

SAT Math Sample Paper 01

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 $3x + 10 = 28$, what is the value of x ?
2. A line in the xy -plane has a slope of 4 and passes through the point $(0, 5)$. Which of the following is an equation of the line?
(A) $y = 5x + 4$
(B) $y = 4x + 5$
(C) $y = -4x + 5$
(D) $y = \frac{1}{4}x + 5$
3. The function f is defined by $f(x) = x^2 - 7$. What is the value of $f(5)$?
(A) 3
(B) 12
(C) 18
(D) 25
4. A teacher has 24 students in a class. If 75% of the students passed a test, how many students passed the test?
5. Which of the following is equivalent to $3(x + 4) + 2(x - 1)$?
(A) $5x + 10$
(B) $5x + 11$
(C) $5x + 14$
(D) $5x + 12$
6. A right triangle has legs with lengths of 9 and 12. What is the length of the hypotenuse?
7. If $|x - 5| = 10$, and $x < 0$, what is the value of x ?
(A) -15
(B) -10
(C) -5
(D) 5

8. A circle in the xy -plane is defined by the equation $x^2 + y^2 = 49$. What is the radius of the circle?

9. The table below shows the frequency of scores on a quiz. What is the median score?

Score	1	2	3	4	5
Frequency	2	3	5	4	1

- (A) 2
- (B) 3
- (C) 3.5
- (D) 4

10. If $\frac{2}{5}x = 10$, what is the value of x ?

11. A car travels 180 miles in 3 hours. At this constant rate, how many miles will the car travel in 5 hours?

- (A) 240
- (B) 270
- (C) 300
- (D) 330

12. If $a + b = 20$ and $a - b = 4$, what is the value of ab ?

- (A) 80
- (B) 84
- (C) 96
- (D) 100

13. A rectangle has a length of $x + 5$ and a width of $x - 2$. If the area of the rectangle is 30, what is the value of x ?

14. Which of the following describes the graph of $y = 3(2)^x$?

- (A) A line with slope 2
- (B) A line with slope 3
- (C) An exponential growth curve
- (D) An exponential decay curve

15. If $\sin(x^\circ) = \cos(40^\circ)$, and $0 < x < 90$, what is the value of x ?

16. A cylinder has a volume of 80π and a height of 5. What is the radius of the cylinder?

- (A) 4
- (B) 8
- (C) 16
- (D) 20

17. If $f(x) = 2x - 3$ and $g(x) = x + 5$, what is the value of $f(g(2))$?

18. The sum of two numbers is 15 and their difference is 3. What is the larger number?

- (A) 6
- (B) 9
- (C) 12
- (D) 18

19. A bag contains 5 red, 3 blue, and 2 yellow marbles. If one marble is drawn at random, what is the probability that it is NOT red?
20. If $x^2 - 10x + k = 0$ has exactly one real solution, what is the value of k ?
- (A) 5
 - (B) 10
 - (C) 20
 - (D) 25
21. What is the slope of the line $2x - 3y = 9$?
22. A square has a perimeter of 32. What is the area of the square?
- (A) 16
 - (B) 32
 - (C) 64
 - (D) 128

