1940

4-H Surveying Club - Members Problems: Extension Circular 7-31-2 1940

Follow this and additional works at: https://digitalcommons.unl.edu/a4hhistory

Part of the Service Learning Commons

https://digitalcommons.unl.edu/a4hhistory/176

This Article is brought to you for free and open access by the 4-H Youth Development at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska 4-H Clubs: Historical Materials and Publications by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
4-H SURVEYING CLUB
MEMBERS PROBLEMS
RECEIVED
DEC 10 1970
COLLEGE OF AGRICULTURE
LIBRARY
Problem 1

PACING EXERCISE

Distances are very frequently judged by stepping them off. Unless the length of the step or pace is very definitely known, the estimated figure for the distance may vary as much as ten percent, which is too great an error for even a rough guess. In this problem, you will work out the average length of your pace. This information will be very useful to you in stepping off a field, determining the length of a corn row, and in many other places where you want to know the distance.

A pace is the distance from the toe of one foot to the toe of the other foot and taken when a step is made. This distance is taken in the direction of travel.

TOOLS AND SUPPLIES NEEDED

1. One hundred foot steel tape.
2. Two stakes at least 4 feet long. Two lath may be used.
3. Notebook and pencil.

OUTLINE OF WORK

1. Lay off a measured distance of 300 feet using the steel tape. Place a 4-foot stake at each end of this course.
2. Using your natural pace, step off the length of the 300 foot distance.
3. Record in your notebook the number of paces you took to cover the distance.
4. Repeat your pacing exercise until the course has been covered at least six times.
5. Add up the results of the six or more trials and divide the number of trials made to get the average number of paces required to cover the distance.
6. Divide 300 feet, the length of the course, by the average number of paces required to step off the distance to determine the length of your natural pace in feet.
7. Transfer the results obtained from your notebook to the work sheet at the end of the problem.
## SAMPLE COPY OF NOTES

### PACING EXERCISE

Length of Course: 300 feet.

<table>
<thead>
<tr>
<th>Trial No.</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>112.0</td>
</tr>
<tr>
<td>2</td>
<td>113.0</td>
</tr>
<tr>
<td>3</td>
<td>112.5</td>
</tr>
<tr>
<td>4</td>
<td>112.0</td>
</tr>
<tr>
<td>5</td>
<td>112.7</td>
</tr>
<tr>
<td>6</td>
<td>111.5</td>
</tr>
<tr>
<td>7</td>
<td>112.5</td>
</tr>
<tr>
<td>8</td>
<td>113.0</td>
</tr>
<tr>
<td>9</td>
<td>112.0</td>
</tr>
<tr>
<td>10</td>
<td>113.3</td>
</tr>
</tbody>
</table>

**TOTAL** 1123.5 steps

**AVERAGE** 112.35 steps

Average Length of Pace = \( \frac{112.35 \times 300}{112.35} = 2.86 \text{ feet} \)

In the above table, the number of steps required to cover the course each time has been recorded to the nearest one-tenth of a step. You will find as you step off the distance that you seldom end up with a full step. The length of the last pace is estimated to the nearest one-tenth.
**PROBLEM I**

**WORK SHEET - CLUB MEMBER'S COPY**

**PACING EXERCISE**

Transfer your results obtained in the field from your notebook to the space provided below.

Length of course: _______________ feet.

<table>
<thead>
<tr>
<th>Trial No.</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Total: _______________

Average: _______________

Average Length of Pace: _______________ = _______________ Feet

**KEEP THIS SHEET FOR CORRECTION**

Member's Name: _________________________  Name of Club: _________________________

10548mh
Problem II

USE OF THE TAPE OR CHAIN

When accurate knowledge of distances is required, a steel tape is used as the measuring device. Surveys for deeds of farms, city property, and other pieces of ground are made with the use of a steel tape, usually 100 feet long.

