

# CAAP



Collegiate Assessment of Academic Proficiency

## Mathematics

## Sample Test Questions Booklet

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## Note to Users

### ***Welcome to the CAAP Sample Mathematics Test!***

You are about to look at some sample test questions as you prepare to take the actual CAAP test. The examples in this booklet are similar to the kinds of test questions you will see when you take the actual CAAP test. Since this is a practice exercise, you won't receive a real test score. The aim of this booklet is to give a sense of the kinds of questions examinees will face and their levels of difficulty. An answer key is provided at the end of the booklet.

We hope you benefit from these sample questions, and we wish you success as you pursue your education and career goals!

### ***CAAP Mathematics Test***

The CAAP Mathematics Test is a 35-item, 40-minute test that measures students' mathematical reasoning ability. The test assesses students' proficiency in solving the types of mathematics problems typically encountered in many college-level mathematics courses and upper-division courses in mathematics and other disciplines. The CAAP Mathematics Test emphasizes quantitative reasoning rather than the memorization of formulas. The content areas in the test are described below:

- **Prealgebra.** Items in this category involve operations with whole numbers, decimals, and fractions; order concepts; percentages; averages; exponents; scientific notation; and similar concepts.
- **Elementary Algebra.** Items in this category involve basic operations with polynomials, setting up equations, and substituting values into algebraic expressions. They may also require the solution of linear equations in one variable and other related topics.
- **Intermediate Algebra.** Items in this category assess students' understanding of exponents, rational expressions, and systems of linear equations. Other concepts such as the quadratic formula and absolute value inequalities may also be tested.
- **Coordinate Geometry.** Knowledge and skills assessed in this category may include graphing in the standard coordinate plane or the real number line, graphing conics, linear equations in two variables, graphing systems of equations, and similar skills.
- **College Algebra.** Items in this category are based on advanced algebra concepts, including rational exponents, exponential and logarithmic functions, complex numbers, matrices, inverses of functions, and domains and ranges.
- **Trigonometry.** Items in this category include concepts such as right triangle trigonometry, graphs of trigonometric functions, basic trigonometric identities, and trigonometric equations and inequalities.

Samples of test questions in the CAAP Mathematics Test are provided on the following pages.

## MATHEMATICS TEST

*40 Minutes—35 Questions*

**DIRECTIONS:** Solve each problem, then choose the correct answer by circling the corresponding answer option.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You may use a calculator for any of the problems on this test. However, all problems can be solved without using

a calculator, and some of the problems may in fact be simpler if done without a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

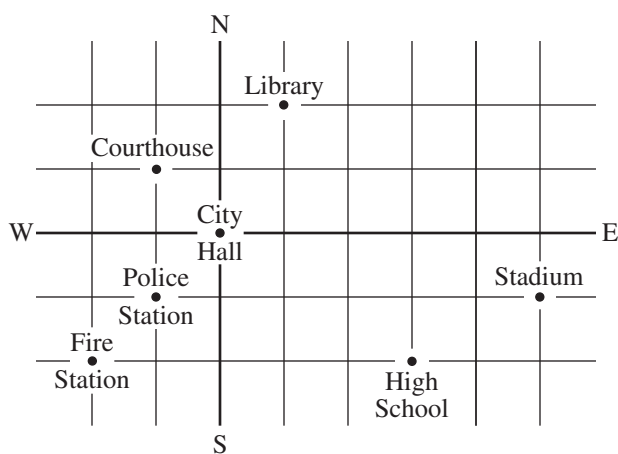
1. Illustrative figures are NOT necessarily drawn to scale.
  2. Geometric figures lie in a plane.
  3. The word *line* indicates a straight line.
  4. The word *average* indicates arithmetic mean.
-

1.  $4^3 + (5 \times 3)^2 = ?$

- A. 42
- B. 128
- C. 289
- D. 337
- E. 481

**DO YOUR FIGURING HERE.**

2. City Hall, the hub of the city, is placed at the origin of a standard  $(x,y)$  coordinate grid as shown below. Grid lines 1 unit apart are used to locate other important buildings.



Which landmark building is located by the coordinates  $(-1,1)$  ?

- F. Stadium
- G. Courthouse
- H. Fire station
- J. Library
- K. Police station

3. At 1:00 p.m. a car leaves St. Louis for Chicago, traveling at a constant speed of 65 miles per hour. At 2:00 p.m. a truck leaves Chicago for St. Louis, traveling at a constant speed of 55 miles per hour. If it is a 305-mile drive between St. Louis and Chicago, at what time will the car and truck pass each other?

