

# CBEST<sup>®</sup> Math Workbook

**CBEST<sup>®</sup> Math Exercises, Tutorials  
and Multiple Choice Strategies**

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# Getting Started

**C**ONGRATULATIONS! By deciding to take the California Basic Educational Skills Test (CBEST®) Exam, you have taken the first step toward a great future! Of course, there is no point in taking this important examination unless you intend to do your best to earn the highest grade that you possibly can. That means getting yourself organized and discovering the best approaches, methods and strategies to master the material. Yes, that will require real effort and dedication on your part, but if you are willing to focus your energy and devote the study time necessary, before you know it you will be opening that letter of acceptance to the school of your dreams.

We know that taking on a new endeavor can be scary, and it is easy to feel unsure of where to begin. That's where we come in. This study guide is designed to help you improve your test-taking skills, show you a few tricks of the trade and increase both your competency and confidence.

## **California Basic Educational Skills Test Math Content**

### **Computation and Problem Solving**

Basic operations with fractions, decimals and percent

Arithmetic

Basic operations with positive and



negative numbers  
Estimation  
Solve word problems  
Identify equivalent equations and different methods  
of solving problems

### **Basic Algebra**

Solve equations with 1 variable

### **Graphic Relationships**

Interpret, and solve problems based on data in graph  
format  
Solve problems using data from tables

### **Basic Statistics**

Calculate mean, mode and median  
Calculate probability and predict outcomes

## **The CBEST® Study Plan**

Now that you have made the decision to take the CBEST®, it's time to get started. Before you do another thing, you will need to figure out a plan of attack. The best study tip is to start early! The longer the time period you devote to regular study practice, the more likely you will retain the material and be able to reach it quickly. If you thought that  $1 \times 20$  is the same as  $2 \times 10$ , guess what? It really is not, when it comes to study time. Reviewing material for just an hour per day over the course of 20 days is far better than studying for two hours a day for only 10 days. The more often you revisit a particular piece of information, the better you will know it. Not only will your grasp and understanding be better, but your ability to reach into your brain and quickly and efficiently pull out the tidbit you need, will

be greatly enhanced as well.

The great Chinese scholar and philosopher Confucius believed that true knowledge could be defined as knowing what you know and what you do not know. The first step in preparing for the CBEST® Exam is to assess your strengths and weaknesses. You may already have an idea of what you know and what you do not know, but evaluating yourself for each of the math areas will clarify the details.

### **Making a Study Schedule**

To make your study time the most productive, you will need to develop a study plan. The purpose of the plan is to organize all the bits of pieces of information in such a way that you will not feel overwhelmed. Rome was not built in a day, and learning everything you will need to know to pass the CBEST® Exam is going to take time, too. Arranging the material you need to learn into manageable chunks is the best way to go. Each study session should make you feel as though you have accomplished your goal, and your goal is simply to learn what you planned to learn during that particular session. Try to organize the content in such a way that each study session builds on previous ones. That way, you will retain the information, be better able to reach it, and review the previous bits and pieces at the same time.

**The Best Study Tip!** The best study tip is to start early! The longer you study regularly, the more you will retain and 'learn' the material. Studying for 1 hour per day for 20 days is far better than studying for 2 hours for 10 days.

### **What don't you know?**

The first step is to assess your strengths and weaknesses. You may already have an idea of where your weaknesses are, or you can take our Self-assessment modules for

each of the areas, math, English, science and reading.

Below is a table to assess your exam readiness in each content area. You can fill this in now, and correct if necessary after completing the self-assessments, or fill it in after you have taken the self-assessments.

## Exam Readiness Assessment

<b>Computation and Problem Solving</b>	<b>Rate 1 - 5</b>
Basic operations with fractions, decimals and percent	
Arithmetic	
Basic operations with positive and negative numbers	
Estimation	
Solve word problems	
Identify equivalent equations and different methods of solving problems	
<b>Basic Algebra</b>	
Solve equations with 1 variable	
<b>Graphic Relationships</b>	
Interpret, and solve problems based on data in graph format	
Solve problems using data from tables	
<b>Basic Statistics</b>	

# Estimation

**E**STIMATING SOLUTIONS TO PROBLEMS ARE INCLUDED IN THE ESTIMATION, MEASUREMENT AND STATISTICAL SECTION OF THE MATHEMATICS TEST.

