Digital SAT Prep · Retired Paper SAT · Calculator Math

Paper SAT May 2023 — Calculator Math (Section 4)
25 Original SOMATH Problems

Original SOMATH problems modeled on the concept spread of the retired May 2023 US paper SAT Calculator section. Every question is written by the SOMATH team — not a reprint of College Board content. 55 minutes, calculator allowed. Answer key is on the last page. Full step-by-step solutions live at schoolofmath.us/posts/paper-sat-may-2023-calculator-math-25-original-problems

Question 1

The line of best fit for a scatterplot of eight data points has equation y = 0.008x + 4. Using this line, which value is closest to the predicted y-value when x = 3,700 ?

A) 14
B) 27
C) 33
D) 40

Question 2

An object has a mass of 4,200 milligrams. What is the mass of the object in grams? (1 gram = 1,000 milligrams)

A) 0.42
B) 4.2
C) 42
D) 420

Question 3

A line passes through the points (−4, 3) and (4, −1). What is the y-intercept of this line?

A) (0, −1)
B) (0, 0)
C) (0, 1)
D) (0, 3)

Question 4

On average, one square inch of a certain leaf contains 480 stomata. A section of this leaf contains 1,320 stomata. Based on this information, which value is closest to the area of this section, in square inches?

A) 0.36
B) 0.86
C) 2.75
D) 3.44

Question 5

The graph of y = t(x) starts high on the y-axis, drops quickly as x increases, and levels off just above the x-axis without ever touching it. Which type of function best describes t ?

A) Increasing linear
B) Decreasing linear
C) Increasing exponential
D) Decreasing exponential

Question 6

A dot plot has 9 data values on the number line 40 to 90. Which of the following distributions has a median value that is LESS than 60 ?

A) One dot each at 40, 45, 50, 55, 60, 65, 70, 75, 80
B) Two dots at 50, one dot each at 55, 60, 65, 70, 75, 80, 85
C) Three dots at 45, two dots at 50, one dot each at 55, 65, 70, 80
D) One dot each at 45, 50, 60, 65, 70, 75, 80, 85, 90

Question 7

The heights of five mountain peaks are given in feet: 14,500, 14,410, 14,380, 14,320, and 14,290. What is the height, in meters, of the tallest peak on this list? (Use 1 meter = 3.28 feet.)

A) 439.0
B) 4,421
C) 47,560
D) 47,568

Question 8

For a certain pair of buildings, the taller building is 1,050 feet tall and the shorter building is 700 feet tall. The height of the taller building is approximately what percent GREATER than the height of the shorter building?

A) 33%
B) 50%
C) 70%
D) 150%

Question 9

Data set A: 3, 5, 7, 7, 9, 13. Data set B: 3, 5, 7, 7, 9, 13, 28. Which statement best compares the medians of the two data sets?

A) The median of set A is greater than the median of set B
B) The median of set A is less than the median of set B
C) The medians of set A and set B are equal
D) There is not enough information to compare the medians

Question 10

A solution of alcohol and water has total mass 200 grams and satisfies $0.79x + 1.0y = 200$, where x is the volume of alcohol in cm^3 and y is the volume of water in cm^3. If the volume of alcohol is 150 cm^3, what is the approximate volume of water, in cm^3 ?

A) 50
B) 82
C) 118
D) 150

Question 11

There are 500 members of a certain club. If m members are in favor of a proposal, which expression represents the percentage of members in favor of the proposal?

A) 100(m/500)
B) 100(500/m)
C) 500(m/100)
D) 500(100m)

Question 12

Which of the following equations has the same solution as 8(x + 40) = 40 ?

A) x + 40 = 5
B) x + 40 = 48
C) x + 5 = 5
D) x + 5 = 40

Question 13

A graph shows the temperature, in degrees Celsius, of a cooling metal over time in minutes. The temperature starts at 90°C, drops sharply during the first 3 minutes, and then approaches room temperature (about 22°C) more slowly. At which of the following times, in minutes, is the temperature closest to 40°C ?

A) 1
B) 2
C) 5
D) 12

Question 14

The function C(x) = 6.2x + 22 models the annual cost of an online subscription, in dollars, x years after 2020. On the domain 0 ≤ x ≤ 20, which of the following describes the correct graph of this model?

A) A line from (0, 6) rising slowly to about (20, 20)
B) A line from (0, 22) rising to about (20, 146)
C) A line from (0, 200) rising to about (20, 300)
D) A line from (0, 0) rising to about (20, 100)

Question 15

The function P(x) = 3.2x + 47 models the population, in thousands, of a small town x years after 2010. According to the model, what is the best interpretation of 3.2 in this context?

