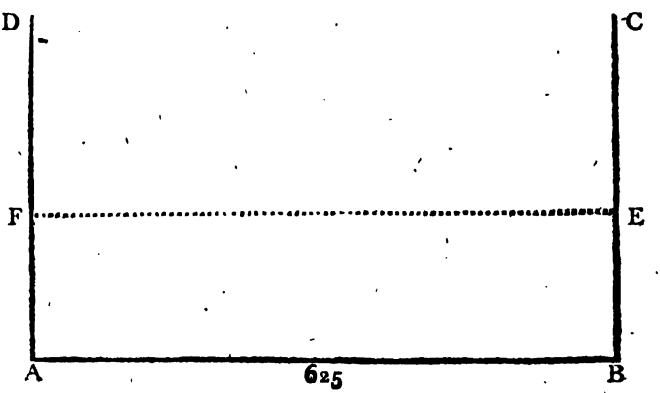
PART THE FIFTH.

RULES

To part off any given portion of a Field, in Form of a PARALLELOGRAM, TRIANGLE or SQUARE.

To part off a given portion of a Field, on a given line in form of a Parallelogram, when the Fences are at right angles.

Allow the given line AB to be 625 links long, what length must be taken on the lines AD and BC, that the Parallelogram ABEF may contain one acre, the two lines AD and BC, being at right angles to AB.



RULE—Reduce the given portion of land into **links**, and divide by the number of links in the given **line**, the quotient will be the length of the lines required.

LINKS.

100000 in an Acre
50000 in $\frac{1}{2}$ an Acre
25000 in a Rood
625 in a Perch

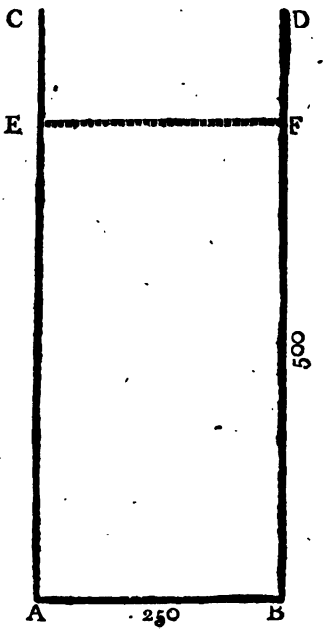
625) 100000 (160 Length of BE and AF
625

3750
3750

Proof
625
160

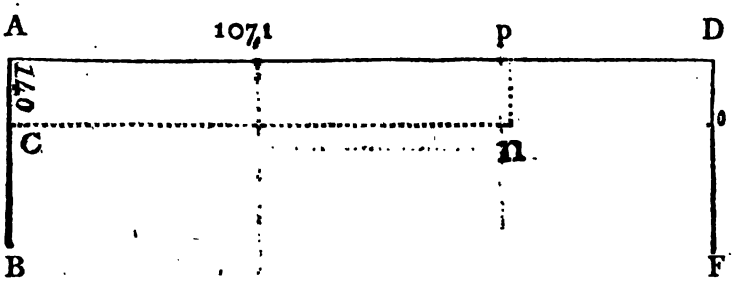
1,00000

If the line AB is 250 links long; What length must be taken on the lines AC and BD, to part off an acre and a quarter in the form of a Parallelogram, AC and BD being at right angles to AB?



Ans. 500 Links.

Allow the distance from A to C 140 links; What length must be taken on the line AD, to part off an acre and an half in the form of a Parallelogram, AC and AD being at right angles?

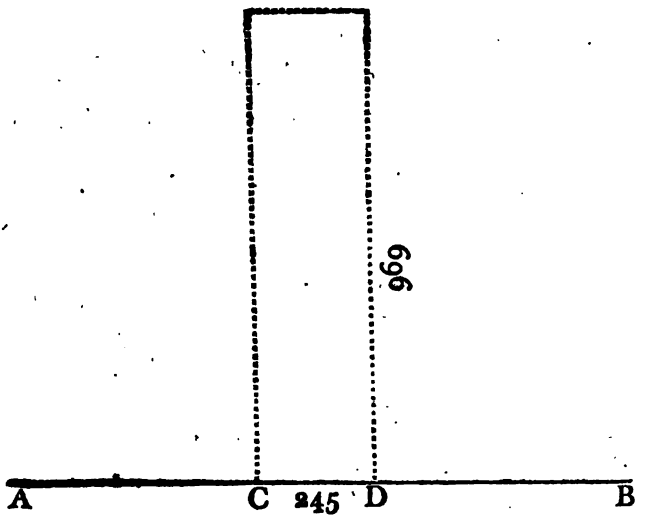


Ans. 1071 Links.

NOTE—To measure C n perpendicular to AB, place the cross at C in such a position, as to see the mark at B through one sight, and the mark at A through the other. Look through the other pair of sights, and observe some mark in the fence DF which can then be seen, or place a mark at any convenient distance as at *o*, and measure the length required from C towards *o*, as C n.

In the same manner may the line p n be measured perpendicular to AD, or any other line to its base.

It is required to part off 2 *Acres* 1 *Rood* 20 *Poles, on part of the line* AB, *viz. from* C *to* D 245 *links long, in form of a right angled parallelogram.*



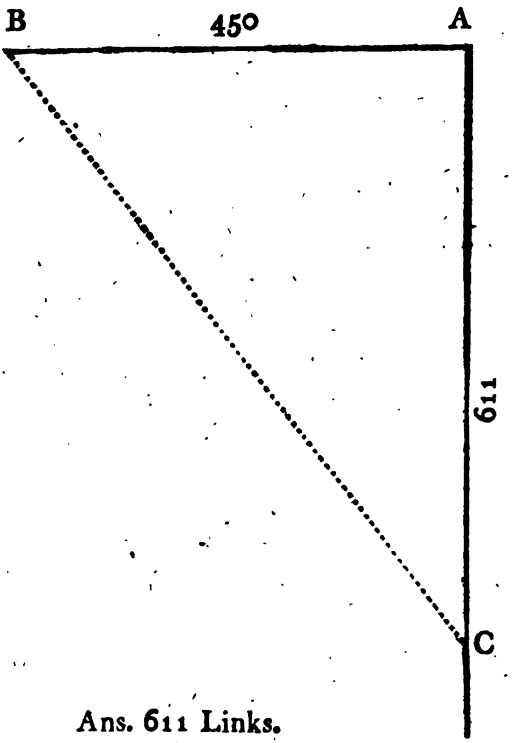
Ans. 969 Links.

To part off any given portion of a Field on a given line in form of a triangle, when the fences are at right angles.

RULE. Reduce the quantity to links, and divide by half the given line, the quotient will be the length that must be taken on the adjoining line.

To these two draw a diagonal, which will complete the triangle required.

It is required to part off 1 *A* 1 *R* 20 *P in form of a triangle, on the given line* AB, 450 *links in length; the two lines* AC *and* AB *being at right angles.*

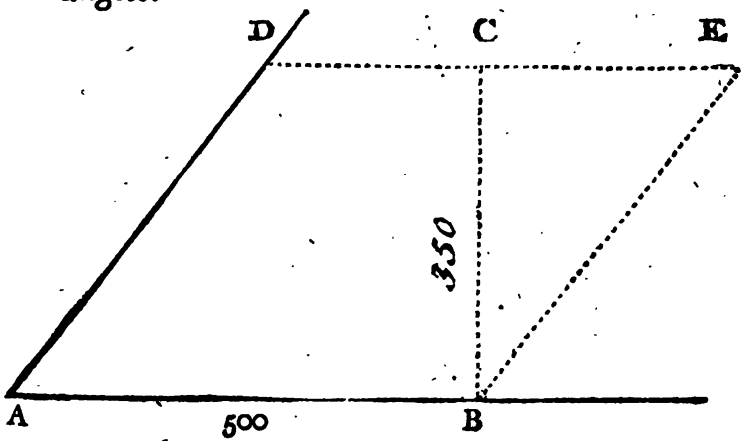


Ans. 611 Links.

To part off any given portion of a Field in form of a parallelogram, when the fences are not at right angles.

RULE. Reduce the given quantity to links, which divide by the given line, the quotient will be the perpendicular height of a parallelogram, which will contain the given quantity.

It is required to part off a parallelogram which shall contain 1 *A* 3 *R on the base* AB 500 *links long; the lines* AB *and* AD *not being at right angles.*



Ans. 350 Perpendicular height.

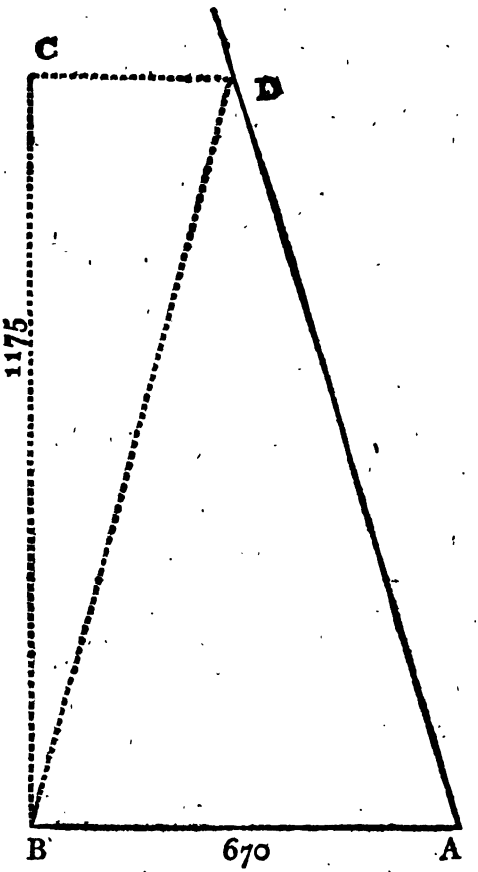
Measure a perpendicular (BC 350) to the line AB, and leave a mark at C.

Measure a perpendicular (CD) to the line BC. Produce DC at C to E, till DE is equal to AB (500). The parallelogram ABED will contain the quantity required.

To part off a given portion of a Field in form of a triangle, when the fences are not at right angles.

RULE. Divide the given quantity in links by half the given line, the quotient will be the perpendicular height of a triangle, which will contain the portion required.

It is required to part off a triangle on the base AB 670, *that shall contain* 3 *A.* 3 *R.* 30 *P.*

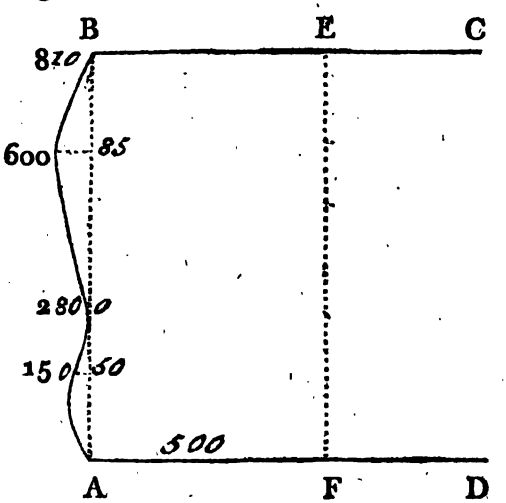


Ans. 1175

If there are Offsets on a given line, and those Offsets are to be included as part of the portion to be parted off:

RULE. Find the area of the offsets, which subtract from the given portion, proceed with the remainder as before.

It is required to part off 4 *Acres,* 1 *Rood,* 16 *Perches, in form of a parallelogram on the irregular line* AB; *the straight line* AB *being at right angles to* BC *and* AD, *and* 810 *links long.*



280	530
50	85
14000	2650
45050	4240
2) 59050	45050
29525 Offsets to be subtracted	

A R P
4 1 16
4

17
40

696
625

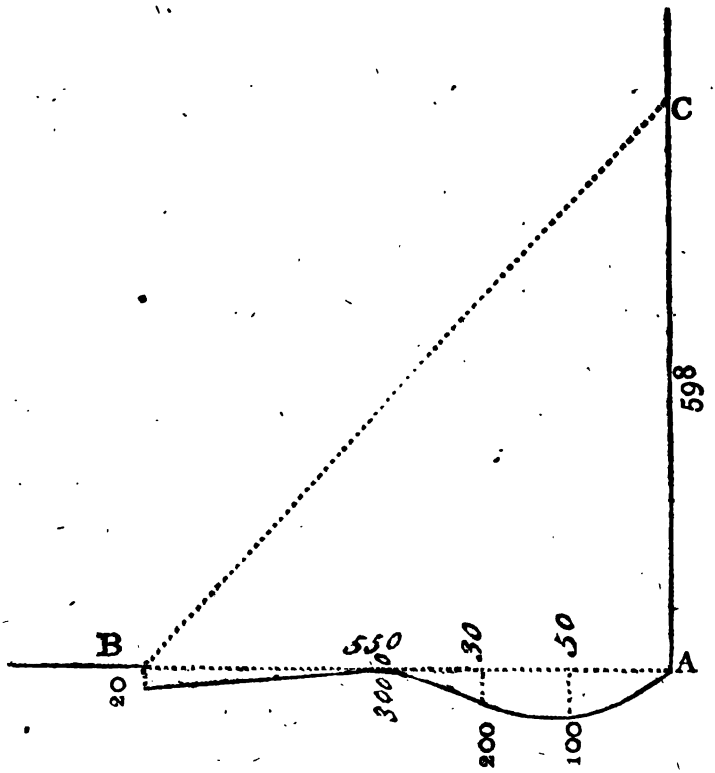
3480
1392
4176

435000
29525

81,0) 40547,5 (500=BE and AF
40500

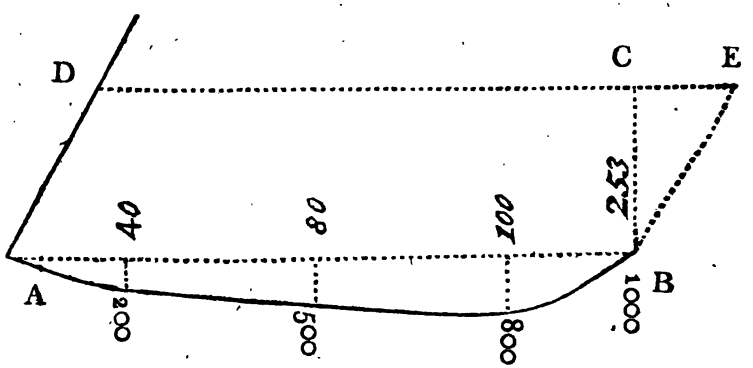
47

It is required to part off 1 *A.* 3 *R. on the irregular line* AB, 550 *links long, in form of a triangle; the two straight lines* AB *and* AC *being at right angles.*



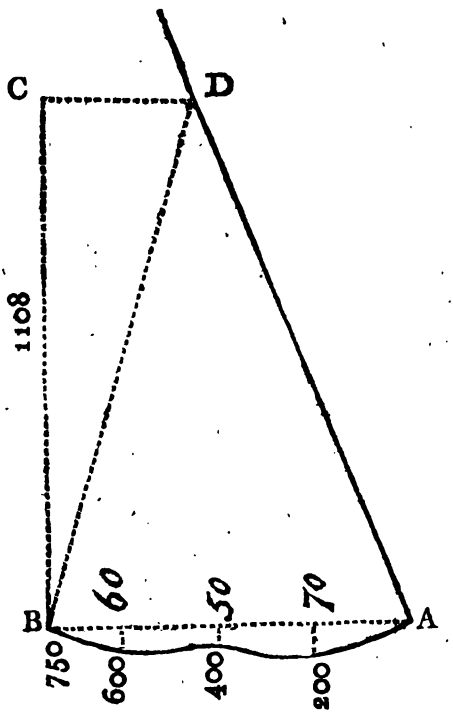
Ans. 598

It is required to part off 3 *A* 20 P *in form of a parallelogram, on the irregular line* AB 1000 *links long; the straight lines* AB *and* AD, *not being at right angles.*



Ans. 253

It is required to part off $4\frac{1}{2}$ *Acres in form of a triangle on the irregular line* AB, 750 *links long; the straight lines* AB *and* AD *not being at right angles.*



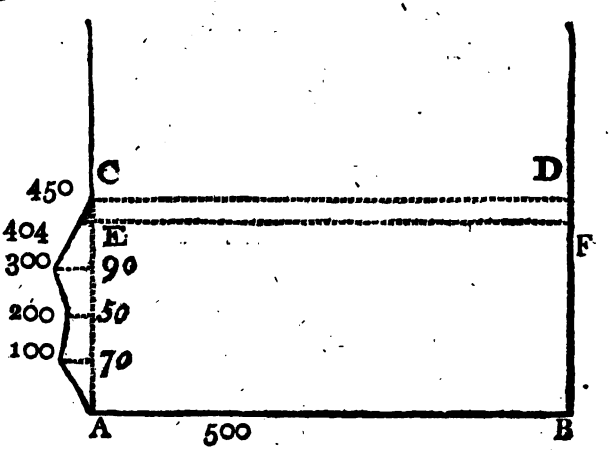
Ans. 1108

When the given line is straight, but there are Offsets on an adjoining line, and those Offsets are to be included as part of the portion to be parted off.

Rule for the following example of a parallelogram at right angles.

Reject the offsets, and the lines of partition will be CD and DB. The irregular figure ABCD will contain more than the quantity required by the offsets on the line AC, to rectify which, find the area of those offsets in links, which divide by the number of links in the given line, the quotient will be the length in links, which must be taken back from C towards A as at E, and from D towards B as at F. ABEF will contain the quantity required less the shadowed offset.

What length must be taken on the lines AC *and* BD *to part off on the line* AB, 500 *links long,* 2 *A* 1 *R in form of a parallelogram; the straight lines* BD *and* AC *being at right angles to* AB.



A R
2 1
4

9
25000

5,00) 2250,00

450=AC
46=CE

Ans. 404=AE

150
90

13500

50
90

140
100

14000
7000
12000
13500

2) 46500

5,00) 232,50

46=CE

100 70
70 50

7000 120
100

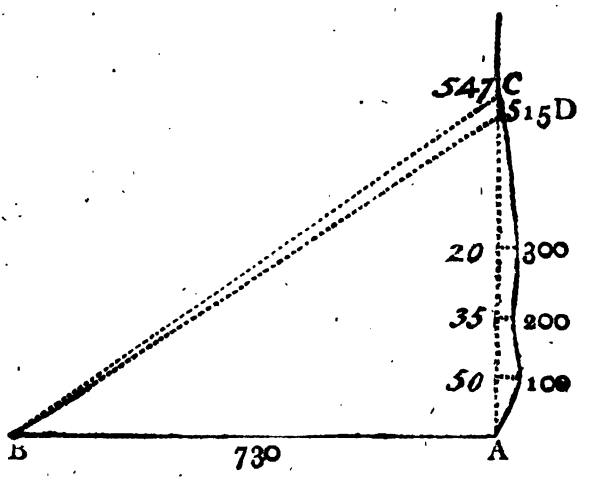
12000

Rule for the following example of a triangle at right angles.

Reject the offsets, and the line of partition will be BC. The irregular triangle ABC will contain more than the quantity required, by the offsets on the line AC. To rectify which, find the area of those offsets in links, which subtract from the given quantity, what remains must be divided by half the given line, the quotient will be the length that must be taken on the line AC as AD. The line of partition will be BD.

The irregular triangle ABD will contain the given quantity less the shadowed offset.

Allow the length of the given line AB *to be* 730, *what length must be taken on the line* AC, *that the irregular triangle* ABC *may contain* 2 *acres, the straight lines* AB *and* AC *being at right angles.*

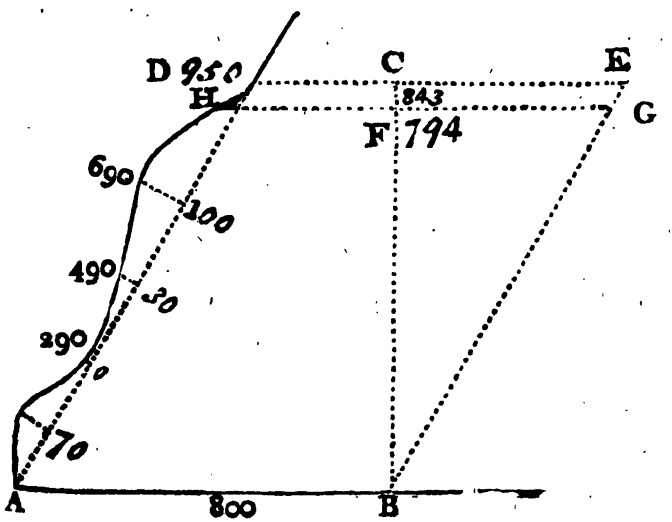


Ans. 515.

Rule for the following example of a parallelogram not at right angles.

Reject the offsets, and the perpendicular height of the parallelogram will be BC, the portion parted off would then contain more than the quantity required, by the offsets on the line AD. Find the area of those offsets and subtract from the given quantity, divide the remainder by the given line, the quotient will be the perpendicular height BF, with which form the parallelogram as before, the portion ABGH will contain the quantity required less the shadowed offset.

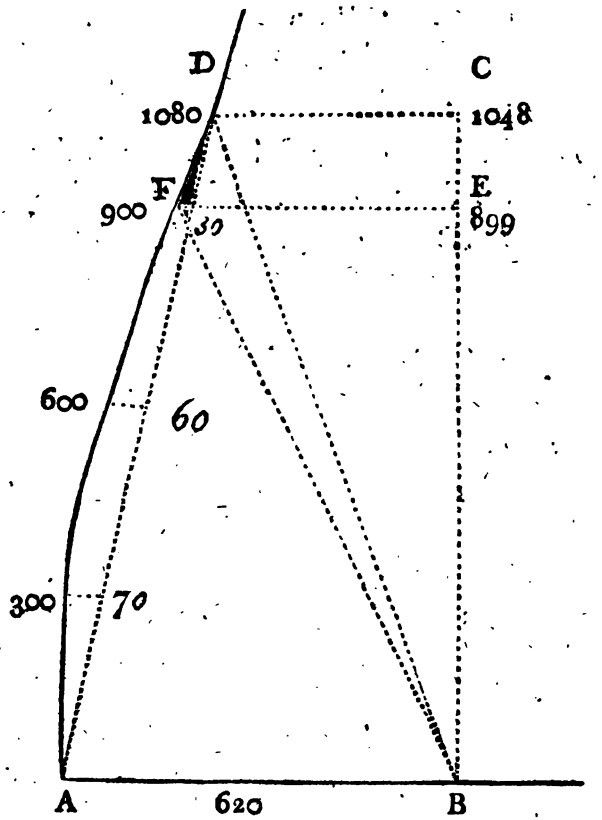
It is required to part off 6 *A.* 3 *R. on the line* AB 800 *links long in form of a parallelogram,* AB *and* AD *not being at right angles.*



Ans. 794=BF

The following example of a triangle not at right angles, may be answered by the last rule, only observe to divide by half the given line.

