

SAT Math Sample Paper 05

MATHEMATICS SECTION PATTERN

- **Total Questions:** 44 Questions
- **Modules:** 2 Modules (22 Questions each)
- **Time:** 70 Minutes Total (35 Minutes per Module)
- **Content Areas:** Algebra, Advanced Math, Problem-Solving and Data Analysis, Geometry and Trigonometry.
- **Question Formats:** Multiple Choice and Student-Produced Response.

Module 1

1. If $5x + 3 = 18$, what is the value of $10x - 4$?
(A) 26
(B) 28
(C) 30
(D) 32
2. A line in the xy -plane passes through $(2, 5)$ and $(4, 11)$. What is the slope of the line?
(A) 2
(B) 3
(C) 4
(D) 6
3. If $f(x) = 3x - 1$ and $f(k) = 8$, what is the value of k ?
4. A jacket originally costs \$80. If the price is increased by 25%, what is the new price?
(A) \$90
(B) \$100
(C) \$110
(D) \$120
5. In a right triangle, the legs have lengths 7 and 24. What is the length of the hypotenuse?
6. Which of the following is the equation of a circle with center $(0, -5)$ and radius 3?
(A) $x^2 + (y - 5)^2 = 9$
(B) $x^2 + (y + 5)^2 = 9$
(C) $x^2 + (y + 5)^2 = 3$
(D) $(x - 5)^2 + y^2 = 9$
7. If $2x + 3y = 12$ and $x - y = 1$, what is the value of x ?
(A) 1
(B) 2
(C) 3

(D) 4

8. What is the sum of the solutions to $|x - 4| = 10$?

9. The ratio of boys to girls in a class is 3:4. If there are 28 students in total, how many are girls?

- (A) 12
- (B) 14
- (C) 16
- (D) 18

10. If $(x + 3)(x - 5) = x^2 + kx - 15$, what is the value of k ?

11. A bag contains 6 red, 4 blue, and 2 green pens. If a pen is chosen at random, what is the probability it is NOT blue?

- (A) $1/3$
- (B) $1/2$
- (C) $2/3$
- (D) $5/6$

12. If $\sin(x^\circ) = \cos(50^\circ)$, what is the value of x ?

- (A) 30
- (B) 40
- (C) 50
- (D) 60

13. The average of 8, 12, 15, and n is 12. What is the value of n ?

14. A city's population increases by 2% each year. If the initial population is 50,000, which expression represents the population after t years?

- (A) $50000(0.02)^t$
- (B) $50000(1.02)^t$
- (C) $50000 + 1.02t$
- (D) $50000(0.98)^t$

15. If $\sqrt{x + 16} = 9$, what is the value of x ?

16. What is the slope of a line perpendicular to $y = -2x + 7$?

17. In which quadrant does the point $(-3, 4)$ lie?

- (A) I
- (B) II
- (C) III
- (D) IV

18. A circle has a radius of 6. What is the area of a sector with a central angle of 90° ?

- (A) 3π
- (B) 6π
- (C) 9π
- (D) 12π

19. For the parabola $y = x^2 - 6x + 5$, what is the y -coordinate of the vertex?
20. Which of the following points is a solution to the inequality $2x - y > 5$?
- (A) $(1, 1)$
 - (B) $(2, -2)$
 - (C) $(4, 1)$
 - (D) $(0, -6)$
21. In similar triangles ABC and DEF , the ratio of corresponding sides is 2:5. If the area of ABC is 12, what is the area of DEF ?
22. What is the median of the following data set: 14, 18, 12, 20, 15, 11, 19?
- (A) 14
 - (B) 15
 - (C) 18
 - (D) 20

