



Taking the SAT[®] I: Reasoning Test

Math Test Sections

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SECTION 1
Time — 30 minutes
25 Questions

Directions: In this section solve each problem, using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

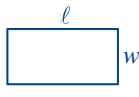
- The use of a calculator is permitted. All numbers used are real numbers.
- Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information

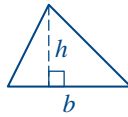


$$A = \pi r^2$$

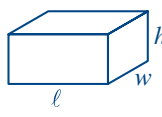
$$C = 2\pi r$$



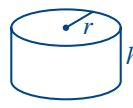
$$A = \ell w$$



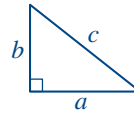
$$A = \frac{1}{2}bh$$



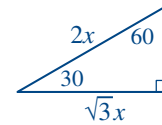
$$V = \ell wh$$



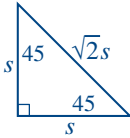
$$V = \pi r^2 h$$



$$c^2 = a^2 + b^2$$



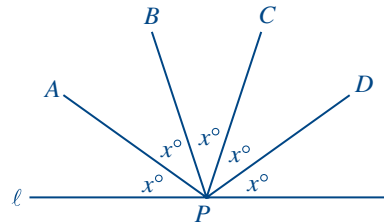
Special Right Triangles



The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $\frac{3}{9} = \frac{3}{x+2}$, what is the value of x ?

- (A) $-\frac{5}{9}$
(B) $\frac{7}{3}$
(C) 3
(D) 7
(E) $\frac{25}{3}$



2. In the figure above, point P is on line ℓ . What is the value of x ?

- (A) 15
(B) 26
(C) 30
(D) 35
(E) 36

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SID'S CHECKING ACCOUNT

Days	Change in Account Balance (in dollars)
Monday	+20
Tuesday	-13
Wednesday	-16
Thursday	+9
Friday	-12

3. The chart above shows the dollar amounts that were added to or subtracted from Sid's checking account on each of 5 days. According to the chart, the total change in Sid's account balance for all five days is equal to the change in the account balance for which single day?

(A) Monday
(B) Tuesday
(C) Wednesday
(D) Thursday
(E) Friday

4. In the xy -coordinate plane, the coordinates of three vertices of a rectangle are (1, 5), (5, 2), and (5, 5). What are the coordinates of the fourth vertex of the rectangle?

(A) (1, 2)
(B) (1, 7)
(C) (2, 1)
(D) (2, 5)
(E) (5, 7)

5. Francis bought a stereo for x dollars and sold it at a 3 percent profit. Which of the following gives the amount of Francis' profit?

(A) $\$0.03x$
(B) $\$0.07x$
(C) $\$0.30x$
(D) $\$0.70x$
(E) $\$0.97x$

$$\frac{4K8}{3} = m$$

6. In the equation above, K is a digit in the three-digit number $4K8$, and m is a positive integer. Which of the following could be the digit K ?

(A) 1
(B) 3
(C) 4
(D) 5
(E) 7

7. If $w < x < z$ and $w < y < z$, which of the following statements must be true?

I. $w < z$
II. $x < y$
III. $y < z$

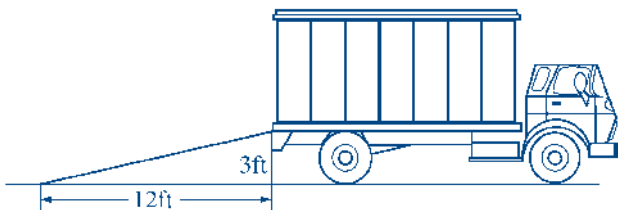
(A) I only
(B) II only
(C) III only
(D) I and III only
(E) I, II, and III

$$\{6, 2, 1, 3\}$$

8. If k is a number so that the sum of k and any number in the set above is also in the set, what is the value of k ?

(A) 5
(B) 4
(C) 1
(D) 0
(E) -1

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Note: Figure not drawn to scale.

9. The figure above shows a ramp that extends from level ground to the bed of a truck. What is the slope of the ramp?

- (A) $\frac{1}{4}$
(B) $\frac{1}{3}$
(C) $\frac{4}{3}$
(D) 3
(E) 4

80, 80, 84, 85, 88, 92, 97, 98

10. The average (arithmetic mean) of the 8 numbers listed above is 88. Of the following, which pair of numbers could be removed from the list without changing the average?

