# SAT Mathematics Level 1 Practice Test

**There are 50 questions on this test. You have 1 hour (60 minutes) to complete it.**

1. The table below shows the 2010 human population and projected 2025 human population for different regions. In which region is the greatest percent increase predicted?

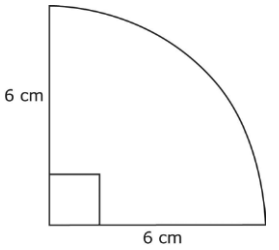
| **Region** | **2010** | **2025** |
|---|---|---|
| Africa | 1,033,043 | 1,400,184 |
| Asia | 4,166,741 | 4,772,523 |
| Latin America and the Caribbean | 588,649 | 669,533 |
| North America | 351,659 | 397,522 |
| Oceania | 35,838 | 42,507 |

(A) Africa (B) Asia (C) Latin America and the Caribbean
(D) North America (E) Oceania

2. $M(2,6)$ is the midpoint of $\overline{AB}$. If $A$ has coordinates (10,12), the coordinates of $B$ are

(A) (6,10) (B) (–6,0) (C) (–8,–4)
(D) (18,16) (E) (22,18)

3. When the figure below is spun around its vertical axis, the volume of the solid formed will be




(A) 9π (B) 36π (C) 72π (D) 144π (E) 288π

4. If $f(x) = \frac{x^2 + x - 6}{x^2 + 6x + 8}$, $f(2)$ =

(A) 0 (B) 5.75 (C) 6.25 (D) 24.5 (E) Undefined

5. A high school musical production sells student tickets for $5 each and adult tickets for $8 each. If the ratio of adult to student tickets purchases is 3:1, what is the average income per ticket sold?

(A) $5.50 (B) $5.75 (C) $6.50 (D) $7.25 (E) $14.50

6. Due to poor economic conditions, a company had to lay off 20% of its workforce. When the economy improved, it was able to restore the number of employees to its original number. By what percent was the depleted workforce increased in order to return to the original number of employees?

(A) 20 (B) 25 (C) 80 (D) 120 (E) 125

7. A value $z$ is multiplied by $\frac{1}{3}$, $\frac{1}{2}$ is subtracted from the result, and the square root of the end result is 4. What was the original number?

(A) $\frac{1}{2}$ (B) $5\frac{1}{6}$ (C) $15\frac{1}{2}$ (D) 16 (E) $49\frac{1}{2}$

8. If two fair dice are rolled, what is the probability that the sum of the dice is at most 5?

(A) $\frac{5}{36}$ (C) $\frac{1}{0}$ (D) $\frac{26}{36}$ (E) $\frac{30}{36}$

(B) $\frac{36}{36}$

9. If $\frac{5}{8}x + \frac{2}{3} = \frac{7}{12}$, then $\frac{1}{2}x =$

(A) $\frac{-1}{15}$ (B) $\frac{-2}{15}$ (C) 1 (D) 2 (E) 4

10. $\left(\frac{x^2 - 2x - 8}{x^2 - 4}\right) \div \left(\frac{6 - 3x}{20 - 5x}\right) =$

(A) $\frac{-3}{5}$ (B) $\frac{3}{5}$ (C) $\frac{3(x+4)(2-x)}{5(x+2)(4-x)}$

(D) $\frac{3(x+4)(x-2)}{5(x+2)(x-4)}$ (E) $\frac{3(x+4)}{5(4-x)}$

11. If $i^2 = -1$, then $(5 + 6i)^2 =$

(A) –11 (B) $-11 + 11i$ (C) $-11 + 30i$ (D) $-11 + 60i$
(E) 61

12. The mean of 48, 27, 36, 24, $x$, and $2x$ is 37. $x =$

(A) $13\frac{1}{3}$ (B) $16\frac{2}{3}$ (C) 29 (D) $33\frac{3}{4}$ (E) 40

13. $\sqrt[3]{32x^6y^8}$ =

(A) $4x^3y^4\sqrt[3]{2}$ (B) $2x^2y^4\sqrt[3]{4}$ (C) $2x^2y^3\sqrt[3]{4y^2}$

(D) $2x^2y^2\sqrt[3]{4y^2}$ (E) $2x^2y^3\sqrt[3]{2y^2}$

14. A circle is inscribed in a square of side length 6. The area of the region inside the square but outside the circle is

