Driver Operator Course
Fire Ground Hydraulics Worksheet

Answers can be found in Hydraulics Section of the Drill Manual.

1. Basic Pump Pressure Formula:＿＿＿＿＿＿＿ = ＿＿＿＿ + ＿＿＿＿＿
2. Nozzle Pressures:

    Hand lines with smooth bore nozzles = ＿＿＿＿＿psi

    Deluge, monitor nozzles, or water equipped with a smooth bore tip = ＿＿＿＿psi

    All adjustable or FOG nozzles = ＿＿＿＿＿psi

    Foam Application = ＿＿＿＿psi

    High-rise Nozzle = ＿＿＿＿psi
3. Total Friction Loss = ＿＿＿＿＿ x ＿＿＿＿
4. Friction Loss Rate = ＿＿＿＿＿＿＿
5. Q = ＿＿＿＿＿ / ＿＿＿＿
6. When pumping to an adjustable gpm fog nozzle and the gpm setting is NOT KNOWN

    Interior Attack = ＿＿＿＿＿gpm

    Exterior Attack = ＿＿＿＿＿gpm

    When the use and gpm setting is both unknown, pump to the ＿＿＿＿＿ gpm for that nozzle.
7. Smooth Bore Nozzles:

    GPM = ＿＿＿＿＿＿

    D = Diameter

    NP = Nozzle Pressure

    There are only two square root numbers to choose from for these calculations, they are:

    i. Hand held straight tip - 50 psi = ＿＿＿＿

    ii. Hose Control or Monitor - 80 psi = ＿＿＿＿

8. All flow rates through various size hoses must be converted to an equivalent flow (EF) as if it were flowing through___" hose

9. Conversion Factors:

    3/4" = _____

    1" = _____

    1 1/2"=_____

    1 3/4" =_____

    3" =_____

    3 1/2"=_____

    4" =_____

10. Length =_____/_____

11. Water weighs_____pounds per gallon

12. Gravity Loss (GL) -_____pressure

13. Gravity Gain (GG) -_____pressure

14. Gravity Gain/ Loss per foot = _____

15. Gravity Gain/Loss per floor = _____

16. Initial Pump Pressure:

    All Hand Lines =_____+_____or -_____

    Elevated Streams =_____psi

    Sprinkler and Standpipe Systems =_____psi

17. Estimating Available Flow from Hydrant:

    _____% drop, 3 more like volumes

    _____% drop, 2 more like volumes

    _____% drop, 1 more like volume

18. Nozzle Reaction =_____x_____x_____

19. Smooth Bore Tips:

    Wildland Tips:

        i.   3/16" =_____psi_____gpm

        ii.   1/4" =_____psi_____gpm

        iii.   3/8" =_____psi_____gpm

Handlines:

   i. 1/2" = _____ psi _____ gpm

   ii. 5/8" = _____ psi _____ gpm

   iii. 3/4" = _____ psi _____ gpm

   iv. 7/8" = _____ psi _____ gpm

   v. 1" = _____ psi _____ gpm

   vi. 1 1/8" = _____ psi _____ gpm

   i. 1 1/4" = _____ psi _____ gpm

Smooth Bore Tips - Appliances:

   ii. 1 1/4" = _____ psi _____ gpm

   iii. 1 3/8" = _____ psi _____ gpm

   iv. 1 1/2" = _____ psi _____ gpm

   v. 1 3/4" = _____ psi _____ gpm

   vi. 2" = _____ psi _____ gpm

20. Misc. Information

   Appliance Loss = _____ psi

   Ladder System Loss (LSL) = _____ psi

   System Loss (SL) = _____ psi

   Sprinkler Loss = _____ psi

   Sprinkler per head = _____ gpm per head

21. Foam = _____ psi

22. Rule of 12's = _____ to _____ gpm

23. When pumping two or more separate hose lines, pump to the _____ and gate down on the others.

24. Siamese Lines (Equal Length); when pump Siamese lines of equal length, _____ flow and calculate for one line

25. Siamese Lines (Unequal Length); when pumping Siamese lines of unequal length, _____ the lengths and calculate flow.

26. Wyed Lines (Unequal Length); when pumping wyed lines of unequal length, pump to the _____ line.

27. Wyed Lines (Unequal Flows); when pumping wyed lines of unequal flows, determine required pressures and pump to the _____ gpm line.

28. Apparatus Deck Gun (Monitor)

   Tip = _____ psi

   FOG = _____ psi