TOOLS AND SUPPLIES NEEDED

1. Hundred foot steel tape.
2. Two lath or stakes about 4 feet long.
3. Notebook and pencil.

OUTLINE OF WORK

Note:—This problem is easiest worked out with two or three boys in each crew. Two boys may handle the tape and if the crew is made up of three boys, the third may carry the notebook and record the measurements as the work progresses.

1. Designate two points approximately 1,000 feet apart and place a lath at each point.
2. With the tape, measure the distance between the two stakes, taking care to follow as straight a line as possible.
3. Record this measurement to the nearest one-tenth of a foot in the notebook. For keeping records, follow the suggested form on the work sheet at the end of the problem.
4. Repeat the measuring exercise at least four times.
5. Add the results of the four or more trials and divide by the number of trials made to get the average of your measurements.
6. Transfer the results obtained from your notebook to the work sheet before the next meeting.
MEASURING WITH THE ENGINEERS' TAPE

Measuring is done with all sorts of devices such as 100' tapes, 66' chains and calibrated wires. Tapes are ordinarily calibrated in feet and the standard surveyor's tapes are 100', 200', and 500' in length. The 66' chain has one advantage, and that is that the length of a field in chains may be multiplied by the width in chains and the answer is directly in acres after one place is marked off in the resulting figure. Thus, a field 20 chains long by 20 chains wide would contain 400 square chains = 40 acres. (20 x 20 = 400 square chains = 40 acres.)

Anyone using the 100' tape should learn how to do up a tape properly, how to throw it into a double circle and also how to let it out again for measuring purposes. A great deal of time is lost in straightening out snarled tapes unless this process is learned. The process scarcely can be described in words and must be learned by demonstration.

Chaining Pins. When using a 100' tape, the surveyor ordinarily uses eleven chaining pins made from 3/16" iron and from 14" to 18" long. The top is bent into a ring for convenience in carrying. Ordinarily, a red rag is tied through the ring to permit the back chairman to find the pin.

For quick and effective measuring work, two operators are required when using a chain or tape. The rear chairman takes one pin and the front chairman ten. The chain is stretched up in the proper direction and pulled tight. The rear chairman calls "stick" as soon as he has the end of the tape even with the back pin. The front chairman sticks the pin and calls "stuck". The rear chairman should then drop the chain and allow it to drag, or at least carry the end without tension in the tape. The distance measured at any time will be the number of loose pins that the rear chairman has in his hand.

In all types of measuring work having to do with land surveys, it is always necessary to measure in a straight line. Considerable error may be accumulated in using a surveyor's tape by measuring in a zig-zag course. In Figure No. 1 is shown the zig-zag line which is much longer than the actual distance. It is, therefore, necessary that the chairman have some sort of guide such as the edge of a field, a fence line or certain objects may be sighted up on in order that a straight line can be maintained. The rear chairman should align the front chairman by sighting ahead to a distant object.
Care of Tape. Steel tapes will stand considerable abuse. However, any tape will break when kinked and subjected to a slight pull. A tape that has not been done up properly invariably tends to kink when being uncoiled. Anyone using a tape should know how to do it up, how to throw it in a double circle and also how to let it out again.

DOING UP THE TAPE

To do up a tape, grasp it in both hands in such a manner that both thumbs extend forward. Place the thumb of the left hand on the zero mark and allow the tape to slip through the right hand until the 5 foot mark is reached. Move the right hand straight forward and place the 5 foot mark on top of the zero mark underneath the left thumb. Let more of the tape pass through the fingers of the right hand until the thumb touches the 10 foot mark. Place the 10 foot mark over the 5 foot graduation and repeat the operations until all of the tape has been done up in coils each 5 feet long. If taken up correctly, the coils in the tape will assume the form of a figure "8". Care should be taken that none of the coils are permitted to drop or change from the position in which they were placed under the left thumb.