(A) 36π (B) 36π − 9 (C) 36π − 36
(D) 36 − 9π (E) 9π − 36

15. If the binary operation $a \# b = a^b - \sqrt{b}$, then $(2 \# 4) - (4 \# 2) =$

(A) –32 (B) $\sqrt{2} - 2$ (C) 0 (D) $\sqrt{2} - 2$ (E) 32

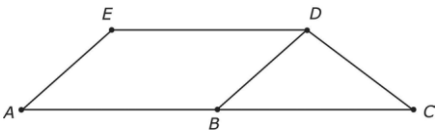
16. Of the 45 countries in Europe, 7 get 100% of their natural gas from Russia, and 6 get 50% of their natural gas from Russia. If 25% of all the natural gas imported into Europe comes from Russia, what is the average percent of imported natural gas from Russia for the remaining countries in Europe?

(A) 3.9% (B) 20% (C) 25% (D) 75% (E) 78.1%

17. $A(-3,9)$ and $B(9,-1)$ are the endpoints of the diameter of a circle. The equation for this circle is

(A) $(x-3)^2 + (y-4)^2 = 61$ (B) $(x-7)^2 + (y+4)^2 = 269$
(C) $(x+7)^2 + (y-4)^2 = 61$ (D) $(x+3)^2 + (y+4)^2 = 169$
(E) $(x+3)^2 + (y-4)^2 = 25$

18. Isosceles trapezoid $ACDE$ with $\overline{AC} \parallel \overline{DE}$ is shown below. $E$ is the midpoint of $AB$, and $BD = DC$ and $BC = DE$.




The ratio of the area of triangle $BDC$ to trapezoid $ACDE$ is

(A) 1:2 (B) 1:3 (C) 1:4 (D) 1:5 (E) 1:6

19. If $3\begin{bmatrix} 2 & 3 \\ 4 & 1 \end{bmatrix} - 2\begin{bmatrix} x & y \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} 10 & 11 \\ z & -5 \end{bmatrix}$, then $x + y - z =$

(A) –21 (B) –15 (C) 0 (D) 15 (E) 21

20. If $f(x) = 5x + 3$ and $g(x) = x^2 - 1$, then $f(g(2)) =$

(A) 3 (B) 13 (C) 18 (D) 39 (E) 168

21. Chords $\overline{AB}$ and $\overline{CD}$ of circle $O$ intersect at point $E$. If $CE = 3$, $ED = 12$, and $AE$ is 5 units longer than $EB$, $AB =$

(A) 4 (B) 9 (C) 11 (D) 13 (E) 18

22. Which is the equation of the line perpendicular to $4x - 5y = 17$ that passes through the point (5,2)?

(A) $4x - 5y = 10$ (B) $5x + 4y = 33$ (C) $4x + 5y = 30$

(D) $5x - 4y = 17$ (E) $y = \frac{-5}{4}x + \frac{15}{2}$

23. A stone is thrown vertically into the air from the edge of a building with height 12 meters. The height of the stone is given by the formula $h = -4.9t^2 + 34.3t + 12$. What is the maximum height, in meters, of the stone?