It is required to part off $3\frac{1}{4}$ *acres on the line* **AB**, 620 *links long in form of a triangle, the fences not being at right angles.*



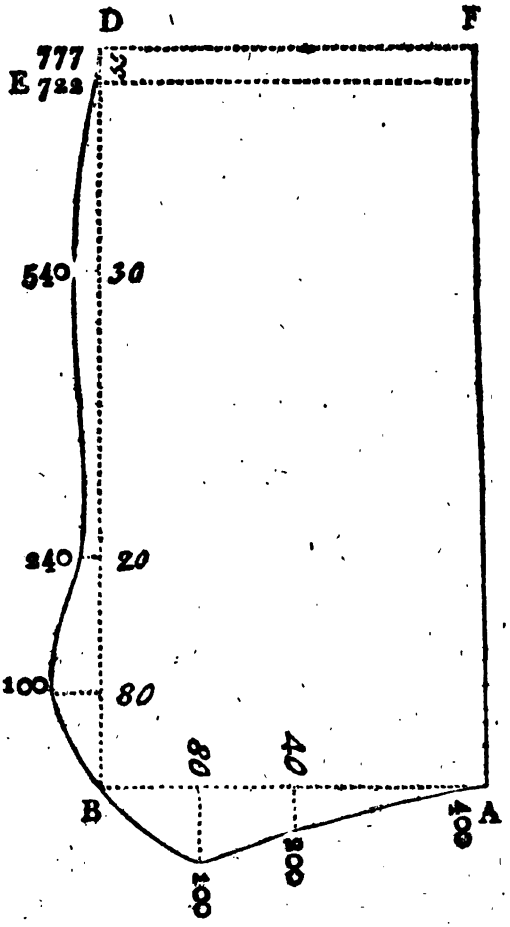
Ans. 899, Perpendicular height of the Triangle **ABF**.

When there are offsets on the given line, and on an adjoining line, or on two adjoining lines, and the offsets are to be included as part of the quantity to be parted off:

RULE. Let the area of the offsets which are on the given line be subtracted from the given portion, and proceed with the remainder and the other offsets, as in the former examples.

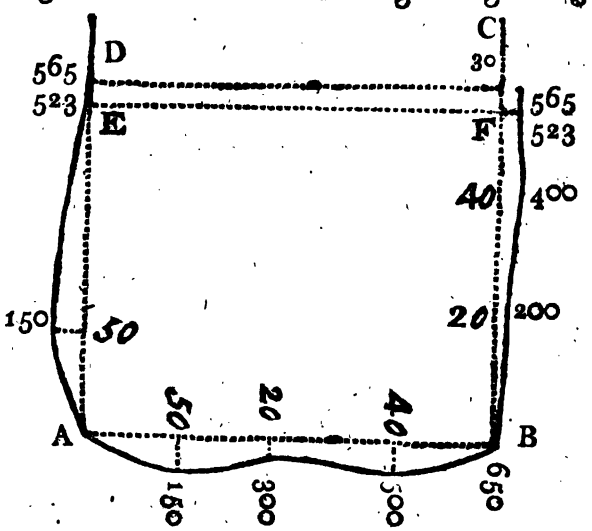
Allow the length of the given line AB *to be* 400 *links long; what length must be taken on the lines* BD *and* AF *to part off* 3 *A.* 1 *R. in form of a right angled parallelogram?*

	A R	
80	3 1	40
100	4	80
8000	13	120
	25000	100
40	325000	12000
200	14000	8000
8000	4,00) 3110,00	8000
	777=BD	2) 28000
		14000


D
F
777
E 722
55
540
30
240
20
100
80
60
40
B
A
100
100
100

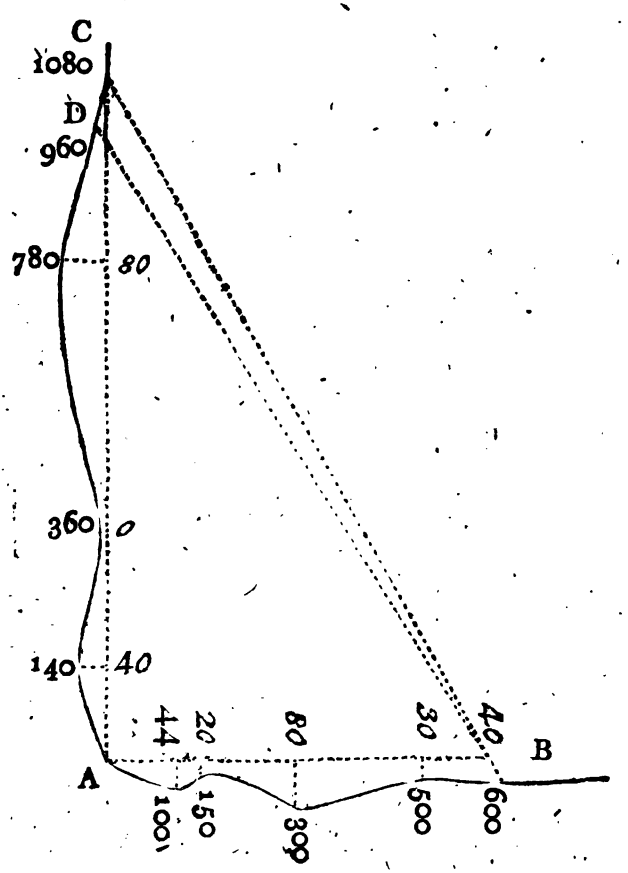
100	20	237
80	30	30
8000	50	7110
	300	
80	15000	777 BD
20	14000	55 ED
100	7110	722=BE
140	8000	
14000	2) 44110	
	4,00) 220,55	
	55=ED	

It is required to part off 3 *A.* 3 *R.* 17 *P. in form of a parallelogram on the irregular line* AB; *the straight lines* AD *and* BC *being at right angles.*



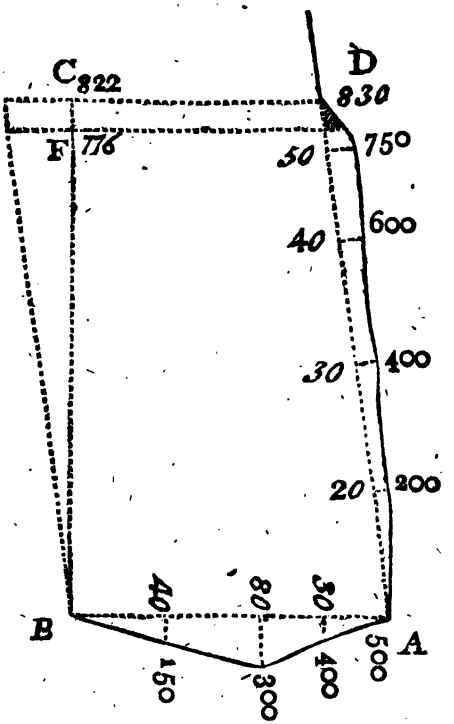
Ans. 523=AE & BF

Allow the length of the given line AB *to be* 600; *what length must be taken on the line* AC, *that the irregular triangle* ABC *may contain* 3 *Acres,* 2 *Roods? the straight lines* AB *and* AC *being at right angles.*



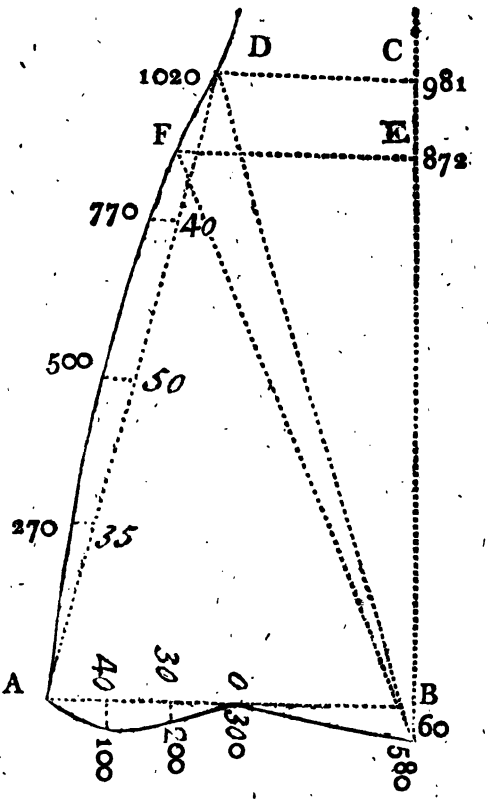
Ans. 960=AD

It is required to part off 4 *A.* 1 *R.* 8 *P. in form of a paralellogram on the irregular line* AB, 500 *links long; the straight lines* AB *and* AD *not being at right angles.*



Ans. 776=BF

It is required to part off 3 *Acres in form of a triangle on the irregular line* AB 580 *links long; the straight lines* AB *and* AD *not being at right angles.*

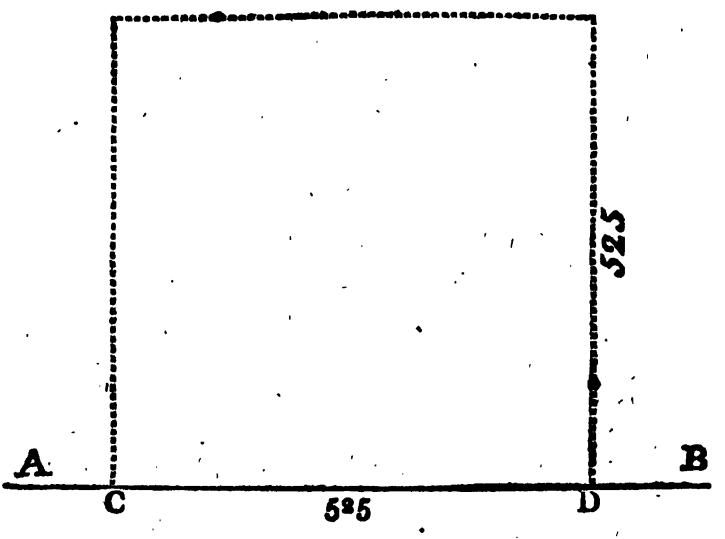


Ans. 872=BE

To part off any portion of a Field in form of a square.

RULE. Reduce the given quantity to links, and extract the square root, which will be the length of a side of the square required.

It is required to part off 2 *A.* 3 *R.* 1 *P. on the line* AB, *from* C *towards* B *in form of a square.*



A R P
2 3 1
4

11
40

441
625

2205
882
2646

275625 (525=CD Ans.
25

256
102 204

5225
1045 5225

PART THE SIXTH.

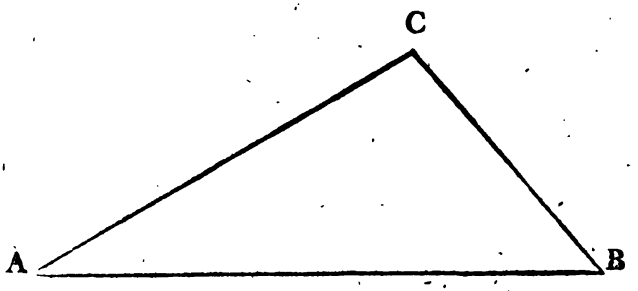
TO SURVEY SEVERAL FIELDS TOGETHER WITH THE CHAIN.

THE foregoing methods of surveying are best adapted for single fields; but if several fields or a lordship is to be surveyed, the field-book must be kept in a different manner.

To render this method as easy to be understood as possible, I shall give examples of single fields first, and then of several together.

The pages of the field-book must be ruled into three columns: it is best to begin taking notes at the bottom of the last page and write upwards.

To survey the Triangular Field ABC.



Place three marks at the angles A, B, and C, begin to measure at A towards B, allow the length of AB to be 1785. The notes in the field-book will stand thus:

Left of B
1785 AB begin at A

Measure BC, allow its length to be 907, write this above the last notes thus:

Left of C
907 BC L of B
1785 AB begin at A

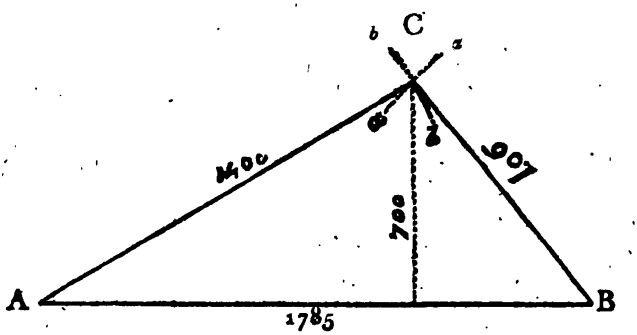
Measure the other line CA 1400, which write above the last notes thus:

End 1400 CA L of C
907 BC L of B
1785 AB begin at A

From the above notes, the plan and content of the Field may be obtained.

TO CONSTRUCT THE PLAN.

Draw the line AB 1785.

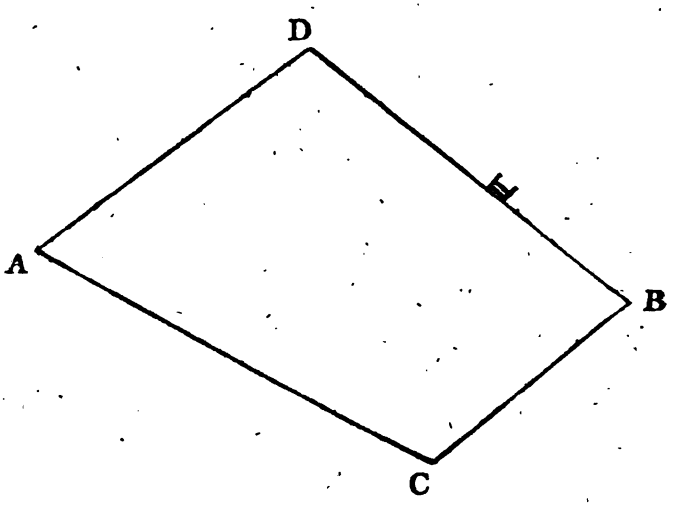


With the radius BC 907, and B as a centre, draw the arc *aa* on the left side of the line AB.

With the radius CA 1400, and A as a centre, draw the arc *bb*, ABC is the plan.

	A	R	P
The Content is	6	1	0

To survey a Trapezium ACBD.

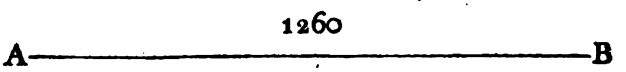


Measure the four sides and the diagonal AB, in the same manner the three sides of the triangle were measured, the notes will stand thus:

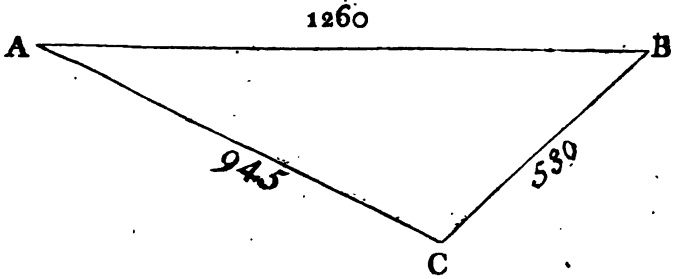
	865 DB
	470 Gate
	R[t] of D
	745 AD
	R[t] of A
	945 CA
	R[t] of C
	530 BC
	R[t] of B
Diagonal	1260 AB
Begin at	A

To construct the Plan.

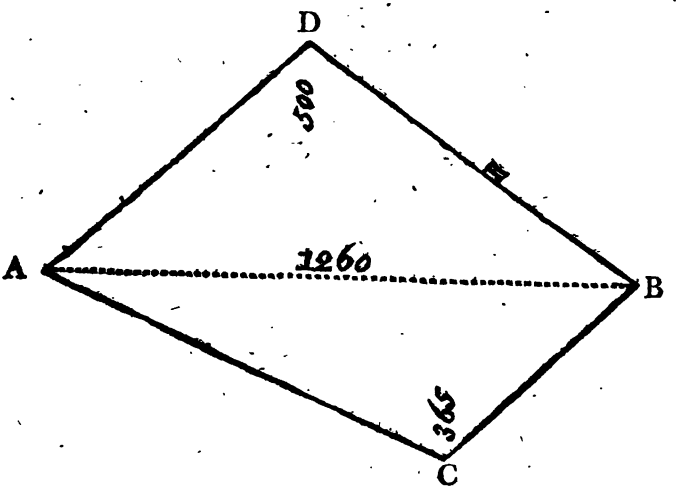
Draw the Diagonal AB 1260.



On the right side of it complete the triangle ABC.

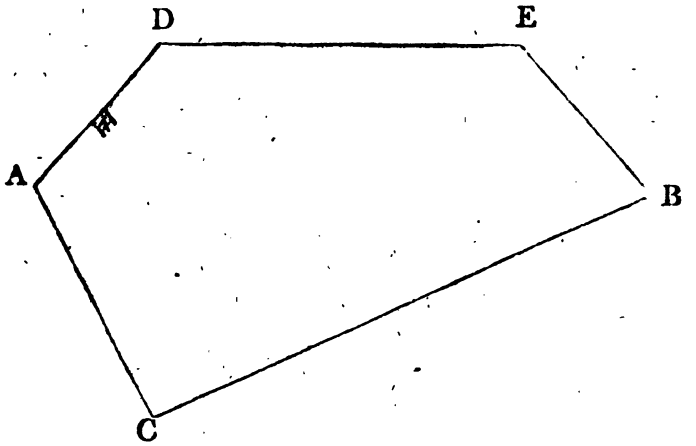


On the left side complete the triangle ADB.



	A	R	P
Content	5	1	31

To draw a plan, and find the content of a Field which has five sides.

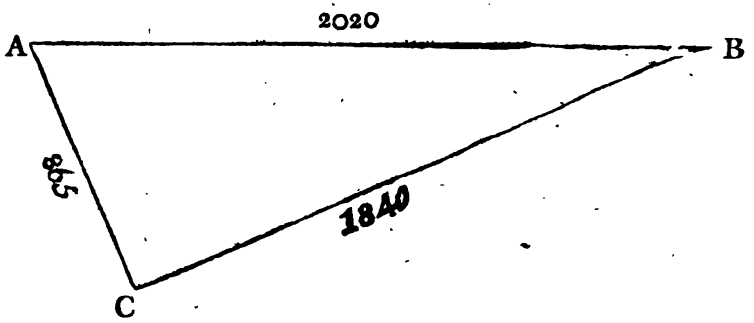


Measure the five sides and the two diagonals, the notes in the field-book will stand thus:

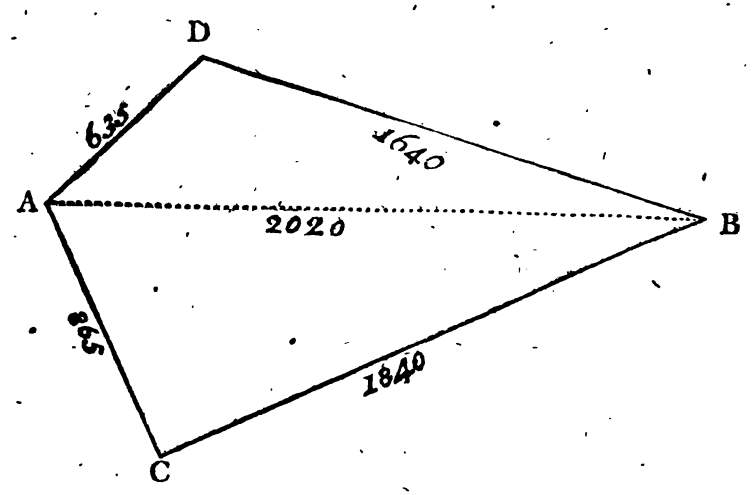
	End 1225 ED L of E
	555 BE L of B
Diagonal	1640 DB R[t] of D
	635 AD 300 Gate R[t] of A
	865 CA R[t] of C
	1840 BC R[t] of B
Diagonal Begin at	2020 AB A

To draw the plan.

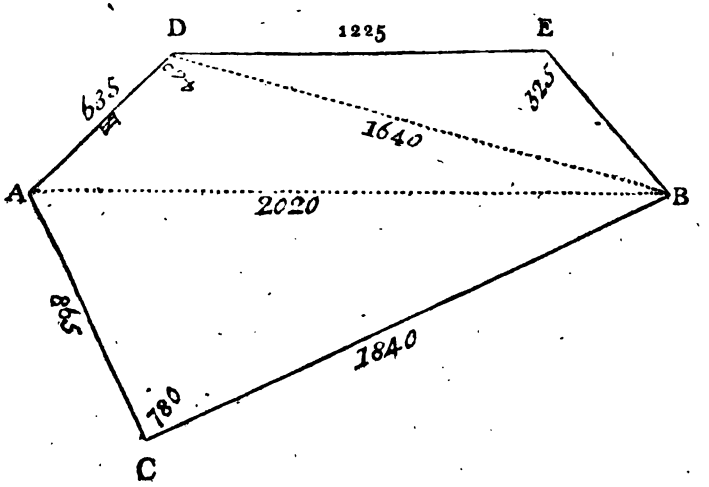
Construct a triangle with the first three lines.



With AB for a base and the two following lines, construct another triangle ABD.



With DB as a base, and the remaining two sides, construct the third triangle DBE.

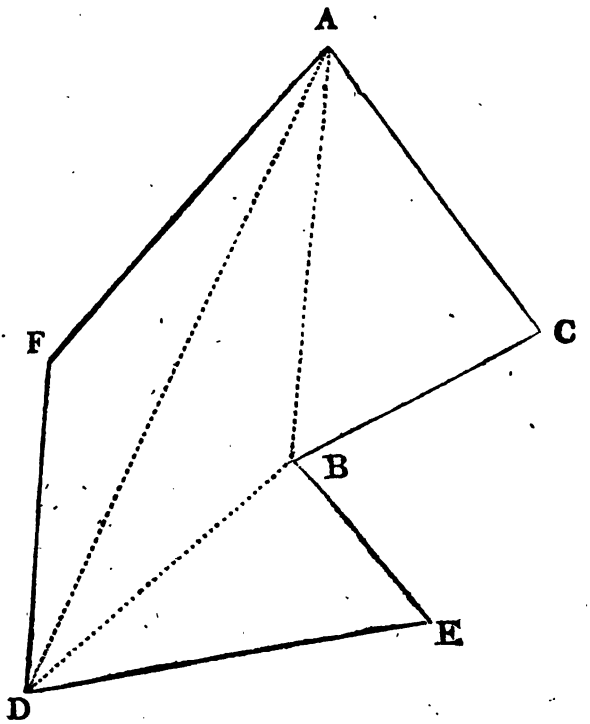


	A	R	P
Content	15	0	30

Draw a plan, and find the content of a Field, from the following notes.

	875 FA R[t] of F
	700 DF R[t] of D
	860 ED R[t] of E
	435 BE R[t] of B
Diagonal	745 DB L of D
Diagonal	1495 AD L of A
	746 CA L of C
	600 BC L of B
Diagonal Begin at	868 AB A

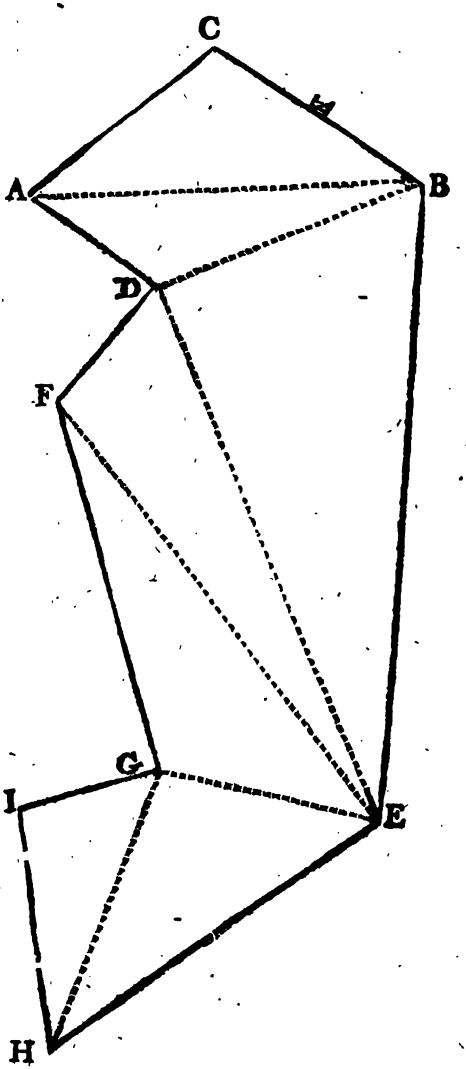
PLAN.