When all of the tape has been taken up in the manner just described, it is necessary to securely tie both ends with the rawhide thongs with which each end of the tape is provided. First fasten the end of the tape that is on the inner side of the coil. Carefully and securely wrap the thong six or eight times around all coils of the tape. Then make an opening between any two of the coils; put the loose end of the thong through this opening and pull it up tight. Now follow the same procedure with the thong on the other end of the tape.

Grasp the tape tightly in both hands at or near the center of the figure "8". Extend the right hand straight forward and pull the left hand back along the left side of the body as far as the coils of the tape will permit. Hold the right hand extended and rigid. Turn the left wrist in such a way that the little finger of the left hand comes inward and upward. Without undue strain the coils will assume the form of a double circle. Do not try to forcibly twist the coils. Difficulties will be encountered if the various coils of the tape have not been tied carefully and securely in the positions in which they were respectively done up.

UNCOILING THE TAPE

A tape that has been properly done up is easily uncoiled. First the coils should be brought back into the form of a figure "8". Next the thongs are untied, taking care that each coil remains in its original position. Holding the tape firmly in the left hand, in such a way that the loose end of the upper coil points in the direction opposite from the one which the person is facing, take the upper coil in the right hand and drop it to the ground. If several coils are dropped together, the tape is likely to become tangled. Walk forward as each succeeding coil is released. If the zero end has been used in starting to do up the tape, this end will be dropped last from the coil in uncoiling. Since in measuring, the front chairman carries the zero end of the tape, the person uncoiling the tape should walk in the direction in which the first measurement is to be taken.

HANDLING THE TAPE

When measuring, the tape should at all times be kept extended in its full length. Often the rear chairman, when returning the chaining pins to the front chairman, has a habit of carrying the rear end of the tape with him. As the front
chainman again proceeds forward the double tape often forms a loop or kink. This habit is the cause of broken tapes.

A tape can be taken, for short distances, from field to field or from farm to farm by simply dragging it along. Dragging the tape on hard and gravelly surfaces, however, will cause the babbitt graduations to wear off.

The driving of vehicles over tapes should be guarded against. A pneumatic tire may not damage a tape when the tape lies flat on smooth ground. Hard-tired vehicles driven over a tape will leave a distinct bend, causing a weak spot which often breaks under a slight pull.

Steel tapes rust easily and when not in use should be kept in a dry place. If the tape is damp at the end of a day's measuring, wipe it dry, moisten a cloth with a thin oil and run the tape through this cloth. Whenever the tape is to be put away for a considerable length of time, a light application of oil is advisable.
Problem III

MEASURING AND COMPUTING FIELD AREAS
(Regularly Shaped)

Perhaps the most useful application of surveying to the farm is that of measuring land. To determine the area of a field, it is necessary to measure two or more of its sides. Several fields may be measured but each boy is required to make a sketch and the necessary computations for one field which he measured or helped measure and record his results as suggested on the work sheet at the end of this problem.

By far the greatest proportion of all fields in Nebraska are rectangles. This is due to the system of rectangular land surveys instituted in middle-western states. In the notes for study, a number of the more common shaped fields are shown together with formulas for computing the areas of such fields.

TOOLS AND SUPPLIES NEEDED

1. One hundred foot steel tape.
2. Eleven (11) chaining pins (2/16" rod iron and from 14" to 18" long).
3. Notebook, small ruler, and pencil.

OUTLINE OF WORK

Note:— The problem is easiest worked out with two or three boys in each crew. Two boys are necessary to handle the tape and the third may record the measurements in the notebook.

1. After the field to be measured has been decided upon, make use of the study notes to determine what measurements are necessary to obtain the area of the field.
2. Make the necessary measurements, using fence lines as the boundaries of the field. Do not measure sides that do not contribute to solving the problem.
3. Record to the nearest foot, all measurements as they are being made.
4. Repeat the measurements, giving each one of the members in the party a different job.
5. Make a sketch of the field in the space provided on the work sheet at the end of this lesson showing the measurements which were made.
6. Set up the equation and compute the area of the field.
NOTES FOR STUDY

Following will be found a number of the most commonly shaped fields with the essential measurements indicated. In the right hand column is the formula for computing the area.