Here are some strategies for estimating answers.

## Strategy 1: Break it down

Estimate  $105 \times 8$

- a. 840
- b. 922
- c. 880
- d. 860

Answer: A

Break 105 into 2 parts: 100 and 5, then multiple both by 8, and add.

$100 \times 8$  is easy -  $100 \times 8 = 800$ . And,  $5 \times 8 = 40$ , adding gives the answer, 840, Choice A

## Strategy 2: Use base 10

Estimate  $1050 \times 128$

- a. 210,000
- b. 200,000
- c. 21,000
- d. 130,000

1050 and 128 are difficult to multiply in your head so take 1000 and 100 - add two zeros to 1000 for the answer, 100,000. Because we rounded down to 1000 and 100, this estimate will be lower than the actual answer.

Looking at the choices, A, B and C can all be eliminated as too small (C) or too large (A and B) so the answer must be D.

Confirming with a calculator,  $1050 \times 128 = 134,400$ .

# Answer Sheet

	A	B	C	D
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Practice Questions

**1. Brad has agreed to buy everyone a Coke. Each drink costs \$1.89, and there are 5 friends. Estimate Brad's cost.**

- a. \$7
- b. \$8
- c. \$10
- d. \$12

**2. What is the best approximate solution for  $1.135 - 113.5$ ?**

- a. -110
- b. 100
- c. -90
- d. 110

**3. Estimate  $16 \times 230$**

- a. 31,000
- b. 301,000
- c. 3,100
- d. 3,000,000

**4. Estimate  $215 \times 65$**

- a. 1,350
- b. 13,500
- c. 103,500
- d. 3,500

## Answer Key

### 1. C

If there are 5 friends, and each drink costs \$1.89, we can round up to \$2 per drink and estimate the total cost at,  $5 \times \$2 = \$10$ . The actual cost is  $5 \times \$1.89 = \$9.45$ .

### 2. A

$1.135 - 113.5 = -112.37$ . Best approximate = -110

### 3. C

$$16 \times 230 = 3680$$

To estimate, break 16 into 10 and 6.  $10 * 230 = 2300$ , and  $6 * 230$  will be about half that 1150 (actually 1380)

For an approximation,  $2300 + 1150 = 3450$ . The only choice is choice C, 3100.

### 4. B

$$215 \times 65 = 13975$$

Choices A (1,350) and D (3,500) can be eliminated right away as they are too small. Choice C (103,500) is too large and can be eliminated, leaving only choice B.



# Statistics

**T**he Statistics questions ARE INCLUDED IN THE ESTIMATION, MEASUREMENT AND STATISTICAL PROBLEMS SECTION OF THE MATHEMATICS TEST.

**The questions cover the following areas:**

Interpret data in graph or chart form

Graph data

Calculate the Mean, Mode and Median

Basic Probability

## **Mode, Mean and Median**

The Mode, Mean and Median, are types of averages.

The mean is the average calculated by adding the numbers and dividing by the number of items in the data set. The median is the middle value in a data set. To calculate the median, put the numbers in order, and the median will be the middle number. If there is an even number of items in the data set, then the median is found by taking the mean (average) of the two middlemost numbers. See our example below. The mode is the most frequently occurring number. If no number is repeated, then there is no mode.

# Answer Sheet

	A	B	C	D
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Data Analysis and Statistics Practice Questions

**1. Find the median of the set of numbers – 1,2,3,4,5,6,7,8,9 and 10.**

- a. 55
- b. 10
- c. 1
- d. 5.5

**2. Find the median of the set of numbers – 21, 3, 7, 17, 19, 31, 46, 20 and 43.**

- a. 19
- b. 20
- c. 3
- d. 167

**3. Find the median of the set of numbers – 100, 200, 450, 29, 1029, 300 and 2001.**

- a. 300
- b. 29
- c. 7
- d. 4,080

## Answer Key

### 1. D

First arrange the numbers in a numerical sequence – 1,2,3,4,5,6,7,8,9, 10. Then find the middle number or numbers. The middle numbers are 5 and 6. The median =  $5 + 6/2 = 11/2 = 5.5$

### 2. B

First arrange the numbers in a numerical sequence – 3,7, 17, 19, 20, 21, 31, 43, 46. Next find the middle number. The median = 20

### 3. A

First arrange the numbers in a numerical sequence – 29,100, 200, 300, 450, 1029, 2001. Next find the middle number. The median = 300

# Word Problems

**W**ORD PROBLEMS ARE INCLUDED IN THE COMPUTATION AND PROBLEM SOLVING SECTION OF THE MATHEMATICS TEST.

## How to Solve Word Problems

Most students find math word problems difficult. Tackling word problems is much easier if you have a systematic approach which we outline below.

