


Irrigation
 ASSOCIATION **CERTIFICATION PROGRAM**

Landscape/Turf Specialty Residential/Commercial Examination Equations

Basic and non-irrigation equations and conversions are assumed to be known by candidates. POI refers to Principles of Irrigation, 3rd ed. Dec. 2012. Irrigation Association. 6th ed. refers to Irrigation, Irrigation Association. The equations are presented in the latest IA format and may appear different from those presented in the reference material.

1 cubic foot of water = 7.48 gallons	1 acre-inch = 27,154 gallons	1 gallon water weighs 8.328 lbs	
$PAW = AW \times RZ$	POI 2-4	$AD = PAW \times (MAD / 100)$	POI 2-5
$ET_c = ET_o \times K_c$	POI 2-8	$Q = \frac{18.86 \times A \times ET_c}{t \times (E_a / 100)}$	POI 5-8
$A = \frac{Q \times t \times \left(\frac{E_a}{100}\right)}{18.86 \times ET_c}$	POI 5-8a	$H = 2.31 \times P$	POI 8-1
$Q = A \times V$	POI 8-2	$V = \frac{0.408 \times Q}{ID^2}$	POI 8-3
$H_v = \frac{V^2}{2 \times g}$	POI 8-4	$H_{p1} + \frac{V_1^2}{2 \times g} + Z_1 = H_{p2} + \frac{V_2^2}{2 \times g} + Z_2 + H_L$	6 th ed. Ch. 7 p. 221
$H_z = k_z \times \frac{V^2}{2 \times g}$ Z= various values depending upon equation	POI 8-8, 8-9. 8-10, 8-11	$K = \left(1 - \frac{D_1^2}{D_2^2}\right)^2$	POI 8-12
$K = 0.7 \times \left(1 - \frac{D_1^2}{D_2^2}\right)^2$	POI 8-13	$H_f = 0.2083 \times \left(\frac{100}{C}\right)^{1.852} \times \frac{Q^{1.852}}{D^{4.866}} \times \frac{L}{100}$	POI 8-7
$Q = k \times C \times A \times \sqrt{P}$	POI 8-17	$\frac{Q}{Q_0} = \sqrt{\frac{P}{P_0}}$	6 TH ed. Ch. 7 p. 254



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$PR = \frac{96.3 \times Q}{A}$	<p><u>Various A values</u> $A = S_r \times S_s$ $A = 0.866 \times S_s^2$ $A = 0.8 \times D_t \times S_s$</p>	POI 3-2, 3-4, 3-5	This space intentionally left blank.	
$Whp = \frac{Q \times H}{3,960}$		POI 9-2	$Bhp = \frac{Q \times H}{3,960 \times (E_p / 100)}$	POI 9-3
$NPSHa = H_a - H_s - H_f - H_{vp}$		POI 9-1	$\frac{Q_2}{Q_1} = \frac{N_2}{N_1}$	POI 9-5
$\frac{H_2}{H_1} = \left(\frac{N_2}{N_1} \right)^2$		POI 9-5	$\frac{Bhp_2}{Bhp_1} = \left(\frac{N_2}{N_1} \right)^3$	POI 9-5
$\frac{Q_2}{Q_1} = \frac{D_2}{D_1}$		POI 9-6	$\frac{H_2}{H_1} = \left(\frac{D_2}{D_1} \right)^2$	POI 9-6
$\frac{Bhp_2}{Bhp_1} = \left(\frac{D_2}{D_1} \right)^3$		POI 9-6	$V = I \times R$	POI 10-1
$p_s = \frac{0.07 \times (\text{velocity}) \times (\text{length of straight pipe})}{(\text{valve closing time})}$		POI 8-15	$IN_m = \frac{AD}{ET_c}$	POI 5-3
$IR_{net} = IN_a \times ET_c$		POI 5-4 similar	$IR_{gross} = \frac{IR_{net}}{E_a / 100}$	POI 5-4
$RT = 60 \times \frac{IR_{gross}}{PR}$		POI 5-5	This space intentionally left blank.	