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ABSTRACT

Developed as part of the ABCs of Construction National Workplace Literacy Project, this instructional module is designed to help individuals employed as pipefitters learn to solve problems with charts and tables. Outlined in the first section is a five-step procedure for solving problems involving tables and/or charts: identifying the question to be answered, deciding which operations to use, determining the information needed from the chart, plugging the information into the selected operations, and working the problem. The remainder of the module consists of seven sections that each begin with a table/chart and 10 problems based on the information contained in it. The problems are related to the following pipe fitting-related tasks/topics: stacking and determining pipe diameters, rated capacities for slings, pipe wall thicknesses, and required sizes of concrete pipe and ductile iron pipe. (MN)

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TECHNICAL DEVELOPMENT CENTER
ED 374 308

Solving **Problems** *with* **Charts** *&* **Tables**

PIPEFITTER

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ABC's of Construction
National Demonstration Project in Workforce Literacy

The ABC's of Construction Project was funded in 1991 by the U.S. Department of Education as a grantee through the National Workplace Literacy Program (PR #198A10155). The program provided basic skills instruction to industrial construction workers employed by companies which are members of the Pelican Chapter of Associated Builders and Contractors (ABC). Located in Baton Rouge, Louisiana, ABC provides training to employees of over 60 member companies who perform contract work in the 53 petrochemical facilities located along the Mississippi River between Baton Rouge and New Orleans.

The grantee, the Adult Education Department of East Baton Rouge School Board, performed a comprehensive literacy task analysis of the apprenticeship training program for millwrights, pipefitters, electricians, instrumentation techs, and welders involved in the ABC training program. Over 20 modules of original, contextual curriculum were developed to teach the reading and math skills required for success in the craft training program.

Materials developed for instruction incorporated cognitive strategies for learning basic skills in the context of the craft and safety knowledge demanded by the industrial construction workplace. Instruction was written for a competency-based, open-entry/open-exit, individualized adult learning program that operated at the ABC training center in the evenings after work-hours.

SOLVING PROBLEMS WITH CHARTS AND TABLES

Phil is running 3/4 inch screw pipe and needs to find the cut-length for a piece that runs between two 90° fittings. To do this, he has to find the make-up for 2 ends of 3/4 inch pipe and subtract this from his center-to-center measurement. He uses the following chart:

LENGTH OF STANDARD PIPE THREADS			
PIPE SIZE (inches)	NUMBER OF THREADS (per inch)	TOTAL LENGTH (E + V)	EFFECTIVE LENGTH (E only)
1/8	27	7/16	1/4
1/4	18	5/8	7/16
3/8	18	5/8	7/16
1/2	14	13/16	9/16
3/4	14	13/16	9/16
1	11-1/2	1	11/16
1 1/4	11-1/2	1	11/16
1 1/2	11-1/2	1-1/32	3/4
2	11-1/2	1-1/16	3/4
2 1/2	8	1-9/16	1-1/8
3	8	1-5/8	1-1/4
4	8	1-3/4	1-5/16
6	8	1-15/16	1-1/2
8	8	2-3/16	1-3/4
10	8	2-3/8	1-15/16
12	8	2-9/16	2-1/8

Sometimes you need to do more than look up information on a chart. You need to solve a problem using information in the chart. How do you do that?

You need to be able to do five things:

(1) Identify the question you want to answer.
(2) Decide what operation(s) (addition, subtraction, multiplication, division) you need to use.
(3) Determine what information you need from the chart.
(4) Plug the information into your operation(s).
(5) Work the problem.

Look at Phil's problem again.

Phil wants to figure the make-up for two ends of 3/4 inch pipe to subtract from his center-to-center measurement.

What is the question he wants to answer? He wants to know the make-up for two ends of a pipe.

What operation(s) does he need? Phil knows the chart shows make-up for one end of a pipe. To find two ends, he must multiply by 2.

What information does he need from the chart? He needs the make-up for 3/4 inch pipe, 9/16".

Plug the information into the problem. 9/16 X 2 =

Work the problem. $9/16 \times 2/1 = \frac{9 \times 2}{16 \times 1} = \frac{18}{16} = \frac{1}{8}$

Now Phil has the answer. There is one more step he should follow. This step is **"Does that make sense?"** Some people think that if they use a calculator, they will always be right. This is only true if you put the right numbers into the calculator. Only you can determine if the answer seems right based on your experience.

