



3<sup>RD</sup>  
EDITION

# MATHEMATICS WORKBOOK

FOR THE

# SAT\*

INTENSIVE PRACTICE IN ESSENTIAL  
MATHEMATICS TO BOOST YOUR COLLEGE  
ENTRANCE TEST SCORE

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**NEW EXCLUSIVE FEATURE:**

**TEST BUSTERS**

**INSIDE STRATEGIES FOR THE SAT'S**

**QUANTITATIVE COMPARISON ITEMS**

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**ARCO**

# **MATHEMATICS WORKBOOK FOR THE SAT**



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# **MATHEMATICS WORKBOOK FOR THE SAT\***

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This book is dedicated to the students of Great Neck South Senior High School, who have made my many years of teaching there so rewarding. Special thanks must go to my son, Danny, for his suggestions, help, and patience during my months of writing. Also, to David, Dad, Mom, and Mother for their continued support.

# *To The Student*

The following text is designed as a self-teaching text in preparation for college entrance examinations. At the beginning of each chapter, you will find a diagnostic test consisting of ten questions. Try this test before you read the chapter. Answers will be found at the end of the chapter. If you get eight to ten questions right, you may skip that chapter and go right on to the next diagnostic test at the beginning of the following chapter. Or perhaps you would like to skim the instructional material anyway, just for review, but not bother with the practice exercises. If you get five to seven questions right, you might do the practice exercises only in the sections dealing with problems you missed. If you get less than five questions right, you need to work very carefully through the entire chapter.

After working through a specific chapter, you will find a similar test at the end. Try this and your score should now be almost perfect. Look once again at any instructional material dealing with errors you made before proceeding to the next section.

Working diligently through every chapter in this manner will strengthen your weaknesses and clear up any mathematical confusions. Completely worked-out solutions to all practice exercises will be given at the end of each chapter.



# TYPICAL FORMAT OF THE SAT\*

The following is a schematic representation of a typical SAT examination. While the ordering of the sections might differ from test to test, the format will adhere to this basic scheme, as established by ETS.

SECTION	NUMBER OF QUESTIONS	TIME ALLOWED
SECTION I: VERBAL ABILITIES	45	30 min.
Antonyms	15	
Sentence Completions	10	
Analogies	10	
Reading Comprehension	10	
SECTION II: MATHEMATICAL ABILITIES	25	30 min.
Standard Multiple Choice		
SECTION III: TEST OF STANDARD WRITTEN ENGLISH	50	30 min.
Usage	35	
Sentence Corrections	15	
SECTION IV: VERBAL ABILITIES	40	30 min.
Antonyms	10	
Reading Comprehension	15	
Sentence Completions	5	
Analogies	10	
SECTION V: MATHEMATICAL ABILITIES	35	30 min.
Standard Multiple Choice	15	
Quantitative Comparisons	20	
SECTION VI: EXPERIMENTAL SECTION	varies	30 min.
Verbal Abilities, Mathematical Abilities, or Test of Standard Written English		

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\* Although the SAT has six sections, all practice examinations in this book contain only five sections, since one of the six sections on the actual test is experimental in format and does not count toward your score.

# ABOUT THE SCHOLASTIC APTITUDE TEST (SAT)

## PURPOSE OF THE SAT

The Scholastic Aptitude Test (SAT) is offered by the Admissions Testing Program of the College Board to high school students. Well over 2,000 colleges and universities in the United States and Canada require their applicants to take the test. Since the SAT is a standardized examination that is consistent in difficulty and format, it allows colleges to compare the abilities of students from different high schools.

The SAT is designed to measure your aptitude for college work. It is not a test of how much information you have acquired in your high school courses but a test of your basic skills—your ability to understand what you read, use language effectively, reason clearly, and apply fundamental mathematical principles to unfamiliar problems.

## FORMAT OF THE SAT

The SAT is a three-hour multiple-choice examination divided into six parts of 30 minutes each. Two parts test verbal ability, and two parts test mathematical ability. These four parts make up the scores that the colleges you choose will look at in evaluating your application.