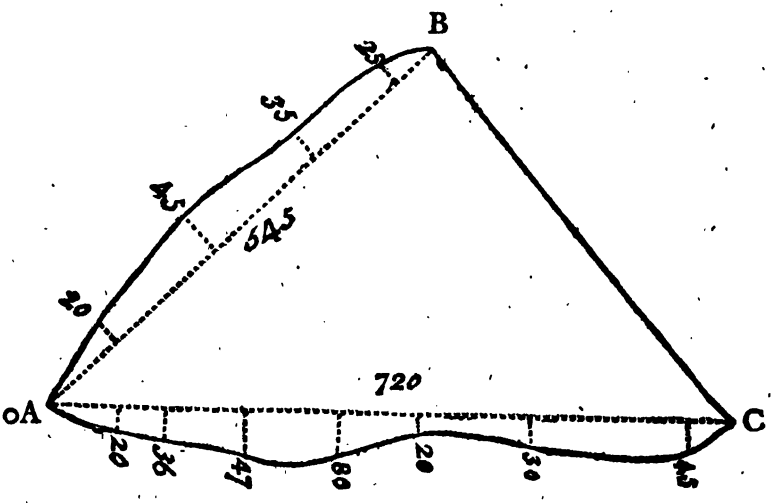
Draw a plan, and find the content of a Field, from the following notes.

	445 IG R[t] of I
	780 HI R[t] of H
	1260 HE L of H
Diagonal	900 GH L of G
	1260 GF R[t] of G
Diagonal	680 EG R[t] of E
Diagonal	1670 FE L of F
	480 DF L of D
Diagonal	1825 ED R[t] of E
	2000 BE R[t] of B
Diagonal	890 DB L of D
	475 AD L of A
	760 CA L of C
	850 BC
Gate	440 L of B
Diagonal Begin at	1260 AB A

PLAN.



In measuring a line which has offsets on the left side, note them down in the left column of the Field-book; if they are on the right side, note them in the right column.



In measuring from A to B the notes will stand thus:

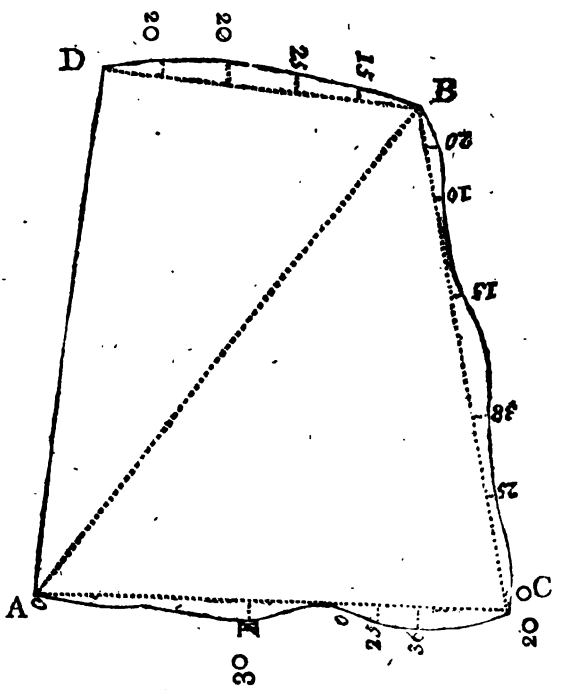
0	545 AB	
25	500	
35	380	
45	240	
20	100	
Begin at	A	

In measuring from A to C the notes will stand thus:

	720 AC	0
	670	45
	500	30
	380	20
	300	80
	200	47
	120	36
	70	20
Begin at	A	0

Draw a Plan, and find the area of a Field, from the following Notes.

	500 DB	0
	400	15
	300	25
	200	25
	100	20
	R^{t} of D	0
	843 AD	
	R^{t} of A	
	745 CA	0
	405	30 Gate
	260	0
	200	25
	140	36
	R^{t} of C	20
	808 BC	0
	630	25
	500	38
	300	15
	150	10
	55	20
	R^{t} of B	0
Diagonal	976 AB	
Begin at	A	

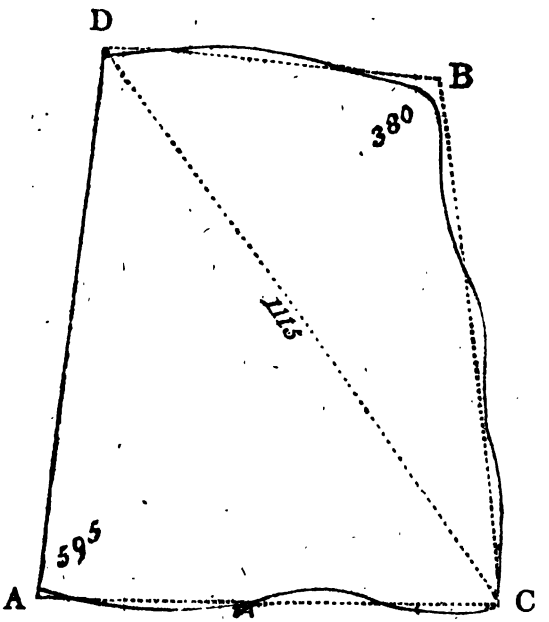


In surveying a farm or lordship consisting of several Fields, it is customary to draw a plan of the whole, and then compute the content of each piece separately, by drawing fresh lines to divide them into Trapeziums and Triangles, the bases and perpendiculars of which, must be accurately measured by the scale they were plotted from; in doing which, many of the crooked lines may be reduced to straight ones, by applying a straight piece of lantern-horn to the crooked line in such a manner, that the small parts cut off from the crooked figure by

it, may be equal to those which are taken in, which equality of parts included and excluded may be very nicely judged of by a little practice: then with a pencil draw a line by the straight edge of the horn. Or instead of horn use a bow made of wire and cane, which can easily be applied with one hand, and two dots made with the other to draw a line by.

In this way the work is very expeditiously done and sufficiently correct: for such dimensions are taken as afford the most easy method of calculation; and amongst a number of parts thus taken and applied to a scale, it is likely some parts will be taken a small matter too little, and others too great, so that they will upon the whole, in all probability, very nearly balance each other.—*Vide* HUTTON's Mathematical Dictionary, Vol. II. Page 553.

The following diagram represents the last Field with the fences straightened, &c. according to the foregoing method.

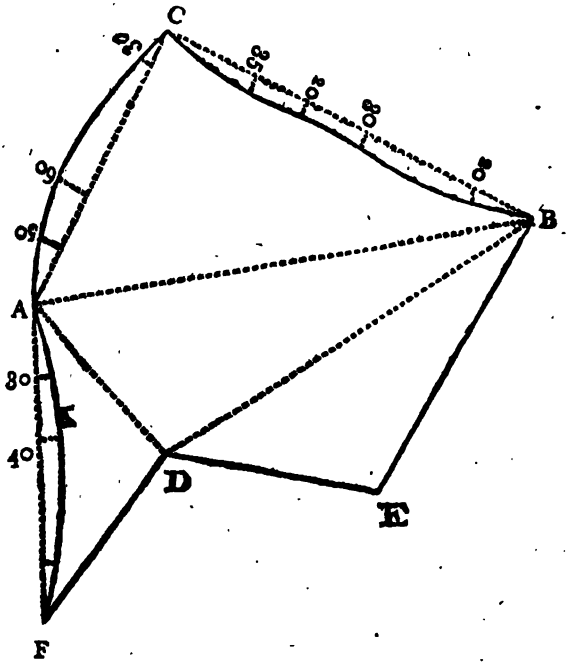


	A	R	P
Content	5	1	29

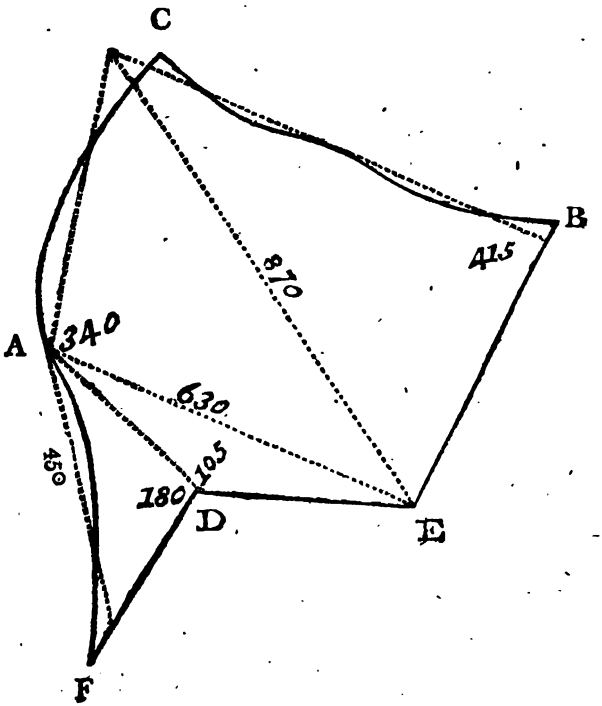
Draw a Plan, and find the area of a Field from the following notes.

	500 FA	0
	400	30
	310	Gate
	300	40
	100	30
	R[t] of F	0
	325 DF	
	L of D	
	345 ED	
	R[t] of E	
	500 BE	
	R[t] of B	
Diagonal	700 DB	
	L of D	
Diagonal	815 AD	
	L of A	
	505 CA	0
	400	50
	300	60
	60	30
	L of C	0
0	680 BC	
85	500	
20	410	
30	300	
20	100	
0	L of B	
Diagonal	825 AB	
Begin at	A	

PLAN.

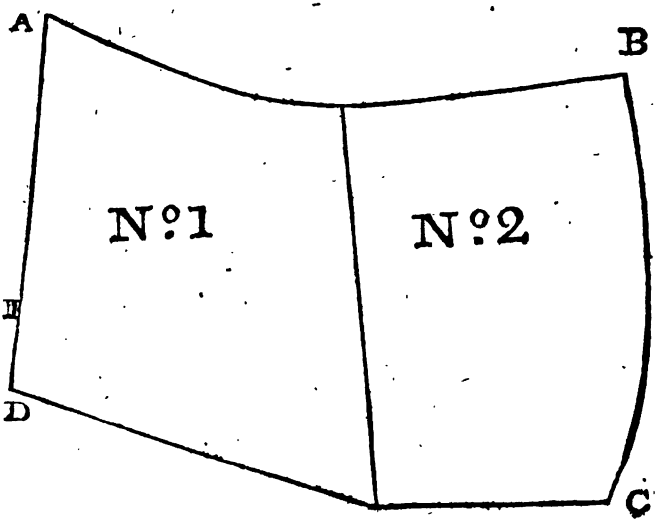


Plan with the crooked fences straightened.



	A	R	P
Content	4	0	3

To survey two adjoining Fields together.



Proceed as if they were one Field, in doing which, the fence which parts them will be crossed three times. Note down in what part of the chain-line the crossings are made, by drawing lines on that side the middle column the fence runs, or on both sides if the fence runs on both sides. This will be easily understood by examining the following notes, and comparing them with the plan.

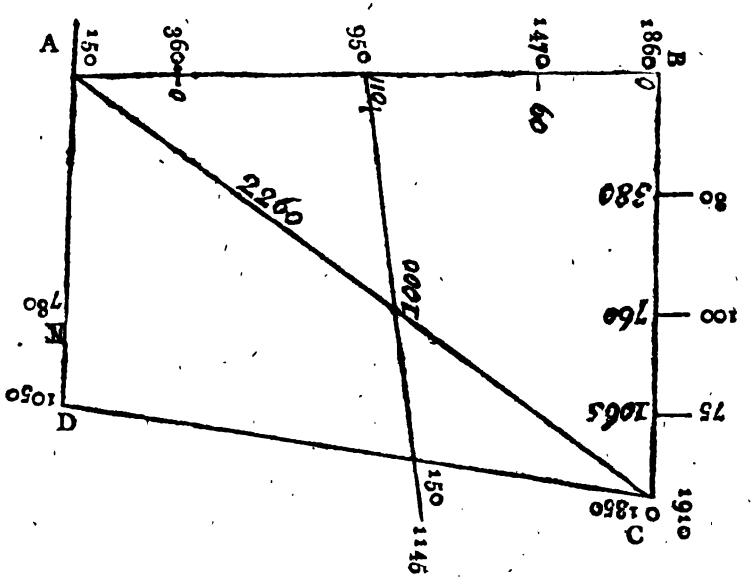
	1910 DC	0
straight ——	1145	150
	L of D	
	1050 AD	
	780	Gate
	L of A	
Diagonal	2260 CA	
straight ——	1000	——straight
	R[t] of C	
0	1350 BC	
75	1065	
100	760	
80	380	
	R[t] of B	
	1860 AB	
	1470	60
	950	110 straight
0	360	
150	A	Begin

TO PLOT THEM.

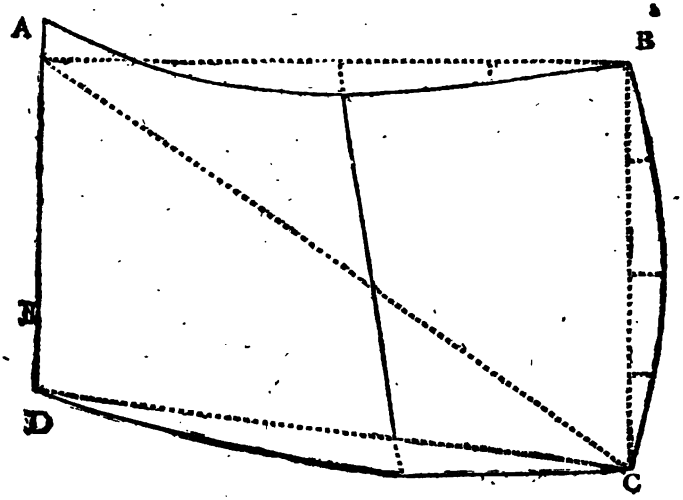
Draw the Trapezium ABCD, and the offsets as before directed. Mark the place on the diagonal where you crossed the fence, which stands thus in the Notes: straight —— 1000 ——straight.

The words *straight*, denote the fence crossed runs straight to the end; and as it is crossed in more than one place, there is no occasion to measure it unless to prove the Work.

The Plot will then appear thus:

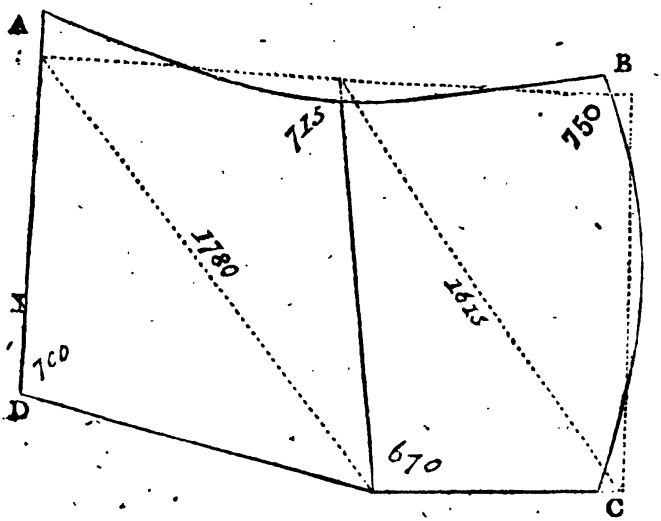


Draw the boundaries touching the extremities of the offsets, and it will appear thus:



Which being cleared of the superfluous marks, &c. will be finished as in the first figure.

Find the area of each Field separately, by straightening the fences, &c, as before directed.



	A	R	P
Content of No 1,	12	2	14
Content of No. 2,	11	1	34

It must necessarily follow, the larger the number of Fields, the greater will be the variety of memorandums and marks. It is impossible to invent a method that will suit all kind of Inclosures; but those who study these notes, and carefully lay down the pieces from them, may gain such a general knowledge of this method, as will enable them to survey by it.

Most surveyors keep their Field-books in a similar manner, but each adopts his own marks, nor do any two follow the same method exactly.

The engraved Field-book, which is stitched into covers by itself, will be found particularly useful in plotting the two following examples; for the notes are very much disjointed in the letter-press, in order to explain them. I have purposely omitted noticing trees, ponds, and other appendages which occur in surveying, that the Field-book might have as few incumbrances as possible; for when the learner is capable of plotting the lines, offsets, &c, the secundary observations will naturally occur.

When the learner attempts to survey several Fields together, he must not burthen his memory with too many lines at first. After a little practice he may lay down the work twice a day, when more expert once a day will do. He must not be discouraged if his lines will not prove; small variations will always occur with the most accurate, and a Tyro will very frequently have to measure his lines twice. He must not be in haste to begin, but must walk over the tract of land two or three times, and observe how it can be divided into the largest triangles; for in all surveying with the chain, whether of single or more Fields, or of a Parish, a chief point to be observed is, to measure the largest possible triangles which the case will admit. On the laying down of which triangles the accuracy of almost every part must in a great degree depend.

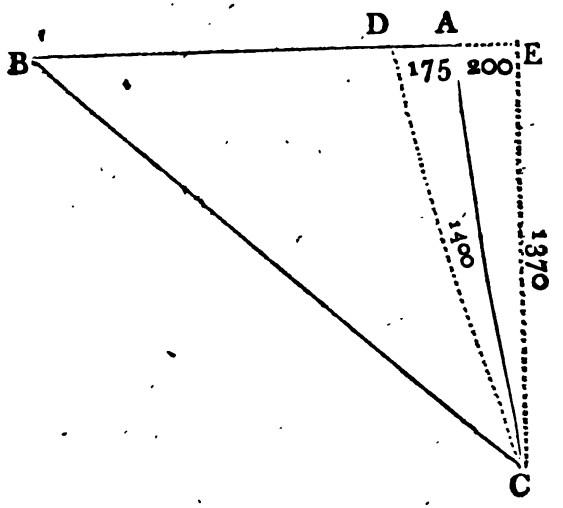
In the following map I have taken care to make the lines meet in the most convenient places, which I was enabled to do from the flatness of the land; but when the land is hilly, or the lines so long that one end of a line cannot be seen when you are standing at the other, a cross will sometimes be found useful somewhere between the two marks, to determine the direction of the line, by placing it in such a situation that both of them may be seen through one pair

of sights. But when the two marks cannot thus be seen, great care should be taken to go in a straight direction; to do which, the follower should always have at least three poles before him in a straight line. So soon as he comes up to the nearest, he must direct his assistant to get in a straight line with the other two, and fix another beyond the last, proceeding in this manner till the line is finished, which most likely will be either on the right or left of the mark measured for.

Or fix all the poles up first and then measure.

Suppose two lines AB and BC of the Triangle ABC are measured, and in measuring the third line it ends at D, measure the distance from D to A, the notes will stand thus;

1400 CD L of C	175 to A



If the line ends at E, measure the distance from E to A, so that EB is one straight line, the notes will stand thus :

to A 200	1370 CE L of C	

* It is best to dig holes of different shapes for marks, in which poles may be placed; if a pole be removed by accident the hole will remain.

In taking small surveys, the different marks are easily remembered, but if the lines are of a considerable length, the shape of the mark dug in the ground must be entered in the Field-book thus :

A△ B▷ C▽ D◁ E◺ F◹ G□ ▭ Io K▯ L▱ M+ &c. &c.

No poles should be left standing but such as serve for marks.

Many perplexing errors occur with young surveyors, from changing the rods improperly. The leader must not ask for the rods till he wants one to put down and has not got one: the leader and follower must then let the chain drop on the ground, meet each other half way, and each of them tell there are ten; the leader must then return to his place and put down a rod. It is best to note down every change thus: 1000, 2000, 3000, &c; if this is neglected, in measuring long lines an error of ten chains is very likely to happen.

If at any time a rod is lost, return to the last mark, and measure over again.

After having finished plotting, the fences must be straightened, and the content of each field found, as before directed, which must be written down in the plan with ink. To prove the work, you must consider the whole estate as one large field, the fences of which may be straightened, and the area found as in a smaller field; which area ought to be nearly the same as the sum of the areas of all the fields.

To make a clean copy of the plan, you must place the vellum or paper at the back of the original, and lay them on an even surface; place weights round the edges to prevent their

slipping; then, with a fine needle fixed in a wooden handle, prick the extremities of straight lines, and as much of the curved ones as will enable you to draw them on the new plan; the outline must then be traced with a fine pen and indian ink. Common ink must never be used in planning.

Let the north side of the plan be at the top if convenient.

In order to shade it, rule fine lines across with black-lead pencil, at about one-eighth of an inch asunder; let these lines be traced by hand very lightly, and insert others between them till the whole is properly shaded; retrace the boundaries, and draw the gates, trees, hedges, &c.

Roads ought to be shaded with umber, or any other brown; and water with prussian blue: not with a brush, but a pen, in the same manner as indian ink is used.

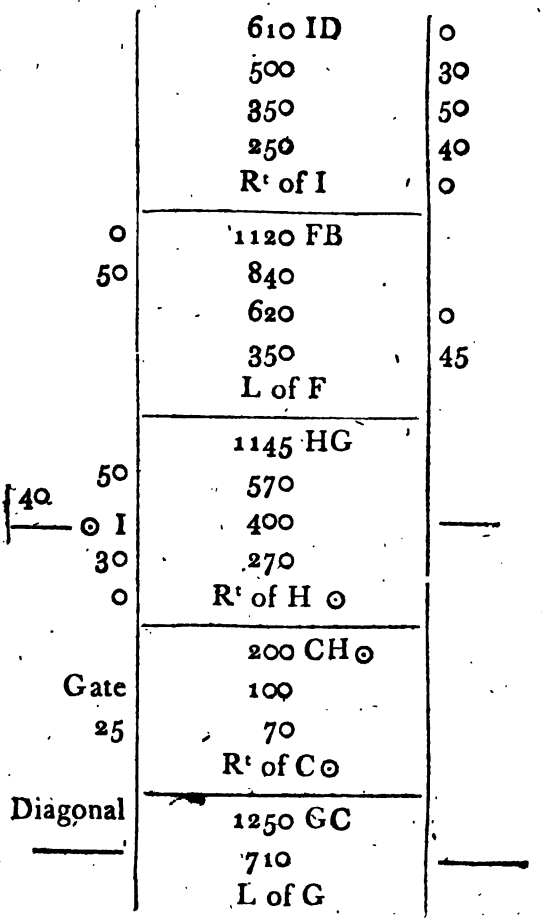
To find a Meridian line, take a compass somewhere in the middle of the estate, and observe in what direction the needle points; the true Meridian line will be $22\frac{1}{2}$ degrees to the right of the needle, (that being the present variation at London).

