

SAT Math Sample Paper 07

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 $k + 12 = 33$, what is the value of $2k - 10$?
(A) 32
(B) 42
(C) 52
(D) 56
2. A line in the xy -plane passes through the origin and has a slope of 7. What is the value of y when $x = 4$?
3. The function f is defined by $f(x) = \frac{1}{3}x + 5$. What is the value of x for which $f(x) = 10$?
(A) 5
(B) 15
(C) 20
(D) 30
4. If $3x - 3 = 12$, what is the value of x ?
5. Which of the following is equivalent to $4x(x^2 - 3x)$?
(A) $4x^3 - 3x$
(B) $4x^3 - 12x^2$
(C) $4x^2 - 12x$
(D) $x^3 - 12x^2$
6. A bag contains 50 tokens. 20% of the tokens are blue. If 10 more blue tokens are added to the bag, what percentage of the total tokens are now blue?
(A) 25%
(B) 30%
(C) 33.3%
(D) 40%
7. In a right triangle, the length of the hypotenuse is 13 and the length of one leg is 5. What is the length of the other leg?
8. If $x^2 - 144 = 0$ and $x > 0$, what is the value of $x + 10$?
(A) 2

- (B) 12
- (C) 22
- (D) 154

9. A circle has a circumference of 18π . What is the area of the circle?

- (A) 9π
- (B) 18π
- (C) 36π
- (D) 81π

10. What is the y -intercept of the graph of $y = 3(2)^x + 4$ in the xy -plane?

11. If $2x + 3y = 13$ and $x - y = -1$, what is the value of x ?

- (A) 2
- (B) 3
- (C) 4
- (D) 5

12. A data set consists of the values 10, 10, 20, 30, 80. Which of the following will change the most if the value 80 is removed?

- (A) Mean
- (B) Median
- (C) Mode
- (D) Range

13. If $\sqrt{x+7} = 4$, what is the value of x ?

14. Which of the following lines is perpendicular to $y = \frac{2}{3}x - 4$?

- (A) $y = \frac{2}{3}x + 4$
- (B) $y = -\frac{2}{3}x - 4$
- (C) $y = \frac{3}{2}x - 4$
- (D) $y = -\frac{3}{2}x - 4$

15. A rectangle has a length of 10 and a width of 5. What is the perimeter of the rectangle?

16. If $f(x) = x^2 - 5x + 6$, what is the value of $f(-2)$?

- (A) 0
- (B) 4
- (C) 12
- (D) 20

17. A store offers a 15% discount on all items. If the original price of a shirt is P , which expression represents the sale price?

- (A) $0.15P$
- (B) $0.85P$
- (C) $1.15P$
- (D) $P - 15$

18. If $\tan \theta = 1$, what is the value of θ in degrees for an acute angle θ ?

19. If $x^2 + 10x + k = 0$ has exactly one real solution, what is the value of k ?

- (A) 5
- (B) 10
- (C) 25
- (D) 100

20. A box contains 4 red, 6 blue, and 10 yellow marbles. If a marble is drawn at random, what is the probability it is blue or red?

- (A) 0.2
- (B) 0.4
- (C) 0.5
- (D) 0.6

21. If $a + b = 10$ and $a^2 - b^2 = 40$, what is the value of $a - b$?

22. The average of 3, 5, 10, and x is 8. What is the value of x ?

- (A) 10
- (B) 12
- (C) 14
- (D) 16

Module 2

23. If $f(x) = a(x - 3)(x + 5)$ and the graph of f passes through $(0, -30)$, what is the value of a ?
- (A) 2
(B) 3
(C) 5
(D) 10
24. A circle in the xy -plane has equation $(x + 2)^2 + (y - 4)^2 = 36$. What is the radius of the circle?
25. In a right triangle ABC , $\sin A = \cos B$. If $\angle A = 2k + 10$ and $\angle B = 3k - 5$, what is the value of k ?
- (A) 15
(B) 17
(C) 18
(D) 20
26. If $\sqrt{2x + 1} = 5$, what is the value of x ?
27. A population grows at 12% every 4 hours. If the initial population is 500, which function $P(t)$ represents the population after t hours?
- (A) $P(t) = 500(1.12)^t$
(B) $P(t) = 500(1.12)^{4t}$
(C) $P(t) = 500(1.12)^{t/4}$
(D) $P(t) = 500(0.12)^{t/4}$
28. If $x^2 - 13x + 30 = 0$, what is the sum of the solutions?
29. The average of 10 numbers is M . If each number is increased by 5, what is the new average?
- (A) M
(B) $M + 5$
(C) $10M + 5$
(D) $M + 50$
30. A cylinder has radius r and height h . If the radius is doubled and height is halved, what is the ratio of the new volume to the original?
- (A) 1:1
(B) 2:1
(C) 4:1
(D) 1:2
31. What is the value of x such that $2(x + 4) = 3(x - 1)$?
32. Which of the following is a factor of $x^3 + 2x^2 - 15x$?
- (A) $x - 3$
(B) $x + 3$
(C) $x - 5$
(D) $x + 15$
33. If $\cos(x^\circ) = \sin(70^\circ)$, what is the value of x ?
34. A bag contains 5 red and n blue marbles. If the probability of drawing a red marble is $1/4$, what is n ?