The two verbal sections test reading comprehension and vocabulary skills.

The two mathematical sections cover arithmetic, algebra, and geometry. The formulas you need will be given in the test instructions; you are not required to memorize them. Although they can all be answered with basic math, the questions may, in some instances, seem unusual to you. They are designed to test your skill in applying what you know to unfamiliar situations.

The fifth part of the SAT is the Test of Standard Written English (TSWE). It tests your ability to use the kind of formal English found in college textbooks and expected in college papers. The usage questions in this part require you to pick out the error in a given sentence. In the sentence correction questions you must select the best version of a given sentence. This part is scored separately and is not considered in evaluating your application to any school. Your TSWE score is used only to help the college that accepts you in placing you in the appropriate freshman English class.

The sixth part of the SAT is experimental in nature. It may be another verbal, mathematical, or TSWE section. Your score in this section does not count; the results are used solely by the testmakers in devising future tests. The order of the six parts of the SAT is not fixed. You will not be told which of the parts is the experimental one, so it is important that you do your best on every part.



## SCORES

Every correct answer is worth one point. If you leave an answer blank, you score no point. For every incorrect answer, you lose one fourth of a point.\* This penalty for wrong answers is meant to discourage random guessing.

Regardless of the number of questions on the test, all SAT scores are reported on a scale of 200 to 800. The scores are based on the four verbal and mathematical sections and are broken down into:

Overall score

Mathematical score

Verbal score (including subscores for reading comprehension and vocabulary)

Since it is not used in the selection of college applicants, the Test of Standard Written English is scored separately. It is reported on a scale of 20 to 60.

Five or six weeks after the exam, your scores will be sent to the colleges you will have named on your registration form, to your high school, and to you.

## TAKING THE TEST

You may find that many of the instructions on the SAT are similar in form to the ones in this book. Even if they look familiar, be sure to read all the instructions carefully.

There is a time limit on each section of the SAT, so you need to pace yourself. If a question seems too difficult, skip it and go on to the next one. Answer all the questions you can, and then, if there is time, go back to the ones you skipped. There is no penalty for leaving a question blank.

On a difficult question, try to eliminate some of the answer choices. If you can eliminate one or more, you should probably guess. Remember, though, that wrong answers are penalized; wild guessing is likely to lower your score.

## REGISTRATION

The SAT is administered on several Saturday mornings throughout the year at established testing centers. When you apply to a college, find out whether it requires you to take the SAT and when. If you have not yet decided which schools you will apply to, take the SAT in the early winter of your senior year. You will then be sure of having your scores reported in time wherever you apply.

Registration forms for the SAT may be available from your high school guidance officer. You may also obtain the form by writing to:

College Board ATP  
CN 6200  
Princeton, NJ 08541-6200

or

College Board ATP  
Box 1025  
Berkeley, CA 94701

Along with the registration form you will receive a current Student Bulletin. It includes all necessary information on procedures, exceptions and special arrangements, times and places, and fees.

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\* For certain mathematics questions, namely quantitative comparisons, you lose one third of a point.

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*Test Busters*

1A

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# Operations with Integers and Decimals

## DIAGNOSTIC TEST

Answers on page 13

1. Find the sum of 683, 72, and 5429  
(A) 5184    (B) 6184    (C) 6183    (D) 6193    (E) 6284
2. Subtract 417 from 804  
(A) 287    (B) 388    (C) 397    (D) 387    (E) 288
3. Find the product of 307 and 46  
(A) 3070    (B) 14,082    (C) 13,922    (D) 13,882    (E) 14,122
4. Divide 38,304 by 48  
(A) 787    (B) 798    (C) 824    (D) 1098    (E) 1253
5. Add  $6.43 + 46.3 + .346$   
(A) 14.52    (B) 53.779    (C) 53.392    (D) 53.076    (E) 1452
6. Subtract 81.763 from 145.1  
(A) 64.347    (B) 64.463    (C) 63.463    (D) 63.337    (E) 63.347
7. Multiply 3.47 by 2.3  
(A) 79.81    (B) 7.981    (C) 6.981    (D) 7.273    (E) 7.984
8. Divide 2.163 by .03  
(A) 7210    (B) 721    (C) 72.1    (D) 7.21    (E) 0.721
9. Find  $3 - 16 \div 8 + 4 \times 2$   
(A) 9    (B)  $2\frac{1}{3}$     (C) 10    (D) 18    (E)  $\frac{2}{3}$
10. Which of the following is closest to  $\frac{8317 \times 91}{217 \times .8}$ ?  
(A) 4    (B) 40    (C) 400    (D) 4000    (E) 40,000

