Diagonal: 1/8" x 1" H.R. Steel Scrap

Bars: 1" x 1" x 0.095" Steel Square Tubing Spaced 6" on-centers

Main Frame: 1-1/2" x 1-1/2" x 0.95" Steel Square Tubing

Trim: 4" x 4" x 0.188" Square Tubing, each is 1-1/2" long

All main frame corners: mitered.
ffa state finals: 2018
ag. mechanics: problem solving

instructions: verify your contestant number on the scantron form issued by the proctor. examine each of the three sets of plans provided. consider the questions pertaining to each, and record your answers on the scantron. scratch paper is provided for your calculations.

electrical plan:

1. what size wire is used for the bedroom lights and outlet circuit?
   a. 8 awg
   b. 10 awg
   c. 12 awg
   d. 14 awg

2. how many fluorescent fixtures are to be installed in the garage?
   a. 1
   b. 2
   c. 4
   d. none

3. what size wire is used for the dryer plug?
   a. 8 awg
   b. 10 awg
   c. 12 awg
   d. 14 awg

4. what size circuit breaker should be installed for the dryer plug?
   a. 20 a
   b. 30 a
   c. 40 a
   d. 60 a

5. how many duplex outlets are to be installed in the bedrooms on the upper floor?
   a. 1
   b. 2
   c. 6
   d. 8
   e. none of the above

6. how many 3-way wall switches are needed to complete the wiring?
   a. 1
   b. 2
   c. 3
   d. 4
7. What size is the main circuit breaker?
   a. 20 A
   b. 150 A
   c. 200 A
   d. 14,998 VA

8. Approximately what length of wire would be needed to run from the Dryer plug to the loadcenter panel in the garage?
   a. 10 ft
   b. 40 ft
   c. 150 ft
   d. 1 inch

9. What voltage is the furnace?
   a. 120 V
   b. 240 V
   c. 20 V
   d. 12 V

10. What size feeder wire is running into the load center panel?
    a. 12 AWG Copper
    b. 10 AWG Copper
    c. 8 AWG Copper
    d. 3 AWG Copper
    e. 1 AWG Copper

11. Approximately how much type NM-8-3 wire is needed to complete the project?
    a. None
    b. 10 ft
    c. 40 ft
    d. 200 ft
    e. 1000 ft

12. Approximately how much 6 AWG wire is needed to complete the wiring to the Range plug in the kitchen?
    a. None
    b. 10 ft
    c. 50 ft
    d. 200 ft
    e. 128 ft
Log Splitter Questions: Assume we are constructing one machine.

13. How heavy are (2) 20’ pieces of C4 x 5.4?
   a. 80 lb
   b. 160 lb
   c. 108 lb
   d. 216 lb

14. What is the cross-sectional area of the hydraulic cylinder’s piston (bore)?
   a. 78.5 in²
   b. 19.6 in²
   c. 5 in²
   d. 25 in²

15. The local steel yard has the following lengths of W8 x 31 available as rems (remnants). Which one below is the cheapest and will still suffice?
   a. 8’
   b. 9’
   c. 10’
   d. 11’

16. How many 20’ lengths of C4 x 5.4 are required?
   a. 1
   b. 2
   c. 0
   d. 3

17. What are the dimensions of the 1/4” Plate?
   a. 48” x 96”
   b. 48” x 60”
   c. 48” x 30”
   d. 45” x 57”

18. How heavy is a 10’ piece of the W8 x 31?
   a. 80 lb
   b. 248 lb
   c. 248 kg
   d. 310 lb

19. How many 5/8” NC Flathead Socket Cap screws are required?
   a. 6
   b. 8
   c. 10
   d. 12
   e. 32
20. At what angle is the mitered end of the W8 x 31 cut?
   a. 90 degrees
   b. 30 degrees
   c. 16 degrees
   d. 45 degrees

21. If an 8” tall item is shown on a drawing with a (1” = 1’) scale, how large would it be on the paper?
   a. 8’
   b. 0.67”
   c. 1/8”
   d. 1/8’

22. If the hydraulic pump can deliver 2000 psi (pounds per square inch), how much force can be delivered by the hydraulic cylinder?
   a. 2000 psi
   b. 10000 psi
   c. 39300 lb
   d. 40 tons
Steel Gate Plan Questions:

23. To build 4 gates, how many 20’ lengths of 1-1/2” tubing would be required? Assume a saw kerf of 1/8”.
   a. 3
   b. 5
   c. 7
   d. 8
   e. 9

24. How long does the diagonal need to be?
   a. 120.00”
   b. 192.24”
   c. 122.64”
   d. 107.33”

25. To build 4 gates, how many 20’ lengths of ¼” x 1” H.R. flat would be required?
   a. 1
   b. 2
   c. 3
   d. 4

26. Neglecting saw kerf, how much 4” x 4” x 0.188” square tubing is required to construct one gate?
   a. 15”
   b. 15’
   c. 67-1/2”
   d. 6-3/4”

27. What is the length of the vertical bars (1” square tubing)?
   a. 41-1/4”
   b. 48”
   c. 36-3/4”
   d. 38-1/4”

28. Assuming the cost of cold drawn steel tubing is $0.80/lb, how much would (15) 20’ lengths of 1-1/2” x 1-1/2” x 0.065” tubing cost (including tax @ 7.75%)? (See included table on last page)
   a. $380.40
   b. $304.32
   c. $327.90
   d. $80.00
29. At the same cost per pound, how much would (18) 20’ lengths of 1” x 1” x 0.065” tubing cost (include tax)?
   a. $282.08
   b. $320.60
   c. $256.48
   d. $360.00

30. To build 4 gates, how many 20’ lengths of 1” square tubing would be required?
   a. 15
   b. 9
   c. 13
   d. 3

31. If you used your ruler to measure something on the drawing, a 2-3/8” measurement would represent what actual length?
   a. 2-3/8 ft
   b. 23.8 ft
   c. 23-3/4”
   d. 23-3/4 ft

32. What is the length of the gate in centimeters?
   a. 304.8 cm
   b. 3048.0 cm
   c. 30.48 cm
   d. 3.048’