FIELD SHAPES

FORMULA FOR COMPUTING THE AREA

A

L

r A + C x B = Area

B

2

Figure 2
Long narrow rectangles measure sides A, C and B.

A

D

B

C

Figure 3
Square fields or those nearly square, sides A, B, C and D should be measured.

A

D

B

C

Figure 4
Measure sides A, B, C and D.

A

D

B

C

Figure 5
Measure sides A, B, C and D.
FORMULA FOR COMPUTING AREA

In right angle triangles measure $A$ and $B$.

$$\frac{B \times A}{2} = \text{Area}$$

In other triangles measure the base $B$ and the altitude $A$.

$$\frac{B \times C + \frac{B}{2} \times A}{2} = \text{Area}$$

or $$\frac{B}{2} (C + A) = \text{Area}$$

Example: To compute the area of Figure 8, assume that $B = 810$ ft, $A = 390$ ft, and $C = 200$ ft.

Then $$\frac{810}{2} \times (390 + 200) = 238,950$$ square feet

Since 1 acre is equal to 43,560 square feet

$$\frac{238,950}{43,560} = 5.49 \text{ acres}$$
PROBLEM III

WORK SHEET — CLUB MEMBER'S COPY
MEASURING AND COMPUTING FIELD AREAS

1. In the space below, make a sketch of the field that has been measured.

2. Set up the equation for computing the area of the field.

KEEP THIS SHEET FOR CORRECTION

Member's Name ___________________________ Name of Club ___________________________

10648mh
Problem IV

MEASURING AND COMPUTING FIELD AREAS
(Irregularly Shaped)

This problem is a continuation of the preceding one in which the measurements of the more regularly shaped fields were discussed and studied. At this time, some attention should be given to irregularly shaped fields. Many fields are bordered by rivers, creeks, and gullies, while others have gullies and other unproductive areas extending into or running through them. A few irregularly shaped fields, together with formulas for computing areas, are given in the notes for study.

Several fields may be measured, but each boy is required to make the sketch and the necessary computations for one field which he measured or helped measure, and record his results as suggested on the work sheet at the end of this problem.

TOOLS AND SUPPLIES NEEDED

1. One hundred foot steel tape.
2. Eleven (11) chaining pins (3/16" iron, 14" to 18" long).
3. A number of stakes or lath.

PROCEDURE

Note: It is advisable that the work in the field be done by crews of two or three boys.

1. After the field to be measured has been decided upon, study the field and determine what measurements should be taken to compute its area.
2. Make the measurements required, using fence lines and edges of cultivated land along gullies or creeks as boundaries.
3. Record to the nearest foot all measurements as they are being made.
4. Repeat the measurements, giving each one of the members in the crew a different job.
5. On the work sheet at the end of the lesson, make a sketch of the field measured, indicate what measurements have been made, set up the equation, and compute the area.

10548mh
Notes for Study.

Since every irregularly shaped field is actually broken up into regularly shaped areas before the total area of such a field can be determined, it is deemed advisable to review the study notes under Problem III.

Below are given a number of irregularly shaped fields. Suggestions as to the proper procedure in measuring and computing the area are given with each example.

**Figure 9**

*Long, Irregular Field of Nearly Uniform Width*

Measure the length along a center line A to B, following a row in the case of row crops. Measure the width in several places, as at C, D, E, and F, to obtain the average width.