1 Problem

Mike is a new worker. He got a load of different sizes of pipe. Mike must stack it. He reviews the following information from his ABC manual.

STACKING

Stack ductile iron pipe on timbers or elevated concrete supports to keep the bottom layer off the ground. Some companies are using large styrofoam blocks for stacking pipe. For the sake of convenience, stack the same sizes of pipe together.

Alternate the layers of pipe by placing bell end on top of spigot end in successive layers. Be sure to place timbers between layers. Chock the ends of each layer to prevent movement.

For safety, follow the recommendations shown in Figure 8 that govern the number of layers high that various sizes of pipe may be stacked.

PIPE SIZE (inches)	NUMBER OF TIERS
3	18
4	16
6	13
8	11
10	10
12	9
14	8
16	7

PIPE SIZE (inches)	NUMBER OF TIERS
18	6
20	6
24	5
30	4
36	4
42	3
48	3
54	3

Figure 8 -- Stacking Pipe

1. Mike has 100 pieces of 10 inch pipe. He puts 5 pipes per tier. How many stacks of pipe should he make?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

2. Mike has 18 full stacks of 54-inch pipe. How many tiers should there be?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

3. Mike has 2 stacks of 16-inch pipe. He has 5 stacks of 30 inch pipe. He has 3 stacks of 18-inch pipe. He has 10 pipe in each tier. How many pieces of pipe does he have?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

4. Mike needs 42 pieces of 8 inch pipe. He has 4 stacks of pipe. He has 5 pieces in each tier. Does he have enough pipe? How much more does he need or how much will he have left?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

5. Mike has 9 stacks of 18 inch pipe. There are 9 pieces in each tier. How many pieces does he have?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

6. Mike had 12 stacks of 36 inch pipe. Each tier had 5 pieces in it. He has 5 stacks of 3 inch pipe. Each tier had 16 pieces. He used half of the pipe. How many pieces does he have left?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

7. Mike has 5 stacks of pipe. The pipe is stacked to the highest, but safest height. There are 10 pieces in each tier. He has 350 pieces in all. What size is the pipe?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

8. Mike has some 10-inch pipe. He put 10 pieces per tier. He has 7 tiers. How many more pieces of pipe can he put on that stack?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

9. Mike is stacking 36 inch pipe. He is putting 5 pieces per tier. He has 72 pipes. How many tiers will he have? If he has any left over, what fraction of a tier will that be?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

10.Mike has a lot of pipe. He has one stack of each size listed on the chart. How many tiers of pipe does he have?

What is the question?

_____

What operation(s) is needed?

_____ _____

What information do you need from the chart?

_____

_____ _____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

2 Problem

Mike has a new assignment. He must stack cast-iron pipe. Mike again refers to his ABC manual. He finds the following chart:

PIPE SIZE (Inches)	Number of Tiers		
	16 FT. length	18 FT. length	20 FT. length
3	18	18	18
4	16	16	16
6	13	13	---
8	11	11	---
10	9	9	---
12	8	8	8
14	7	7	7
16	7	6	6
18	6	6	5
20	5	5	4
24	4	4	3
30	3	2	2
36	3	---	2
42	2	---	2
48	2	---	1

1. Mike is stacking 3 inch pipe. He has 16-ft., 18-ft., and 20-ft., sizes. He has a full stack of each. How many tiers of pipe should he have?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

2. Mike has 18 inch pipe. It is in 18-ft. lengths. He is putting 12 pieces in a tier. How many pieces will he have in a full stack?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

3. **Mike has a full stack of 6 inch pipe in 16-ft. lengths. He has 15 pieces per tier. He needs 1000 feet for a job. Does he have enough in this stack? How much will he have left over or how much more will he need?**

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

4. Mike is unloading 4-inch pipe in 20 ft. lengths. He plans to put 3 pieces in each tier. How many pieces will he have in a full stack?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

5. Mike has 12 inch pipe in 16-ft. lengths. He also has 24 inch pipe in 20-ft. lengths. If he has a full stack of both, how many tiers of pipe will he have?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

6. Mike has a load of 18-ft. pipe in each pipe size on the chart. He makes one stack of each size. How many tiers of pipe does he have in all?

What is the question?