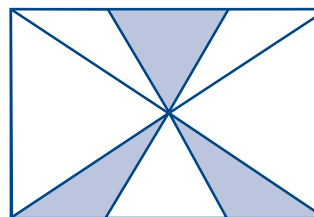
- (A) 80 and 97
(B) 80 and 98
(C) 84 and 92
(D) 84 and 97
(E) 85 and 92

11. If $n^k = 64$ and n and k are integers, which of the following could NOT be a value of n ?

- (A) 16
(B) 8
(C) 4
(D) 2
(E) -2

12. Three percent of 4,200 is equal to 6 percent of what number?

- (A) 8,400
(B) 2,100
(C) 1,260
(D) 252
(E) 126



13. Four lines are drawn through the center of the rectangle shown above. What fraction of the area of the rectangle is shaded?

- (A) $\frac{3}{8}$
(B) $\frac{1}{4}$
(C) $\frac{1}{8}$
(D) $\frac{1}{10}$
(E) $\frac{1}{16}$

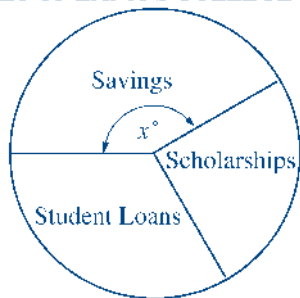
14. If $7x$ is 24 more than x , then x^2 is how much more than $\sqrt{x}$?

- (A) $49 - \sqrt{7}$
(B) 24
(C) 14
(D) $2\sqrt{6}$
(E) 6

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SOURCES OF LANA'S COLLEGE TUITION



15. The pie chart above shows the three sources for Lana's college tuition. If $\frac{1}{4}$ of the total amount was from scholarships and $\frac{1}{3}$ was from student loans, what is the value of x ?

(A) 120
(B) 130
(C) 140
(D) 150
(E) 160

16. If a is greater than 4, then, of the following, which will always have the least value?

(A) $\frac{4}{a-1}$
(B) $\frac{4}{a}$
(C) $\frac{4}{a+1}$
(D) $\frac{a}{4}$
(E) $\frac{a+1}{4}$

17. A circle of radius 4 and a circle of radius 5 have exactly one point in common. If P is a point on one circle and Q is a point on the other circle, what is the maximum possible length of segment PQ ?

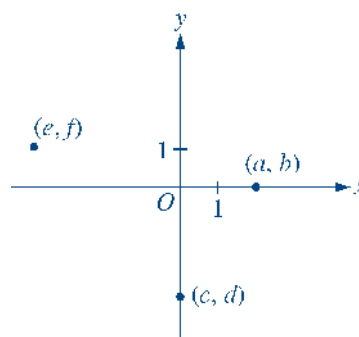
(A) 9
(B) 10
(C) 13
(D) 14
(E) 18

18. The sum of five consecutive whole numbers is less than 25. One of the numbers is 6. Which of the following is the greatest of the consecutive numbers?

(A) 6
(B) 7
(C) 8
(D) 9
(E) 10

19. If $(x+2)^n(x-2) = (x+2)(x^2-4)$ for all values of x , what is the value of n ?

(A) 1
(B) 2
(C) 3
(D) 4
(E) It cannot be determined from the information given.



20. The coordinates of three points are given in the figure above. Which of the following must be true?

I. $b = c$
II. $f > e$
III. $a + d = 0$

(A) None
(B) I only
(C) I and II only
(D) II and III only
(E) I, II, and III

GO ON TO THE NEXT PAGE



21. Emerson School has s students equally divided among c classes. The school wants to order enough health textbooks so that each student will have a book and each class will have 2 extra books. How many health textbooks does the school need to order?

(A) $\frac{s}{c} + 2$
(B) $s + 2$
(C) $s + 2c$
(D) $c + 2s$
(E) $c(s + 2)$

22. When a coin is tossed in an experiment, the result is either a head or a tail. A head is given a point value of 1 and a tail is given a point value of -1 . If the sum of the point values after 50 tosses is 14, how many of the tosses must have resulted in heads?

(A) 14
(B) 18
(C) 32
(D) 36
(E) 39

23. If a triangle has exactly one of its vertices on a circle, which of the following CANNOT be the number of points that the triangle and the circle have in common?

(A) Two
(B) Three
(C) Four
(D) Five
(E) Six

<u>List I</u>	<u>List II</u>
2	3
4	5
7	6

24. One number is to be selected at random from each of the lists above. What is the probability that both of the numbers selected will be less than 5?

