# East Bay Municipal Utility District

# Entry-Level Sample Test Items

**East Bay Municipal Utility District**
**Sample Test Items**

## Table of Contents

# Overview

These are sample test questions for entry-level written tests administered by the East Bay Municipal Utility District (EBMUD). These samples have four sections:

(a) math;

(b) reading comprehension;

(c) reading blueprints; and,

(d) reading water meters.

Written exams typically consist of items, which may include any or all of the above sections administered at one testing session. You may prepare for the test by reviewing the concepts, tips and examples listed in this section.

# Section One: Math Test

Math Concepts

The math portion of a written test may have several types of applied math items. You may need to know how to calculate the following:

1. Addition and subtraction of whole numbers, fractions and decimals
2. Multiplication, division and averaging of whole numbers, fractions and decimals
3. Converting fractions to decimals and vice versa
4. Area and volume
5. Ratios
6. Percentages
7. Converting units of measurement, such as inches to feet, feet to yards, cubic feet to cubic yards, etc

The difficulty level of the math will vary depending on requirement of the job and typically there will be test items that are more difficult than the samples illustrated.

Many of the items on the math portion of the test will require multiple steps to solve. You may be required to use a combination of the functions listed above to solve a specific item. A math information sheet can be found on the following page. Samples of the types of items you will have to solve during the test are listed. You should practice solving these types of problems and items that fall under the seven categories listed above in order to prepare for the math portion of a written test. The answers to the sample items are on the last page of this booklet.

For most test administrations, you will be allowed to use a noiseless, nonprogrammable calculator. Calculator functions on cell phones, PDA's and other electronic devices are not allowed.

Math Information Sheet

Review the information presented below. A copy of this information **may** be provided at the time of the written test. Make sure you thoroughly understand the information in the charts and how to apply this information to a math problem. Be prepared to refer to this sheet as little as possible if provided on the day of the written test.

| Units and Conversion Factors |
|---|
| 12 inches = 1 foot (′)<br>3 feet = 1 yard<br>1 inch (in) (″) = 2.54 centimeters (cm)<br>1 meter = 100 centimeters = 39.4″<br>1 acre (a) = 43,560 square feet ($ft^2$)<br>1 cubic foot ($ft^3$) = 7.48 gallons (gal)<br>1 liter (L) = 1,000 milliliters (ml)<br>1 gallon = 3.78 L = 3,780 ml<br>1 pound (lb) = 454 grams (gm)<br>1 lb = 7,000 grains (gr)<br>1 gm = 1,000 milligrams (mg)<br>1 ppm = 1 part per million |

| Water Measurements |
|---|
| 1 $ft^3$ of water weighs 62.4 lbs<br>1 gallon of water weighs 8.34 lbs<br>1 L of water weighs 1,000 gm<br>1 mg/L = 1 ppm<br>1 grain per gallon (gpg) = 17.1 ppm<br>1 atmosphere = 33.9 feet of water or = 14.7 pounds/square inch (psi)<br>1 million gallons per day (MGD) = 1.55 cubic feet per second (cfs)<br>1 part per billion (ppb) = ppm/1,000 |

| Formulas for Calculating Angles, Volume and Areas |
|---|
| Sides of right triangle: $L^2 = a^2 + b^2$ (L = long side, a = side, b = side) |
| Interior angles of a triangle add up to 180 degrees |
| Interior angles of a quadrilateral (square, rectangle, trapezoid, etc.) add up to 360 degrees |
| Area: $A = l \times w$ (l = length, w = width) |
| Volume: $V = l \times w \times h$ (l = length, w = width, h = height) |
| Area of a circle: $A = \pi r^2$ ($\pi = 3.14$, r = radius) |
| Volume of a cylinder: $V = \pi r^2 h$, and can be expressed in $in^3$ or $ft^3$ |
| $\pi = 3.14$; r = radius = diameter/2; h = height |

Sample Math items

1. What is the cost of 33 pieces of paneling 2' - 0" wide, and 5' - 0" long at a cost of $.30 per square foot?

2. What is the total thickness of three sheets of plywood which are 5/16-inch, 5/8-inch and 7/8-inch thick?

3. If a contractor buys 6,000 board feet of oak flooring, and has to use 1,928 board feet on one house and 1,850 board feet on another house, how much flooring is left?

