Delineating a Watershed Using a Topographical Map

1. Review map scale and contour intervals →
2. Determine where the lake outlet is located
3. On the map, place an "X" on the highest points surrounding the waterbody
   (*these would be the tops of hills and mountains and appear as circles drawn from a single contour line)*
4. Read the elevations carefully to determine what land will drain to the lake, and what land lies outside of the watershed
5. Connect the highest points by traveling down ridges and keeping your line perpendicular to the contour line (*imagine standing on top of the hill and pushing your thumb out, causing a wave pattern of the contours, which in this case makes a ridge*).
6. compare and modify what you determined as the watershed with the "master copy" of the watershed.

Tips on Topographical Map Reading:

1. Contour lines are brown; water features are blue; vegetation is green; cleared areas (fields, farmland, wetlands and developed areas) are white; and roads, buildings, and other non-natural features are black. Urban areas are gray.
2. All points along any one contour line are at the same elevation. Contour lines never cross each other. The closer the contour lines are to one another, the steeper the land.
3. Elevation, in feet above sea level, is indicated on contour lines and on the summit of many hills and mountains.
4. The difference in elevation between two adjacent contours is called the contour interval.

Calculations

Size of the Watershed

1. Use a string to measure the watershed boundary
2. Measure length of string used
3. Calculate the Watershed Perimeter by converting the length of string to the map's scale

   For example, if 1/2" = 1,000'
   then 40" of string = 40,000'

This is the Watershed Perimeter

Length of string = _____

Watershed Perimeter = _____

"Side" Dimensions = _____

_____

_____

Watershed Area = _____
(length x width)

4. For Bliss Pond's watershed, which is closest in shape to a rectangle, estimate the length of the two longest and shortest sides.

5. Calculate Watershed Area (Area = length x width)
To convert your answer to acres, divide by 44,560, the number of square feet per acre.

Lake Volume Lake volumes can be calculated using the formula: volume = surface area x average depth

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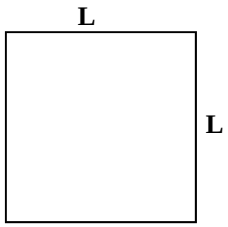
Calculating Area of Geometric Shapes

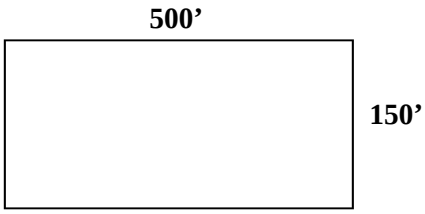
SQUARE

If "L" represents the side length of a square, the area of the square is L^2 or L x L



RECTANGLE (and square too)

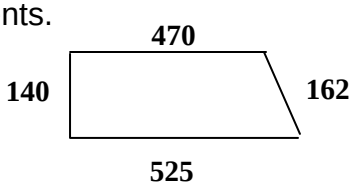
Rectangular watershed areas are estimated by the formula:
Area = length x width



500' x 150' = 75,000 square feet (ft^2)
To convert from square feet to acres, divide by 43,560 (number of square feet per acre)
Area = 75,000 ÷ 43, 560 = 1.72 or 1.7 acres

ALMOST RECTANGLULAR

First need to calculate the average length and width measurements.



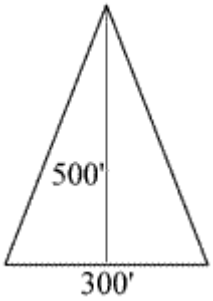
$$\text{Area} = \frac{470+525}{2} \times \frac{140+162}{2}$$

((470 + 525 ÷ 2) x (140 + 162 ÷ 2)) = 75,123 ft^2

TRIANGULAR

Area = base x height ÷ 2

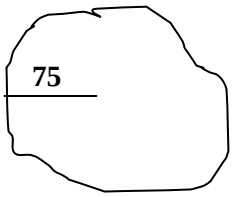
The base and the height should be measured. Multiply those two numbers, then take half of the resulting amount.



If the triangle is 300 feet at the base and 500 feet high, the equation would be:
(300' x 500') ÷ 2 = 75,000 ft^2
75,000 ÷ 43,560 = 1.72 acres

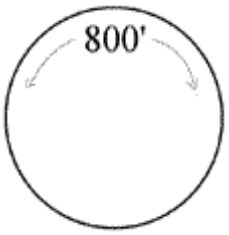
CIRCULAR

Area = 3.14 **x** radius^2 (or pi x r^2)
(radius is one-half the diameter)



For example, a circular watershed with a radius of 75 feet has an area of 17,663 ft^2 (3.14 x 75 x 75) or 0.4 acres

But if you don't know the radius, then try using the following equation.
If the watershed is close to circular, the distance circumference of it should be measured in feet. That number should be multiplied by itself and then divided by 547,390. If the watershed's circumference is 800 feet, the equation would be:
800 x 800 = 640,000
640,000 ÷ 547,390 = 1.17 acres

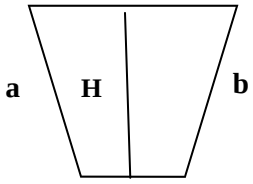


TRAPEZOID

$$\text{Area} = \frac{H \times (a + b)}{2}$$

In this case, if a and b = 300 feet and H = 200 feet, The equation would be:

$$\frac{200 \times (300 + 300)}{2} = 60{,}000\ ft^2$$



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