(A) $\frac{1}{9}$
(B) $\frac{2}{9}$
(C) $\frac{1}{3}$
(D) $\frac{4}{9}$
(E) $\frac{5}{9}$

25. How many positive integers less than 1,001 are divisible by either 2 or 5 or both?

(A) 400
(B) 500
(C) 540
(D) 600
(E) 700

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

SECTION 3

Time — 30 minutes

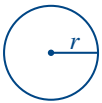
25 Questions

Directions: This section contains two types of questions. You have 30 minutes to complete both types. You may use any available space for scratchwork.

Notes:

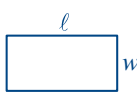
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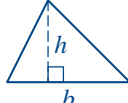


$$A = \pi r^2$$

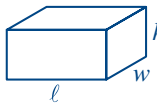
$$C = 2\pi r$$



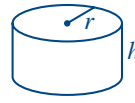
$$A = \ell w$$



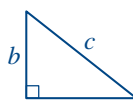
$$A = \frac{1}{2}bh$$



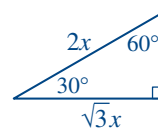
$$V = \ell wh$$



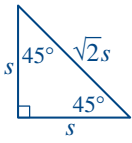
$$V = \pi r^2 h$$



$$c^2 = a^2 + b^2$$



Special Right Triangles



The number of degrees of arc in a circle is 360.

The measure in degrees of a straight angle is 180.

The sum of the measures in degrees of the angles of a triangle is 180.

Directions for Quantitative Comparison Questions

Questions 1-15 each consist of two quantities in boxes, one in Column A and one in Column B. You are to compare the two quantities and on the answer sheet fill in oval

- A if the quantity in Column A is greater;
 B if the quantity in Column B is greater;
 C if the two quantities are equal;
 D if the relationship cannot be determined from the information given.

AN E RESPONSE WILL NOT BE SCORED.

Notes:

- In some questions, information is given about one or both of the quantities to be compared. In such cases, the given information is centered above the two columns and is not boxed.
- In a given question, a symbol that appears in both columns represents the same thing in Column A as it does in Column B.
- Letters such as x , n , and k stand for real numbers.

EXAMPLESColumn AColumn BAnswers**E1**

$$5^2$$

$$20$$

☒ (A) ☐ (B) ☐ (C) ☐ (D) ☐ (E)
E2

$$x$$

$$30$$

☐ (A) ☐ (B) ☒ (C) ☐ (D) ☐ (E)
E3
 r and s are integers.

$$r + 1$$

$$s - 1$$

☐ (A) ☐ (B) ☐ (C) ☒ (D) ☐ (E)

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SUMMARY DIRECTIONS FOR COMPARISON QUESTIONS

Answer: A if the quantity in Column A is greater;
 B if the quantity in Column B is greater;
 C if the two quantities are equal;
 D if the relationship cannot be determined from the information given.

Column A

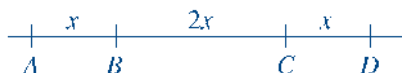
Column B

 x is 4 greater than y .

1.

x

$y + 3$

 $BC = 8$

2.

The length of segment AD

32

A stadium contains 40,000 seats. At a certain event, 20 percent of the seats remained empty.

3.

The number of empty seats

800

4.

The number of different two-letter pairs that can be formed using the letters C, A, and T

The number of different two-letter pairs that can be formed using the letters D, O, and G

Column A

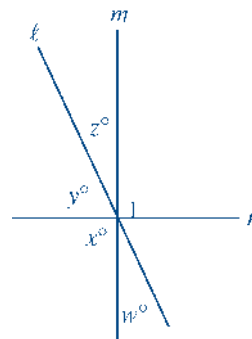
Column B

 x is a positive even integer less than 10.

5.

$3 + x$

8



6.

x

$w + y$

 $0 < z < 1$

7.

$z \times 10^2$

100

8.

The area of a circle with radius 3

27

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SUMMARY DIRECTIONS FOR COMPARISON QUESTIONS

Answer: A if the quantity in Column A is greater;
 B if the quantity in Column B is greater;
 C if the two quantities are equal;
 D if the relationship cannot be determined from the information given.

Column AColumn B

$x > 0$

9.

$(x + 1)^2$

$x^2 + 2x$

Lines ℓ , m , and n lie in plane P .

10.

The number of points
that lie on more than
one of the three lines

2

11.

$n + 1$

$-n + 1$

$x - y = 1$

12.

$2x - 3y$

$2y - 3x$

Column AColumn B

Sarah either drives her car to work or walks to work.
 Sarah never drives her car to work on a sunny day.
 It takes Sarah 20 minutes to walk to work and
 5 minutes to drive to work.

13.

The time that it takes
Sarah to get to work on
a rainy day

15 minutes

$0 < x < 1$

14.