Here is the biggest tip for studying word problems.

**Practice regularly and systematically.** Sounds simple and easy right? Yes it is, and yes it really does work.

Word problems are a way of thinking and require you to translate a real world problem into mathematical terms.

Some math instructors go so far as to say that learning how to think mathematically is the main reason for teaching word problems.

So what do we mean by Practice regularly and systematically? Studying word problems and math in general requires a logical and mathematical frame of mind. The only way that you can get this is by practicing regularly, which means everyday.

It is critical that you practice word problems

everyday for the 5 days before the exam as a bare minimum.

If you practice and miss a day, you have lost the mathematical frame of mind and the benefit of your previous practice is pretty much gone. Anyone who has done any number of math tests will agree – you have to practice everyday.

**Everything is important.** The other critical point about word problems is that all the information given in the problem has some purpose. There is no unnecessary information! Word problems are typically around 50 words in 1 to 3 sentences. If the sometimes complicated relationships are to be explained in that short an explanation, every word has to count. Make sure that you use every piece of information.

**Here are 9 simple steps to solve word problems.**

**Step 1** – Read through the problem at least three times. The first reading should be a quick scan, and the next two readings should be done slowly to answer these important questions:

What does the problem ask? (Usually located towards the end of the problem)

What does the problem imply? (This is usually a point you were asked to remember).

Mark all information, and underline all important words or phrases.

**Step 2** – Try to make a pictorial representation of the problem such as a circle and an arrow to show travel.

This makes the problem a bit more real and sensible to you.

A favorite word problem is something like, 1 train leaves Station A traveling at 100 km/hr and another train leaves Station B traveling at 60 km/hr. ...

Draw a line, the two stations, and the two trains at either end. This will solidify the situation in your mind.

**Step 3** – Use the information you have to make a table with a blank portion to show information you do not know.

**Step 4** – Assign a single letter to represent each unknown datum in your table. You can write down the unknown that each letter represents so that you do not make the error of assigning answers for the wrong unknown, because a word problem may have multiple unknowns and you will need to create equations for each unknown.

**Step 5** – Translate the English terms in the word problem into a mathematical algebraic equation. Remember that the main problem with word problems is that they are not expressed in regular math equations. Your ability to correctly identify the variables and translate the word problem into an equation determines your ability to solve the problem.

**Step 6** – Check the equation to see if it looks like regular equations that you are used to seeing and whether it looks sensible. Does the equation appear to represent the information in the question? Take note that you may need to rewrite some formulas needed to solve the word problem equation. For example, word distance problems may need you rewriting the distance formula, which is Distance = Time x Rate. If the word problem requires that you solve for time you will need to use Distance/Rate and Distance/Time to solve for Rate. If you understand the distance word problem you should be able to identify the variable you need to solve for.

**Step 7** – Use algebra rules to solve the derived equation.

Take note that the laws of equation demands that what is done on this side of the equation has to also be done on the other side. You have to solve the equation so that the unknown ends alone on one side. Where there are multiple unknowns you will need to use elimination or substitution methods to resolve all the equations.

**Step 8** – Check your final answers to see if they make sense with the information given in the problem. For example if the word problem involves a discount, the final price should be less or if a product was taxed then the final answer has to cost more.

**Step 9** – Cross check your answers by placing the answer or answers in the first equation to replace the unknown or unknowns. If your answer is correct then both side of the equation must equate or equal. If your answer is not correct then you may have derived a wrong equation or solved the equation wrongly. Repeat the necessary steps to correct.

## Types of Word Problems

Word problems can be classified into 12 types. Below are examples of each type with a complete solution. Some types of word problems can be solved quickly using multiple choice strategies and some cannot. Always look for ways to estimate the answer and then eliminate choices.



**1. Age**

A girl is 10 years older than her brother. By next year, she will be twice the age of her brother. What are their ages now?