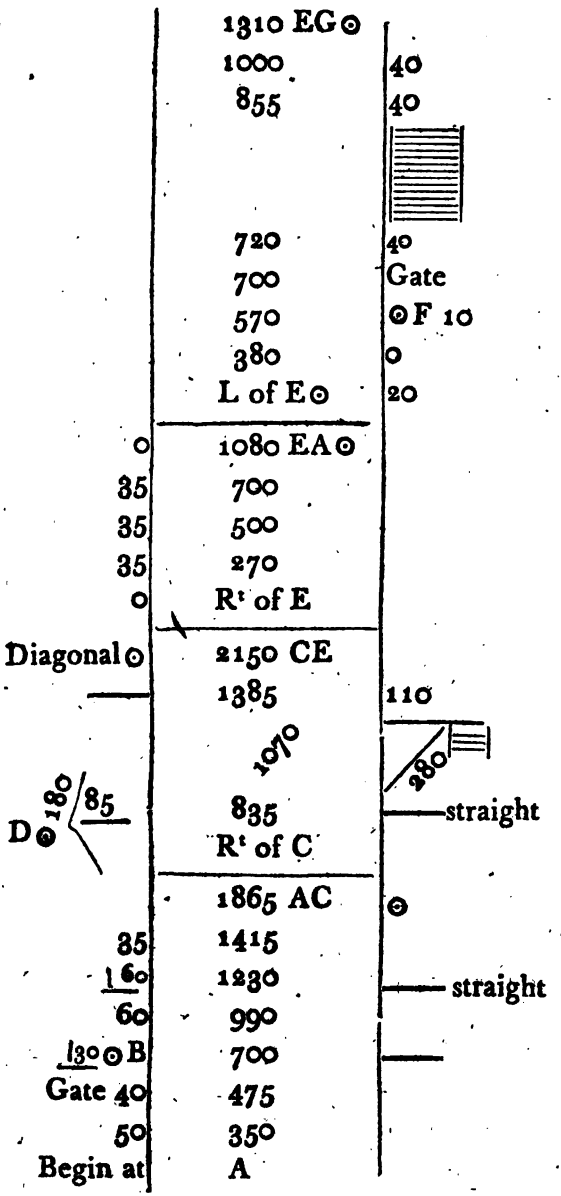
Another method.—Draw five or more concentric circles, about a foot asunder, on a level piece of ground, somewhere in the middle of

the estate, and in the centre of them fix a pole perpendicularly, of such a height, that the whole of its shadow may fall within the circles from nine in the morning till three in the afternoon. Watch the extremity of its shortening shadow in the forenoon, and mark where it touches the several circles; and in the afternoon of the same day, watch the extremity of the lengthening shadow, and mark where it touches the circles. Draw a straight line AB, fig. 5, plate V, touching the two marks made on any *one* circle; bisect this line with another, CD, drawn at right angles to it, which will pass through the centre, and be a true meridian; produce this line both ways till it touches some known boundary, it can then be plotted in the map, and if it is not in a convenient place, it may be transferred to any other by drawing another parallel to it.

The best time for drawing a Meridian line in this manner is about the 21st of June, because the sun then changes its declination slowest, and its altitude quickest.

To survey the four Fields together. Fig. 1*st, Plate* 5*th. The notes for which will stand thus:*




1310 EG⊙
1000
855
720
700
570
380
L of E⊙
1080 EA⊙
700
500
270
R^t of E
2150 CE
1385
1070
835
R^t of C
1865 AC
1415
1230
990
700
475
350
A
40
40
40
Gate
⊙F 10
0
20
110
280
straight
straight
0
35
35
35
0
Diagonal⊙
180
85
D⊙
35
160
60
130⊙B
Gate 40
50
Begin at

When the chain-lines, offsets, and other marks are drawn, the plan will appear as in Plate 5th, Fig. 2d.

Draw the boundaries touching the extremities of the offsets, clear it of superfluous marks, and the plan will be finished as in Fig. 1st.

The area of each piece is computed by straightening the crooked fences, as in Fig. 3d.

Content of N°. 1.

A	R	P
3	2	21

Content of N°. 2.

A	R	P
3	0	9

Content of N°. 3.

A	R	P
5	3	21

Content of N°. 4.

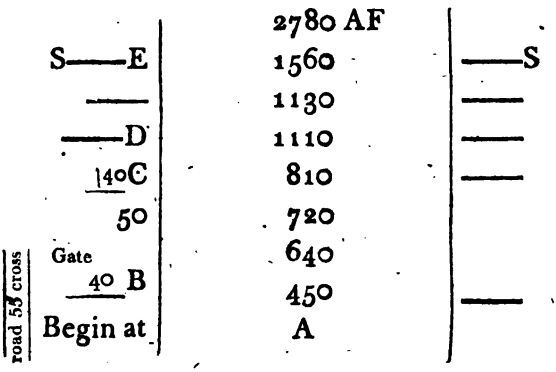
A	R	P
7	1	21

Directions for surveying and planning a small Farm. Plate 6.

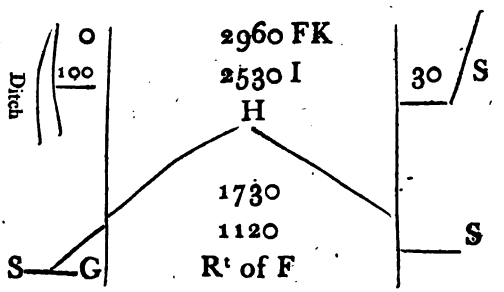
The straight dotted lines divide the whole into triangles, and are to be measured with the chain.

The notes for the largest triangle AFK will stand thus:

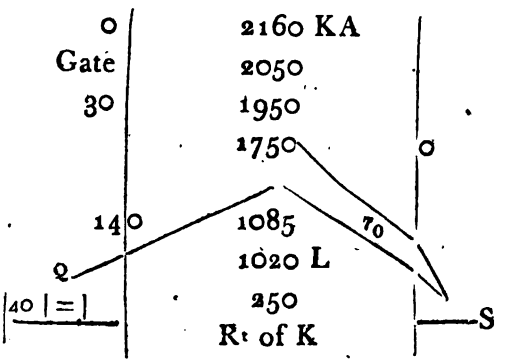
The first line AF.



The second line FK.

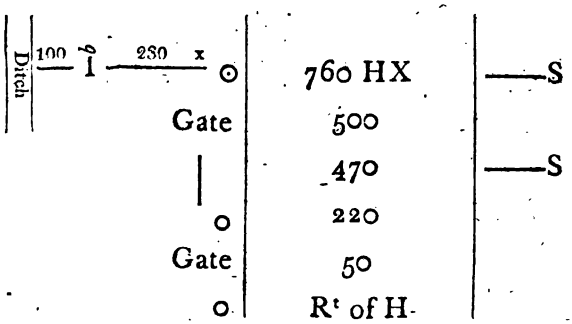


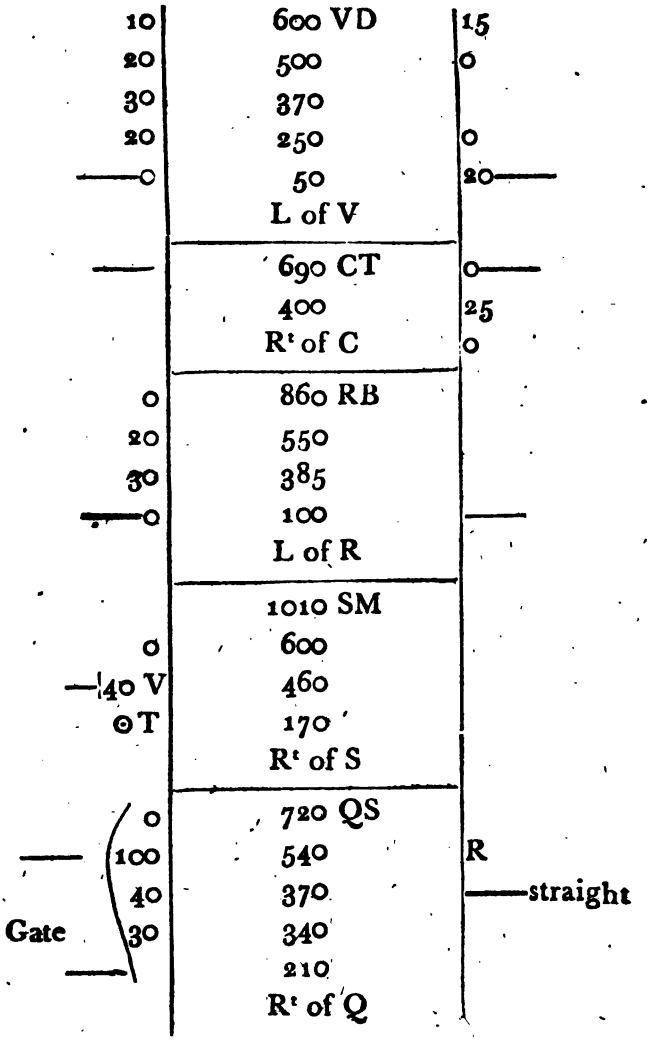
The third line KA.



Construct the triangle with the three lines, draw the offsets and crossings, it will appear as in Plate 7, Fig. 1. Next measure the lines within the triangle, viz. EG. MQ. QS. SM. RB, CT. VD. and HX. The other lines run straight, and being crossed in two places need not be measured unless to prove the work.

The notes for the above eight lines will stand thus :




10
600 VD
15
20
500
0
30
370
20
250
0
0
50
20
L of V
690 CT
0
400
25
Rt of C
0
860 RB
20
550
30
385
0
100
L of R
1010 SM
0
600
40 V
460
T
170
Rt of S
0
720 QS
100
540
R
40
370
straight
Gate
30
340
210
Rt of Q

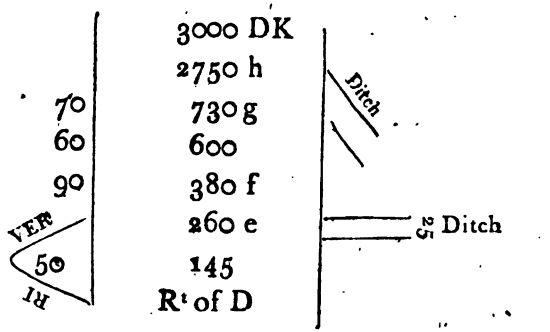
	1710 MQ	
	1580 ML	
S——o	1330	
S——N	1000	120
to H S	400	40
	R[t] of M	o Gate
	890 EG	
M	450	——
	R[t] of E	

Then measure the two lines CW and WF.

o	1020 WF	
30	850	
o	450 Gate	
30	150	
o	R[t] of W	
o	1030 CW	
60	670	——
50	320	——
45	290	Path
o	170	
Gate	100	
40	L of C	

When the foregoing lines are plotted, the offsets and crossings marked, the plan will appear as in Plate 7. Fig. 2. Draw the boundary lines and it will appear as in Plate 7. Fig. 3. Then measure the two lines which will complete the next largest triangle Fd and DK.

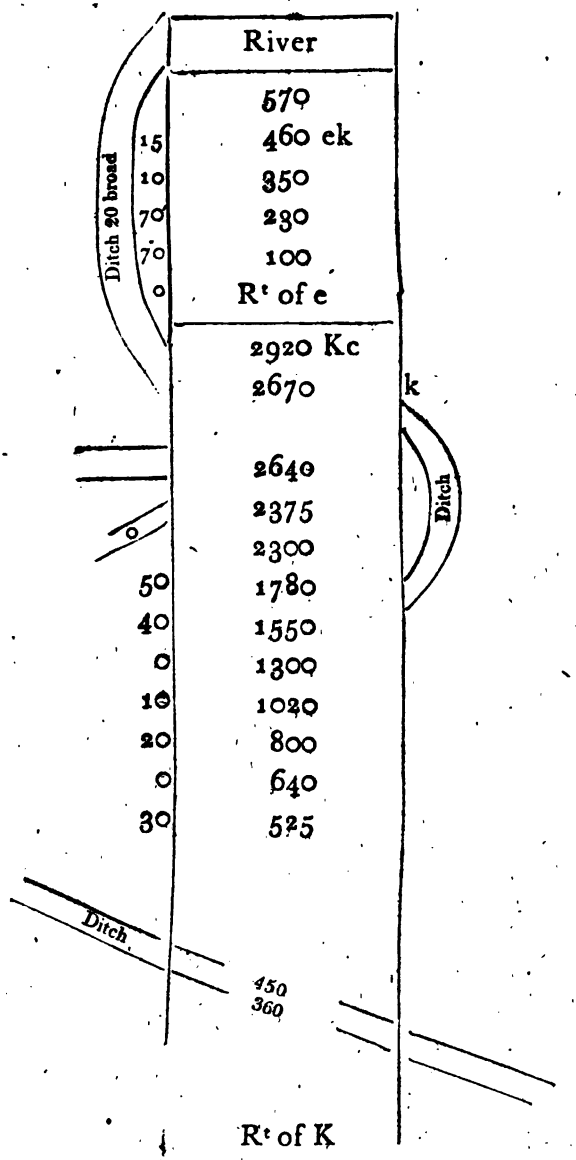
The notes will stand thus :

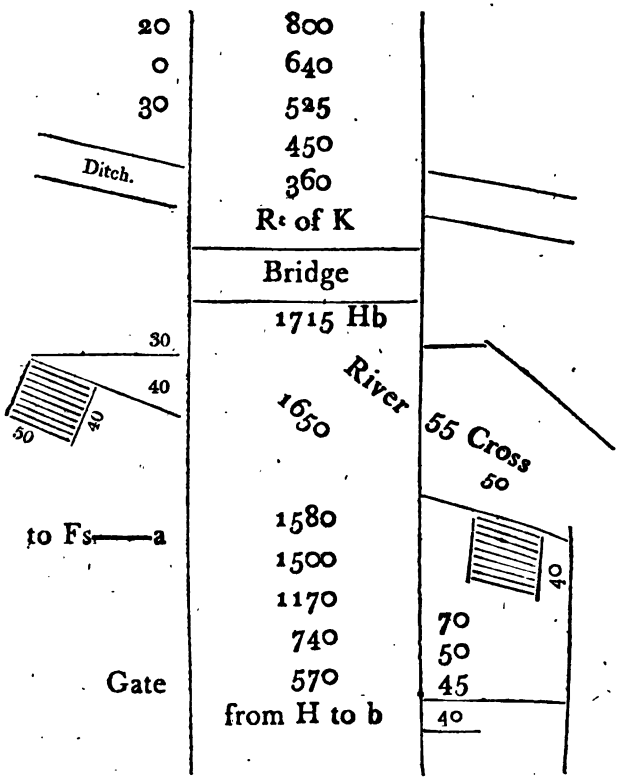


0	1250 Fd
40	1100
30	1000
Gate 60	740 c
	500 b
	R^t of F

Measure the internal lines Hb, Kc, ek, ib, lf, and fi. Then the two smaller triangles g m h, and h p n. The notes for which will stand thus :

	840 pn	40
	700	50
	440	0
	100	60
	L of p	
	615 hp	10
	400	0
	100	20
	L of h	
	1420 mh	
	70 n	
0	R[t] of m	
0	900 gm	
40	765	
50	525	
0	300	
70	L of g	
	520 fi	
	R[t] of f	
	300 lf	
30	240	
10	120	
50	50	
0	R[t] of L	
0	300 il	
10	150	
0	R[t] of i	


River
579
460 ek
350
230
100
Rt of e
2920 Kc
2670
k
2640
2375
2300
1780
1550
1300
1020
800
640
525
15
10
70
70
0
50
40
0
10
20
0
30
Ditch 20 broad
Ditch
Ditch
450
360
Rt of K



When the foregoing lines are added to Fig. 3, Plate VII. the Plan will appear as in Plate VIII, which being cleared of the superfluous marks, the fences must be straightened, and the content of each field found as before directed. When this is done draw a fresh plan, and add the different appendages as in Plate IX.

PART THE SEVENTH.

IN measuring Roads, Woods, and other Places, which cannot be conveniently divided into Triangles with the Chain, a Mathematical Instrument must be used to measure the Angles with; and that which I recommend, as the best for the use of Schoolboys, is the improved Brass Pocket Box-Cross, Fig. 3, Plate X, because it can either be used as a common Theodolite, Circumferentor, or Cross-Staff, and it costs less than other Instruments which are commonly used for the same purpose. The graduated Base AB, Fig. 1 and 2, is the circumference of a Circle divided into 360 Degrees, which being screwed to the Staff, and the Staff fixed firmly in the ground, the other upper part of the Instrument may be turned either way by rack-work and pinion at C, Fig. 3.

To measure an Angle, ABC. *Fig.* 4, *Plate* X.

Place the Instrument over the angular Point B; move the Pinion C, till the Index of the Nonius E coincides with the 360th Degree. Look through the

Sight which is directly above the Index E, and turn the Instrument on the Staff till you can see one of the Marks, for Example, A; then screw the Instrument fast to the Staff by the tightening Screw; turn the Pinion C to the right, till you can see the Right-hand Mark C through the same Sights; the Index of the Nonius will point out the Number of Degrees, and the coincidence of a division on the Nonius with one on the Circle below, will shew the number of additional Minutes (if there are any) which the Angle contains.

Explanation of the Use of the Nonius.

Let A B represent part of the graduated Circumference of the Instrument. The Nonius, as it stands at C C, Plate X. Fig 1. is rightly placed to make the first Observation with; suppose it stands at D D, Fig. 2. after the second Observation, the Index E points between the 32d and 33d Degrees, observe which Division of the Nonius it is, which exactly or nearest coincides with a Division on the graduated Circumference, as at G, for that will shew the Number of Minutes over the Degrees pointed out by the Index E, which in this Example is 21′, and the Angle contains 32° 21′. Each Division of the Nonius represents 3′.

It is obvious if the first Observation had been made on the Line B C, the Instrument must have been turned the other way, and the Index would have stood at 327° 39′, which subtracted from 360° gives 32° 21′ as before.

To plot an Angle, (See Figure 5, Plate X.)

Draw the Line A B, place the edge of a Protractor on it, so that the Centre Point coincides with the Angular Point B; then by the graduated Edge prick off the Number of Degrees, and a Quarter or Half, or three Quarters of a Degree may be pricked off with a fine Needle by inspection; but it is best to have a circular Protractor with a moveable Index and Nonius, by which the number of Minutes may be pricked off with the accuracy of three, or even one Minute.

In Surveying the Roads and Field, (Fig. 5, Plate X,) by measuring the Angles, &c. the Notes in the Field Book will stand thus:

	End	
	FC 1660	
25	1520	75
15	1220	45
10	880	60
10	722	50
	L of F	60
	30° 5′ ⟩	
	EF 1085	
145	865	
	500	75
44	210	52
	L of E	
	150° 32′ ⟩	
	DE 900	
60	790	25
	250	100
	L of D	
	69° 37′ ⟩	
	CD 590	
	560	70
115	460	93
50	228	40
90	Rt of C	
	150° 45′ ⟨	
	BC 650	
150	608	
	230	70
	L of B	
	117° 15′ ⟩	
	AB 1600	0
0	1432	90
50	1058	50
82	666	13
80	235	25
	begin at, A	

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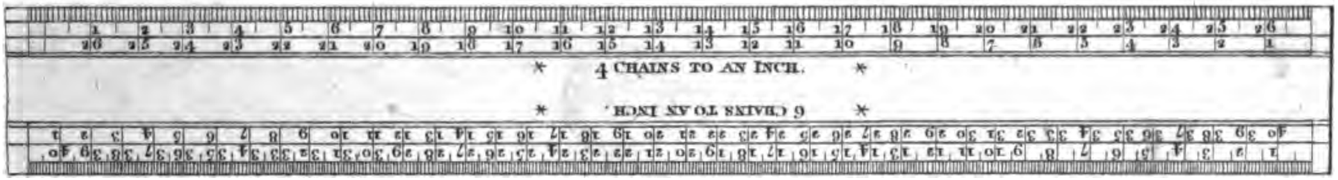
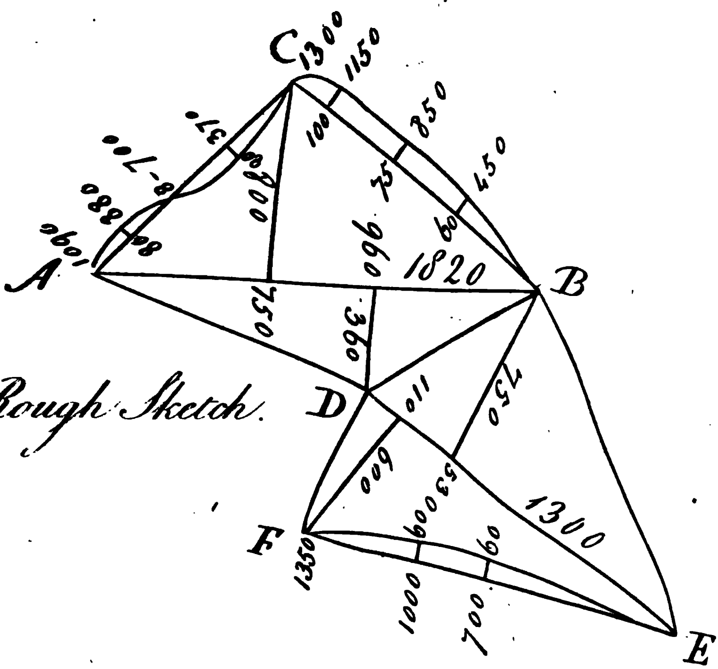
Plate I.

PLOTTING SCALE.

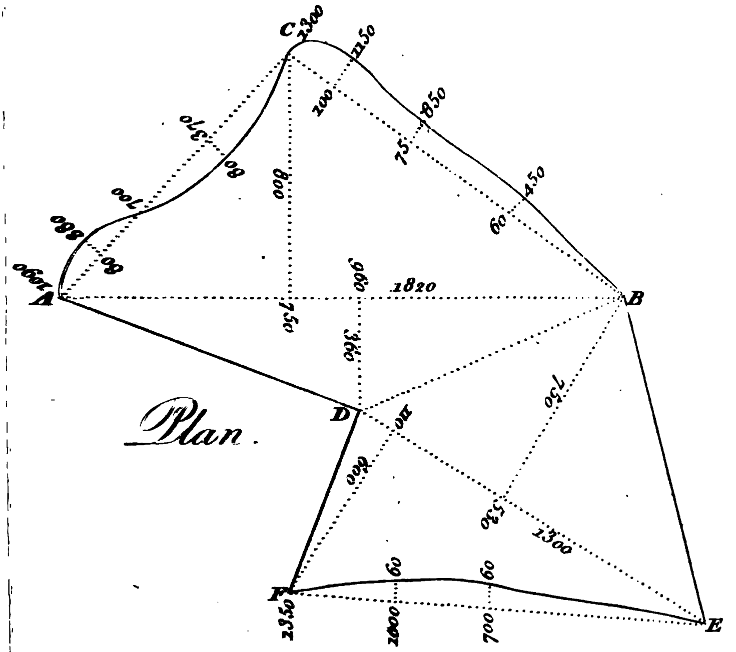


The use of this Scale is too obvious to need much explanation; Every long division marked 1.2.3 &c is 1 Chain or 100 Links & every short division 10 Links.

Dix delin. London Published as the Act directs. Oct.r 1.1799. by L.B. Seeley. Vincent sculp.



Rough Sketch.



Plan.