A) The town had a population of 3,200 in 2010
B) Each year after 2010, the town's population increased by 3,200 people
C) The town's total population between 2010 and 2020 was 3,200
D) Each year after 2010, the town's population increased by 3.2 people

Question 16

A farm sells x bales of hay at $5.50 per bale, so revenue R(x) = 5.50x dollars. According to the function R, how many bales of hay would have to be sold to earn a revenue of $2,750 ?

A) 250
B) 500
C) 750
D) 1,500

Question 17

A farm has total cost C(x) = 40,000 + 1.25x dollars and revenue R(x) = 5.25x dollars, where x is the number of bales of hay sold. Which of the following inequalities models the number of bales that must be sold to earn a profit of $12,000 or more? (Profit = revenue − cost.)

A) 12,000 ≤ 4x − 40,000
B) 12,000 ≥ 4x − 40,000
C) 12,000 ≤ 4x + 40,000
D) 12,000 ≥ 4x + 40,000

Question 18

Which expression is equivalent to $(x^2 + 5)^2 + (x - 3)(x + 3)$?

A) x^4 + x^2 + 16
B) x^4 + 10x^2 + 25
C) x^4 + 11x^2 + 16
D) x^4 + 11x^2 + 25

Question 19

y = 3x + 2 and y = 3x + 8. How many solutions does the given system of equations have?

A) Zero
B) Exactly one
C) Exactly two
D) Infinitely many

Question 20

h(x) = 2x + 6. Which inequality represents all values of x for which the graph of y = h(x) in the xy-plane is above the x-axis?

A) x < −3
B) x > −3
C) x < 3
D) x > 3

Question 21

The mass of iodine-131 (I-131) remaining in a sample follows a half-life graph. The half-life of I-131 is about 8 days. What is the mass, in nanograms, of I-131 remaining in the sample after 24 days if the initial mass was 8 ?

A) 0.5
B) 1
C) 2
D) 4

Question 22

Which of the following quadratic equations has NO real solutions?

A) $2x^2 - 4 = 0$
B) $2x^2 + 4x = 0$
C) $2x^2 + 4x + 5 = 0$
D) $2x^2 - 6x + 4 = 0$

Question 23

A right triangle has legs of length 20 and 21, and hypotenuse 29. The angle x is opposite the leg of length 20. For this triangle, which equation is NOT true?

A) $\sin x = 20/29$
B) $\sin(90° - x) = 20/29$
C) $\cos(90° - x) = 20/29$
D) $\sin(90° - x) - \cos x = 0$

Question 24

In 1980, there were approximately 500 bald eagles in a certain state. In 2020, the number of bald eagles in that state was 260% GREATER than in 1980. Approximately how many bald eagles were in the state in 2020 ?

A) 1,300
B) 1,800
C) 2,600
D) 3,600

Question 25

When the quadratic function f is graphed in the xy-plane, where $y = f(x)$, its vertex is $(4, -9)$. One of the x-intercepts of this graph is $(1, 0)$. What is the other x-intercept of the graph?

A) (5, 0)
B) (7, 0)
C) (8, 0)
D) (9, 0)

Answer Key

Full step-by-step solutions are on the blog post:
schoolofmath.us/posts/paper-sat-may-2023-calculator-math-25-original-problems

Q	Ans	Skill	Q	Ans	Skill
1	C	Line of best fit	14	B	Model matches graph
2	B	mg → g conversion	15	B	Slope in context
3	C	y-intercept from 2 pts	16	B	Solve R(x) = c
4	C	Density (per sq in)	17	A	Profit inequality
5	D	Decreasing exponential	18	C	Polynomial expand
6	C	Median from dot plot	19	A	Parallel-line system
7	B	ft → m conversion	20	B	h(x) > 0 linear
8	B	% greater than baseline	21	B	Half-life at t
9	C	Compare medians	22	C	No real solutions (D<0)
10	B	Mass-balance equation	23	B	Cofunction identity
11	A	Ratio to percent	24	B	260% greater than
12	A	Equivalent equation	25	B	Symmetry of parabola
13	C	Read graph at time			

About these problems

Every question in this worksheet is an original SOMATH problem written by our teaching team. They test the same underlying math skills the retired May 2023 US paper SAT Calculator section tested, but the wording, numbers, contexts, and answer choices are new. We do not reprint College Board content because it is copyrighted. The official released paper SATs are available directly from College Board's SAT practice archive at satsuite.collegeboard.org/sat/practice-preparation/practice-tests, and the current Digital SAT is at bluebook.collegeboard.org.