

FirePumpSim Printable Scenario

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Driver/Operator Practice Worksheet

Scenario: Residential Wye Operation - Two Attack Lines

Student Name: _____

Date: _____

Class: _____

Score: _____

Given / Reference

- Engine 181 supplies a wye using 100 ft of 2 1/2-inch hose
- Branch A: 150 ft of 1 3/4-inch hose with a 95-GPM fog nozzle at 100 PSI
- Branch B: 150 ft of 1 3/4-inch hose with a 95-GPM fog nozzle at 100 PSI
- C values: 1 3/4-inch = 15.5; 2 1/2-inch = 2
- Wye appliance loss: 10 PSI; elevation change: 0 PSI

Student Questions

1. What is the total fire flow when both branch lines are operating?

2. What is the friction loss in each 150-ft 1 3/4-inch branch line?

3. What is the friction loss in the 100-ft 2 1/2-inch main line when both branches are flowing?

4. What PDP is required to supply both branch lines through the wye?

5. If Branch B is shut down and only one 95-GPM branch is flowing, what new PDP is required?

Required Equations

$$FL = C \times Q^2 \times L$$

• Total flow = Sum of operating lines

$$Q = GPM / 100$$

$$PDP = NP + \text{Branch FL} + \text{Wye Loss} + \text{Main FL} \pm \text{Elevation}$$

Training use only. Follow department SOPs, instructor direction, and local hydraulic guidance.

FirePumpSim Answer Key

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- Wye appliance loss: 10 PSI; elevation change: 0 PSI

Instructor Answer Key

1. Total fire flow

95 GPM + 95 GPM = **190 GPM.**

2. Branch friction loss

Q = 0.95; L = 1.5.

FL = $15.5 \times (0.95)^2 \times 1.5 = 20.99$ PSI.

Rounded answer: 21 PSI.

3. Main-line friction loss

Main-line flow = 190 GPM; Q = 1.9; L = 1.

FL = $2 \times (1.9)^2 \times 1 = 7.22$ PSI.

Rounded answer: 7 PSI.

4. PDP with both branches flowing

PDP = 100 NP + 21 branch FL + 10 wye + 7 main FL.

Answer: 138 PSI.

5. PDP with one branch flowing

Branch FL remains 21 PSI. Main FL at 95 GPM is $2 \times (0.95)^2 \times 1 = 1.8$ PSI, round to 2.

PDP = 100 + 21 + 10 + 2 = **133 PSI.**

Accept reasonable rounding unless the instructor specifies otherwise.