4. How many cubic yards are there in 297 cubic feet?

5. If a concrete mix contains 1-1/2 cubic feet of gravel, 1/2 cubic foot of water, 1 cubic foot of cement, and 2 cubic feet of sand, what percentage of the mix is sand?

6. How many sheets of 3/4" x 4' x 8' plywood are required to cover a 24' x 32' floor?

7. What is the volume of a rectangular container that is 6' long, 4' high and 3' wide?

8. If there are 2.54 centimeters in 1 inch, what is the length of wire in inches that is 905 millimeters long?

9. An antifreeze solution for an automobile is used in a ratio of 1 part antifreeze and 2 parts water. If 2 gallons of antifreeze are used, how much water is needed?

10. If a car runs 80 miles on 5 gallons of gasoline, how many gallons will be needed to travel 200 miles?

11. A truck starts at Point A and drives South three miles. Then it turns left at Point B and drives East four miles to Point C. How many miles is the truck at Point C from Point A if it were to drive directly from Point A to Point C?

12. What is the volume in cubic inches of a cylinder that has a height of 10 inches and a radius of 5 inches?

13. If you have a triangle with two angles that are $35^{o}$ and $100^{o}$, how many degrees is the final angle?

14. What is the volume in cubic yards of a trench that is 20′ long, 2′ wide and 5′ high?

15. There are three excavations from which 5.2, 6.8 and 7.2 cubic yards of material are excavated, respectively. What is the average number of cubic yards of each excavation?

16. Your foreman asks you to purchase three pairs of gloves at $3.95 each, four pairs of goggles at $5.99 each, five rolls of paper towels at $1.69 per roll and two cases of bottled water at $4.95 per case. How much will all of the items costs?

17. Pete can wallpaper a room in four hours; Warren can wallpaper the same room in seven hours. How long will it take them to wallpaper the room if they work together?

    a. 4.5 hours
    b. 3.2 hours
    c. 5.5 hours
    d. 2.5 hours*

18. In a trade school with 2000 students, the student-faculty ratio is 16:1. If 18% of the faculty originally graduated from the trade school, approximately how many did not?

    a. 119
    b. 127
    c. 23
    d. 103*

## Section Two: Reading Comprehension

A Reading Comprehension test is typically made up of reading passages in which you will be asked interpretive, applicative and inferential questions. These questions will measure your ability to understand, apply and analyze information and concepts presented in written form. All items are to be answered on the basis of what is stated or implied in the reading material and no specific prior knowledge of the material is required.

Success with reading comprehension items depends on more than just being literate. You must also know how to obtain the answers from the reading selection and be able to distinguish the **best** answer from a number of answers that all seem to be correct, or from a number of answers that all seem to be wrong.

We have provided a passage to read followed by sample items. Try the following system and determine whether or not it works for you:

- Read just the questions – not the answer choices - before you read the passage. The questions will alert you to look for certain details, ideas and points of view.

- Skim the passage very rapidly to get an idea of its subject matter and its organization.

- Read the passage carefully with comprehension as your main goal.

- Return to the questions. Read each question carefully. Be sure you know what it asks. Misreading of questions is a major cause of error on reading comprehension tests. Read **all** of the answer choices. Eliminate the obviously incorrect answers. You may be left with only one possible answer. Then skim the passage once again. By now you should be able to conclude which answer is **best or correct**.