**Formula for Computing the Area:**

\[
\frac{C + D + E + F}{4} \times \text{length (A to B)} = \text{Area}
\]

**Figure 10**

*Regular Field Traversed by Ditch or Stream.*

To determine the tillable area of this field, it is necessary to subtract the area of the ditch from the total area of the field. First measure all four sides of the rectangular field. Then measure the ditch as explained under Figure 9.
Formula for Computing the Area:

Total area of rectangle: \[ \frac{A\cdot B + C\cdot D}{2} \times \frac{A\cdot D + B\cdot C}{2} \]

Area of ditch: \[ M\cdot N \times \left( \frac{E + F + G + H + I}{5} \right) \]

Tillable area of field = Area of rectangle - Area of ditch

Irregular Field Along a Stream

A field shaped as the one above must be broken into smaller divisions of more or less regular shape. Suppose that the line AB represents the edge of the field or a fence line. Along this line, measure out uniform distances O. The length of this distance O should be determined by the irregularity of the stream boundary; the more irregular the boundary, the shorter the length of O. Convenient lengths as 50, 100 or 200 feet are recommended. This usually results in an odd length G at one end of the field. Stakes are set every 100 feet (if 100 feet is the interval O decided upon), and the off-sets C, D, E, and F are measured from the stakes to the stream at right angles to the line AB.

Figure 11 above shows that the field has been broken into triangles and trapezoids. In each one of these smaller areas, the stream boundary is considered to be a straight line as indicated by the dotted line. This clearly shows the effect the length of the interval O has upon the accuracy of determining the area. The off-sets C, D, E, and F are treated as the bases of their respective trapezoids with O the altitude in each case.

Formula for Computing the Area:

Area of Triangles: \( \frac{O \times C}{2} + \frac{G \times F}{2} \)

Area of Trapezoids: \( \frac{C + D}{2} \times O + \frac{D + E}{2} \times O + \frac{E + F}{2} \times O \)

Total area of field:
\[ \left[ \frac{O \cdot C}{2} \right] + \left[ \frac{G \cdot F}{2} \right] + \left[ \frac{(C + F + D + E)}{2} \cdot O \right] \]
Example:

Assuming the following lengths:

\[ \begin{align*}
O &= 100' \\
G &= 80' \\
C &= 60' \\
D &= 72' \\
E &= 75' \\
F &= 70'
\end{align*} \]

Then

\[ \begin{align*}
\left[ \frac{100}{2} \times 60 \right] + \left[ \frac{80}{2} \times 70 \right] + \left[ \frac{60 + 70 + 72 + 75}{2} \times 100 \right] = 50 \times 60 + 40 \times 70 + 212 \times 100 \\
3,000 + 2,800 + 21,200 = 27,000 \text{ square feet}
\end{align*} \]

\[ \frac{27,000}{43,560} = 0.62 \text{ Acres} \]

---

**Figure 12**

Irregular Field Along a Stream

By carefully analyzing the shape of the field shown above, it becomes apparent that much time can be saved if the trapezoid A, B, C, D is measured first. The line C D can then be used as a base from which off-sets G, H, I, etc. can be taken. Measure the trapezoid as shown in Figure 5, Problem III. For the rest of the field, follow the discussion on Figure 11, using D C as the base line.

**Formula for Computing the Area**

Area of trapezoid

\[ \frac{A B + D C}{2} \times \frac{B C + D E}{2} \]

Area of irregular portion of field

\[ \left[ \frac{O}{2} \times G \right] + \left[ \frac{F}{2} \times M \right] + \left[ \frac{G + M + H + I + J + K + L}{2} \right] \]

Prepared by Aldert Molenaar.  
Approved by the Dept. of Agr. Eng.
PROBLEM IV

WORK SHEET — CLUB MEMBER'S COPY

Measuring and Computing Field Areas

1. In the space below, make a neat sketch of the field that has been measured.

2. Set up the equation and compute the area of the field.

KEEP THIS SHEET FOR CORRECTION

Member's Name ___________________________ Club Name ___________________________
Problem V

FIELD NOTES AND FARM MAPPING

Keeping a neat and complete set of field notes is a very essential part of surveying. This problem will deal with keeping a complete set of field notes. After mastering the method of keeping notes, you will proceed to measure your farm, being careful to keep a complete set of notes.