- A. 2:30 p.m.
- B. 3:00 p.m.
- C. 4:00 p.m.
- D. 4:30 p.m.
- E. 5:00 p.m.

4. For all  $x \neq 0$  and  $y \neq 0$ ,  $\frac{(2x^{-3}y^4)^3}{(4xy)^2} = ?$

F.  $\frac{y^{10}}{2}$

G.  $\frac{2y^{10}}{x^{10}}$

H.  $\frac{y^{10}}{2x^{11}}$

J.  $\frac{y^3}{2x^2}$

K.  $\frac{y^9}{4x^4}$

**DO YOUR FIGURING HERE.**

5. If 0.00005893 is expressed in the form  $5.893 \times 10^n$ , what is the value of  $n$  ?

A. -5

B. -4

C. 4

D. 5

E. 8

6. What is the value of  $3 + 6 \div 2 - 4 \times 3$  ?

F. -13.5

G. -6.0

H. 0.0

J. 1.5

K. 2.0

7. What is the sum of  $(x + 2y)^2$  and  $(x - y)^2$  ?

A.  $2x^2 + 3y^2$

B.  $2x^2 + 5y^2$

C.  $2x^2 + 2xy + 5y^2$

D.  $4x^2 + y^2$

E.  $4x^2 + 4xy + y^2$

**DO YOUR FIGURING HERE.**

8. What are the factors of  $12c^2 + cd - 6d^2$  ?

- F.  $(4c + 3d)(3c - 2d)$
- G.  $(4c - 3d)(3c + 2d)$
- H.  $(6c + d)(2c - 6d)$
- J.  $6(2c - d)(c + d)$
- K.  $6(2c + d)(c - d)$

9. How much larger than the sum of  $-1$ ,  $-2$ , and  $5$  is the sum of the squares of these same integers?

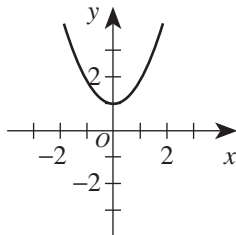
- A. 18
- B. 20
- C. 22
- D. 28
- E. 32

10. Which of the following expresses the complete solution, for  $x$ , to the inequality shown below?

$$3x - 5 > 5x - 9$$

- F.  $x > -\frac{7}{4}$
- G.  $x > 2$
- H.  $x < 2$
- J.  $x > -2$
- K.  $x < -2$

11. The figure below most closely resembles the graph of which of the following functions?



- A.  $-x^2 + 1$
- B.  $x^2 + 1$
- C.  $x^2 - 1$
- D.  $2x^2$
- E.  $x^3 - 1$

12. The owner of a store displays a large jar of nickels and dimes and offers the value of the coins to the person who guesses how many dimes there are. If there are 1,130 coins, and they are worth \$100, how many dimes are there?

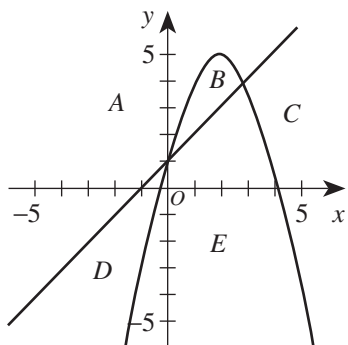
F. 130  
G. 260  
H. 870  
J. 970  
K. 1,000

**DO YOUR FIGURING HERE.**

13. In simplified form,  $\frac{24x^4z^{-2}}{8x^{-3}z} = ?$

A.  $\frac{3x}{z}$   
B.  $\frac{16x^7}{z}$   
C.  $\frac{3x^7}{z^3}$   
D.  $16xz$   
E.  $3x^7z^3$

14. The graphs of  $x - y = -1$  and  $y = -x^2 + 4x + 1$  separate the plane into 5 regions, labeled A, B, C, D, and E in the diagram below. Which region represents the intersection of the graphs of the inequalities  $x - y < -1$  and  $y < -x^2 + 4x + 1$ ?