Module 2

23. If $x^2 - kx + 16 = 0$ has exactly one real solution, and $k > 0$, what is k ?
- (A) 4
(B) 8
(C) 16
(D) 32
24. The system of equations $4x - 2y = 10$ and $ax + y = 5$ has infinitely many solutions. What is the value of a ?
25. A study found that 40% of participants preferred a new soda, with a margin of error of 3.5%. Which of the following percentages is most likely the true population preference?
- (A) 35%
(B) 38%
(C) 44%
(D) 45%
26. If $x^2 + y^2 = 25$ and $xy = 12$, what is the value of $(x - y)^2$?
27. A box contains 5 red and 5 blue marbles. If two marbles are drawn at random without replacement, what is the probability that both are red?
- (A) $\frac{1}{4}$
(B) $\frac{2}{9}$
(C) $\frac{1}{5}$
(D) $\frac{5}{18}$
28. A circle has an arc length of 10π that corresponds to a central angle of 120° . What is the radius of the circle?
29. If $f(x) = 2^x$, which of the following is equal to $f(x + 3)$?
- (A) $f(x) + 3$
(B) $3f(x)$
(C) $8f(x)$
(D) $f(x) + 8$
30. The surface area of a cube is 150. What is the volume of the cube?
31. If $g(x) = 2x^2 - 3x + 1$, what is the value of $g(x - 1)$?
- (A) $2x^2 - 7x + 6$
(B) $2x^2 - 3x + 6$
(C) $2x^2 - 7x + 2$
(D) $2x^2 + x - 1$
32. In a right triangle, $\sin \theta = \frac{15}{17}$. What is $\tan \theta$?
33. Which of the following is equivalent to $\frac{3x}{x+1} - \frac{2}{x-1}$?
- (A) $\frac{3x^2 - 5x - 2}{x^2 - 1}$

- (B) $\frac{3x^2-x-2}{x^2-1}$
(C) $\frac{x-2}{x^2-1}$
(D) $\frac{3x-2}{x^2-1}$

34. A set of data has a range of 25. If every value in the set is multiplied by 3, what is the new range?
35. A line passes through (1, 2) and is parallel to the line $3x + y = 10$. What is the y -intercept of this line?
- (A) 1
(B) 3
(C) 5
(D) 7
36. An object has a mass of 450 grams and a volume of 150 cubic centimeters. What is its density in g/cm^3 ?
37. If \$2,000 is invested at 4% annual interest compounded quarterly, which expression gives the balance after 5 years?
- (A) $2000(1.01)^{20}$
(B) $2000(1.04)^5$
(C) $2000(1.01)^5$
(D) $2000(1.16)^{20}$
38. A circle $(x-1)^2 + (y+2)^2 = 25$ intersects the line $x = 1$ at two points. What is the distance between these two points?
39. If $x^3 - 4x^2 - 12x = 0$, what is the sum of the three possible values of x ?
- (A) -4
(B) 0
(C) 4
(D) 12
40. In the figure, a square is inscribed in a circle. If the area of the square is 50, what is the area of the circle?
41. A store owner buys x items for \$10 each and y items for \$15 each. If he spends \$500 and buys 40 items total, how many \$15 items did he buy?
- (A) 10
(B) 20
(C) 30
(D) 40
42. What is the sum of the solutions to $x^2 - 12x + 20 = 0$?
43. Line k is perpendicular to $y = \frac{2}{3}x - 4$ and passes through (4, -1). What is the equation of line k ?
- (A) $y = -\frac{3}{2}x + 5$
(B) $y = \frac{3}{2}x - 7$
(C) $y = -\frac{3}{2}x - 5$
(D) $y = \frac{2}{3}x + 1$

44. A person can complete a job in 6 hours. A second person can complete the same job in 3 hours. How many hours will it take them to complete the job together?

prepp
Your Personal Exam Guide

Answers and Detailed Solutions

1. **A**
Sol: $5x = 15 \Rightarrow x = 3$. $10(3) - 4 = 26$.
2. **B**
Sol: $m = (11 - 5)/(4 - 2) = 6/2 = 3$.
3. **3**
Sol: $3k - 1 = 8 \Rightarrow 3k = 9 \Rightarrow k = 3$.
4. **B**
Sol: $80 \times 1.25 = 100$.
5. **25**
Sol: $\sqrt{7^2 + 24^2} = \sqrt{49 + 576} = 25$.
6. **B**
Sol: Center $(h, k) = (0, -5)$ and $r^2 = 9$. Eq: $(x - 0)^2 + (y + 5)^2 = 9$.
7. **3**
Sol: Substitute $y = x - 1$: $2x + 3(x - 1) = 12 \Rightarrow 5x - 3 = 12 \Rightarrow 5x = 15 \Rightarrow x = 3$.
8. **8**
Sol: $x - 4 = 10$ or $x - 4 = -10$. $x = 14, -6$. Sum = 8.
9. **C**
Sol: $3x + 4x = 28 \Rightarrow 7x = 28 \Rightarrow x = 4$. Girls = $4(4) = 16$.
10. **-2**
Sol: $x^2 - 5x + 3x - 15 = x^2 - 2x - 15$. $k = -2$.
11. **C**
Sol: Total = 12. Not blue = $12 - 4 = 8$. $8/12 = 2/3$.
12. **B**
Sol: $\sin x = \cos(90 - x)$. $x = 90 - 50 = 40$.
13. **13**
Sol: $(8 + 12 + 15 + n)/4 = 12 \Rightarrow 35 + n = 48 \Rightarrow n = 13$.
14. **B**
Sol: $P = P_0(1 + r)^t$. $r = 0.02$.
15. **65**
Sol: $x + 16 = 81 \Rightarrow x = 65$.
16. **0.5**
Sol: Perpendicular slope is $-1/(-2) = 1/2$.
17. **B**
Sol: $(-x, +y)$ lies in the second quadrant.
18. **C**
Sol: Area = $(90/360) \times \pi(6^2) = 1/4 \times 36\pi = 9\pi$.
19. **-4**
Sol: $x = -b/2a = 6/2 = 3$. $y = 3^2 - 6(3) + 5 = 9 - 18 + 5 = -4$.