TOOLS AND SUPPLIES NEEDED

1. One hundred foot steel tape
2. Eleven (11) chaining pins
3. Notebook and fairly hard lead pencil (preferably No. 3)

OUTLINE OF WORK

1. It will be necessary first to study very carefully and thoroughly the method of taking notes as given on the following pages. Remember that after studying these notes you must be able to keep an accurate and complete set of notes as you measure your field.

   Note: The field work should be done by crews of two or three. However, each boy should draw a map of his own farm. In case a boy does not live on a farm a map of a friend's or neighbor's farm may be made. When a crew is composed of three boys, it will be necessary for these boys to measure three farms. It would be advisable for each boy to keep the set of notes for his farm.

2. Using one of the boundary lines of the farm as a base line and one of the corners on this line as a starting point, proceed to measure in a counter-clockwise direction. Keep your set of notes complete as you proceed.

3. Record all measurements to the nearest foot as they are being made.

4. Measure the first side, noting all landmarks such as cross fences and other field dimensions along the way. (See sample notes Fig. Nos. 13 to 17.)

5. Continue along the remaining sides of the farm in a similar manner.

6. When the outer boundary has been established, make any additional inside measurements necessary to establish the boundaries of all fields, pasture, farmstead, etc. (See sample notes Fig. No. 17.)
An important part of measuring land is a satisfactory method of recording the measurements on paper. Especially where several fields are included in the tract to be measured and the area of each individual field, as well as the area of the whole tract are desired, complete and legible notes are necessary.

In many cases, a fairly accurate map of a farm may be desired. The information needed for a complete farm map can be gotten in several ways. The most satisfactory method is to measure completely around the farm indicating distances from corners to cross-fences and field divisions and then complete any additional measurements of fields within the boundaries of the farm. The map of the farm, Fig. No. 18, was drawn from measurements thus obtained. A copy of the notes obtained in the field is shown on Fig. No. 13 to 17. Extreme care should be used in making all measurements.

The sketches on the following pages represent a reproduction of the notebook pages on which the measurements of the farm on Fig. No. 18 were recorded in the field. The map shown has been drawn from only the notes reproduced here. It was necessary to scale several of the division lines between fields in order to determine the area of the various fields.

The line through the center of the right hand page of the notebook represents in each case the line along which the measurements were being made. Each cross line on the same page indicates a field division or fence between fields. These division lines are identified directly opposite on the left hand page of the notebook. The figures in the extreme left hand column designate the distance that each division line is from the starting point. For instance, in the notes on Fig. No. 18 the east edge of the wheat field, which is to the left of the line being measured, is located 2,237 feet from the fence at the road. When measured completely across the farm from west to east, the total length of the line was found to be 3,980 feet as indicated in the last figure of the column.

When measuring a farm especially where the measurements are to be used for making a map of the farm, it is best to use one of the line fences, preferably the one along the road, as a base or reference line. A reference line is of special value where the shape of the farm does not approach either a square or a rectangle. In making the map, consider the reference line to be a straight line and one of the corners adjacent to this line as a right angle. Where a farm is located in a corner of the section, the angle which the fence lines make in the corner where the two roads cross can in many cases be considered as a right angle. The south fence was used as a reference line and the southeast corner was considered to be a right angle.

The measuring may be started at any convenient corner of the farm. As the first line is being measured, it is advisable to record the distance from the starting point to any cross-fences, as this will result in a considerable saving of time in establishing the boundaries of fields. Referring to the notes, Fig. No. 18,
suppose that the measuring of the farm was started in the southwest corner and proceeded along the south boundary in a counter-clockwise direction. When the front chairman reached the cross-fence, the fence along the east side of the temporary pasture, he stopped, aligned the zero end of the tape with the fence, but did not set a pin. The rear chairman walked up to the place where the front chairman had set the last pin and read the distance this pin was from the cross-fence. In the illustration, the last pin was set at 200 feet from the starting point and the rear chairman read 90 feet on the tape. The total distance from the starting point to the cross fence was, therefore, 290 feet. The rear chairman remained at the pin while the front chairman moved along the south fence line. The same process is repeated each time a cross-fence is reached. When the southeast corner of the farm was reached, the total length of the south side was 3,967 feet.