- a. 25, 15
- b. 19, 9
- c. 21, 11
- d. 29, 19

**Solution: B**

We will assume that the girl's age is "a" and her brother's age is "b." This means that based on the information in the first sentence,

$$a = 10 + b$$

Next year, she will be twice her brother's age, which gives,  $a + 1 = 2(b+1)$

We need to solve for one unknown factor and then use the answer to solve for the other. To do this we substitute the value of "a" from the first equation into the second equation. This gives

$$10+b + 1 = 2b + 2$$

$$11 + b = 2b + 2$$

$$11 - 2 = 2b - b$$

$$b = 9$$

$9 = b$  this means that her brother is 9 years old. Solving for the girl's age in the first equation gives  $a = 10 + 9$ .  $a = 19$  the girl is aged 19. So, the girl is aged 19 and the boy is 9

# Answer Sheet

	A	B	C	D	E		A	B	C	D	E
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	21	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	22	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	23	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	24	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	25	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
11	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
12	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
15	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
20	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						

**Part 1 - Equation Translation**

**1. Translate the following into an equation: Five greater than 3 times a number.**

- a.  $3X + 5$
- b.  $5X + 3$
- c.  $(5 + 3)X$
- d.  $5(3 + X)$

**2. Translate the following into an equation: three plus a number times 7 equals 42.**

- a.  $7(3 + X) = 42$
- b.  $3(X + 7) = 42$
- c.  $3X + 7 = 42$
- d.  $(3 + 7)X = 42$

**3. Translate the following into an equation: 2 + a number divided by 7.**

- a.  $(2 + X)/7$
- b.  $(7 + X)/2$
- c.  $(2 + 7)/X$
- d.  $2/(7 + X)$

**4. Translate the following into an equation: six times a number plus five.**

- a.  $6X + 5$
- b.  $6(X+5)$
- c.  $5X + 6$
- d.  $(6 * 5) + 5$

# Answer Key

## Part 1 - Equation Translation

### 1. A

Five greater than 3 times a number.

$5 + 3$  times a number.

$$3X + 5$$

### 2. A

Three plus a number times 7 equals 42.

Let  $X$  be the number.

$$(3 + X) \text{ times } 7 = 42$$

$$7(3 + X) = 42$$

### 3. A

2 + a number divided by 7.

$(2 + X)$  divided by 7.

$$(2 + X)/7$$

### 4. B

Six times a number plus five is the same as saying six times (a number plus five). Or,

$6 * (\text{a number plus five})$ . Let  $X$  be the number so,  $6(X+5)$ .

# Fractions Decimal & Percent

**F**ractions, decimals and percent ARE INCLUDED IN THE COMPUTATION AND PROBLEM SOLVING AND THE NUMERICAL AND GRAPHIC RELATIONSHIPS SECTION OF THE MATHEMATICS TEST.

## Fraction Tips, Tricks and Shortcuts

When you are writing an exam, time is precious, and anything you can do to answer faster is a real advantage. Here are some ideas, shortcuts, tips and tricks that can speed up answering fractions problems.

Remember that a fraction is just a number which names a portion of something. For instance, instead of having a whole pie, a fraction says you have a part of a pie--such as a half of one or a fourth of one.

Two digits make up a fraction. The digit on top is known as the numerator. The digit on the bottom is known as the denominator. To remember which is which, just remember that “denominator” and “down” both start with a “d.” And the “downstairs” number is the denominator. So for instance, in  $\frac{1}{2}$ , the numerator is the 1 and the denominator (or “downstairs”) number is the 2.

- It's easy to add two fractions if they have the same denominator. Just add the digits on top, and leave the bottom one the same:  $\frac{1}{10} + \frac{6}{10} = \frac{7}{10}$ .
- It's the same with subtracting fractions

with the same denominator:  $7/10 - 6/10 = 1/10$ .