In preparing for the mathematics section of your college entrance examination, it is most important to overcome any fear of mathematics.

The level of this examination extends no further than relatively simple geometry. Most problems can be solved using only arithmetic. By reading this chapter carefully, following the sample problems, and then working on the practice problems in each section, you can review important concepts and vocabulary, as well as familiarize yourself with various types of questions. Since arithmetic is basic to any further work in mathematics, this chapter is extremely important and should not be treated lightly. By doing these problems carefully and reading the worked-out solutions, you can build the confidence needed to do well.

## 1. ADDITION OF INTEGERS

In the process of addition, the numbers to be added are called *addends*. The answer is called the *sum*. In writing an addition problem, put one number underneath the other, being careful to keep columns straight with the units' digits one below the other. If you find a sum by adding from top to bottom, you can check it by adding from bottom to top.

Example: Find the sum of 403, 37, 8314 and 5

Solution: 
$$\begin{array}{r} 403 \\ 37 \\ 8314 \\ \underline{5} \\ 8759 \end{array}$$

### Practice 1

Answers on page 13

1. Find the sum of 360, 4352, 87, and 205  
(A) 5013 (B) 5004 (C) 5003 (D) 6004 (E) 6013
2. Find the sum of 4321, 2143, 1234, and 3412  
(A) 12,110 (B) 11,011 (C) 11,101 (D) 11,111 (E) 11,110
3. Add  $56 + 321 + 8 + 42$   
(A) 427 (B) 437 (C) 517 (D) 417 (E) 527
4. Add  $99 + 88 + 77 + 66 + 55$   
(A) 384 (B) 485 (C) 385 (D) 375 (E) 376
5. Add  $1212 + 2323 + 3434 + 4545 + 5656$   
(A) 17,171 (B) 17,170 (C) 17,160 (D) 17,280 (E) 17,270



## 2. SUBTRACTION OF INTEGERS

The number from which we subtract is called the *minuend*. The number which we take away is called the *subtrahend*. The answer in subtraction is called the *difference*.

If 5 is subtracted from 11, the minuend is 11, the subtrahend is 5 and the difference is 6.

Since we cannot subtract a larger number from a smaller one, we often must borrow in performing a subtraction. Remember that when we borrow, because of our base 10 number system, we reduce the digit to the left by 1, but increase the right-hand digit by 10.

Example: 
$$\begin{array}{r} 54 \\ - 38 \\ \hline \end{array}$$

Since we cannot subtract 8 from 4, we borrow 1 from 5 and change the 4 to 14. We are really borrowing 1 from the tens column and, therefore, add 10 to the ones column. Then we can subtract.

Solution: 
$$\begin{array}{r} 4 \overset{1}{4} \\ - 3 \quad 8 \\ \hline 1 \quad 6 \end{array}$$

Sometimes we must borrow across several columns.

Example: 
$$\begin{array}{r} 503 \\ - 267 \\ \hline \end{array}$$

We cannot subtract 7 from 3 and cannot borrow from 0. Therefore we reduce the 5 by one and make the 0 into a 10. Then we can borrow 1 from the 10, making it a 9. This makes the 3 into 13.