Vincent sculp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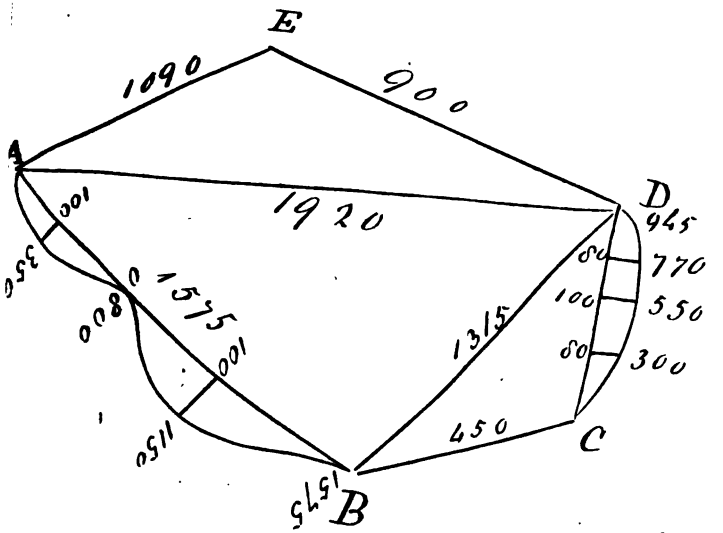
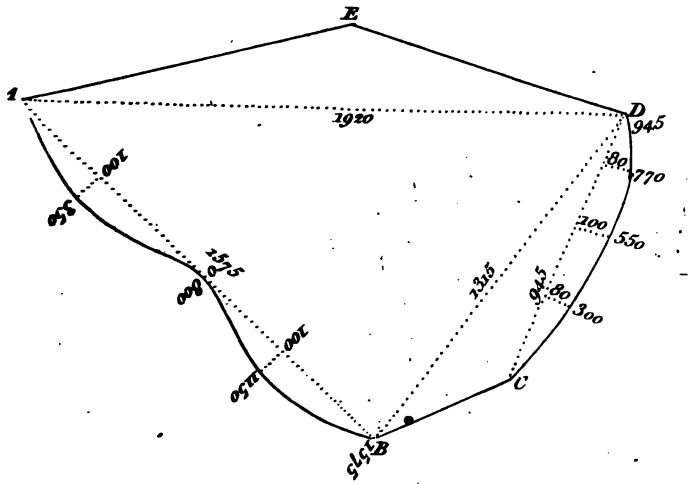
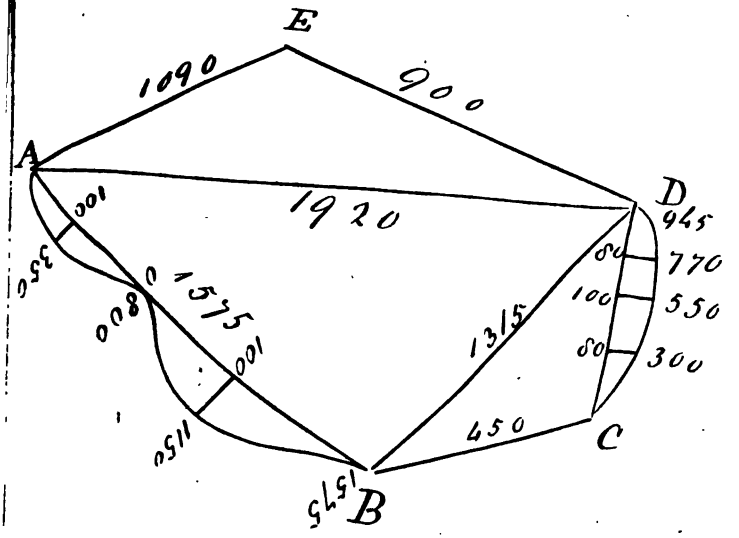
Rough Sketch.



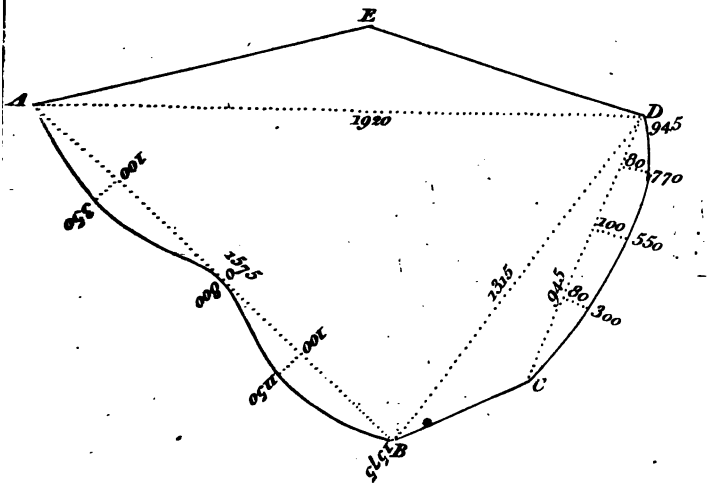
Plan.



Rough Sketch.



Plan.



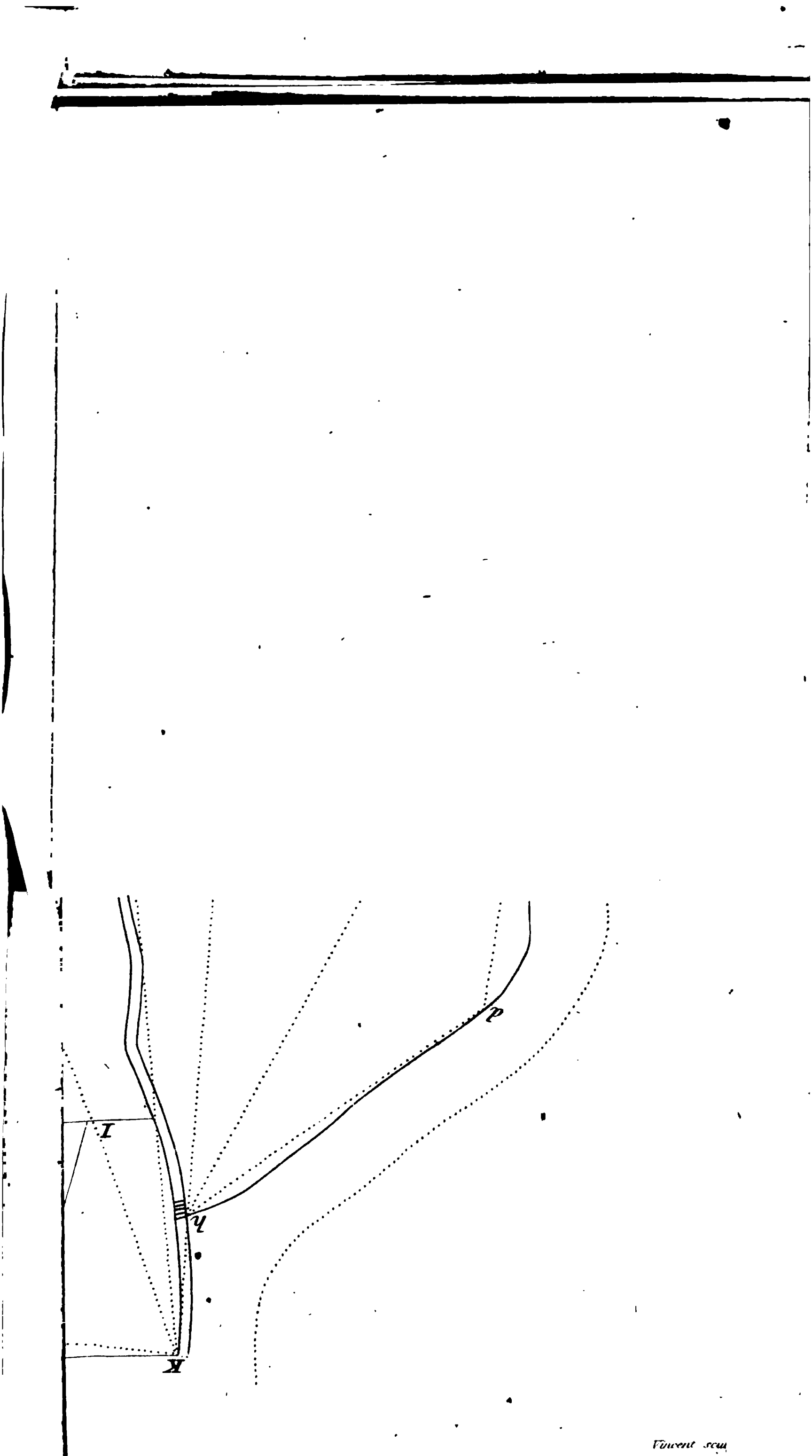

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Plate VIII

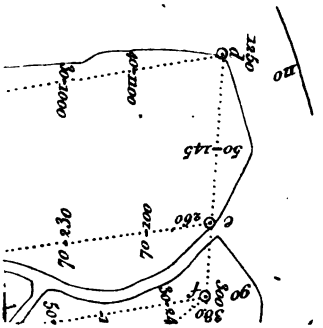


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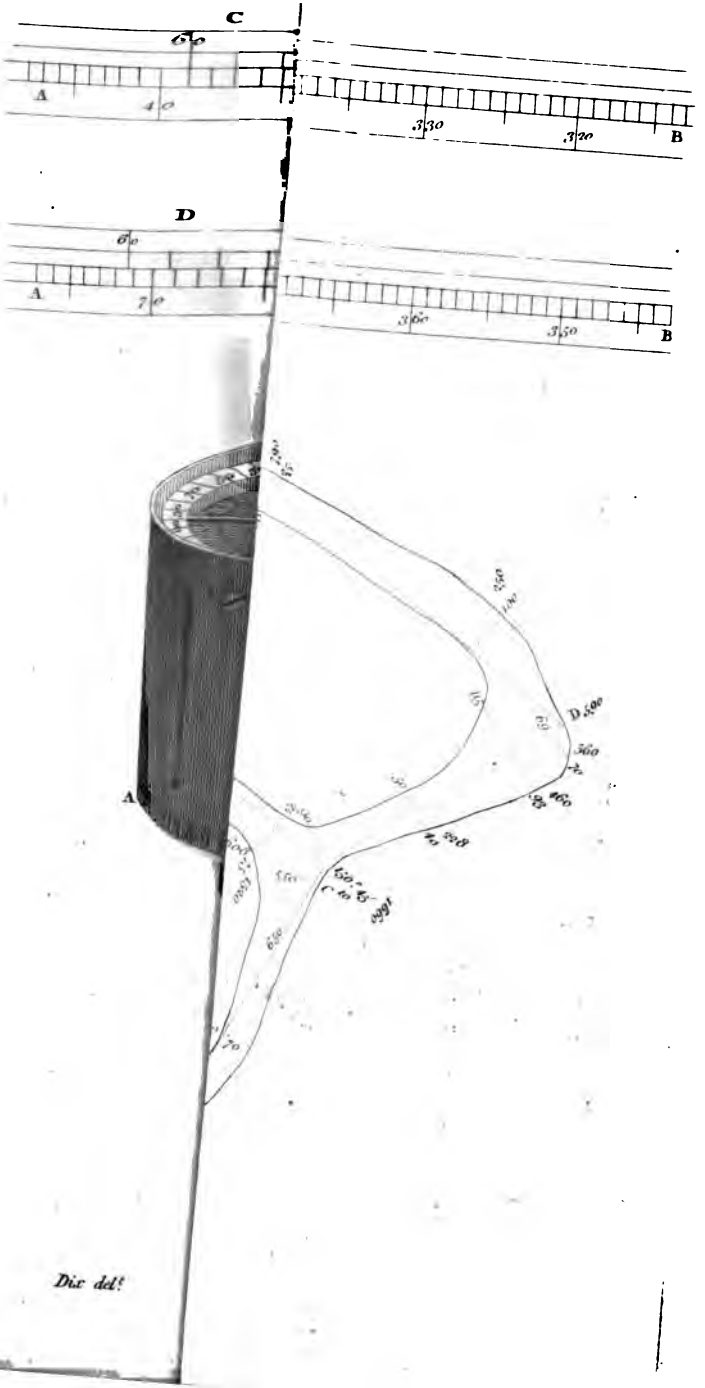
Plate X.



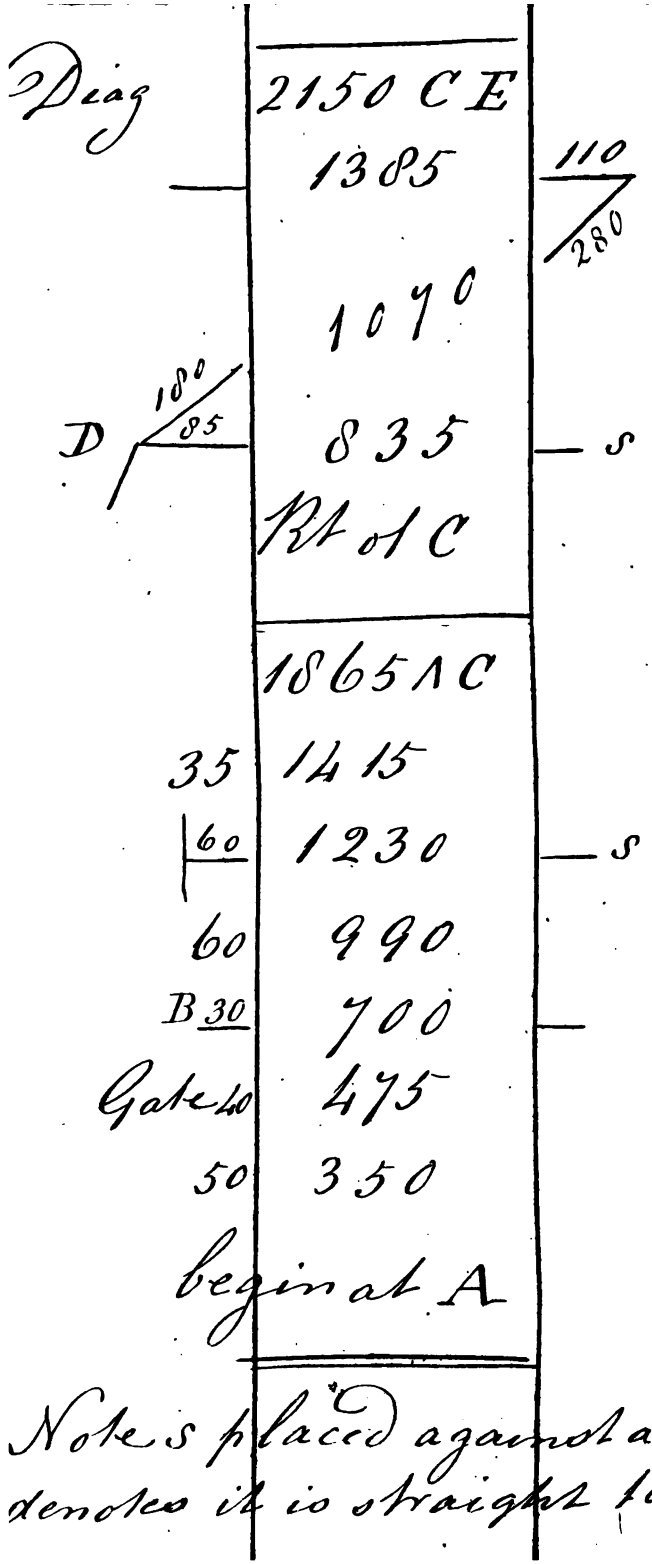
Notes for the four Fields P
the Fifth.

FINIS^r

	610 I D	0
	500	30
	350	30
	250	40
	Rt of I	0
0	1120 F B	
50	840	
	620	0
	350	45
	L of F	

	1145 HG
50	570
40 I	400
30	270
0	Rt of H
	200 CH
Gate	100
25	70
	Rt of C
Diagonal	1250 GC
—	710 —
	L of G

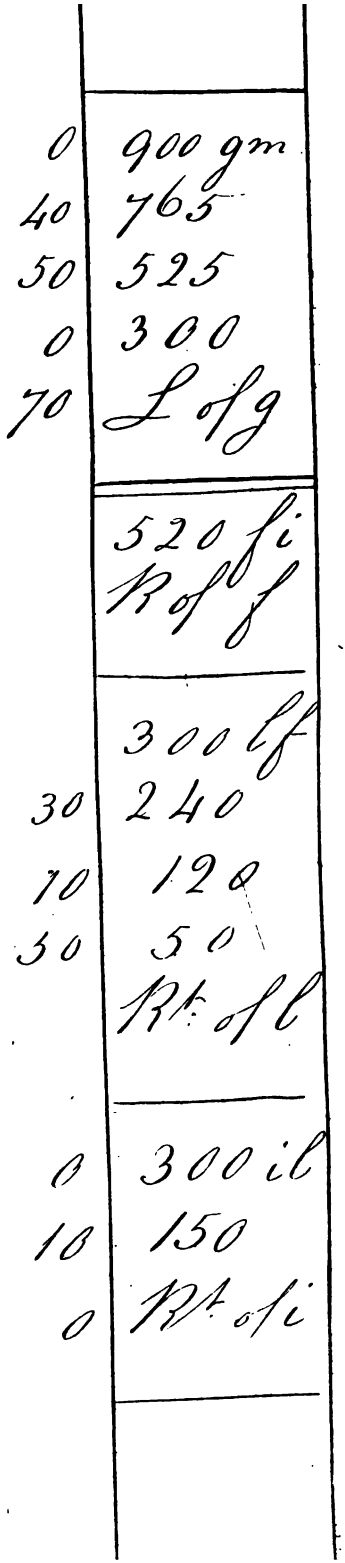
	1310 E G	
~~50~~	~~1000~~	~~mid~~
	1000	40
	850	40
	720	 Barn
	700	40 Gate
	570 F	10
	380	0
	L of E	
0	1080 E A	
35	700	
35	500	
35	270	
0	Rt of E	

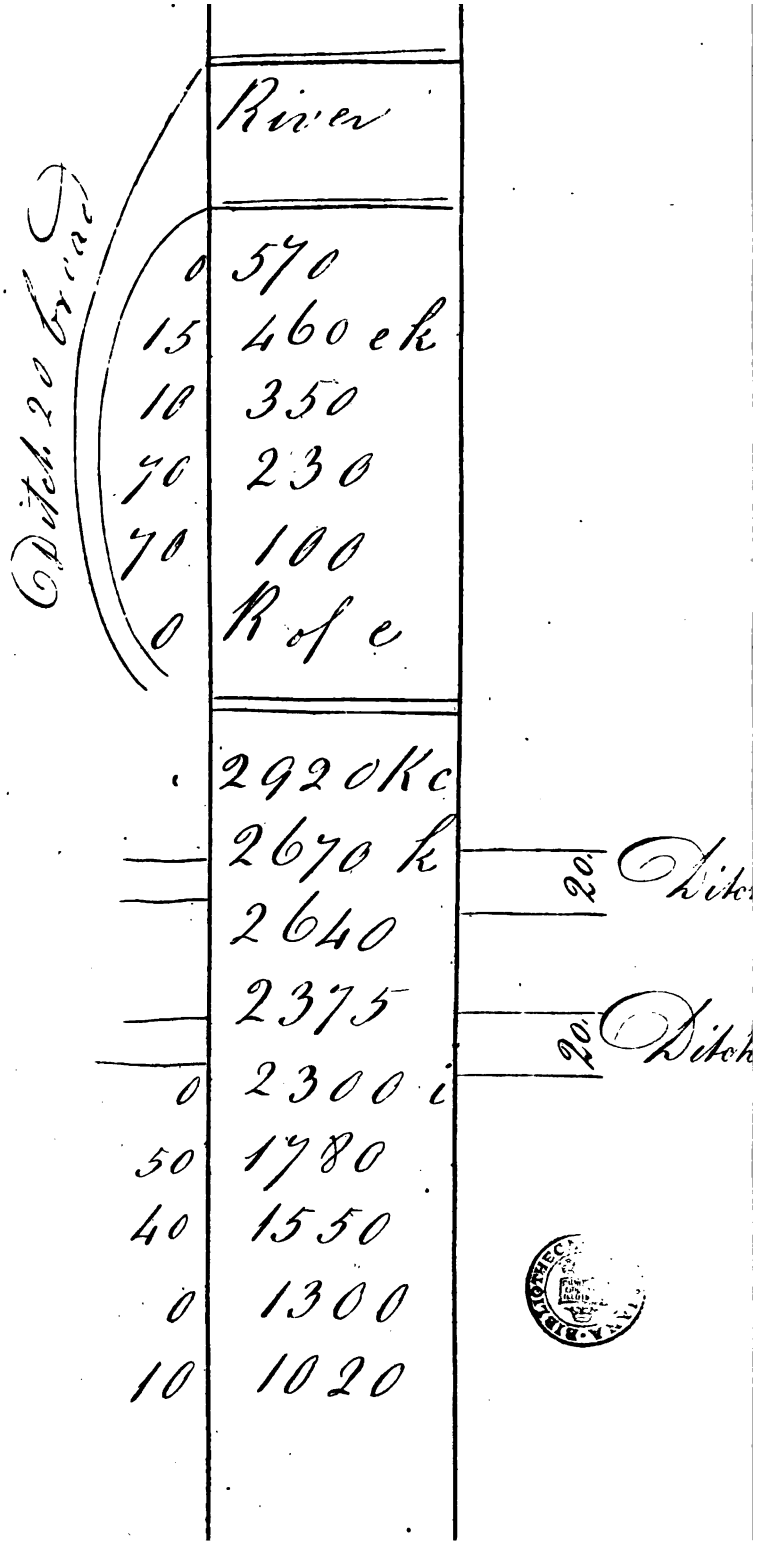


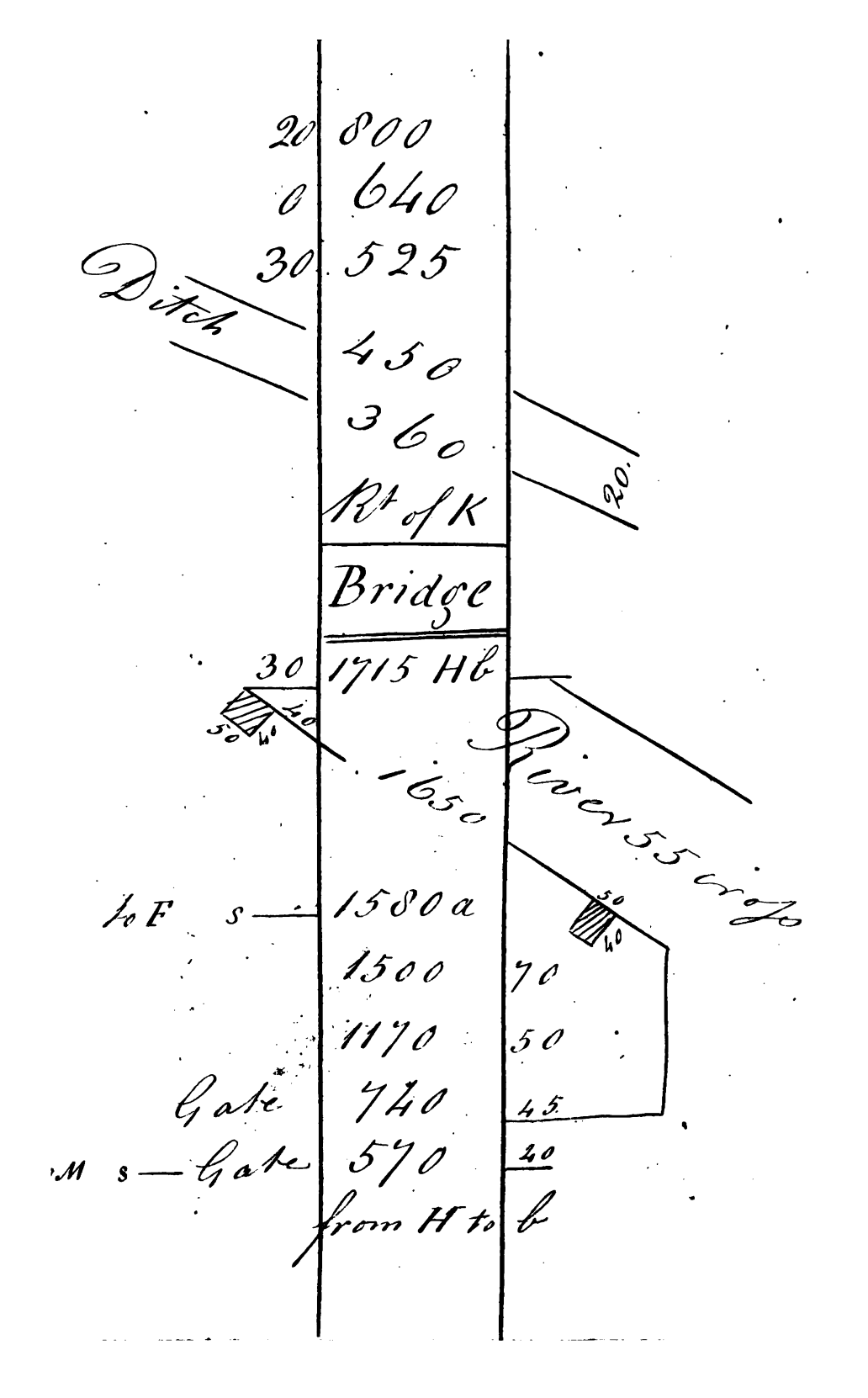
Note S placed against a Line denotes it is straight to the End.