_____ _____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

7. Mike has 6 inch pipe in 16-ft lengths. He also has 18- inch pipe in 20-foot lengths. What is the difference in the number of tiers in each stack?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

8. Mike has 29 stacks of 48 inch pipe in 20-ft. lengths. What is the total number of tiers he should have?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

9. Mike has a full stack of 4 inch pipe. He has a full stack of 12 inch pipe. He has a full stack of 14 inch pipe. All are 16-ft lengths. What is the total number of tiers of pipe?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

10. Mike is stacking 20 inch pipe. He has 18-ft. and 20 ft. lengths. He has 5 pieces in each tier. He has 4 stacks of 18-inch pipe. He has 9 stacks of 20-ft. pipe. How many feet of pipe does he have?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

3 Problem

PIPE SIZE (inches)	O.D. of PIPE	NOMINAL THICKNESS FOR SCHEDULE···>			
		SCHED. 5S	SCHED. 10S	SCHED. 40S	SCHED. 80S
1/8	0.405	---	0.049	0.068	0.095
1/4	0.540	---	0.065	0.088	0.119
3/8	0.675	---	0.065	0.091	0.126
1/2	0.840	0.065	0.083	0.109	0.147
3/4	1.050	0.065	0.083	0.113	0.154
1	1.315	0.065	0.109	0.133	0.179
1 1\4	1.660	0.065	0.109	0.140	0.191
1 1\2	1.900	0.065	0.109	0.145	0.200
2	2.375	0.065	0.109	0.154	0.218
2 1\2	2.875	0.083	0.120	0.203	0.276
3	3.5	0.083	0.120	0.216	0.300
3 1/2	4.0	0.083	0.120	0.226	0.318
4	4.5	0.083	0.120	0.237	0.337
5	5.563	0.109	0.134	0.258	0.375
6	6.625	0.109	0.134	0.280	0.432
8	8.625	0.109	0.148	0.322	0.500
10	10.75	0.134	0.165	0.365	0.500
12	12.75	0.156	0.180	0.375	0.500

Table 1
Standard Pipe Sizes

1. Ed has 3 1/2 inch pipe and 2 1/2 pipe. What is the difference in their outside diameters?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

2. Ed has 1/4 inch pipe in Schedule 10S and Schedule 80S sizes. What is the difference in their nominal thicknesses?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

3. Ed has 5 inch pipe. What is the difference between the nominal pipe size and the outside diameter?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

4. Ed has 10-inch and 12-inch pipe. He calculates the difference between the nominal size and the outside diameter for each. What is the difference between those two results?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

5. Ed has Schedule 80S pipe. The difference between the nominal thickness between two sizes of pipe in 0. What sizes of pipe might have that difference?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

6. Ed has 1/2 and 3/4 inch pipe. What is the difference between their nominal thicknesses for Schedule 10S pipe?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

7. Mike has 1 1/4 inch, schedule 10S pipe. He has 1 1/2 inch Schedule 40S pipe. What is the difference in their nominal thicknesses?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

8. Ed has 1/8 inch pipe. He has 6 inch pipe. What is the difference in their outside diameters?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

9. Ed has 1/2 inch pipe. What is the difference between the pipe size and the outside diameter?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

10. Ed has 3/8 inch pipe. What is the difference between the pipe size and the outside diameter?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