Reading Comprehension Sample

Questions 1 to 4 refer to the passage below:

Ventilation, as used in fire-fighting operations, means opening up a building or structure in which a fire is burning to release the accumulated heat, smoke and gases. Lack of knowledge of principles of ventilation on the part of firemen may result in unnecessary accidents due to ventilation being neglected or improperly handled. While ventilation itself extinguishes no fires, when used in an intelligent manner, it allows firemen to get at the fire more quickly, easily and with less danger and hardship.

1. According to the above paragraph, the most important result of failure to apply the principles of ventilation at a fire may be:
    a. loss of public confidence
    b. disciplinary action
    c. excessive use of equipment
    d. injury to firemen

2. It may be inferred from the above paragraph that the chief advantage of ventilation is that it:
    a. eliminates the need for breathing equipment
    b. reduces smoke damage
    c. permits firemen to work
    d. cools the fire

3. Knowledge of the principles of ventilation, as defined in the above paragraph, would be least important in a fire in a:
    a. high rise apartment
    b. grocery store
    c. ship's hold
    d. lumberyard

4. We may conclude from the above paragraph that, for all well-trained and equipped firemen, ventilation is:
    a. a simple matter
    b. rarely necessary
    c. relatively unimportant
    d. a basic tool

## Section Three: Blueprint Reading

A drawing of a piece of equipment or process may be included in the written test. The types of information displayed on the blueprint may include:

a) the project;
b) part(s) used;
c) the scale;
d) date of drawing;
e) information concerning the components for the equipment;
f) material list that shows the item number that corresponds to the drawing;
g) the number of parts required;
h) a description of the part.

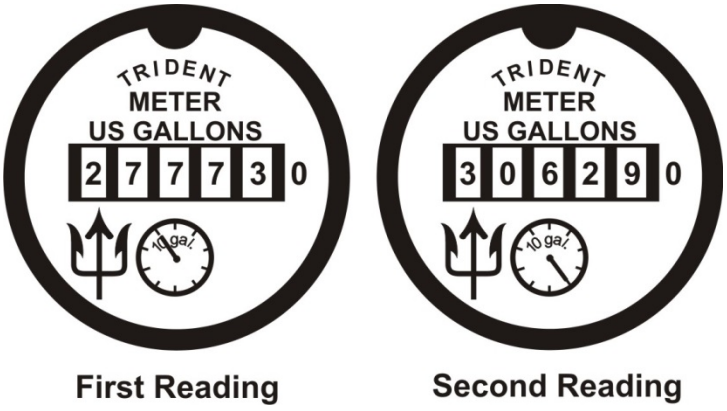
Questions may be asked about any or all the information shown on the drawing. You may be tested on types of drawings such as electrical schematics, mechanical assemblies and/or blueprints.

## Section Four: Meter Reading

Samples of meter reading items that may be included in the written test are shown below. The types of information displayed on the meter reading items may include:

1. How many gallons of water were used between the first and second readings? *(In order to read this type of meter, you must replace the zero with the number indicated in the dial labeled "10 gal". The 10 gal dial is read in a clockwise direction where the 12 o'clock position is zero and each increment from there is 1 gallon.)*

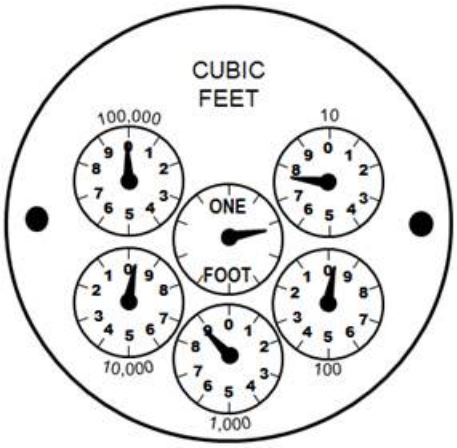
a. 28,550
b. 28,555
c. 28,560
d. 285,595




First Reading Second Reading

2. What is the number of cubic feet registered in the meter below?
*(In order to read this type of meter, please read the explanation on how to read meters in the link below.)*