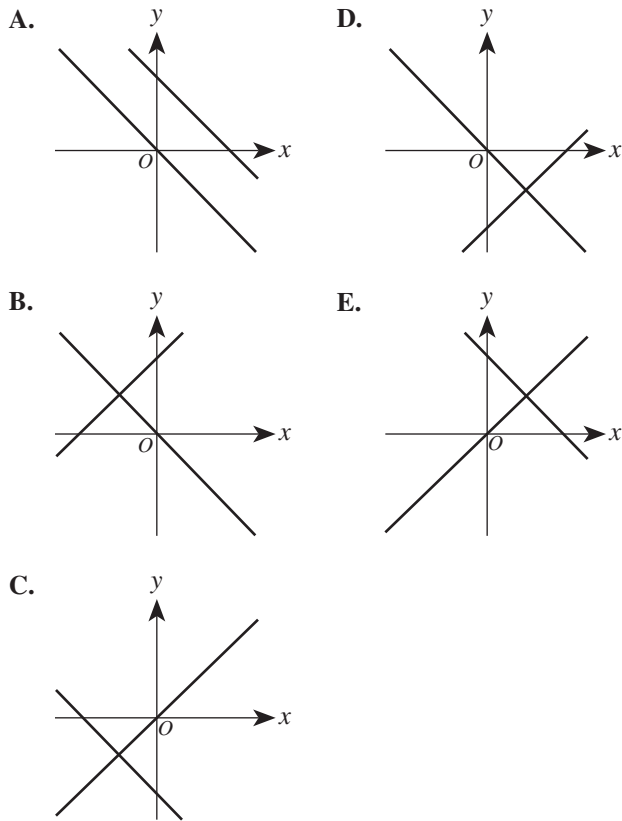


F. A  
G. B  
H. C  
J. D  
K. E

**GO ON TO THE NEXT PAGE.**

15. Which graph best presents the following system of equations and its solution?

$$\begin{aligned}x + y &= 4 \\x - y &= 0\end{aligned}$$



**DO YOUR FIGURING HERE.**

16. Tickets to a play cost \$5 for adults and \$2 for children. If 1,750 tickets were sold for a total of \$7,100, how many children's tickets were sold?

- F. 550
- G. 650
- H. 1,100
- J. 1,200
- K. 1,650

17. Where are the points (1,2) and (-1,1) in relation to the line  $3x + 4y = 7$  ?

- A. Both are on the line.
- B. One is on the line and the other is off the line.
- C. Both are above the line.
- D. Both are below the line.
- E. One is above the line and the other is below the line.



**DO YOUR FIGURING HERE.**

18. If  $f(x) = 2x + 7$ ,  $g(x) = 3x - 5$ , and  $h(x) = 2x + 6$ , then  $h(x) + [f(x) \cdot g(x)] - 6 = ?$

F.  $7x + 2$   
G.  $7x + 8$   
H.  $6x^2 + 13x - 29$   
J.  $6x^2 + 13x - 35$   
K.  $12x^2 - 5x - 143$

19. If  $101! = (99!)x$ , then  $x =$

A. 1  
B.  $\frac{101}{99}$   
C. 9,900  
D. 10,100  
E. 999,900

20. If  $\log_x\left(\frac{1}{4}\right) = -\frac{2}{3}$ , then what is the value of  $x$ ?

F. 32  
G. 8  
H.  $\frac{1}{8}$   
J.  $-\frac{1}{8}$   
K. -8

21. At a fruit market where no sales tax is charged, Abe paid \$1.90 for 1 pear and 3 apples; Joan paid \$1.60 for 1 pear, 1 apple, and 1 orange; and Latonya paid \$1.70 for 2 apples and 1 orange. If each person paid the same amount per pear, the same amount per apple, and the same amount per orange, what amount did each person pay for each apple?

A. \$0.40  
B. \$0.45  
C. \$0.50  
D. \$0.52  
E. \$0.70

**GO ON TO THE NEXT PAGE.**

22. If the range of  $f(x) = x^2 + 4$  is all real numbers from 13 to 29, what positive numbers lie in the domain of  $f(x)$  ?

F.  $3 \leq x \leq 5$   
G.  $5 \leq x \leq 21$   
H.  $9 \leq x \leq 25$   
J.  $13 \leq x \leq 29$   
K.  $173 \leq x \leq 845$

**DO YOUR FIGURING HERE.**

23. Which of the following is equivalent to  $\begin{vmatrix} 1 & 2 & 0 \\ 2 & 1 & 3 \\ 0 & 0 & a \end{vmatrix}$  ?

A. 0  
B.  $-3a$   
C.  $a$   
D.  $3a$   
E.  $5a$

24. What is the 50th term of the arithmetic sequence 4, 10, 16, 22, ... ?

F. 202  
G. 206  
H. 294  
J. 298  
K. 304

25. If  $f(x) = 3x + 2$ , then  $f(a + b) = ?$

A.  $3a + 3b + 2$   
B.  $3a + 3b + 4$   
C.  $3x + 2 + a + b$   
D.  $3x + 2 + 3a + 3b$   
E.  $3x + 4 + 3a + 3b$

**GO ON TO THE NEXT PAGE.**

**DO YOUR FIGURING HERE.**

26. If  $i = \sqrt{-1}$ , which of the following is equivalent to

$$\frac{2i}{1+i} ?$$

- F.  $-2$
- G.  $-1 + 2i$
- H.  $1 - i$
- J.  $1 + i$
- K.  $2$

27. Which of the following equations has  $-i$ ,  $i$ , and  $0$  as its only roots?

- A.  $x^2 - 1 = 0$
- B.  $x^2 + 1 = 0$
- C.  $x^2 + x + 1 = 0$
- D.  $x^3 - x = 0$
- E.  $x^3 + x = 0$

