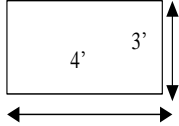


VOLUME CALCULATIONS

Length x Width x Average Depth x 7.5 = Gallons

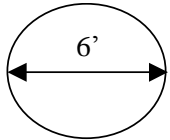
When calculating pond volume, regardless of the shape and size of the pond, there are 4 numbers that have to be used in order to determine the gallons of water in the pond.

- 1) Length
- 2) Width
- 3) Average Depth
(Shallowest + Deepest End Divided by 2)
- 4) 7.5 = # of gallons per cubic foot



Assuming the average depth of the pond on the left is 1.5', here is how gallons are calculated:

$$4 \times 3 \times 1.5 = 18, 18 \times 7.5 = 135 \text{ Gallons}$$

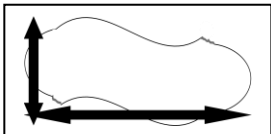


For circular ponds: $\frac{1}{2}$ the diameter squared, multiplied by pi, multiplied by the average depth = gallons.

$$(\frac{1}{2} \text{ Diameter})^2 \times \text{pi} \times \text{Average Depth}$$

$$9 \times 3.14 \times 1.5 = 43, 43 \times 7.5 = 318 \text{ Gallons}$$

For irregularly shaped ponds, measure the longest length and the longest width for the measurements and use the same formula as the square in the first example.



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Tips and Tricks

Sealing the cracks between the rocks of a waterfall with [waterfall foam](#) can help give the illusion of a larger pump.

Adding additional [biological media](#) and an [aeration kit](#) increases a ponds fish holding capacity.

Purchasing lighting components is less expensive than purchasing a [light kit](#) (assuming more than 3 lights will be purchased).

Using [beneficial bacteria](#) weekly is more cost effective than using algaecide as needed.

Splitting, dividing, and transplanting [water lilies](#) helps to increase blooms.

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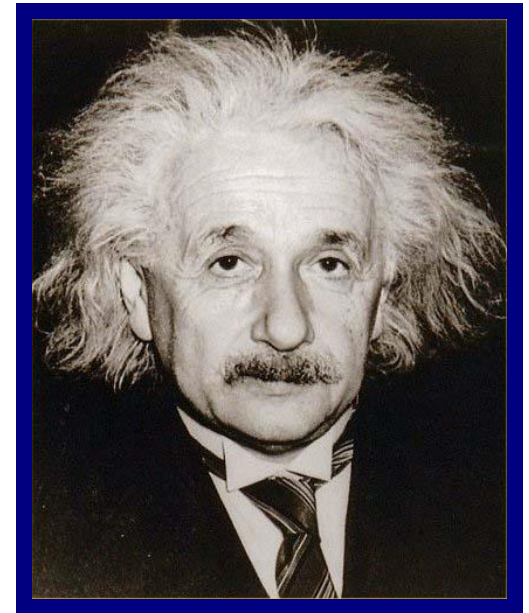
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Formulas

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EQUIPMENT CALCULATIONS

1. **Pump Size:** Pond **Pumps** have to be sized to the pond volume and the waterfall size. **Pumps** must pump enough water to circulate the pond through a **filter** once every 1-2 hours.

2. When sizing a **pump** for waterfalls and streams, determine whether low, moderate, or heavy flow is desired. For every inch of waterfall width,

- Low Flow = 50-100 GPH
- Moderate Flow= 100-200 GPH
- Heavy Flow = 200-300 GPH

In most cases, the **pump** chosen for the waterfall will be large enough to meet the requirements of circulating the pond through a **filter**. Example:

18" wide = 900, 1800, or 3600 GPH

3. **Filter Size:** Pond **filters** must be chosen on total pond volume. The more oversized the **filter**, the less cleaning and maintenance required for the unit to do the job. If the pond volume is over-calculated to the below criteria, and the pond **filter** selected is oversized, the unit will perform better:

- Fish Load: +15%
- Sun Exposure: +15%

*Care must be taken that the pump does not overpower the filter (each filter has a stated flow rate)

4. **UV Size:** when purchasing a **Pond UV**, a decision must be made whether the unit will be used as a sterilizer and/or clarifier. Pond **UV Sterilizers** are used to kill parasites, protozoa, and algae. **Pond UV Clarifiers** are used to keep water sparkling clear.

Sterilizers require a much slower flow rate than **UV Clarifiers**. UV units must be sized to the flow rate of the **pump** and to the pond.

POND LINER/ UNDERLINER

Caution must be used when calculating **pond liner** size. The best tool to use when calculating **liner** size is string. Lay the string down starting at the outer most edge of the hole and continue down over the ledges,



across the deepest part, and back up the other side as shown in the above illustration. Measure the length of string used and add 3 ft. If the hole cannot be dug before the **liner** is purchased, then here is the formula to use:

$$\text{Length} + (2 \times \text{Depth}) + 2 \text{ (or 3)} = \text{Length}$$
$$\text{Width} + (2 \times \text{Depth}) + 2 \text{ (or 3)} = \text{Width}$$

Pond Underliner (Pond Underlayment) does not have to hold water and therefore can be multiple pieces. Calculate the square footage of the **liner** needed and then purchase the appropriate amount of **underliner**.

POND LIGHTS

Pond lights are typically 10 watt and 20 watt. There are 50, 100, and 250 watt models available for the pond requiring a substantial amount of illumination...and for "Tim Taylor" pond folks too. Here are the basic guidelines for determining the number of **pond lights** to use under water:

- 10 watts for every 1-2 sq ft
- 25 watts for every 3-5 sq ft
- 40 watts for every 6-8 sq ft
- 60 watts for every 8-10 sq ft

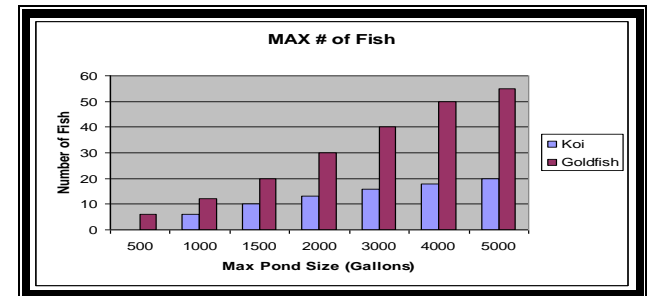
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TOO MANY FISH?

Calculating the number of fish a pond can hold is virtually impossible. There are too many variables like:

- Filter** size and type
- Pond Volume
- Sun Exposure
- Number of **Pond Plants** in the Pond
- Pond Fish Food** used
- Feeding Frequency
- Water Circulation Rate
- Dissolved oxygen levels

The only way to accurately know whether a pond has too many fish is to **test** the pond water according to the "Hardy Pond Fish" brochure. If ammonia and nitrite levels are constantly a problem, then there are too many fish in the pond. Here is a rough guideline:



DETERMINING HOSE SIZE

Hose size is easy to determine. The manufacturer of the pond equipment has done the work for you. If the pump to be used has a 1" outlet, then use 1" hose. The only time hose sizes should be increased are when runs exceed a reasonable distance; i.e. 20'. If the pump has a 1" outlet and the filter has a 1-1/4 inlet and outlet, pick one size and use fittings to make both components work with the hose selected.