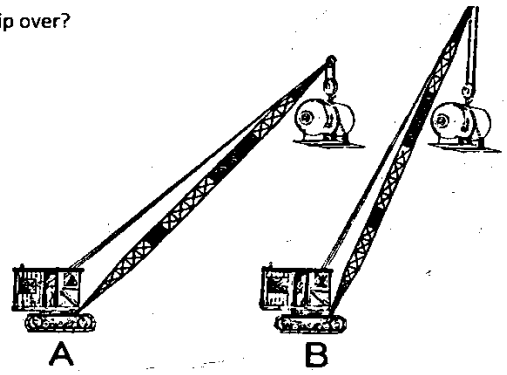
   a. 09997
   b. 99897
   c. 99997
   d. 09897




Refer to this link for more information on how to read meters:
http://www.ebmud.com/customers/about-your-meter

# Section Five: Mechanical/Spatial

1. Which crane is more likely to tip over?

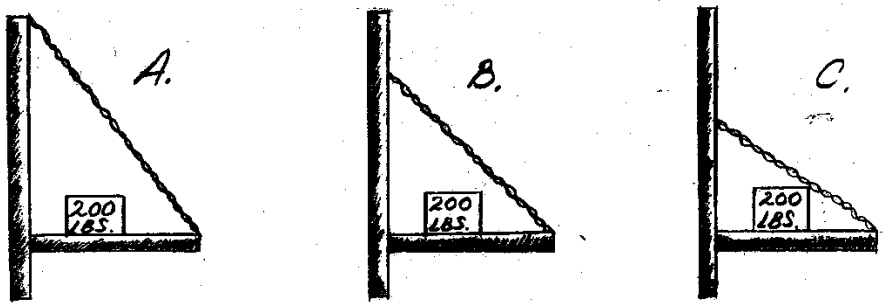



a. A

b. B

c. equal

2. Which chain is most likely to break first?



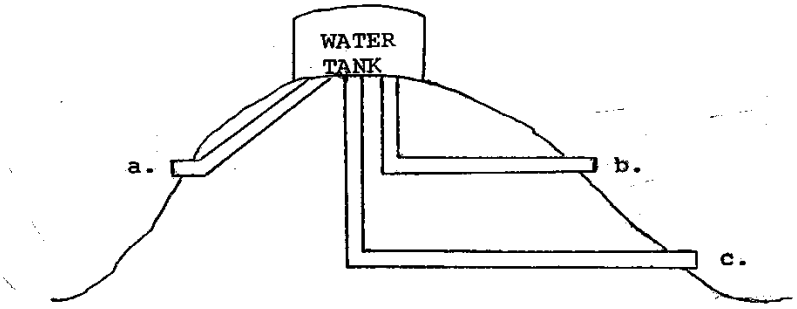

a. A

b. B

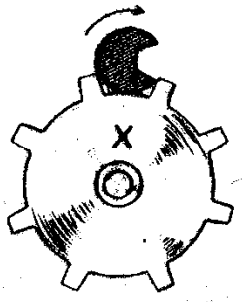
c. C

d. All three chains will break at the same time.

3. Which opening has the greatest water pressure?




4. The top of the wheel "X" will go:




a. steadily to the right.
b. steadily to the left.
c. by jerks to the left.
d. by jerks to the right.

**Answer Key for Sample Questions**

Answers to Sample Math Problems

1. $99
2. 1-13/16 inches
3. 2,222 board feet
4. 11 cubic yards
5. 40%
6. 24 sheets of plywood
7. 72 cubic feet
8. 36 inches
9. 4 gallons
10. 12-1/2 gallons
11. 5 miles
12. 785 cubic inches
13. 45°
14. 7.41 cubic yards
15. 6.4 cubic yards
16. $54.16
17. 2.5 hours
18. 103

Answers to Reading Comprehension Samples

1. d
2. c
3. d
4. d

Answers to Meter Reading Samples

1. b
2. b

Answers to Mechanical/Spatial

1. a
2. c
3. c
4. c