Notes for the Farm

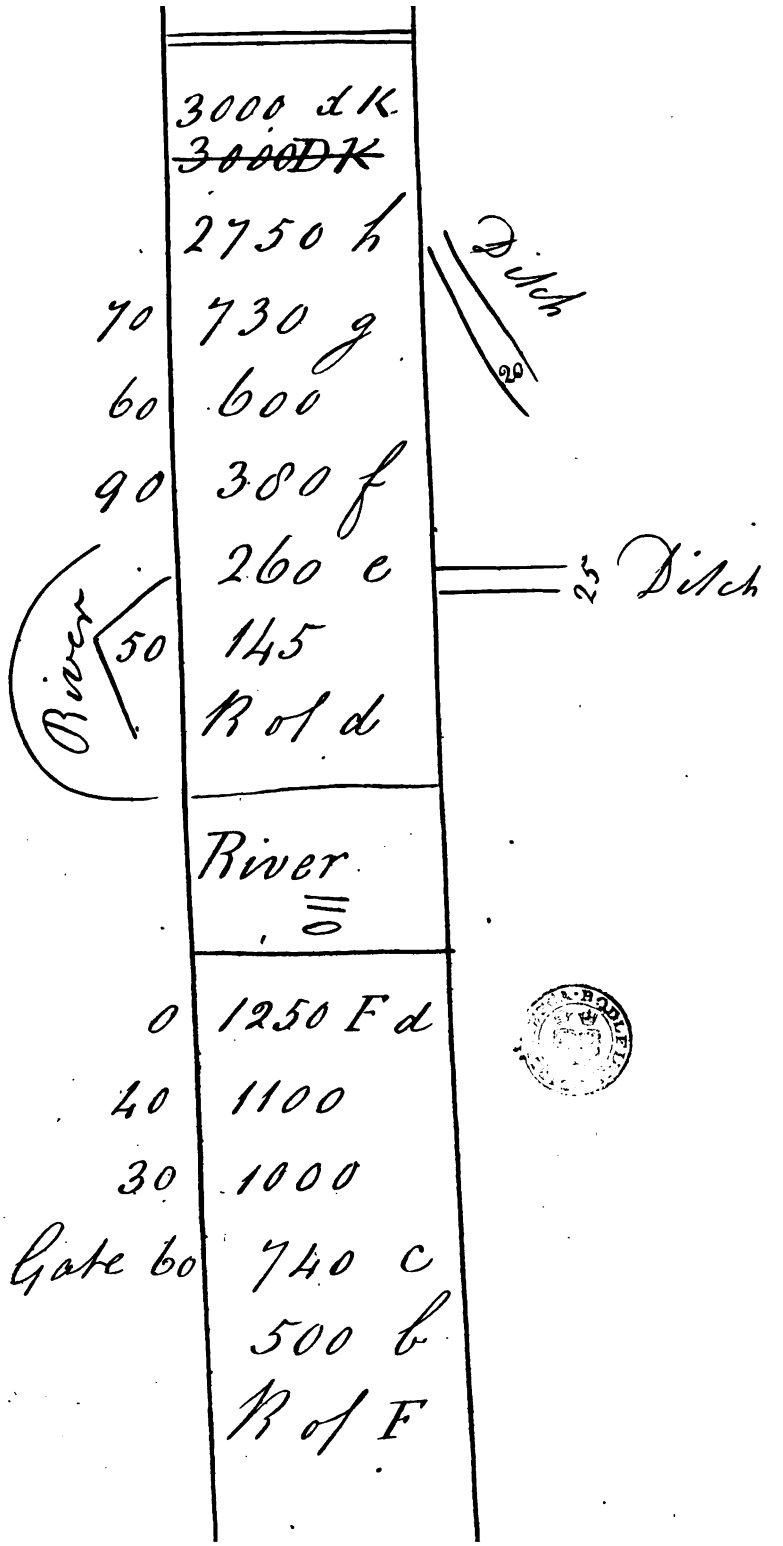
840 pn	40
700	30
440	0
100	60
L of p	
615 hp	10
400	0
100	20
L of h	
1420 mh	
70 n	
0 R of m	
~~19~~	
~~70 100 m~~	
~~R of m~~	

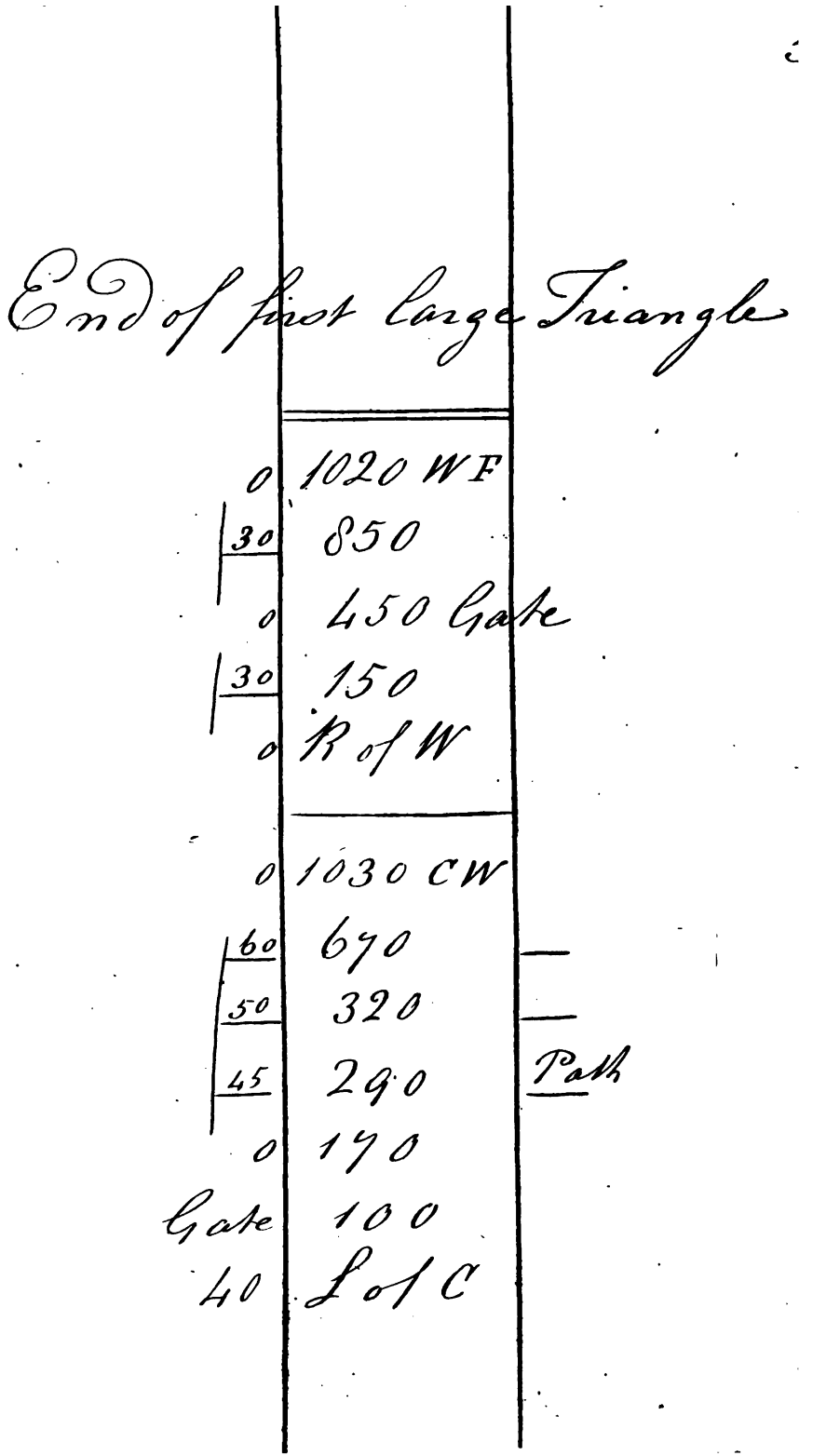

0 900 gm
40 765
50 525
0 300
70 L of g
520 li
R of g
300 lf
30 240
10 120
30 50
Rt of l
0 300 il
10 150
0 Rt of i

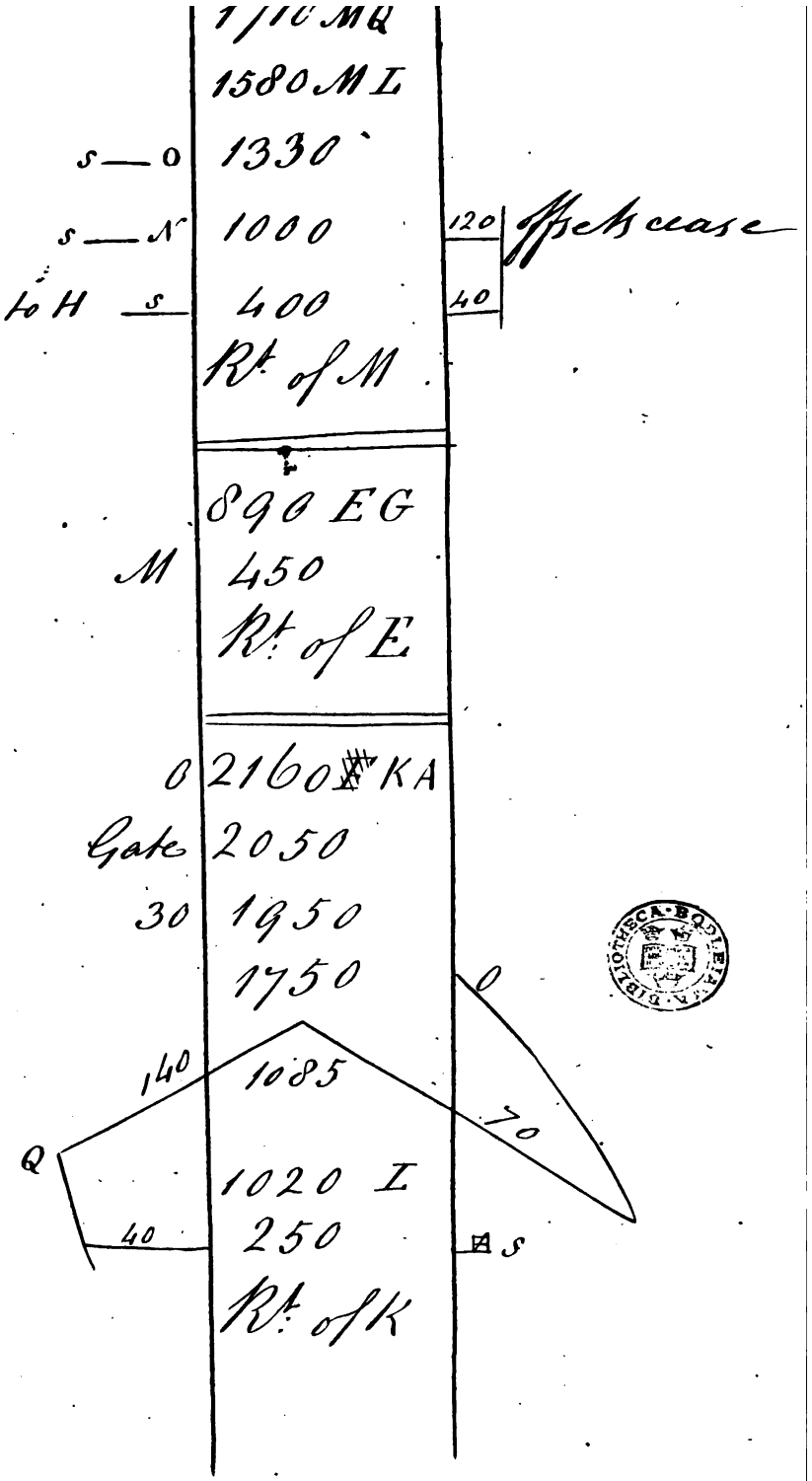

River
Ditch 20 Yards
0 570
15 460 ek
10 350
70 230
70 100
0 Rofe
2920 Kc
2670 k
20.
2640
2375
20.
0 2300 i
50 1780
40 1550
0 1300
10 1020

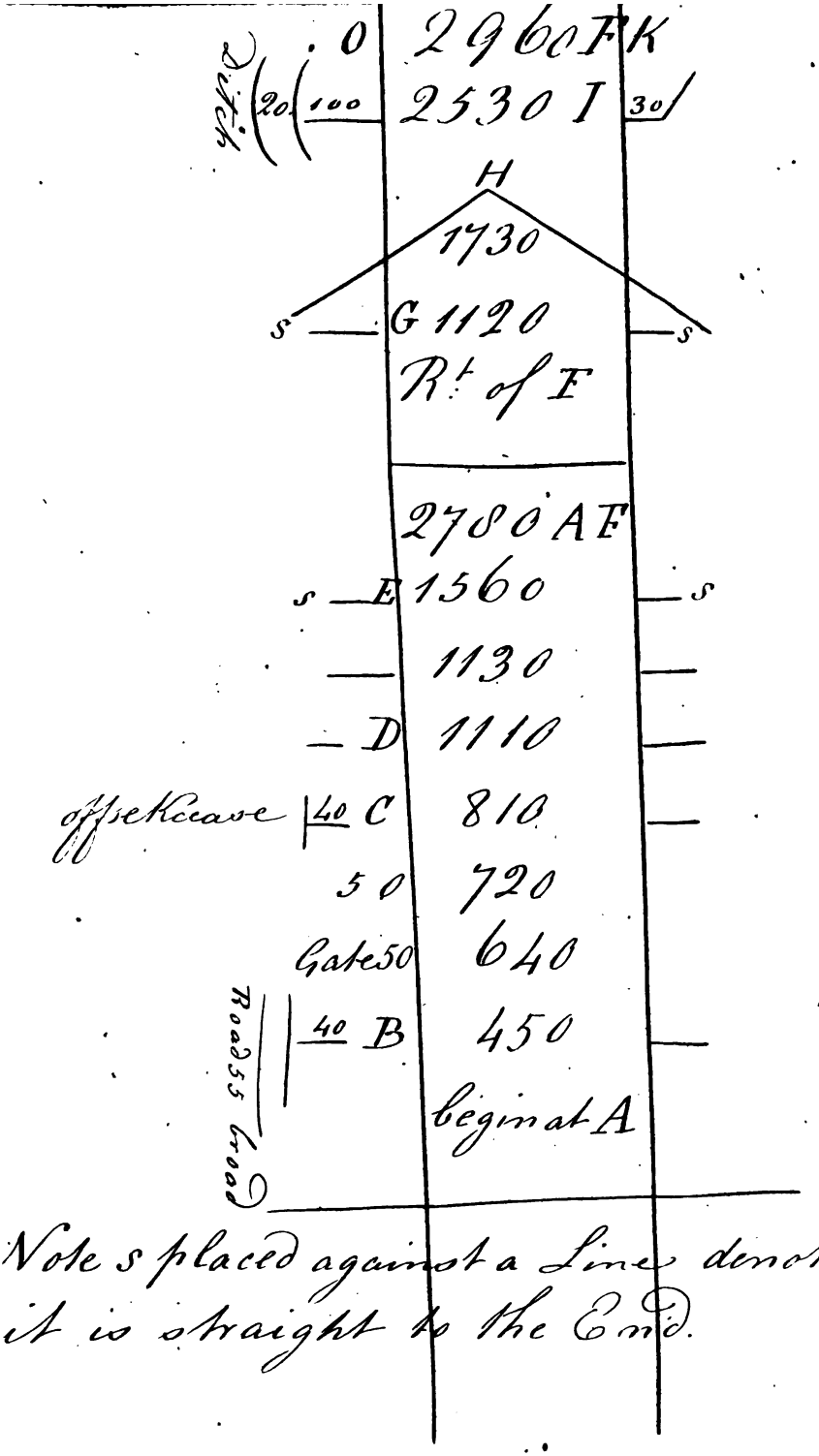

20 800
0 640
30 525
Ditch
450
360
Pt of K
20.
Bridge
30 1715 Hb
40
50 40
1650
River 55 crop
50
40
to F s — 1580 a
1500 70
1170 50
Gate 740 45
M s — Gate 570 40
from H to b

5

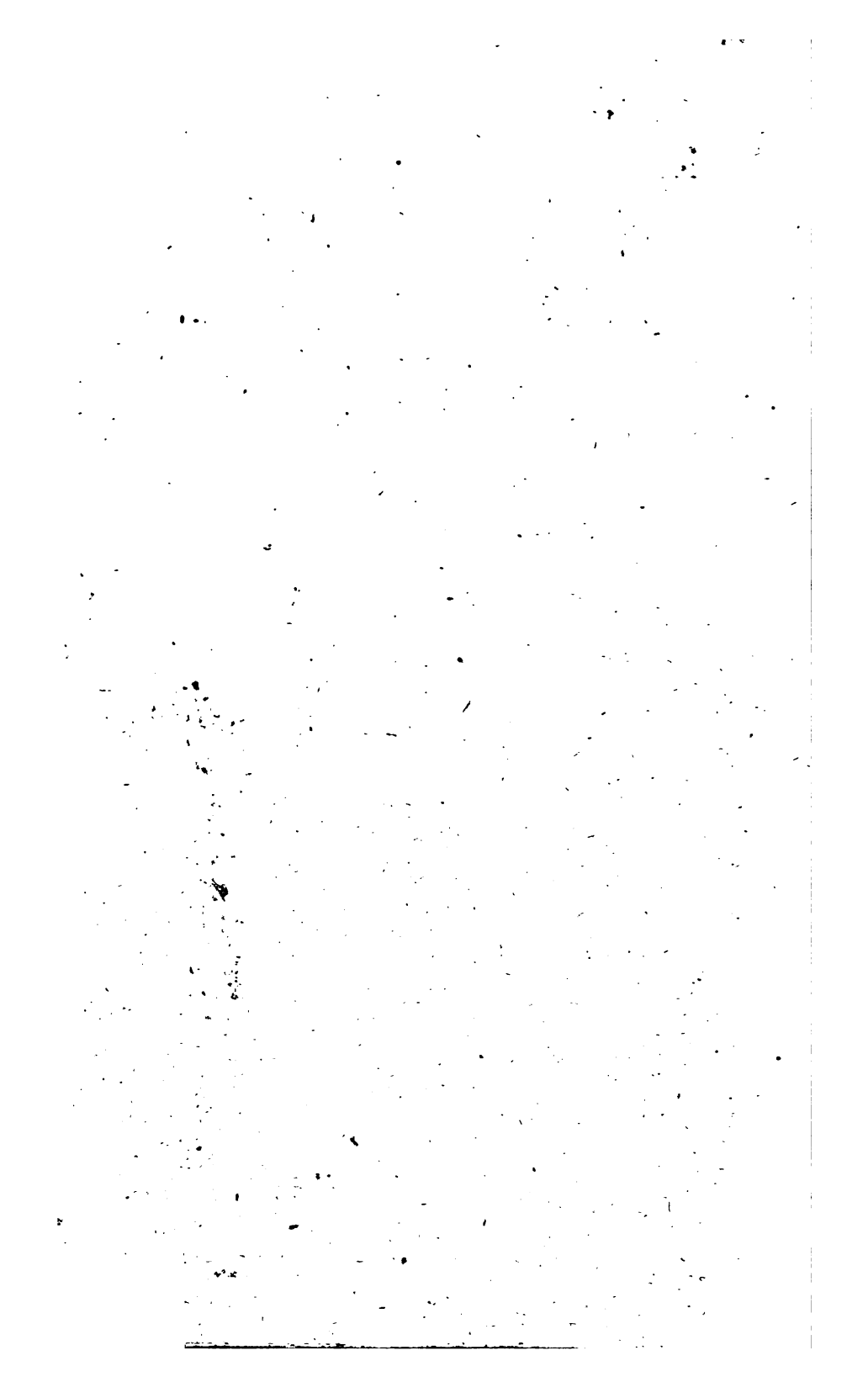

3000 dK
~~3000DK~~
2750 h
Ditch
20
70 730 g
60 600
90 380 f
260 e
25 Ditch
River
50 145
R of d
River
0
0 1250 F d
40 1100
30 1000
Gate 60 740 c
500 b
R of F


End of first large Triangle
0 1020 WF
30 850
0 450 Gate
30 150
0 R of W
0 1030 CW
60 670
50 320
45 290 Path
0 170
Gate 100
40 L of C


1/10 MQ
1580 ML
S — O 1330
S — N 1000
120
Decrease
40 H S 400
40
Rt of M
890 EG
M 450
Rt of E
0 2160 KA
Gate 2050
30 1950
1750
0
140 1085
70
Q
1020 I
40 250
S
Rt of K



Note s placed against a Line denotes it is straight to the End.



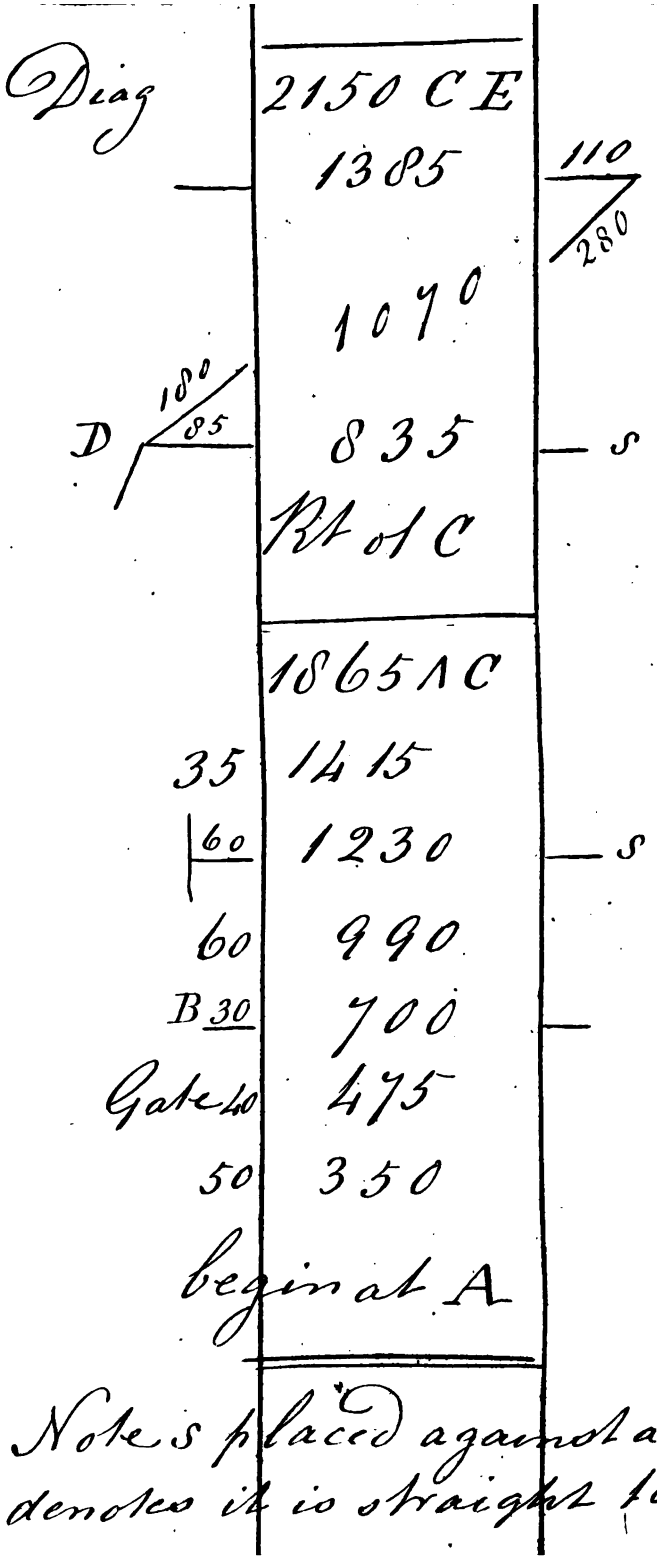
Notes for the four Fields P
the Fifth.