Solution: 
$$\begin{array}{r} 4 \overset{10}{0} 3 \\ - 2 \quad 6 \quad 7 \\ \hline \end{array} \qquad \begin{array}{r} 4 \quad 9 \overset{13}{3} \\ - 2 \quad 6 \quad 7 \\ \hline 2 \quad 3 \quad 6 \end{array}$$

### Practice 2

Answers on page 13

1. Subtract 803 from 952

- (A) 248      (B) 148      (C) 249      (D) 149      (E) 147

2. From the sum of 837 and 415, subtract 1035

- (A) 217      (B) 216      (C) 326      (D) 227      (E) 226

3. From 1872 subtract the sum of 76 and 43

- (A) 1754      (B) 1838      (C) 1753      (D) 1839      (E) 1905

4. Find the difference between 237 and 732

- (A) 496      (B) 495      (C) 486      (D) 405      (E) 497

## 4 OPERATING WITH INTEGERS AND DECIMALS

5. By how much does the sum of 612 and 315 exceed the sum of 451 and 283?

- (A) 294      (B) 1661      (C) 293      (D) 197      (E) 193

## 3. MULTIPLICATION OF INTEGERS

The answer to a multiplication problem is called the *product*. The number being multiplied is called a *factor* of the product.

When multiplying by a number containing two or more digits, place value is extremely important when writing partial products. When we multiply 537 by 72, for example, we multiply first by 2 and then by 7. However, when we multiply by 7, we are really multiplying by 70 and therefore leave a 0 at the extreme right before we proceed with the multiplication.

Example:

$$\begin{array}{r} 537 \\ \times 72 \\ \hline 1074 \\ 37590 \\ \hline 38664 \end{array}$$

If we multiply by a three-digit number, we leave one zero on the right when multiplying by the tens digit and two zeros on the right when multiplying by the hundreds digit.

Example:

$$\begin{array}{r} 372 \\ \times 461 \\ \hline 372 \\ 22320 \\ 148800 \\ \hline 171492 \end{array}$$

### Practice 3

Answers on page 14

Find the following products.

1. 526 multiplied by 317

- (A) 156,742 (B) 165,742 (C) 166,742 (D) 166,748 (E) 166,708

2. 8347 multiplied by 62

- (A) 517,514 (B) 517,414 (C) 517,504 (D) 517,114 (E) 617,114

3. 705 multiplied by 89

- (A) 11,985 (B) 52,745 (C) 62,705 (D) 62,745 (E) 15,121



4. 437 multiplied by 607

(A) 265,259 (B) 265,219 (C) 265,359 (D) 265,059 (E) 262,059

5. 798 multiplied by 450

(A) 358,600 (B) 359,100 (C) 71,820 (D) 358,100 (E) 360,820

#### 4. DIVISION OF INTEGERS

The number being divided is called the *dividend*. The number we are dividing by is called the *divisor*. The answer to the division is called the *quotient*. When we divide 18 by 6, 18 is the dividend, 6 is the divisor and 3 is the quotient. If the quotient is not an integer, we have a *remainder*. The remainder when 20 is divided by 6 is 2, because 6 will divide into 18 evenly, leaving a remainder of 2. The quotient in this case is  $6\frac{2}{6}$ . Remember that in writing the fractional part of a quotient involving a remainder, the remainder becomes the numerator and the divisor the denominator.

When dividing by a single-digit divisor, no long division procedures are needed. Simply carry the remainder of each step over to the next digit and continue.

$$\text{Example: } 6 \overline{) 58431424}$$

#### Practice 4

Answers on page 14

1. Divide 391 by 23

(A) 170 (B) 16 (C) 17 (D) 18 (E) 180

2. Divide 49,523,436 by 9

(A) 5,502,605 (B) 5,502,514 (C) 5,502,604  
(D) 5,502,614 (E) 5,502,603

3. Find the remainder when 4832 is divided by 15

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

4. Divide 42,098 by 7

(A) 6014 (B) 6015 (C) 6019 (D) 6011 (E) 6010

5. Which of the following is the quotient of 333,180 and 617?

(A) 541 (B) 542 (C) 549 (D) 540 (E) 545