$\frac{x^2}{x^4}$

$\frac{x^4}{x^2}$

The retail price of a certain computer at Computer
 Junction is $33\frac{1}{3}$ percent more than its wholesale
 price. For a sale, the manager reduces the retail price
 of that computer by 25 percent.

15.

The wholesale price
of the computerThe price of the
computer for the saleGO ON TO THE NEXT PAGE 

Directions for Student-Produced Response Questions

Each of the remaining 10 questions requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.

Answer: $\frac{7}{12}$ or $7/12$

Write answer in boxes. →

7	/	1	2
•	•	•	•
0	0	0	0
1	1	•	1
2	2	2	•
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
•	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Grid in result. →

Answer: 2.5

2	.	5	
•	•	•	•
0	0	0	0
1	1	1	1
2	•	2	2
3	3	3	3
4	4	4	4
5	5	5	•
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Decimal point

Answer: 201
Either position is correct.

2	0	1	
•	•	•	•
0	•	0	0
1	1	1	•
2	2	2	2
3	3	3	3
4	4	4	4

2	0	1	
•	•	•	•
0	•	0	0
1	1	•	1
2	2	2	2
3	3	3	3
4	4	4	4

Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $2\frac{1}{2}$ must be gridded as

2.5 or 5/2. (If

2	/	1	2
•	•	•	•
0	0	0	0
1	1	1	1
2	•	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6

 is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)

- **Decimal Accuracy:** If you obtain a decimal answer, **enter the most accurate value the grid will accommodate.** For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. **Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3} = .6666 \dots$

2	/	3	
•	•	•	•
0	0	0	0
1	1	1	1
2	•	2	2
3	3	3	•
4	4	4	4
5	5	5	5
6	6	6	6

.	6	6	6
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	•	•	•

.	6	6	7
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	•	•	•

16. If $2x + 1 = 8$, what is the value of $4x + 1$?

17. If the ratio of x to 900 is equal to the ratio of 2 to 3, and if the ratio of 900 to g is equal to the ratio of 3 to 5, what is the value of $x + g$?

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18. For positive integers a , b , c , and d ,

$\frac{a}{c} \begin{array}{|c} b \\ d \end{array}$ is defined as the greater number in the top row minus the lesser number in the bottom row. What

is the value of $\frac{8}{2} \begin{array}{|c} 3 \\ 5 \end{array} - \frac{2}{8} \begin{array}{|c} 5 \\ 3 \end{array}$?

19. The lengths of two sides of an isosceles triangle are 3 and 4. What is one possible length of the third side?

APARTMENT FEATURES

		Fireplace		Totals
		Yes	No	
Built-in Bookcases	Yes	3		
	No		5	
Totals		19		30

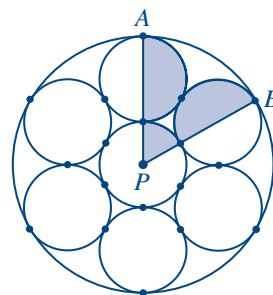
20. The partially completed chart above refers to 30 apartments, 19 of which have fireplaces. How many of the 30 apartments have built-in bookcases?

21. If x and y are positive, $y = x - 3$, and $xy = 54$, what is the value of $\frac{y}{x}$?

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22. The average (arithmetic mean) of a set of 10 different numbers is 100. If the numbers 90 and 70 are removed from the set, what is the average of the remaining numbers?

23. A rectangle measuring 9 centimeters by 12 centimeters is completely divided into t nonoverlapping triangles, each with sides of length 3 centimeters, 4 centimeters, and 5 centimeters. What is the value of t ?



24. In the figure above, the seven small circles, which have equal radii, and the large circle share only those points on the circles that are marked. Point P is the center of the large circle and PA and PB are radii. The area of the shaded portion is how many times the area of one of the small circles?

25. Diana ran a race of 700 meters in two laps of equal distance. Her average speeds for the first and second laps were 7 meters per second and 5 meters per second, respectively. What was her average speed for the entire race, in meters per second?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.