- Adding and subtracting fractions with different denominators is more complicated. First, you have to get the problem so that they do have the same denominators. The easiest way to do this is to multiply the denominators: For  $2/5 + 1/2$  multiply 5 by 2. Now you have a denominator of 10. But now, you have to change the top numbers too. Since you multiplied the 5 in  $2/5$  by 2, you also multiply the 2 by 2, to get 4. So the first number is now  $4/10$ . Since you multiplied the second number times 5, you also multiply its top number by 5, to get a final fraction of  $5/10$ . Now you can add 4 and 5 together to get a final sum of  $9/10$ .
- Sometimes you'll be asked to reduce a fraction to its simplest form. This means getting it to where the only common factor of the numerator and denominator is 1. Think of it this way: Numerators and denominators are brothers that must be treated the same. If you do something to one, you must do it to the other, or it's just not fair. For instance, if you divide your numerator by 2, then you should also divide the denominator by the same. Let's take an example: The fraction  $2/10$ . This is not reduced to its simplest terms because there is a number that will divide evenly into both: the number 2. We want to make it so that the only number that will divide evenly into both is 1. What can we divide into 2 to get 1? The number 2, of course! Now to be "fair," we have to do the same thing to the denominator: Divide 2 into 10 and you get 5. So our new, reduced fraction is  $1/5$ .
- In some ways, multiplying fractions is the easiest of all: Just multiply the two top numbers and then multiply the two bottom numbers. For instance, with this problem:

$2/5 \times 2/3$  you multiply 2 by 2 and get a top number of 4; then multiply 5 by 3 and get a bottom number of 15. Your answer is  $4/15$ .

- Dividing fractions is more involved, but still not too hard. You once again multiply, but only AFTER you have turned the second fraction upside-down. To divide  $7/8$  by  $1/2$ , turn the  $1/2$  into  $2/1$ , then multiply the top numbers and multiply the bottom numbers:  $7/8 \times 2/1$  gives us 14 on top and 8 on the bottom.

## Converting Fractions to Decimals

There are a couple of ways to become good at converting fractions to decimals. The fastest way is to memorize some basic fraction facts. Here are fractions that you should know:

$1/100$  is “one hundredth,” expressed as a decimal, it’s .01.

$1/50$  is “two hundredths,” expressed as a decimal, it’s .02.

$1/25$  is “one twenty-fifths” or “four hundredths,” expressed as a decimal, it’s .04.

$1/20$  is “one twentieth” or “five hundredths,” expressed as a decimal, it’s .05.

$1/10$  is “one tenth,” expressed as a decimal, it’s .1.

$1/8$  is “one eighth,” or “one hundred twenty-five thousandths,” expressed as a decimal, it’s .125.

$1/5$  is “one fifth,” or “two tenths,” expressed as a decimal, it’s .2.

$1/4$  is “one fourth” or “twenty-five hundredths,” ex-

# Answer Sheet

	A	B	C	D	E		A	B	C	D	E
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	21	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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## Practice Questions

1.  $\frac{2}{3} + \frac{5}{12} =$

- a.  $\frac{9}{17}$
- b.  $\frac{3}{11}$
- c.  $\frac{7}{12}$
- d.  $1 \frac{1}{12}$

2.  $\frac{3}{5} + \frac{7}{10} =$

- a.  $1 \frac{1}{10}$
- b.  $\frac{7}{10}$
- c.  $1 \frac{3}{10}$
- d.  $1 \frac{1}{12}$

3.  $\frac{4}{5} - \frac{2}{3} =$

- a.  $\frac{2}{2}$
- b.  $\frac{2}{13}$
- c. 1
- d.  $\frac{2}{15}$

4.  $\frac{13}{16} - \frac{1}{4} =$

- a. 1
- b.  $\frac{12}{12}$
- c.  $\frac{9}{16}$
- d.  $\frac{7}{16}$

## Answer Key

**1. D**

A common denominator is needed, which both 3 and 12 will divide into. So,  $8 + \frac{5}{12} = \frac{13}{12} = 1 \frac{1}{12}$

**2. C**

A common denominator is needed for 5 and 10.  
 $6 + \frac{7}{10} = \frac{13}{10} = 1 \frac{3}{10}$

**3. D**

A common denominator is needed for 5 and 3.  
 $12 - \frac{10}{15} = \frac{2}{15}$

**4. C**

A common denominator is needed for 16 and 4.  
 $13 - \frac{4}{16} = \frac{9}{16}$

# Arithmetic

**A**rithmetic IS INCLUDED IN THE COMPUTATION AND PROBLEM SOLVING SECTION OF THE MATHEMATICS TEST. Included in this section is

- Add, subtract, multiply and divide whole numbers
- Identify appropriate units of measure
- Use less than, greater than, and equal to relationships
- Identify the position of whole numbers relative to each other
- Identify relationships in sets of numbers

# Answer Sheet

	A	B	C	D	E		A	B	C	D	E
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	21	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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## Practice Questions