4 Problem

RATED CAPACITIES FOR 2-LEG AND 3-LEG BRIDLE SLINGS

Rope Dia (Inches)	Constr	Rated Capacities, Tons (2,000 lb)											
		2-Leg Bridle Slings						3-Leg Bridle Slings					
		Vert 30 degree Horz 60 degree		45 degree Angle		Vert 60 degree Horz 30 degree		Vert 30 degree Horz 60 degree		45 degree Angle		Vert 60 degree Horz 30 degree	
		HT	MS	HT	MS	HT	MS	HT	MS	HT	MS	HT	MS
¼	6 × 19	0.85	0.88	0.70	0.72	0.49	0.51	1.3	1.3	1.0	1.1	0.74	0.7
5/16	6 × 19	1.3	1.4	1.1	1.1	0.76	0.79	2.0	2.0	1.6	1.7	1.1	1.2
3/8	6 × 19	1.8	1.9	1.5	1.6	1.1	1.1	2.8	2.9	2.3	2.4	1.6	1.7
7/16	6 × 19	2.5	2.6	2.0	2.2	1.4	1.5	3.7	4.0	3.0	3.2	2.1	2.3
1/2	6 × 19	3.2	3.4	2.6	2.8	1.8	2.0	4.8	5.1	3.9	4.2	2.8	3.0
9/16	6 × 19	4.0	4.3	3.2	3.5	2.3	2.5	6.0	6.5	4.9	5.3	3.4	3.7
5/8	6 × 19	4.8	5.3	4.0	4.4	2.8	3.1	7.3	8.0	5.9	6.5	4.2	4.6
3/4	6 × 19	6.8	7.6	5.5	6.2	3.9	4.4	10.0	11.0	8.3	9.3	5.8	6.6
7/8	6 × 19	8.9	10.0	7.3	8.4	5.1	5.9	13.0	15.0	11.0	13.0	7.7	8.9
1	6 × 19	11.0	13.0	9.4	11.0	6.7	7.7	17.0	20.0	14.0	16.0	10.0	11.0
1 1/8	6 × 19	14.0	16.0	12.0	13.0	8.4	9.5	22.0	24.0	18.0	20.0	13.0	14.0
1 1/4	6 × 37	17.0	19.0	14.0	16.0	9.8	11.0	25.0	29.0	21.0	23.0	15.0	17.0
1 3/8	6 × 37	20.0	23.0	17.0	19.0	12.0	13.0	31.0	35.0	25.0	26.0	18.0	20.0
1 1/2	6 × 37	24.0	27.0	20.0	22.0	14.0	16.0	36.0	41.0	30.0	33.0	21.0	24.0
1 5/8	6 × 37	28.0	32.0	23.0	26.0	16.0	18.0	43.0	48.0	35.0	39.0	25.0	28.0
1 3/4	6 × 37	33.0	37.0	27.0	30.0	19.0	21.0	49.0	56.0	40.0	45.0	28.0	32.0
2	6 × 37	43.0	48.0	35.0	39.0	25.0	28.0	64.0	72.0	52.0	59.0	37.0	41.0

HT = Hand Tucked Splice
MS = Mechanical Splice.

1. Lonnie is making a 2-leg bridle sling. He used 3/4 inch 6 19 rope. It has a 45° angle. What is the difference in rated capacities between hand tacked and mechanical splices?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

2. Lonnie made a 3-leg bridle sling with a mechanical splice. He used 1 inch, 6 x 19 rope. It has a vertical 60° angle. How many pounds can it lift?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

3. **Lonnie is using 1/2 inch, 6 x 19 rope and a hand-tucked splice. He will use a 45° angle. He can make either a 2-leg or a 3-leg sling. What is the difference in their rated capacities?**

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

4. **Lonnie is making a 2-leg sling. He is using 1/4 inch, 6/19 rope. He hand tucked a splice with a vertical 30° angle. He needs to lift 1950 pounds. According to the rated capacities, can he lift that? If not, what is the difference between rated capacity and the amount he needs to lift?**

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

5. Lonnie make a 3-leg sling. He used 9/16 inch, 6 x 19 rope. He will machine splice the rope. What is the difference in rated capacities between a vertical angle of 60° and one of 30°?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

6. Lonnie is using 7/16 inch, 6 x 19 rope. He constructed a sling rated for 4000 pounds. Which sling did he make?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

7. Lonnie made a 3-leg bridle. It has a 45° angle. It is made of 1 5/8 rope. It has a hand tucked splice. What is its rated capacity in pounds?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

8. Lonnie is using 1 3/8 inch 6 x 37 rope. He makes a 3-leg bridle. The angle has a 60° vertical angle. He can use a hand-tuck or mechanical splice. What is the difference in their rated capacities?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

9. Lonnie made 2 slings. Both are 2-leg bridles. Both have hand-tucked splices. Both have 45° angles. One used 1- inch rope. The other used 2 inch rope. What is the difference in their rated capacities?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

10. Lonnie used 1 1/8 inch rope. What is the difference in the rated capacity for the strongest and the weakest slings which can be made from that rope size?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