SECTION 6

Time — 15 minutes

10 Questions

Directions: In this section solve each problem, using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

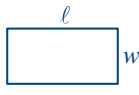
1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information

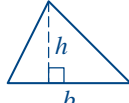


$$A = \pi r^2$$

$$C = 2\pi r$$



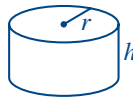
$$A = \ell w$$



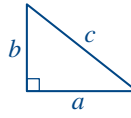
$$A = \frac{1}{2}bh$$



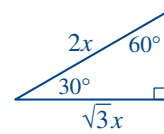
$$V = \ell wh$$



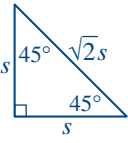
$$V = \pi r^2 h$$



$$c^2 = a^2 + b^2$$



Special Right Triangles



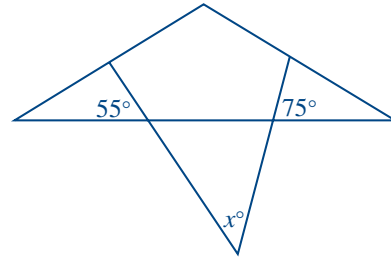
The number of degrees of arc in a circle is 360.

The measure in degrees of a straight angle is 180.

The sum of the measures in degrees of the angles of a triangle is 180.

1. A car rental agency charges \$15 a day plus \$0.12 per mile for its rental cars. If these charges include tax, what is the total cost of traveling 400 miles in 3 days in a car rented from this agency?

- (A) \$45
(B) \$48
(C) \$93
(D) \$144
(E) \$189



2. In the figure above, what is the value of x ?

- (A) 35
(B) 40
(C) 50
(D) 65
(E) 130

GO ON TO THE NEXT PAGE

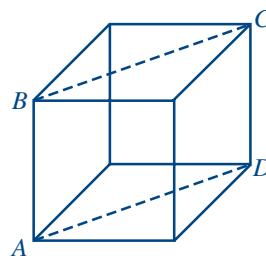


3. The ratio of toggle-bolt prices in year X to toggle-bolt prices in year Y was 4 to 3. If the ratio of prices in year Y to prices in year Z was 3 to 2, what was the ratio of prices in year X to prices in year Z ?

(A) 3 to 1
(B) 2 to 1
(C) 3 to 2
(D) 4 to 3
(E) 7 to 5

4. A group of 110 people is divided into 4 committees. If each committee contains at least 2 people, which of the following statements must be true?

(A) Each committee has at least 4 people.
(B) No 2 committees have the same number of people.
(C) No committee has more than 100 people.
(D) At least 1 committee has more than 25 people.
(E) The largest committee has 3 more people than the smallest committee.



5. In the cube above, $AB = 4$. What is the perimeter of rectangle $ABCD$?

(A) 24
(B) $16\sqrt{2}$ (approximately 22.63)
(C) $16 + 4\sqrt{2}$ (approximately 21.66)
(D) $8 + 8\sqrt{2}$ (approximately 19.31)
(E) $4 + 8\sqrt{2}$ (approximately 15.31)

$$n = 1234567891011 \dots 787980$$

6. The integer n is formed by writing the positive integers in a row, starting with 1 and ending with 80, as shown above. Counting from the left, what is the 90th digit of n ?

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

GO ON TO THE NEXT PAGE 



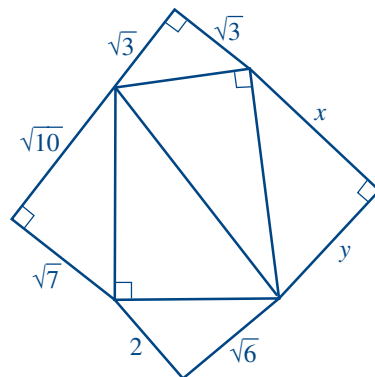
7. What are all possible values of x for which

$$\frac{x + x + x + x + x}{2x} = \frac{5}{2}?$$

- (A) All real numbers except 0
(B) 0 only
(C) 1 only
(D) $\frac{5}{2}$ only
(E) No real numbers

8. If $2x + 3y = 1$, what is $\frac{x}{2} + \frac{y}{3}$ in terms of y ?

- (A) $\frac{y}{5}$
(B) $\frac{1 - 3y}{2}$
(C) $\frac{1 - 3y}{4}$
(D) $\frac{3y + 4}{15}$
(E) $\frac{3 - 5y}{12}$



9. The figure above shows six right triangles. What is the value of $x^2 + y^2$?

- (A) 21
(B) 27
(C) 33
(D) $\sqrt{593}$ (approximately 24.35)
(E) $\sqrt{611}$ (approximately 24.72)

10. For positive integers x , let the symbol $\underline{\underline{x}}$ represent the sum of the digits of x . For example, $\underline{\underline{74}} = 7 + 4 = 11$. If n is a positive integer and $\underline{\underline{n}} = \underline{\underline{33}} + \underline{\underline{17}}$, which of the following could be the value of n ?

- (A) 14
(B) 34
(C) 51
(D) 65
(E) 86

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.