1.  $389 + 454 =$

- a. 853
- b. 833
- c. 843
- d. 863

2.  $9,177 + 7,204 =$

- a. 16,4712
- b. 16,371
- c. 16,381
- d. 15,412

3.  $8,390 - 5,239 =$

- a. 3,261
- b. 3,151
- c. 3,161
- d. 3,101

4.  $643 - 587 =$

- a. 56
- b. 66
- c. 46
- d. 55

## Answer Key

**1. C**

$$389 + 454 = 843$$

**2. C**

$$9,177 + 7,204 = 16,381$$

**3. B**

$$8,390 - 5,239 = 3,151$$

**4. A**

$$643 - 587 = 56$$

# Basic Algebra

**A**LGEBRA IS INCLUDED IN THE COMPUTATION AND PROBLEM SOLVING SECTION

**The algebra section covers:**

Solving equations with 1 unknown  
Operations with Polynomials - adding  
subtracting, multiplying and dividing

## Solving Algebraic Equations

Linear equations with variable  $x$  is an equation with the following form:

$$ax = b$$

where  $a$  and  $b$  are some real numbers. If  $a = 0$  and  $b \neq 0$ , then the equation has no solution.

Here is an example of a simple linear equation with one variable:

$$4x - 2 = 2x + 6$$

To solve, move variables to the one side, and real numbers to the other side of the equals sign. Always remember: if you are changing sides, you are changing signs. Move all variables to the left, and real num-

bers to the right:

$$4x - 2 = 2x + 6$$

$$4x - 2x = 6 + 2$$

$$2x = 8$$

$$x = 8/2$$

$$x = 4$$

Here is more complex linear equation:

$$(2x - 6)/4 + 4 = x$$

Multiple the whole equation by 4 to cancel out the denominator.

$$2x - 6 + 16 = 4x$$

Move whole numbers to one side, and variables top the other, changing sides when crossing the equals sign.

$$2x - 4x = -16 + 6$$

$$-2x = -10$$

$$x = -10/-2$$

$$x = 5$$



# Answer Sheet

	A	B	C	D
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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**1. Solve the equation  $3(x + 2) - 2(1 - x) = 4x + 5$**

- a. -1
- b. 0
- c. 1
- d. 2

**2. Solve  $-x - 7 = -3x - 9$**

- a. -1
- b. 0
- c. 1
- d. 2

**3. Solve for x, when  $5x + 21 = 66$ .**

- a. 19
- b. 9
- c. 15
- d. 5

**4. Solve for n, when  $5n + (19 - 2) = 67$ .**

- a. 21
- b. 10
- c. 15
- d. 7

**5.  $5x + 2(x + 7) = 14x - 7$ . Find x**

- a. 1
- b. 2
- c. 3
- d. 4

## Answer Key

### 1. C

To solve the linear equation, operate the knowns and unknowns within each other and try to obtain x term (which is the unknown) alone on one side of the equation:

$3(x + 2) - 2(1 - x) = 4x + 5$  ... We remove the parenthesis by distributing the factors:

$$3x + 6 - 2 + 2x = 4x + 5$$

$$5x + 4 = 4x + 5$$

$$5x - 4x = 5 - 4$$

$$x = 1$$

### 2. A

Collect similar terms on the same side. Here, we can collect x terms on left side, and the constants on the right:

$-x - 7 = -3x - 9$  .... Let us add 3x to both sides:

$$-x - 7 + 3x = -3x - 9 + 3x$$

$2x - 7 = -9$  ... Now, we can add + 7 to both sides:

$$2x - 7 + 7 = -9 + 7$$

$2x = -2$  ... Dividing both sides by 2 gives us the value of x:

$$x = -2/2$$

$$x = -1$$

### 3. B

$$5b + 21 = 66$$

$$5b = 66 - 21 = 45$$

$$5b = 45$$

$$b = 45/5 = 9$$

# Basic Math Multiple Choice

**M**ath is the one section where you need to make sure that you understand the processes before you ever tackle it. That's because the time allowed on the math portion is typically so short that there's not much room for error. You have to be fast and accurate. It's imperative that before the test day arrives, you've learned all the main formulas that will be used, and then to create your own problems (and solve them).

On the actual test day, use the "Plug-Check-Check" strategy. Here's how it goes.