Module 2

23. If $5x - 7 = 3x + 13$, what is the value of x ?
24. A line passes through the points $(1, 4)$ and $(3, 10)$. What is the y -intercept of the line?
- (A) 1
(B) 2
(C) 3
(D) 4
25. Which of the following is a solution to the system $y = x^2 - 2$ and $y = x$?
- (A) $(2, 2)$
(B) $(1, 1)$
(C) $(0, 0)$
(D) $(-1, 1)$
26. If $x^2 + y^2 = 100$ and $xy = 30$, what is the value of $(x - y)^2$?
27. A population of bacteria doubles every 3 hours. If the initial population is 500, what is the population after 9 hours?
- (A) 1,500
(B) 2,000
(C) 4,000
(D) 4,500
28. What is the sum of the solutions to the equation $(x - 4)(x + 7) = 0$?
29. The average of 5, 10, 15, and x is 12. What is the value of x ?
- (A) 12
(B) 15
(C) 18
(D) 20
30. If $f(x) = \sqrt{x + 9}$, for what value of x is $f(x) = 5$?
31. In the xy -plane, a circle has center $(2, -3)$ and passes through $(2, 1)$. What is the equation of the circle?
- (A) $(x - 2)^2 + (y + 3)^2 = 4$
(B) $(x - 2)^2 + (y + 3)^2 = 16$
(C) $(x + 2)^2 + (y - 3)^2 = 16$
(D) $(x - 2)^2 + (y - 3)^2 = 4$
32. If $3x - 2y = 10$ and $x + 2y = 6$, what is the value of x ?
33. A right triangle has an angle θ such that $\cos \theta = \frac{4}{5}$. What is the value of $\sin \theta$?
- (A) $\frac{3}{5}$
(B) $\frac{4}{5}$
(C) 1
(D) $\frac{5}{4}$

34. The graph of $y = ax^2 + c$ passes through $(0, 3)$ and $(2, 11)$. What is the value of a ?
35. If $2^{x+1} = 32$, what is the value of 3^x ?
- (A) 27
(B) 81
(C) 243
(D) 729
36. The volume of a cube is 64. What is the surface area of the cube?
37. If k is a constant and the equation $2x^2 - 8x + k = 0$ has no real solutions, which of the following could be the value of k ?
- (A) 4
(B) 6
(C) 8
(D) 10
38. A set of 10 numbers has a mean of 15. If one number is removed, the new mean is 14. What number was removed?
39. Which of the following is equivalent to $\frac{1}{x} + \frac{1}{2x}$?
- (A) $2/x$
(B) $3/2x$
(C) $1/3x$
(D) $2/3x$
40. If x is the measure of an angle in degrees and $\sin(x) = \frac{\sqrt{3}}{2}$, what is a possible value of x ?
41. A box contains 4 red balls and n blue balls. If the probability of picking a red ball is 0.2, what is the value of n ?
- (A) 12
(B) 16
(C) 20
(D) 24
42. The expression $x^2 - y^2$ is equivalent to 24. If $x + y = 6$, what is the value of $x - y$?
43. If $f(x) = 3x^2 - 5x + 2$, what is the value of $f(-1)$?
- (A) 0
(B) 4
(C) 8
(D) 10
44. What is the distance between the points $(1, 2)$ and $(4, 6)$ in the xy -plane?

Answers and Detailed Solutions

1. **6**
Sol: $3x = 18 \Rightarrow x = 6$.
2. **B**
Sol: Use $y = mx + b$ with $m = 4$ and $b = 5$ (the y-intercept).
3. **C**
Sol: $f(5) = 5^2 - 7 = 25 - 7 = 18$.
4. **18**
Sol: $0.75 \times 24 = 18$.
5. **A**
Sol: $3x + 12 + 2x - 2 = 5x + 10$.
6. **15**
Sol: $\sqrt{9^2 + 12^2} = \sqrt{81 + 144} = \sqrt{225} = 15$.
7. **C**
Sol: $x - 5 = -10 \Rightarrow x = -5$.
8. **7**
Sol: $r^2 = 49$, so $r = 7$.
9. **B**
Sol: Total frequency is 15. The 8th value (median) falls in score 3.
10. **25**
Sol: $x = 10 \times \frac{5}{2} = 25$.
11. **C**
Sol: Speed is 60 mph. $60 \times 5 = 300$ miles.
12. **96**
Sol: Adding gives $2a = 24 \Rightarrow a = 12$. Subtracting gives $2b = 16 \Rightarrow b = 8$. $12 \times 8 = 96$.
13. **5**
Sol: $(x + 5)(x - 2) = 30 \Rightarrow x^2 + 3x - 40 = 0 \Rightarrow (x + 8)(x - 5) = 0$. $x = 5$.
14. **C**
Sol: $y = ab^x$ with $b > 1$ represents exponential growth.
15. **50**
Sol: $\sin(x) = \cos(90 - x)$, so $x = 90 - 40 = 50$.
16. **4**
Sol: $80\pi = \pi r^2(5) \Rightarrow r^2 = 16 \Rightarrow r = 4$.
17. **11**
Sol: $g(2) = 7$. $f(7) = 2(7) - 3 = 11$.
18. **B**
Sol: $x + y = 15$, $x - y = 3$. Adding gives $2x = 18 \Rightarrow x = 9$.
19. **0.5**
Sol: Total is 10. Not red is $10 - 5 = 5$. $5/10 = 0.5$.