<table>
<thead>
<tr>
<th>ROAD FENCE</th>
<th>SO. LINE GOING EAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PASTURE</td>
</tr>
<tr>
<td>290</td>
<td>WHEAT</td>
</tr>
<tr>
<td>2216</td>
<td>OATS</td>
</tr>
<tr>
<td>2594</td>
<td>CORN</td>
</tr>
<tr>
<td>2865</td>
<td>SW. CL.</td>
</tr>
<tr>
<td>3085</td>
<td>OATS &amp; SW. CL.</td>
</tr>
<tr>
<td>3513</td>
<td></td>
</tr>
<tr>
<td>3967</td>
<td>EAST FENCE</td>
</tr>
</tbody>
</table>

Figure No. 13
### Figure No. 14

<table>
<thead>
<tr>
<th>0</th>
<th>S.E. CORNER OF FARM</th>
<th>EAST LINE GOING NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1597</td>
<td></td>
<td>OATS</td>
</tr>
<tr>
<td>2233</td>
<td></td>
<td>ALFALFA</td>
</tr>
<tr>
<td>3941</td>
<td>N.E. CORNER OF FARM</td>
<td>CORN</td>
</tr>
</tbody>
</table>

### Figure No. 15

<table>
<thead>
<tr>
<th>0</th>
<th>N.E. CORNER OF FARM</th>
<th>NO. LINE GOING WEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>540</td>
<td>W. EDGE CORN FIELD</td>
<td>CORN</td>
</tr>
<tr>
<td>1176</td>
<td>W. EDGE OATS</td>
<td>OATS</td>
</tr>
<tr>
<td>2974</td>
<td>N.W. CORNER OF FARM</td>
<td>ROAD</td>
</tr>
</tbody>
</table>
### Figure No. 16

<table>
<thead>
<tr>
<th>WEST LINE GOING SO.</th>
<th>0 - N.W. CORNER OF FARM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1765</td>
<td>CORN</td>
</tr>
<tr>
<td>2144</td>
<td>FARMSTEAD</td>
</tr>
<tr>
<td>2624</td>
<td>WHEAT</td>
</tr>
<tr>
<td>3946</td>
<td>ROAD</td>
</tr>
</tbody>
</table>

### Figure No. 17

<table>
<thead>
<tr>
<th>CENTER LINE W. TO E.</th>
<th>0 - SIA. 2150 ON W. BOUNDARY LINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>475</td>
<td>EDGE OF FARMSTEAD</td>
</tr>
<tr>
<td>2237</td>
<td>EDGE OF WHEAT FIELD</td>
</tr>
<tr>
<td>2615</td>
<td>EDGE OF OATS</td>
</tr>
<tr>
<td>2786</td>
<td>EDGE OF CORN LARGE FIELD</td>
</tr>
<tr>
<td>2872</td>
<td>EDGE OF CORN</td>
</tr>
<tr>
<td>3056</td>
<td>EDGE OLD SW. CL.</td>
</tr>
<tr>
<td>3175</td>
<td>W. EDGE OF ALFALFA</td>
</tr>
<tr>
<td>3326</td>
<td>EDGE NEW SW. CL.</td>
</tr>
<tr>
<td>3439</td>
<td>W. EDGE OF CORN</td>
</tr>
<tr>
<td>3980</td>
<td>EAST LINE</td>
</tr>
</tbody>
</table>

10548mh
Owner

Address

Tenant

Address

Legal Description of Farm: NW¼, NE¼ of SW¼, W½ of NE¼, NW¼ of SE¼, Section 15, T. 11 N. R. 4 W.