20. **C**

Sol: $2(4) - 1 = 7$, and $7 > 5$ is true.

21. **75**

Sol: Ratio of areas is $(2 : 5)^2 = 4 : 25$. $12/x = 4/25 \Rightarrow 4x = 300 \Rightarrow x = 75$.

22. **B**

Sol: Sorted: 11, 12, 14, 15, 18, 19, 20. Middle is 15.

23. **B**

Sol: $b^2 - 4ac = 0 \Rightarrow k^2 - 64 = 0 \Rightarrow k = 8$.

24. **-2**

Sol: Multiply second eq by -2 : $-2ax - 2y = -10$. For identity, $-2a = 4 \Rightarrow a = -2$.

25. **B**

Sol: Range is $40 \pm 3.5 = [36.5, 43.5]$. 38% falls in this range.

26. **1**

Sol: $(x - y)^2 = x^2 + y^2 - 2xy = 25 - 2(12) = 1$.

27. **B**

Sol: $(5/10) \times (4/9) = 1/2 \times 4/9 = 2/9$.

28. **15**

Sol: $10\pi = (120/360) \times 2\pi r \Rightarrow 10 = 1/3 \times 2r \Rightarrow r = 15$.

29. **C**

Sol: $2^{x+3} = 2^x \cdot 2^3 = 8 \cdot 2^x = 8f(x)$.

30. **125**

Sol: $6s^2 = 150 \Rightarrow s^2 = 25 \Rightarrow s = 5$. $V = 5^3 = 125$.

31. **A**

Sol: $2(x - 1)^2 - 3(x - 1) + 1 = 2(x^2 - 2x + 1) - 3x + 3 + 1 = 2x^2 - 7x + 6$.

32. **15/8**

Sol: $\text{Adj} = \sqrt{17^2 - 15^2} = 8$. $\tan = 15/8$.

33. **A**

Sol: $\frac{3x(x-1)-2(x+1)}{x^2-1} = \frac{3x^2-3x-2x-2}{x^2-1} = \frac{3x^2-5x-2}{x^2-1}$.

34. **75**

Sol: Multiplier applies to the spread. $25 \times 3 = 75$.

35. **C**

Sol: $y = -3x + b \Rightarrow 2 = -3(1) + b \Rightarrow b = 5$.

36. **3**

Sol: Density = $450/150 = 3$.

37. **A**

Sol: $P(1 + r/n)^{nt} \Rightarrow 2000(1 + 0.04/4)^{4 \times 5} = 2000(1.01)^{20}$.

38. **10**

Sol: $(1 - 1)^2 + (y + 2)^2 = 25 \Rightarrow (y + 2)^2 = 25 \Rightarrow y = 3, -7$. Dist = 10.

39. **4**

Sol: $x(x^2 - 4x - 12) = 0 \Rightarrow x = 0, 6, -2$. Sum = 4.

40. **25π** *Sol:* Square diag = diam = $\sqrt{50+50} = 10$. $r = 5$, Area = 25π .41. **20***Sol:* $x + y = 40$ and $10x + 15y = 500$. $10(40 - y) + 15y = 500 \Rightarrow 5y = 100 \Rightarrow y = 20$.42. **12***Sol:* Sum of roots = $-b/a = -(-12)/1 = 12$.43. **A***Sol:* Slope = $-3/2$. $-1 = -3/2(4) + b \Rightarrow -1 = -6 + b \Rightarrow b = 5$.44. **2***Sol:* Combined rate = $1/6 + 1/3 = 1/2$ job/hr. Time = 2 hours.
Your Personal Exam Guide