20. **D**

Sol: $b^2 - 4ac = 0 \Rightarrow 100 - 4k = 0 \Rightarrow k = 25$.

21. **2/3**

Sol: $3y = 2x - 9 \Rightarrow y = \frac{2}{3}x - 3$. Slope is $2/3$.

22. **64**

Sol: Side $s = 32/4 = 8$. Area $= 8^2 = 64$.

23. **10**

Sol: $2x = 20 \Rightarrow x = 10$.

24. **A**

Sol: $m = (10 - 4)/(3 - 1) = 3$. $4 = 3(1) + b \Rightarrow b = 1$.

25. **A**

Sol: Substitute $(2, 2)$: $2 = 2^2 - 2$ is $2 = 2$, and $2 = 2$ is true.

26. **40**

Sol: $(x - y)^2 = x^2 + y^2 - 2xy = 100 - 2(30) = 40$.

27. **C**

Sol: $500 \times 2^{(9/3)} = 500 \times 8 = 4000$.

28. **-3**

Sol: $4 + (-7) = -3$.

29. **C**

Sol: $(5 + 10 + 15 + x)/4 = 12 \Rightarrow 30 + x = 48 \Rightarrow x = 18$.

30. **16**

Sol: $\sqrt{x+9} = 5 \Rightarrow x+9 = 25 \Rightarrow x = 16$.

31. **B**

Sol: Radius r is vertical distance from -3 to 1 , which is 4 . $(x-2)^2 + (y+3)^2 = 4^2$.

32. **4**

Sol: Adding equations: $4x = 16 \Rightarrow x = 4$.

33. **A**

Sol: In a 3-4-5 triangle, $\sin = \text{opp/hyp} = 3/5$.

34. **2**

Sol: $11 = a(2^2) + 3 \Rightarrow 8 = 4a \Rightarrow a = 2$.

35. **81**

Sol: $2^5 = 32$, so $x + 1 = 5 \Rightarrow x = 4$. $3^4 = 81$.

36. **96**

Sol: Side $= 4$. Surface area $= 6 \times 4^2 = 96$.

37. **D**

Sol: $b^2 - 4ac < 0 \Rightarrow 64 - 8k < 0 \Rightarrow 8 < k$. Only 10 satisfies this.

38. **24**

Sol: Total was $10 \times 15 = 150$. New total is $9 \times 14 = 126$. $150 - 126 = 24$.

39. **B**

Sol: $\frac{2}{2x} + \frac{1}{2x} = \frac{3}{2x}$.

40. **60**

Sol: $\sin(60^\circ) = \sqrt{3}/2$.

41. **B**

Sol: $4/(4+n) = 0.2 \Rightarrow 4 = 0.8 + 0.2n \Rightarrow 3.2 = 0.2n \Rightarrow n = 16$.

42. **4**

Sol: $(x+y)(x-y) = 24 \Rightarrow 6(x-y) = 24 \Rightarrow x-y = 4$.

43. **D**

Sol: $3(-1)^2 - 5(-1) + 2 = 3 + 5 + 2 = 10$.

44. **5**

Sol: $\sqrt{(4-1)^2 + (6-2)^2} = \sqrt{3^2 + 4^2} = 5$.

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