



HOMEWORK ANSWERS

dcm 11/8/2021

Answers to Homework Problems

These partial answers will help determine whether you are on track. Some have been rounded.

Week 1

(1) The rounded result of $9812/1000$ is 10 and has 1 significant figure, (3c) 10 m^3 , (4) 7.0 psi, (5c) 2.9 psi, (6b) $A = 54 \text{ in}^2$

Week 2

(1) 15 mm, (3) $6 \times 10^{-5} \text{ ft}^2/\text{s}$, (4b) 320 N, (5) $\mu = 368 \text{ N}\cdot\text{s}/\text{m}^2$, (6a) $P_{\text{max}} = 846 \text{ lb}/\text{ft}^2$, (8b) 13.7 psi

Week 3

(2) $F = 6.1 \times 10^5 \text{ N}$, (3a) 920 lb, (4) 590 kN, (5) 430 N

Week 4

(1a) 42 kg, (2a) 25,000 lb, (3) 190 tons, (4d) 2300 lb, (5) 4032 m^3 , (6) 15 ft^3

Week 5

(4a) $Re = 400$, (5a) 40-44 cfs, (5b) 2.7 ft/s

Week 6

(1c) 60 minutes, (2a) The mass flow rate at duct 1 is $0.144 \text{ kg}/\text{s}$, (3) $1.1 \text{ kg}/\text{min}$, (4d) $0.13 \text{ m}/\text{s}$, (6b) Total head = 28 m

Week 7

(1) 1.1 psi, (2) $0.69 \text{ m}/\text{s}$, (3) $V_A = 14 \text{ m}/\text{s}$, (4) $6.26 \text{ m}/\text{s}$, (6) 92 ft
(8) $P/\gamma = 0$; $z = 270 \text{ m}$; HGL = 270 m

Week 8

(1) 320 hp, (2a) $1.7 \times 10^5 \text{ W}$, (3a) 40 hp, (4b) 19%, (6) $13 \text{ m}/\text{s}$, (7) $V > 14 \text{ m}/\text{s}$

Week 9

(2d) 430 hp, (4) $F = 52 \text{ lb}$, (5) 31 mph, (6) 210 lb, (7) $F = 2.7 \times 10^6 \text{ lb}$

Week 10

3 At point D, the HGL is – 3 ft.
4 At point F, the HGL is 8 ft.

Week 11

(1) 390 ft

Week 12

(1) short response, (2) short response, (3d) 86%, (4) 87 ft/s, (5c) $D = 0.16$ mm

Week 13

(1a) 8 m/s, (2) $Q = 0.0063$ cfs, (3) 1.05 m, (4c) $D = 1.0$ mm, (5) There are 3 Π groups

Week 14

(3b) $V = 2.3$ m/s, (4a) $R_h = 0.75$ ft, (5b) Option 1, \$680K/year; Option 2, \$2.4M/year; Option 3, \$470K/year