5 Problem

WALL THICKNESS - CARBON STEEL PIPE

NOMINAL PIPE SIZE IN INCHES	STD	XS	XSS	10	40	60	80	120	160
2	3.65	5.02	9.03		3.65		5.02		7.06
2.5	5.79	7.66	13.7		5.79		7.66		10.01
3	7.58	10.25	18.58		7.58		10.25		14.31
3.5	9.11	12.51	22.85		9.11		12.51		
4	10.79	14.98	27.54		10.79		14.98	18.98	22.52
6	18.97	28.57	53.16		18.97		28.57	36.42	45.34
8	28.55	43.39	72.42		28.55	35.66	43.39	60.69	74.71
10	40.48	54.74	104.1		40.48	54.74	64.40	89.27	115.7
12	49.56	65.42	125.5		53.56	73.22	88.57	125.5	160.3
14	54.57	72.09		36.71	63.37	85.01	106.1	150.8	139.2
16	62.58	82.77		42.05	82.77	107.5	136.6	192.4	245.2
18	70.59	93.45		47.39	104.8	138.2	170.8	244.1	308.6
20	78.60	104.1		52.73	123.1	166.5	208.9	296.4	379.1
22	86.61	114.8		58.07		197.4	250.8	353.6	451.1
24	94.62	125.5		63.41	171.2	238.3	296.5	429.5	542.1
26	102.6	136.2		85.73					
28	110.6	146.9		92.41					
30	118.7	157.5		99.08					
32	126.7	168.2		105.8	229.9				
34	134.7	178.9		112.4	244.6				
36	142.7	189.6		119.1	282.4				
42	166.7	221.6			330.4				

WEIGHT PER FOOT IN POUNDS

Table 6

1. Jose must move 100 feet of pipe. It is 4 inch pipe, Class XS. How much will it weigh?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

2. Jose rigged a load for 5000 pounds. He has 24 inch pipe class STD. He has 90 feet of pipe. Is the load safe? If not, what is the weight of the load?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

3. Jose has pipe in every class of pipe on the chart. Allof it is 12-inch pipe. What is the total weight of one foot of each class?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

4. Jose has Class 160 pipe. He has 5 feet of 24 inch pipe. He has 31 feet of 20 inch pipe. What is the total weight of the pipe?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

5. Jose compares classes of pipe. What is the difference in the number of sizes in STD Class and the number in Class 160?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

6. Jose ordered 183 feet of 6 inch pipe. He has 998 feet of 2.5 inch pipe. Both are Class 80. What is the difference in their total weights?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

7. Jose ordered Class XSS pipe. The weight of the pipe was 1873.8. He has 18 feet of pipe. What size pipe is it?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

8. Jose has Class 120 pipe. He has 106 feet of it. The total weight is 3860.52. What size pipe is it?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

9. Jose has 42 inch pipe. He has 10 feet of Class STD. He has 8 feet of Class XS. He has 6 feet of Class 40. Which has the greatest weight?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

10. Jose has 142 feet of 12 inch pipe. 95 feet of it is Class 160. The rest is Class XS. What is the total weight?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

6 Problem

CONCRETE PIPE SIZES

ASTM C 14 -- Nonreinforced Sewer and Culvert Pipe, Bell and Spigot Joint

CLASS 1			CLASS 2		CLASS 3	
Internal Diameter inches	Minimum Wall Thickness inches	Average Weight pounds per foot	Minimum Wall Thickness inches	Average Weight pounds per foot	Minimum Wall Thickness inches	Average Weight pounds per foot
4	5/8	9.5	3/4	13	7/8	15
6	5/8	17	3/4	20	1	24
8	3/4	27	7/8	31	1 1/8	36
10	7/8	37	1	42	1 1/4	50
12	1	50	1 3/8	68	1 3/4	90
15	1 1/4	78	1 5/8	100	1 7/8	120
18	1 1/2	105	2	155	2 1/4	165
21	1 3/4	159	2 1/4	205	2 3/4	260
24	2 1/8	203	3	315	3 1/4	350

TABLE 1

This table gives information about nonreinforced concrete culvert, storm drain, and sewer pipe with bell and spigot joints for sizes 4" through 24". Notice that there are three classes. The larger the class number, the thicker the walls.

1. Lynn has 10 feet of 18 inch pipe. It is class 2. What is its weight?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

2. Lynn must move some 21-inch pipe. He has 5 feet of each class. What is the total weight of the pipe?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

3. Lynn has Class 3 pipe. He has 100 feet of 18 inch pipe. He has 100 feet of 4 inch pipe. What is the difference in their weights?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

4. Lynn has 6-inch pipe in each class size. What is the difference between the minimum wall thicknesses between the following?

Class 1 and Class 2
Class 2 and Class 3
Class 1 and Class 3

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

5. Lynn has 15-inch and 24-inch pipe. Both are Class 3. What is the difference in the average weight per foot?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____.

