

Scores

part one: number correct \_\_\_\_\_ x 4 = \_\_\_\_\_ minus number wrong \_\_\_\_\_ = \_\_\_\_\_ (A)

part two: \_\_\_\_\_ (B)

Total score (A) + (B) \_\_\_\_\_

**Part one Instructions:** Work in teams of two. You should use the formulas, constants, and conversion factors provided and your notes. Record your answers by circling the letter to the right. Each correct answer worth 4 points; one point will be deducted for each wrong answer. (Maximum score on part 1 is 24 points.)

	In problems 1 through 6 you are to <b>choose the closest answer.</b>	Circle the letter of the correct answer
1.	Water flows through a 3 in diameter pipe at a velocity of 10 ft/s. Find the volume flow rate in gpm.  (a) 22    (b) 36    (c) 220    (d) 361    (e) 440	a    b    c    d    e
2.	Water flows through a 12 inch diameter pipe at the rate of 500 gallons per minute. The pipe later reduces to a 6 inch diameter pipe. Calculate the velocity in the smaller pipe in ft/sec. (Continuity)  (a) 1.42    (b) 14.2    (c) 5.67    (d) 9.20    (e) 56.7	a    b    c    d    e
3.	Convert 28 mgd into cfs.  (a) 1.55cfs    (b) 15.5cfs    (c) 23.7cfs    (d) 31.5cfs    (e) 43.4cfs	a    b    c    d    e
4.	What size asphalted cast-iron pipe is needed to carry water at a discharge of 12 cfs and with a head loss of 4 ft per 1000 ft of pipe. Use $f = 0.0155$ . (Darcy)  (a) 12in    (b) 15in    (c) 18in    (d) 21in    (e) 24in	a    b    c    d    e
5.	The theoretical velocity (ft/sec) generated by a 10 foot static head is:  (a) 12.2    (b) 17.9    (c) 25.4    (d) 29.2    (e) 35.8	a    b    c    d    e
6.	Water flows through a 1/2 in diameter hose at 3 gallons per minute. Water velocity in ft/sec is nearest to:  (a) 1.    (b) 5.    (c) 10.    (d) 20.    (e) 50.	a    b    c    d    e

(over)

part two: number correct \_\_\_\_\_ x 4 = \_\_\_\_\_ minus number wrong \_\_\_\_\_ = \_\_\_\_\_ (B)

**Part two Instructions:** Work in teams of two. You should use the formulas, constants, and conversion factors provided and your notes. Record your answers by circling the letter to the right. Each correct answer worth 4 points; one point will be deducted for each wrong answer. (Maximum score on part 2 is 24 points.)

	In problems 7 through 12 you are to <b>choose the closest answer.</b>	Circle the letter of the correct answer
7.	Given a frictionless flow of water at $125.6 \text{ ft}^3/\text{sec}$ in a long, horizontal, conical pipe, of diameter 2 ft at one end and 6 ft at the other. The pressure head at the smaller end is 18 ft of water. Find the pressure head in ft at the larger end. (Hint: frictionless $\Rightarrow h_L = 0$ ; horizontal $\Rightarrow z_1 = z_2$ )  (a) 3.5    (b) 15.0    (c) 28.5    (d) 42.5    (e) 57.5	a    b    c    d    e
8.	A rectangular channel, 16 ft wide, carries a flow of 192 cfs. The depth of water on the downstream side of the hydraulic jump is 4.20 ft. What is the depth upstream? (Reminder: $q$ is volume flow rate <u>per unit width</u> of channel)  (a) 0.213    (b) 0.455    (c) 1.10    (d) 1.39    (e) 1.51	a    b    c    d    e
9.	What is the loss of head (ft) through the hydraulic jump in problem 8 above?  (a) 1.19    (b) 3.49    (c) 6.85    (d) 8.22    (e) 11.18	a    b    c    d    e
10.	On what <u>slope</u> should a 24 inch diameter sewer pipe be laid in order that 6.00 cfs will flow when the sewer is half full? Use $n = .013$ .  (a) .0004    (b) .0008    (c) .0009    (d) .0012    (e) .0028	a    b    c    d    e
11.	How <u>wide</u> must a rectangular channel be constructed in order to carry 500 cfs at a depth of 6 ft on a slope of .00040? Use $n = .010$ . (Hint: Use of a numeric solver on the calculator is recommended.)  (a) 6.2ft    (b) 10.1ft    (c) 13.1ft    (d) 15.6ft    (e) 19.2ft	a    b    c    d    e
12.	A vitrified sewer pipe flows .90 full. What is the <u>hydraulic radius</u> as a function of the diameter?  (a) $0.298d$ (b) $0.304d$ (c) $0.632d$ (d) $0.98d$ (e) $1.50d$	a    b    c    d    e