28. A sighting from sea level to the top of a lighthouse was  $60^\circ$ . The lighthouse is known to rise 180 feet above sea level. What is the distance (to the nearest foot) between the observer and the base of the lighthouse?

- F. 104
- G. 180
- H. 208
- J. 254
- K. 311

29. If  $\sin x = \frac{1}{2}$  and  $x$  is between  $\frac{\pi}{2}$  and  $\frac{3\pi}{2}$ , what is the value of  $\frac{x}{2}$ ?

- A.  $\frac{5\pi}{6}$
- B.  $\frac{7\pi}{12}$
- C.  $\frac{5\pi}{12}$
- D.  $\frac{\pi}{3}$
- E.  $\frac{\pi}{12}$

**DO YOUR FIGURING HERE.**

30. Which of the following is another expression for

$$\frac{1 + \csc \theta}{\sec \theta} - \cot \theta ?$$

- F.  $\sin \theta + \tan \theta - \cot \theta$
- G.  $\cos \theta + \tan \theta - \cot \theta$
- H.  $\cos \theta$
- J.  $\sin \theta$
- K.  $\cos \theta + \sin \theta$

31. If  $\sin 2x = \sin x$ , then which of the following could NOT be true?

- A.  $x = 0$
- B.  $x = \frac{-\pi}{3}$
- C.  $\cos x = \frac{1}{2}$
- D.  $\sin x = 0$
- E.  $\cos x = 0$

32.  $2i(4 - 6i) = ?$

- F.  $8i + 12$
- G.  $8i - 12$
- H.  $12 - 8i$
- J.  $8 - 12i$
- K.  $8 + 12i$

33. If  $\log 3 \cong .477$  and  $\log 2 \cong .301$ , then  $\log \sqrt{6} \cong ?$

(Note:  $\cong$  means approximately equal to.)

- A. .143
- B. .286
- C. .389
- D. .778
- E. 2.449

**GO ON TO THE NEXT PAGE.**

34. If for all  $x$ ,  $f(x) = x^2 - 2x + 3$  and  $g(x) = x^2 - 3x + 4$ , what is the value of  $\frac{f(2)}{g(3)}$  ?

F.  $-\frac{1}{2}$

G.  $\frac{1}{5}$

H.  $\frac{1}{2}$

J.  $\frac{2}{3}$

K.  $\frac{3}{4}$

35. If  $f(x) = \frac{5x+2}{3}$ , what is the y-intercept of the graph of  $f^{-1}(x)$  ?

A.  $-\frac{3}{2}$

B.  $-\frac{2}{5}$

C.  $\frac{3}{5}$

D.  $\frac{2}{3}$

E.  $\frac{3}{2}$

**DO YOUR FIGURING HERE.**

**END OF TEST**

**IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY GO BACK AND CHECK YOUR WORK.**

### Correct Answers for Sample Mathematics Test Questions

Question #	Correct Answer	Content Category
1	C	Prealgebra
2	G	Coordinate Geometry
3	C	Elementary Algebra
4	H	Intermediate Algebra
5	A	Prealgebra
6	G	Prealgebra
7	C	Elementary Algebra
8	F	Elementary Algebra
9	D	Prealgebra
10	H	Coordinate Geometry
11	B	Coordinate Geometry
12	H	Intermediate Algebra
13	C	Intermediate Algebra
14	G	Coordinate Geometry
15	E	Coordinate Geometry
16	F	Intermediate Algebra
17	E	Coordinate Geometry
18	J	College Algebra
19	D	College Algebra
20	G	College Algebra
21	C	College Algebra
22	F	College Algebra
23	B	College Algebra
24	J	College Algebra
25	A	College Algebra

<b>Question #</b>	<b>Correct Answer</b>	<b>Content Category</b>
26	J	College Algebra
27	E	College Algebra
28	F	Trigonometry
29	C	Trigonometry
30	H	Trigonometry
31	E	Trigonometry
32	F	College Algebra
33	C	College Algebra
34	K	College Algebra
35	B	College Algebra