Measurements by Aldert Molenaar

Computations by " 

Map drawn by " 

Scale 1" - 600' Date August 6, 1936

FARM MAP

3974'

CORN 131.55 AC.
FIELD NO. 1

WHEAT 78.08 AC.
FIELD NO. 2

Figure No. 18
Problem VI

DRAWING THE FARM MAP

In the preceding problems, considerable work has been done on measuring distances and fields. In the last problem, a farm was completely measured. The next step will be to draw a map of this farm from the notes taken in the previous problem.

TOOLS AND SUPPLIES

1. Notebook
2. Ruler, hard lead pencil and eraser

OUTLINE OF WORK

1. With the aid of notes taken in Problem V, draw up a map of the farm. See Problem V for sample map.
2. Compute the area of each field, pasture, farmstead, etc., also the area of the farm as a whole, bounded by the line fences.

NOTES FOR STUDY

Mapping

With the aid of the field notes taken in Problem V, proceed to draw the map of the farm. An ordinary 12-inch ruler can be used for a scale. A fairly hard pencil should be used to produce a neat map. Neatness and good workmanship are two things which should be observed in drawing the map.

In making the map, it will be necessary to reproduce the distances on paper to a convenient scale. The scale used in drawing the map shown in Problem V was 1 inch equals 600 feet. Others commonly used are 1 inch equals 200, 300, 400 or 500 feet. Be sure that the scale used will permit the farm being reproduced on the following page.

The map of the farm in Problem V was made by combining individual field measurements. The pastures and farmsteads were the only areas not measured. This farm is made up of six 40-acre tracts and in making the map it was assumed that the original land survey had been accurately made and every side of a 40-acre tract would measure 1,320 feet, or a quarter of a mile. To obtain the area of the pastures, waste land, roads, and farmsteads, therefore, it was necessary to add all of the areas of the measured farm land and subtract this total from 240 acres. The notes are recorded in the field have been reproduced in Fig. No. 13 to 17.

The map should be drawn on the following page. Be sure that all blanks are filled in properly. The direction arrow pointing to the north should always be included. The arrow shown at the side should be drawn as shown with the letter 'N' at the tip. When it is possible the top of the map should be to the north with the arrow pointing in that direction.

10548mh
Problem VI

WORK SHEET - CLUB MEMBER'S COPY

FARM MAPPING

Owner of Farm ____________________________ Tenant ____________________________

Description of Farm of Section , Township , Township , County , State .

Measurements by ____________________________

Computations by ____________________________

Map drawn by ____________________________

Scale ____________________________ Date ____________________________

KEEP THIS SHEET FOR CORRECTION

Member's Name ____________________________ Name of Club ____________________________

10548mh
**COMPUTATION OF ACREAGE**

Total Area of Farm, Bounded by Line Fences  ---------------  ________ Acres (1)

Area of Farm in Crop Land

- Field #1  ------------  ________ Acres
- Field #2  ------------  "
- Field #3  ------------  "
- Field #4  ------------  "
- Field #5  ------------  "

Total Area in Crop Land  ------------  ________ Acres

Area of Farm in Hay Land

- Alfalfa  ------------  ________ Acres
- Wild Hay  ------------  "

Total Area in Hay Land  ------------  ________ Acres

Area of Farm in Pasture

- Permanent Pasture  ------------  ________ Acres
- Temporary Pasture  ------------  "

Total Area in Pasture  ------------  ________ Acres

Area of Farm in Farmstead

- Farmstead  ------------  ________ Acres

Total Area in Farmstead  ------------  ________ Acres

Total Area in Crop Land, Hay Land, Pasture, and Farmstead  ------------  ________ Acres (2)

Difference between (1) and (2)  ------------  ________ Acres

10548 mh