(A) 3.5 (B) 12 (C) 72.025 (D) 114.9 (E) 468.2

24. In $\triangle ABC$, $AB = 40$, the measure of angle $B = 50°$, and $BC = 80$. The area of $\triangle ABC$ to the nearest integer is

(A) 613 (B) 1024 (C) 1226 (D) 2240 (E) 2252

25. If $\frac{a+b}{2} = 4$, and $a$ and $b$ are non-negative integers, which of the following cannot be a value of $ab$?

(A) 0 (B) 7 (C) 14 (D) 15 (E) 16

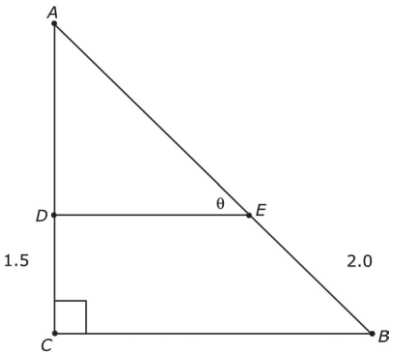
26. The perpendicular bisector of the segment with endpoints (3,5) and (–1,–3) passes through

(A) (–5,2) (B) (–5,3) (C) (–5,4)
(D) (–5,5) (E) (–5,6)

27. The difference between the product of the roots and the sum of the roots of the quadratic equation $6x^2 - 12x + 19 = 0$ is

(A) $\frac{7}{6}$ (B) $\frac{31}{6}$ (C) $\frac{7}{12}$ (D) $\frac{31}{12}$ (E) $-\frac{7}{6}$

28. In right triangle $ABC$, $\overline{DE} \parallel \overline{BC}$, $CD = 1.5$, and $BE = 2.0$.




The sine of angle $\theta$ is equal to

(A) $\frac{1}{2}$ (B) $\frac{3}{4}$ (C) $\frac{\sqrt{2}}{2}$ (D) $\frac{\sqrt{3}}{2}$ (E) $\frac{3}{5}$

29. $QUEST$ is a pentagon. The measure of angle $Q = 3x - 20$, the measure of angle $U = 2x + 50$, the measure of angle $E = x + 30$, the measure of angle $S = 5x - 90$, and the measure of angle $T = x + 90$. Which two angles have equal measures?

(A) $E$ and $S$ (B) $Q$ and $U$ (C) $U$ and $T$
(D) $T$ and $E$ (E) $U$ and $E$

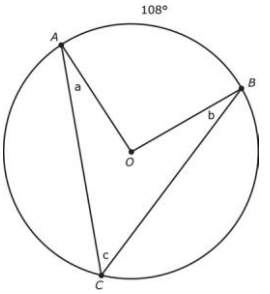
30. The vertices of triangle $PQR$ are $P(-3,2)$, $Q(1,-4)$, and $R(7,0)$. The altitude drawn from $Q$ intersects the line $PR$ at the point

(A) (1,2) (B) (2,1) (C) ( 1,–2)
(D) (–3,2) (E) (7,0)

31. If $q$ is a positive integer > 1 such that $q^{3n^{2-n-4}} = 1$, $n =$

(A) 1 (B) –1 (C) $1, \frac{-4}{3}$ (D) $-1, \frac{4}{3}$ (E) $\frac{1 \pm i\sqrt{47}}{6}$

32. The measure of arc $AB$ in circle $O$ is 108°.




$\frac{a+b+c}{3}$ =

(A) 18 (B) 27 (C) 36 (D) 45 (E) 54

33. Alex observed that the angle of elevation to the top of 800-foot Mount Colin was 23°. To the nearest foot, how much closer to the base of Mount Colin must Alex move so that his angle of elevation is doubled?

(A) 200 (B) 400 (C) 489 (D) 1112 (E) 1600

34. If $f(x) = \frac{x^2+x-6}{x^2-6x+8}$, solve $f(x) = 3$.

(A) {–5, –1} (B) {2, 7.5} (C) $\left\{\frac{1+3\sqrt{7}}{2}, \frac{1-3\sqrt{7}}{2}\right\}$

(D) $\left\{\frac{17+\sqrt{73}}{6}, \frac{17-\sqrt{73}}{6}\right\}$ (E) $\varnothing$

35. In $\triangle QRS$, $X$ is on $\overline{QR}$ and $Y$ is on $\overline{QS}$, so that $\overline{XY} \parallel \overline{RS}$ and $\frac{QX}{XR} = \frac{1}{4}$. The ratio of the area of $\triangle QXY$ to the area of trapezoid $XYSR$ is

(A) 1:4 (B) 1:15 (C) 1:16 (D) 1:24 (E) 1:25

36. In quadrilateral $KLMN$, $KL = LM$, $KN = MN$, and diagonals $\overline{KM}$ and $\overline{NL}$ intersect at $P$. If $KP = PM$, then which of the following statements is true?