Does it seem correct? _____ How do you know?

_____

6. Lynn has 2 sizes of Class 2 pipe. The difference in their average weight per foot is 50 pounds. What 2 pipe sizes of pipe does he have?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

7. Lynn has rigging to move 1000 pounds or less. He needs to move 3 feet of 15 inch pipe, Class 2. Will this load exceed the limit? If so, by how much?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

8. Lynn has 4-inch and 12-inch pipe in each class size. What is the difference in wall thickness for each class size?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____ _____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

9. Lynn has 50 feet of 21-inch pipe. Half of it is Class 1. Half is Class 2. What is the total weight of the pipe?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

10. Lynn ordered 300 feet of 8-inch pipe. One-third is Class 1. Two-thirds is Class 2 pipe. What is the total weight?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

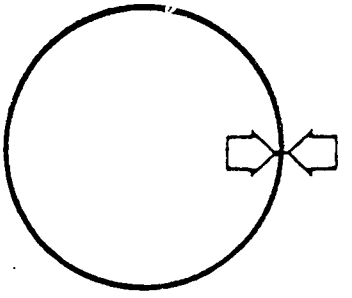
Work the problem _____

Does it seem correct? _____ How do you know?

_____

7 Problem

DUCTILE IRON PIPE SIZES



Size in.	Outside Diameter in.	STANDARD CLASSES – Wall Thicknesses in Inches*						
		50	51	52	53	54	55	56
3	3.96	—	.25	.28	.31	.34	.37	.40
4	4.80	—	.26	.29	.32	.35	.38	.41
6	6.90	.25	.28	.31	.34	.37	.40	.43
8	9.05	.27	.30	.33	.36	.39	.42	.45
10	11.10	.29	.32	.35	.38	.41	.44	.47
12	13.20	.31	.34	.37	.40	.43	.46	.49
14	15.30	.33	.36	.39	.42	.45	.48	.51
16	17.40	.34	.37	.40	.43	.46	.49	.52
18	19.50	.35	.38	.41	.44	.47	.50	.53
20	21.60	.36	.39	.42	.45	.48	.51	.54
24	25.80	.38	.41	.44	.47	.50	.53	.56
30	32.00	.39	.43	.47	.51	.55	.59	.63
36	38.30	.43	.48	.53	.58	.63	.68	.73
42	44.50	.47	.53	.59	.65	.71	.77	.83
48	50.80	.51	.58	.65	.72	.79	.86	.93
54	57.10	.57	.65	.73	.81	.89	.97	1.05

* These are standard thickness Classes as given in AWWA C150 and C151. AMERICAN can furnish any thickness in between these standard thicknesses if deemed economical for major projects. Some sizes of pipe can be furnished in thickness classes heavier than Class 56

Fig. 7. Ductile Iron Pipe Sizes

BEST COPY AVAILABLE

1. Zeke is installing 10-inch pipe. What is the difference between the pipe size and the outside diameter?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____ _____

Does it seem correct? _____ How do you know?

_____

2. Zeke is using 3-inch and 4-inch pipe. What is the differene between their outside diameters?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

3. Zeke is using 30-inch and 36-inch pipe. both are class 54. What is the difference in wall thickness?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

4. Zeke is using 14-inch and 30-inch pipe. Both are class 51. What is the difference in their wall thicknesses?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

5. Zeke has 18-inch and 42-inch pipe. What is the difference in the outside diameter?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

6. Zeke has 16-inch pipe. It is class 52. He also has 12- inch pipe. It is Class 53. What is the difference in wall thicknesses?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

7. Zeke has two pieces of class 50 pipe. The difference in their wall thicknesses is .07. What sizes of pipe does Zeke have?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____ _____

Does it seem correct? _____ How do you know?

_____

8. Zeke installed 20-inch, 10-inch, and 30-inch pipe. Which two pieces of pipe has the greatest difference in outside diameter? What is that difference?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

9. Zeke has 48-inch pipe. What is the difference between the pipe size and the outside diameter?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____

10. Zeke has 36-inch and 42-inch pipe. What is the difference between their outside diameters?

What is the question?

_____

What operation(s) is needed?

_____

What information do you need from the chart?

_____

_____

_____

Plug in the values _____

Work the problem _____

Does it seem correct? _____ How do you know?

_____