Read the problem, but not the answers. You'll want to work the problem first and come up with your own answers. If you did the work right, you should find your answer among the options given.

If you need help with the problem, plug actual numbers into the variables given. You'll find it easier to work with numbers than it is to work with letters. For instance, if the question asks, "If  $Y-4$  is 2 more than  $Z$ , then  $Y+5$  is how much more than  $Z$ ?" try selecting a value for  $Y$ . Let's take 6. Your question now becomes, "If  $6-4$  is 2 more than  $Z$ , then 6 plus 5 is how much more than  $Z$ ?" Now your answer should be easier to work with.

Check the answer choices to see if your answer matches one of those. If so, select it.

If no answer matches the one you got, re-check your math, but this time, use a different method. In math, it's common for there to be more than one way to solve a problem.

# How to Study for a Math Test

**E**VERY SUBJECT HAS ITS OWN PARTICULAR STUDY METHOD. Math is mostly numerical, rather than verbal, and requires logical thinking; it has its own way to be studied. Before touching on significant points of studying a math test, let's look at some of the fundamentals of "learning."

Learning is not an instant experience; it is a procedure. Learning is a process not an event. Rome wasn't built in a day, and learning anything (or everything) isn't going to happen in a day either. You cannot expect to learn everything in one day, at night, before the test. It is important and necessary to learn day-by-day. Good time management plays a considerable role in learning. When you manage your time, and begin test preparation well in advance, you will notice the subjects are easier than you thought, or feared, and you will take the test without the stress of a sleepless body and an anxious mind.

Memorizing is a temporary step of learning if information is not comprehended and applied afterwards. Memorize just the basics and understand the meaning; then apply, analyze, synthesize and evaluate.

These are the hierarchical layout of cognitive learning: Of course, there are some basic properties that you need to memorize in the beginning, since you cannot prove the facts every time you solve a math test. For example; the inner angles of a triangle sum up to  $180^\circ$ . If you do not know this, you may not be able to solve triangle problems. And,

# How to Prepare for a Test

**M**OST STUDENTS HIDE THEIR HEADS AND PROCRASTINATE WHEN FACED WITH PREPARING FOR AN EXAM, HOPING THAT SOMEHOW THEY WILL BE SPARED THE AGONY, ESPECIALLY IF IT IS A BIG ONE THAT THEIR FUTURES RELY ON. Avoiding a test is what many students do best and unfortunately, they suffer the consequences because of their lack of preparation.

Test preparation requires strategy and dedication. It is the perfect training ground for a professional life. Besides having several reliable strategies, successful students also has a clear goal and know how to accomplish it. These tried and true concepts have worked well and will make your test preparation easier.

## **The Study Approach**

**Take responsibility for your own test preparation.**

It is a common - but big - mistake to link your studying to someone else's. Study partners are great, but only if they are reliable. It is your job to be prepared for the test, even if a study partner fails you. Do not allow others to distract you from your goals.

## **Prioritize the time available to study**

When do you learn best, early in the day or at night? Does your mind absorb and retain information most efficiently in small blocks of time, or do you require long stretches to get

# How to Take a Test

**E**VERYONE KNOWS THAT TAKING AN EXAM IS STRESSFUL, BUT IT DOES NOT HAVE TO BE THAT BAD! There are a few simple things that you can do to increase your score on any type of test. Take a look at these tips and consider how you can incorporate them into your study time.

OK - so you are in the test room - Here is what to do!

## Reading the Instructions

This is the most basic point, but one that, surprisingly, many students ignore and it costs big time! Since reading the instructions is one of the most common, and 100% preventable mistakes, we have a whole section just on reading instructions.

Pay close attention to the sample questions. Almost all standardized tests offer sample questions, paired with their correct solutions. Go through these to make sure that you understand what they mean and how they arrived at the correct answer. Do not be afraid to ask the test supervisor for help with a sample that confuses you, or instructions that you are unsure of.

## Tips for Reading the Question

We could write pages and pages of tips just on reading the test questions. Here are a few that will help you the most.

- **Think first.** Before you look at the

# Conclusion

**C**ONGRATULATIONS! You have made it this far because you have applied yourself diligently to practicing for the exam and no doubt improved your potential score considerably! Passing your up-coming exam is a huge step in a journey that might be challenging at times but will be many times more rewarding and fulfilling. That is why being prepared is so important.

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