FINIS^r

	610 ID	0
	500	30
	350	30
	250	40
	Rt of I	0
0	1120 FB	
50	840	
	620	0
	350	45
	L of F	

	1145 HG
50	57 C
40 I	400
30	270
0	Rt of H
	200 CH
Gate	100
25	70
	Rt of C
Diagonal	1250 GC
—	710 —
	L of G

	1310 E G	
~~50~~	~~1000~~	~~road~~
	1000	40
	850	40  Barn 40
	720	
	700	Gate
	570 F	10
	380	0
	L of E	
0	1080 E A	
35	700	
35	500	
35	270	
0	Rt of E	



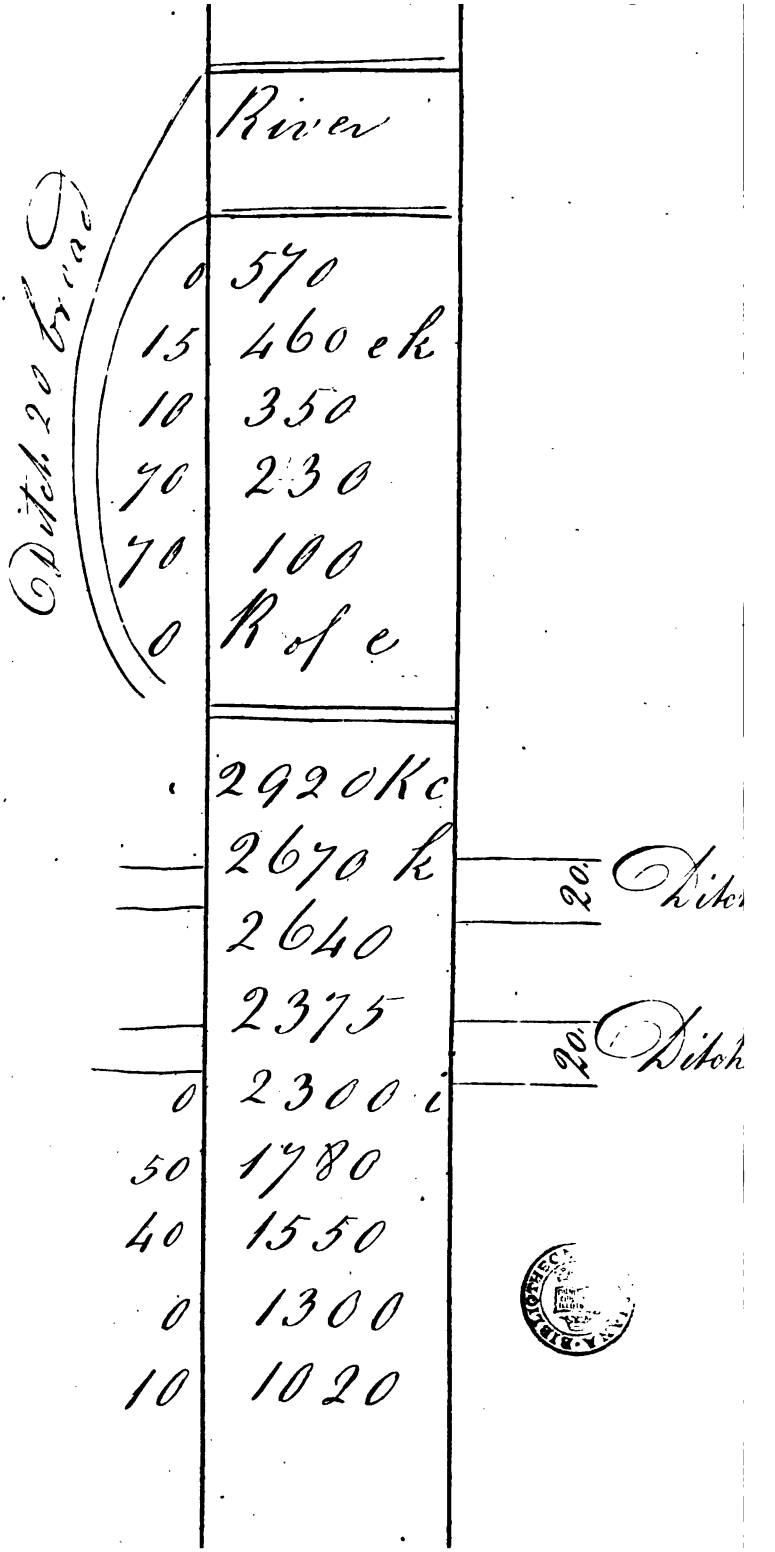
Note S placed against a Line denotes it is straight to the End.

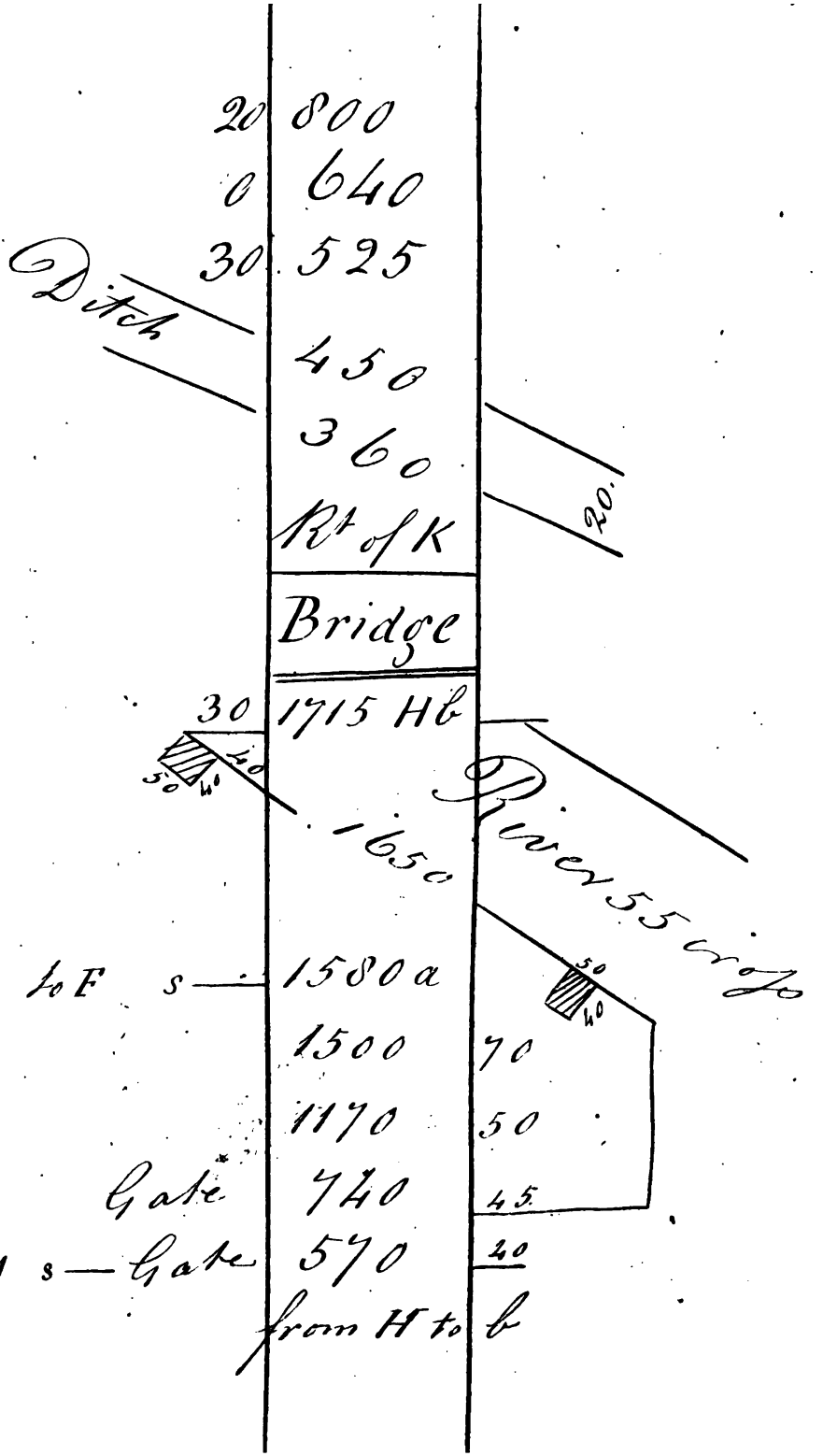
10

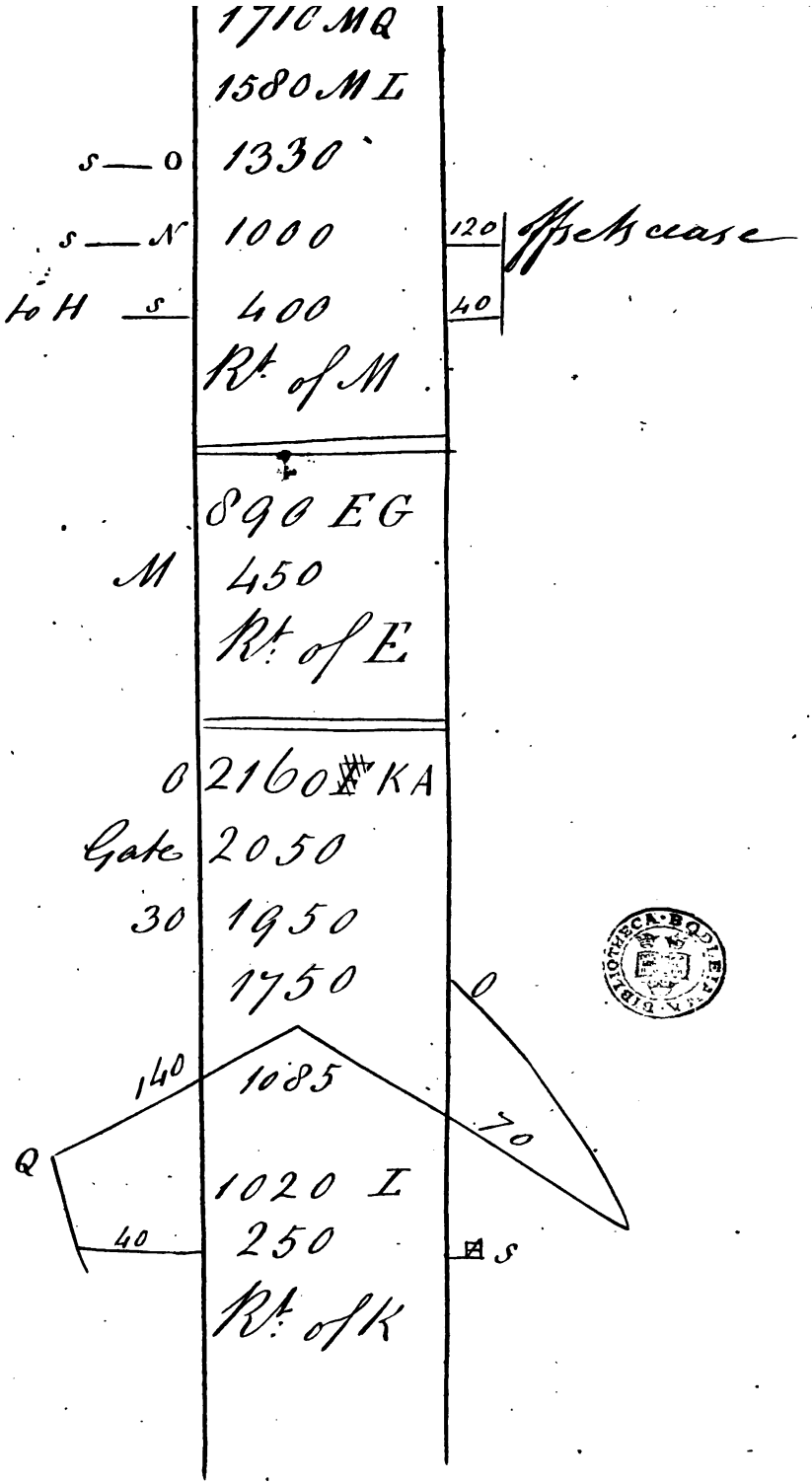
Notes for the Farm

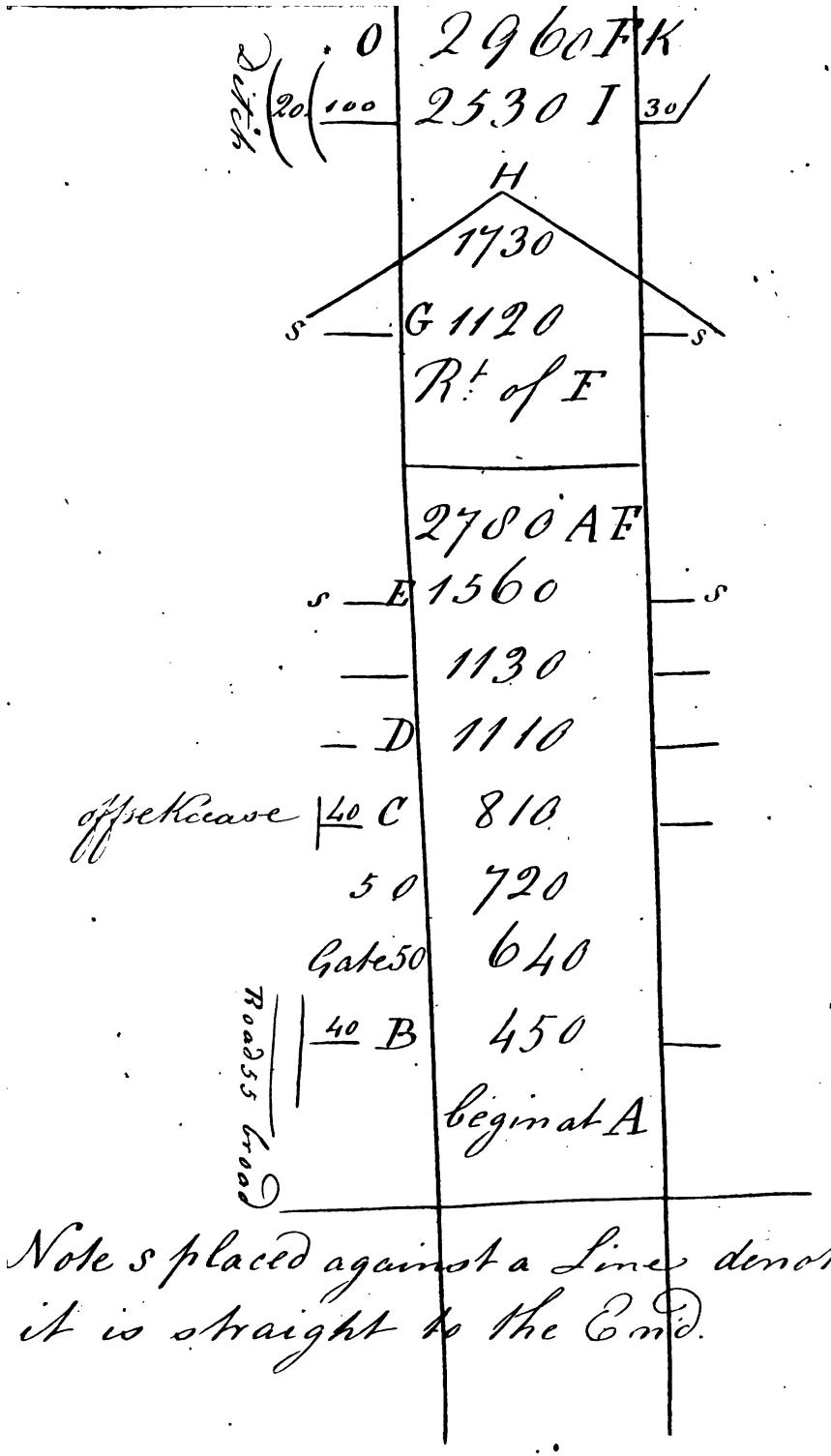
840 pn	40
700	50
440	0
160	60
L of p	
615 hp	10
400	0
100	20
L of h	
1420 mh	
70 n	
0 R of m	
~~19~~	
~~70 100 n~~	
~~R of m~~	

0	900 gm
40	765
50	525
0	300
70	L of g
	520 li
	R of g
	300 lf
30	240
70	120
30	50
	Rt. of l
0	300 il
10	150
0	Rt. of i

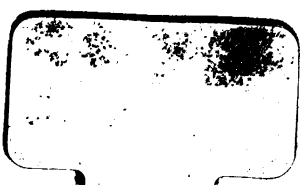

River
Ditch 20 Feet
0 570
15 460 ek
10 350
70 230
70 100
0 Rose
2920 Kc
2670 k
20. Ditch
2640
2375
20. Ditch
0 2300 i
50 1780
40 1550
0 1300
10 1020


20 800
0 640
30 525
Ditch
450
360
Rt of K
20.
Bridge
30 1715 Hb
40
50 40
1650
River 55 crops
to F s — 1580 a
50
40
1500 70
1170 50
Gate 740 45
to M s — Gate 570 40
from H to b

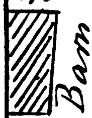

1710 MQ
1580 ML
S — O
1330
S — N
1000
120
Increase
to H S
400
40
Rt of M
890 EG
M
450
Rt of E
0
2160 KA
Gate
2050
30
1950
1750
0
140
1085
70
Q
1020 I
40
250
S
Rt of K



Note s placed against a Line denotes it is straight to the End.



	1310 E G	
~~50~~	~~1900~~	~~[illegible]~~
	1000	40
	850	40



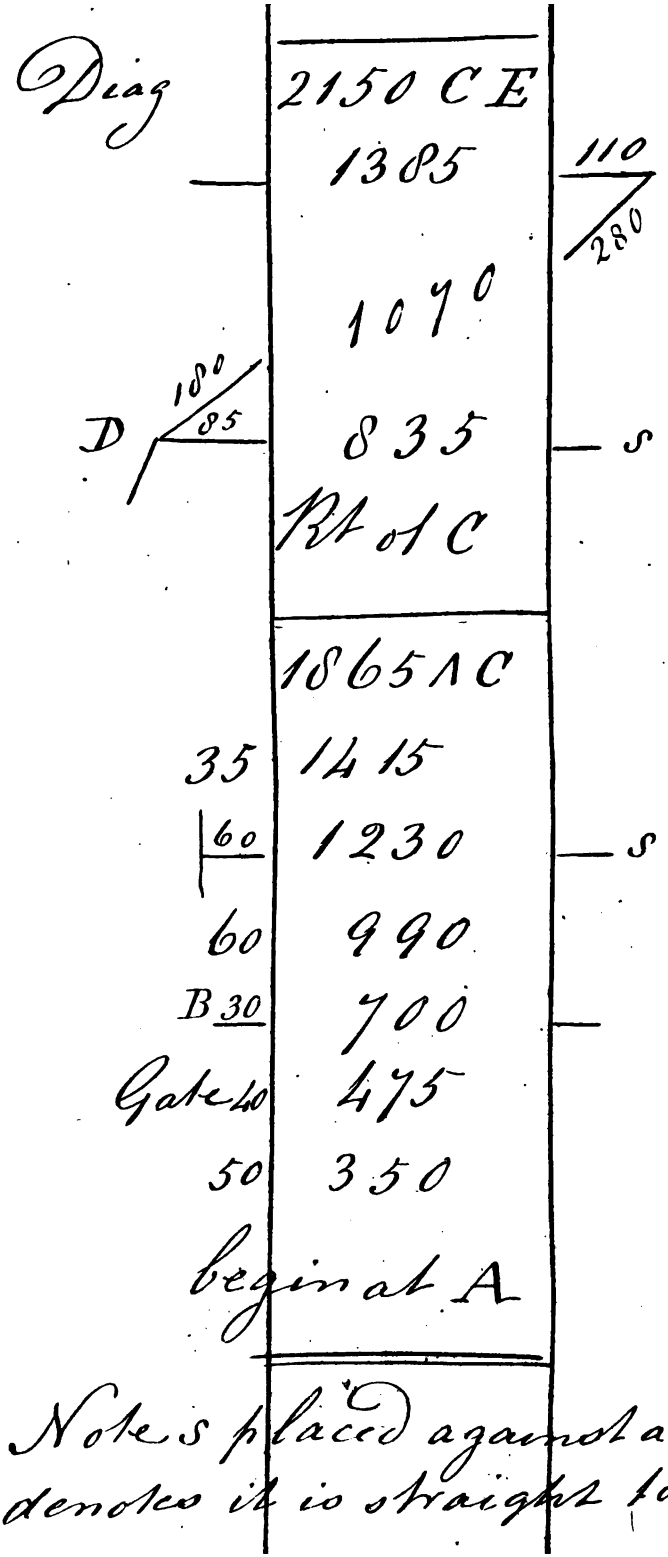
	720	40
	700	Gate
	570 F	10
	380	0
	L of E	

0	1080 E A	
35	700	
35	500	
35	270	
0	Rt. of E	

Diag	2150 CE	
	1385	110 / 280
	1070	
D 180 / 85	835	— S
	Rt of C	
	1865 A C	
35	1415	
60	1230	— S
60	990	
B 30	700	—
Gate 40	475	
50	350	
	begin at A	

Notes placed against a Line denotes it is straight to the End.