- (A) 10
- (B) 15
- (C) 20
- (D) 25

35. What is the distance between the points $(0, 0)$ and $(3, 4)$ in the xy -plane?

36. If $f(x) = 2x^2 - 8x + 1$, what is the x -coordinate of the vertex of the parabola?

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

37. If $x + y = 12$ and $x^2 + y^2 = 80$, what is the value of xy ?

38. A sample of 400 students found 35% own a laptop, with a margin of error of 4%. Which percentage is plausible for the population?

- (A) 30%
- (B) 34%
- (C) 40%
- (D) 45%

39. In the xy -plane, the line $y = mx + b$ passes through $(1, 2)$ and $(3, 10)$. What is m ?

40. If $|2x - 5| = 7$, what is the positive solution for x ?

- (A) 1
- (B) 4
- (C) 6
- (D) 12

41. A sphere has a volume of 36π . What is the radius of the sphere?

42. Which of the following is equivalent to $\frac{x^2 - 25}{x + 5}$?

- (A) $x - 25$
- (B) $x + 5$
- (C) $x - 5$
- (D) 1

43. If $\tan \theta = 3/4$, what is the value of $\cos \theta$?

44. A rectangle has a diagonal of 10 and a width of 6. What is the area of the rectangle?

- (A) 24
- (B) 36
- (C) 48
- (D) 60

Answers and Detailed Solutions

1. **A**
Sol: $k = 21$. $2(21) - 10 = 32$.
2. **28**
Sol: $y = 7x$. For $x = 4$, $y = 28$.
3. **B**
Sol: $10 = \frac{1}{3}x + 5 \Rightarrow x = 15$.
4. **5**
Sol: $3x = 15 \Rightarrow x = 5$.
5. **B**
Sol: Distribute $4x$ to get $4x^3 - 12x^2$.
6. **C**
Sol: Initial blue = 10. New blue = 20, Total = 60. $20/60 = 33.3\%$.
7. **12**
Sol: $\sqrt{13^2 - 5^2} = 12$.
8. **C**
Sol: $x = 12$. $12 + 10 = 22$.
9. **D**
Sol: $r = 9$. Area = $\pi(9^2) = 81\pi$.
10. **7**
Sol: $y = 3(1) + 4 = 7$.
11. **A**
Sol: Sub $y = x + 1$ into 1st eq: $5x = 10 \Rightarrow x = 2$.
12. **D**
Sol: Range drops from 70 to 20, the largest change.
13. **9**
Sol: $x + 7 = 16 \Rightarrow x = 9$.
14. **D**
Sol: Negative reciprocal of $2/3$ is $-3/2$.
15. **30**
Sol: $2(10 + 5) = 30$.
16. **D**
Sol: $(-2)^2 - 5(-2) + 6 = 20$.
17. **B**
Sol: Sale price = $100\% - 15\% = 85\%$ of P .
18. **45**
Sol: $\tan(45^\circ) = 1$.
19. **C**
Sol: $100 - 4k = 0 \Rightarrow k = 25$.
20. **C**
Sol: $(4 + 6)/20 = 0.5$.
21. **4**
Sol: $a - b = 40/10 = 4$.
22. **14**
Sol: $18 + x = 32 \Rightarrow x = 14$.
23. **A**
Sol: $-30 = a(-3)(5) \Rightarrow a = 2$.
24. **6**
Sol: $r^2 = 36 \Rightarrow r = 6$.

25. **B**
Sol: $5k + 5 = 90 \Rightarrow 5k = 85 \Rightarrow k = 17$.
26. **12**
Sol: $2x + 1 = 25 \Rightarrow x = 12$.
27. **C**
Sol: Time t is divided by the interval 4.
28. **13**
Sol: Sum of roots $= -b/a = 13$.
29. **B**
Sol: If all values increase by 5, the mean increases by 5.
30. **B**
Sol: $V_2 = \pi(2r)^2(0.5h) = 2\pi r^2 h$. Ratio is 2:1.
31. **11**
Sol: $2x + 8 = 3x - 3 \Rightarrow x = 11$.
32. **A**
Sol: $x(x + 5)(x - 3)$. $x - 3$ is a factor.
33. **20**
Sol: $x = 90 - 70 = 20$.
34. **15**
Sol: $5/(5 + n) = 1/4 \Rightarrow n = 15$.
35. **5**
Sol: $\sqrt{3^2 + 4^2} = 5$.
36. **A**
Sol: $x = -b/2a = 8/4 = 2$.
37. **32**
Sol: $2xy = 144 - 80 = 64 \Rightarrow xy = 32$.
38. **B**
Sol: Plausible range is 35 ± 4 , so 34% is valid.
39. **4**
Sol: $m = (10 - 2)/(3 - 1) = 4$.
40. **6**
Sol: $2x - 5 = 7 \Rightarrow 2x = 12 \Rightarrow x = 6$.
41. **3**
Sol: $36\pi = 4/3\pi r^3 \Rightarrow r^3 = 27 \Rightarrow r = 3$.
42. **C**
Sol: $x^2 - 25 = (x - 5)(x + 5)$.
43. **0.8**
Sol: $\cos \theta = 4/5 = 0.8$.
44. **C**
Sol: Height $= \sqrt{10^2 - 6^2} = 8$. Area $= 8 \times 6 = 48$.