	1310 E G	
~~50~~	~~1300~~	~~40~~
	1000	40
	850	40
	720	 Barn
	700	40 Gate
	570 F	10
	380	0
	L of E	
0	1080 E A	
35	700	
35	500	
35	270	
0	Rt of E	

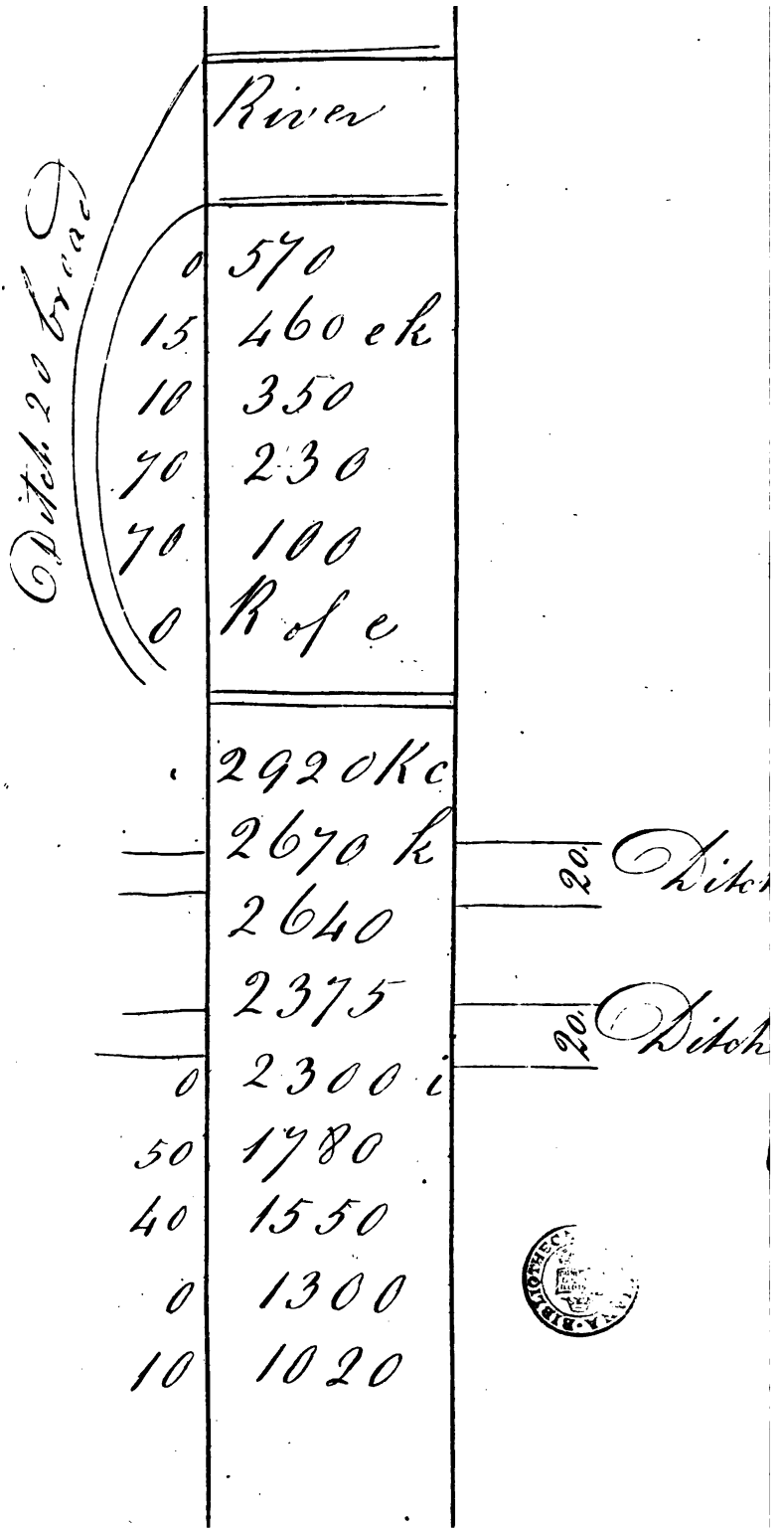


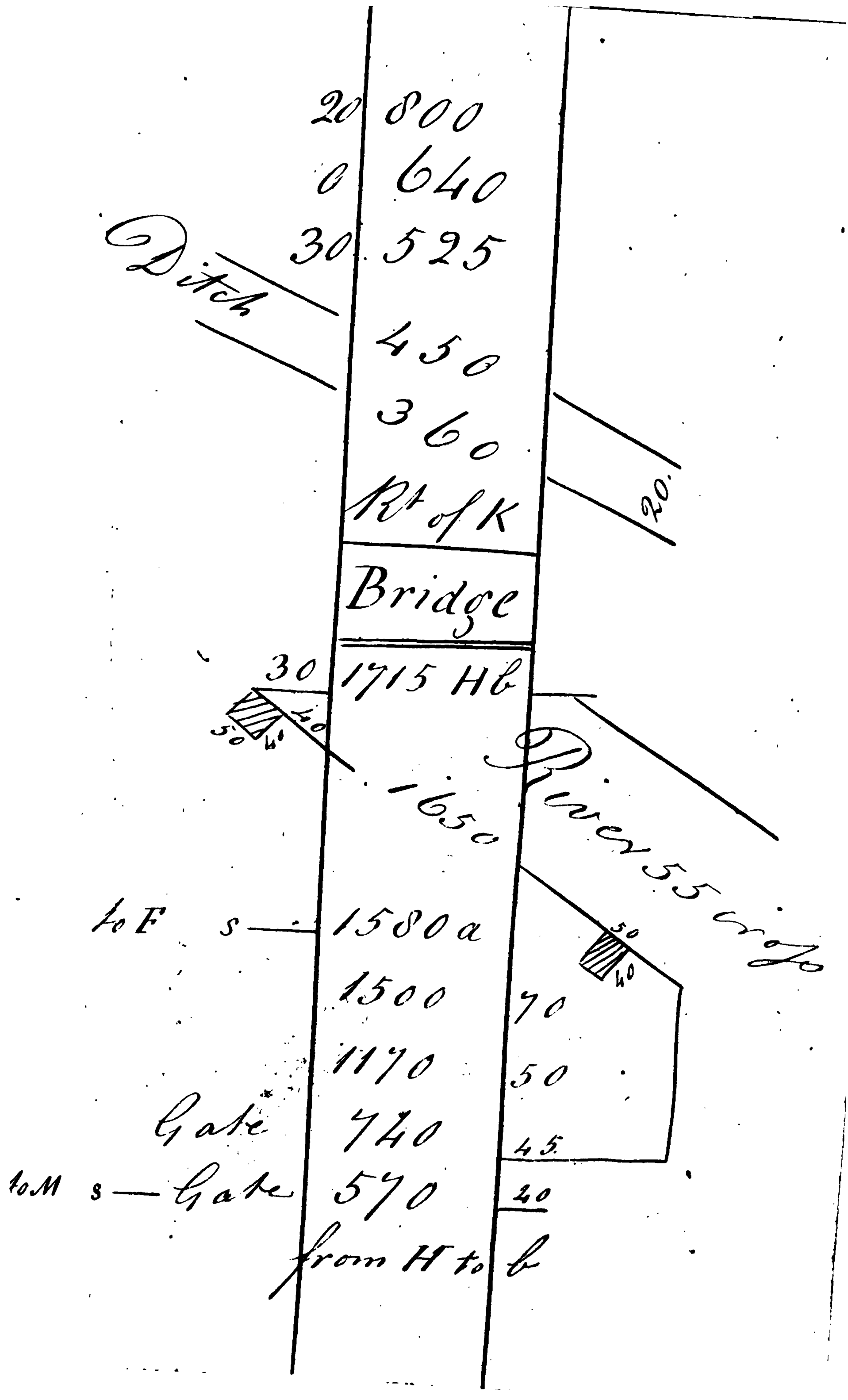
Notes placed against a Line denotes it is straight to the End.

Notes for the Farm

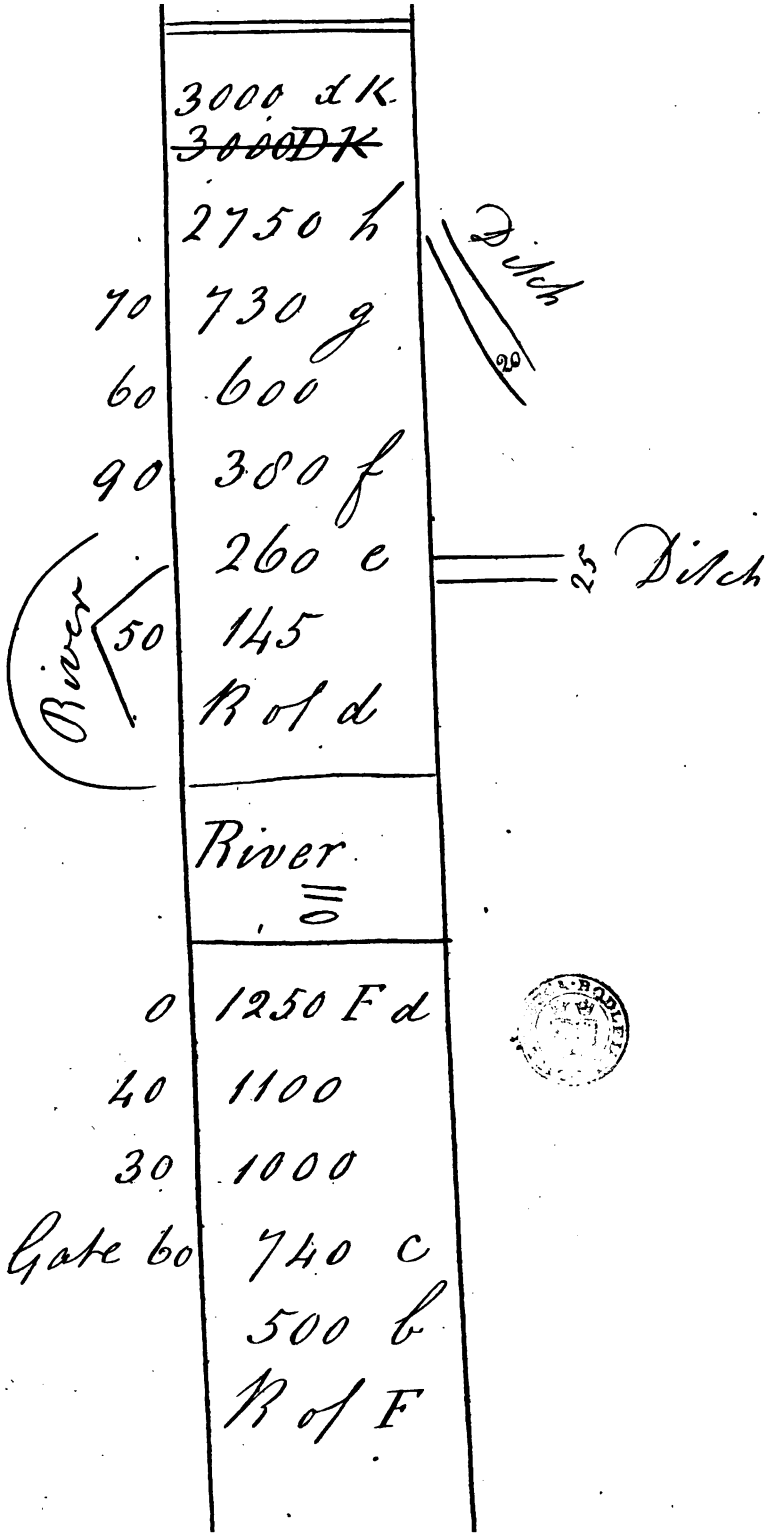
840 pn	40
700	30
440	0
100	60
L of p	
615 hp	10
400	0
100	20
L of h	
1420 mh	
70 n	
0 R of m	
~~19~~	
~~70 100 n~~	
~~R of m~~	

0	900 gm
40	765
50	525
0	300
70	L of g
	520 si
	R of s
	300 sf
30	240
10	120
30	50
	Rt of f
0	300 if
10	150
0	Rt of i


River
0 570
15 460 ek
10 350
70 230
70 100
0 Rofe
Ditch 20 Yards
2920 Kc
2670 k
20. Ditch
2640
2375
20. Ditch
0 2300 i
50 1780
40 1550
0 1300
10 1020



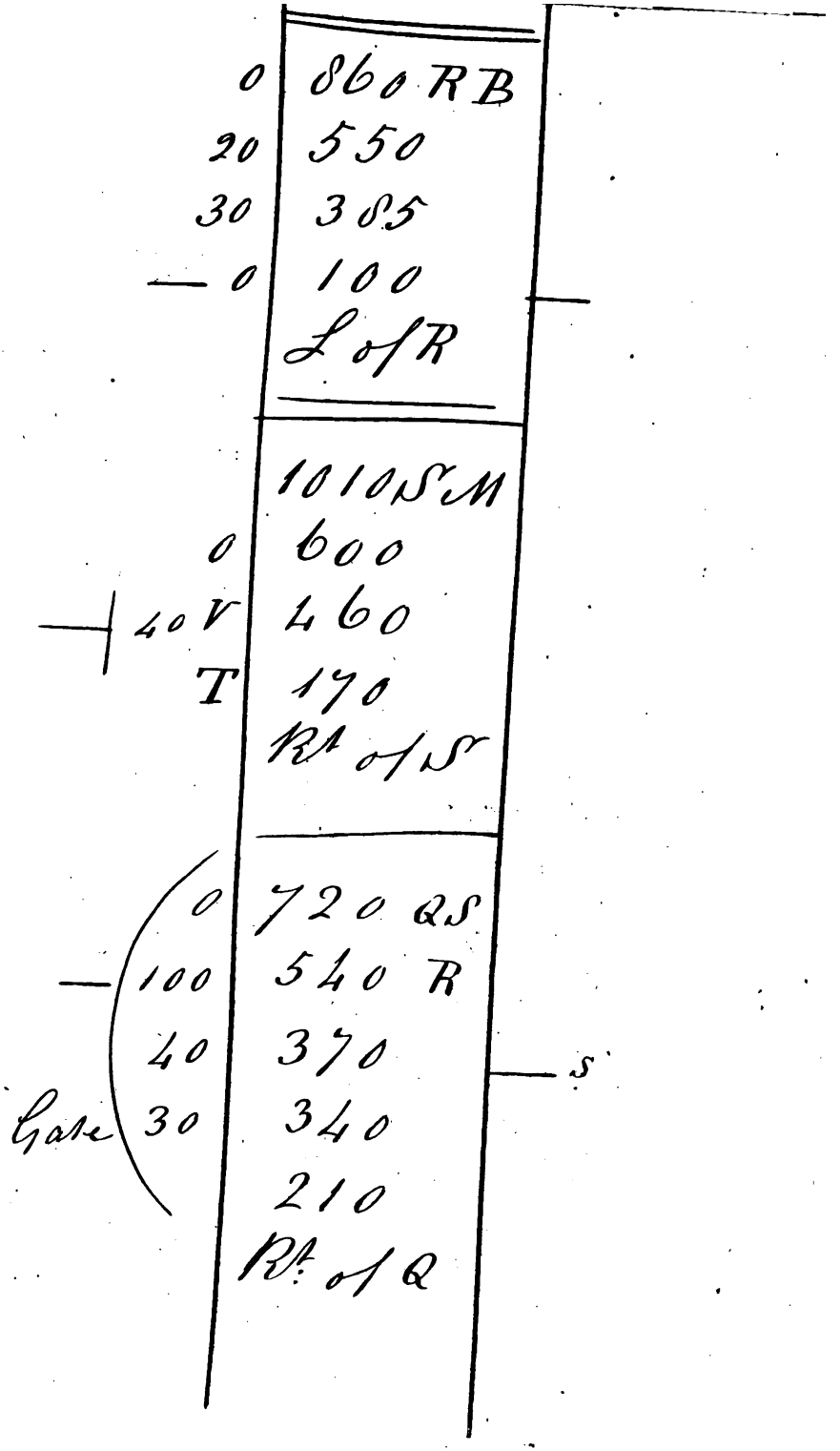
20 800
0 640
30 525
Ditch
450
360
Rt of K
20.
Bridge
30 1715 Hb
50 40 40
River 55 wide
1650
50 40
to F s 1580 a
1500 70
1170 50
Gate 740 45.
to M s Gate 570 40
from H to b

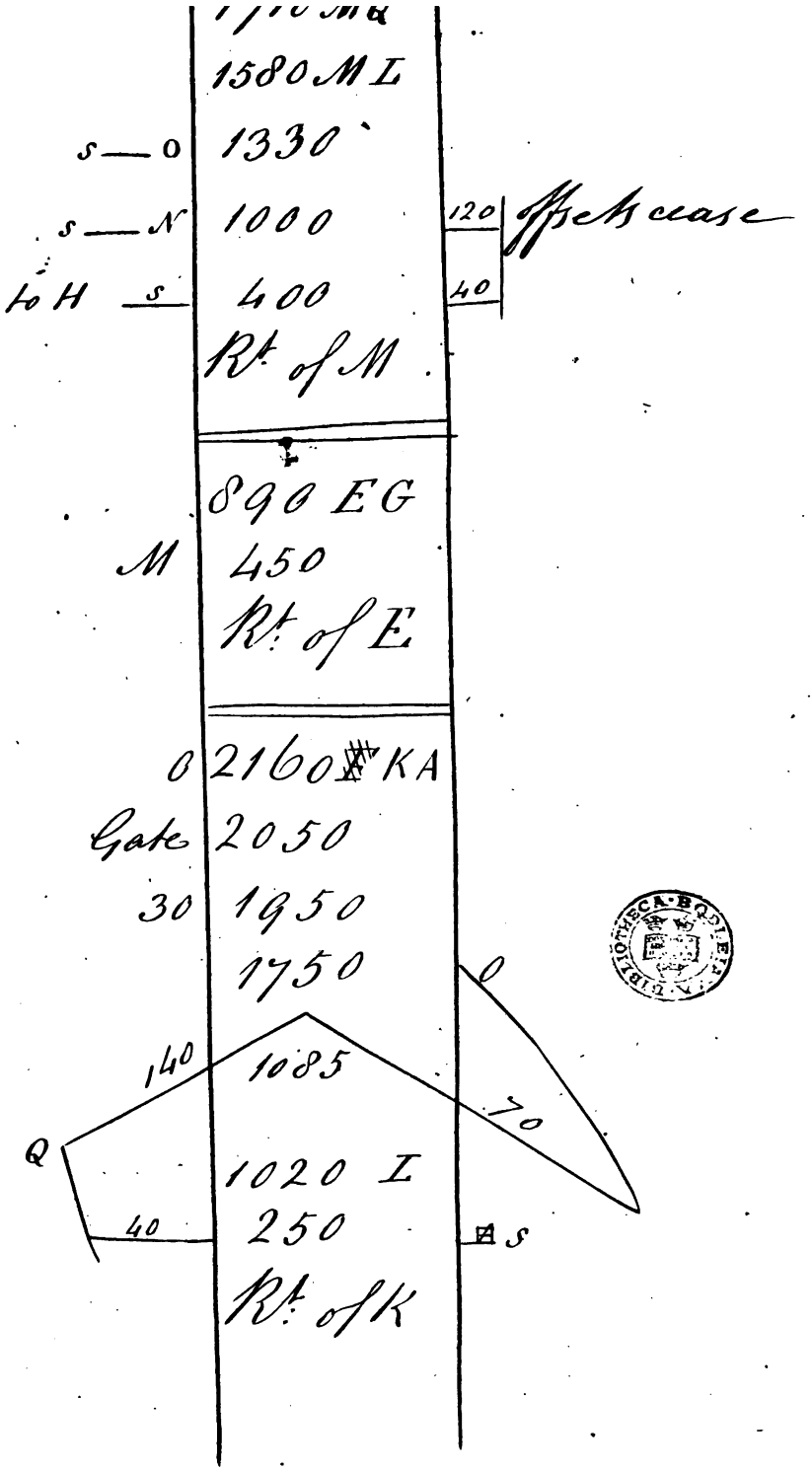

3000 d K.
~~3000 D K~~
2750 h
Ditch
20
70 730 g
60 600
90 380 f
260 e
25 Ditch
River
50 145
R of d
River
0
0 1250 F d
40 1100
30 1000
Gate 60 740 c
500 b
R of F

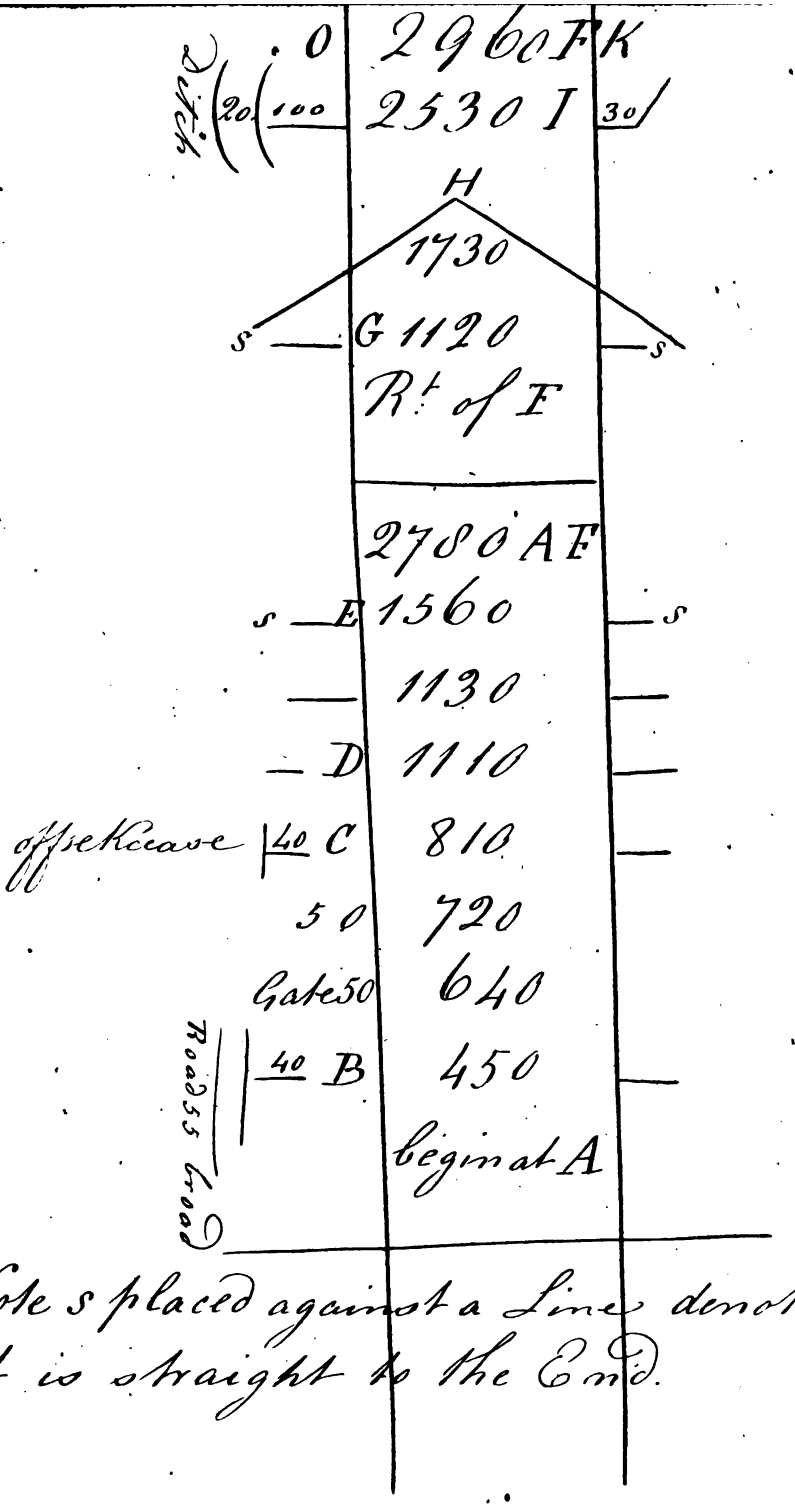
End of first large Triangle

0	1020 WF	
30	850	
0	450 Gate	
30	150	
0	R of W	
0	1030 CW	
60	670	—
50	320	—
45	290	Path
0	170	
Gate	100	
40	L of C	

I 230 X	760 HX	— S
Gate	500	
40	470	— S
0	220	
Gate	50	
0	Rt of H	
10	600 VD	15
20	500	0
30	370	
20	250	0
— 0	50	20 —
	L of V	
—	690 CT	0 —
	400	25
	Rt of C	0


0 860 RB
20 550
30 385
0 100
L of R
1010 SM
0 600
40 V 460
T 170
Rt of S
0 720 QS
100 540 R
40 370
30 340
210
Rt of Q
Gate
S


1580 ML
S — O 1330
S — N 1000
120
Increase
to H S 400
40
Rt of M
890 EG
M 450
Rt of E
O 2160 KA
Gate 2050
30 1950
1750
O
140
1085
70
Q
1020 I
40
250
S
Rt of K



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