I. $NP = PL$.
II. $KLMN$ is a rhombus.
III. The area of $KLMN$ is $\frac{1}{2}(KM)(NL)$.

(A) I only (B) II only (C) III only
(D) II and III only (E) I and III only

37. If $7x + 9y = 86$ and $4x - 3y = -19$, $x + 4y =$

(A) $-31\frac{18}{19}$ (B) $22\frac{1}{3}$ (C) $31\frac{18}{19}$ (D) 35 (E) 105

38. The solution set to $10x^2 + 11x - 6 \leq 0$ is

(A) $-0.4 \leq x \leq 1.5$ (B) $-1.5 \leq x \leq 0.4$ (C) $x \leq -0.4$ or $x \geq 1.5$

(D) $x \leq -1.5$ or $x \geq 0.4$ (E) $-1.5 \leq x \leq -0.4$

39. In simplest form, $\frac{2 - \frac{1}{x-3}}{1 - \frac{1}{3-x}}$ is equivalent to

(A) $\frac{2x-7}{x-2}$ (B) $\frac{7-2x}{x-2}$ (C) $\frac{2x-5}{x-2}$

(D) $\frac{2x+7}{x-2}$ (E) 1

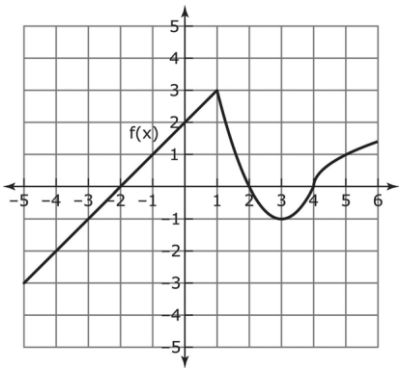
40. In right triangle $QRS$, $QR$ is perpendicular to $RS$, $QR = 12$, and $RS = 12\sqrt{3}$. The area of the circle that circumscribes triangle $QRS$ is

(A) 108π (B) 144π (C) 288π (D) 576π (E) 1728π

41. The solution set for the equation $|2x - 1| - |x + 2| = 5$ is

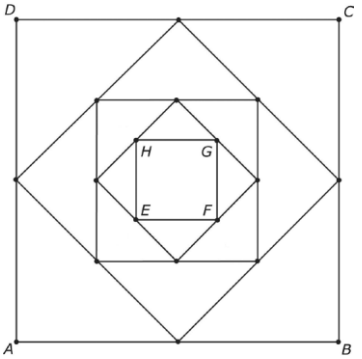
(A) {–2} (B) {3} (C) {8} (D) {3, –7} (E) {–2, 8}

42. Given the graph of $f(x)$ below, let $g(x) = f(x-2) + 1$. For what set of values of will $g(x) = 0$?




(A) {–2, 2, 4} (B) {0, 4, 6} (C) {–4, 2}
(D) {–1, 5} (E) ∅

43. Square $ABCD$ has sides with length 20. Each of the smaller figures is formed by connecting midpoints of the next larger figure.




What is the area of $EFGH$?

(A) $\frac{25}{64}$ (B) $\frac{25}{16}$ (C) $\frac{25}{4}$ (D) 25 (E) 100

44. Which of the statements about the graphs of $f(x) = \frac{x^2 - x - 6}{x - 3}$ and $g(x) = x + 2$ are true?

I. $f(x) + g(x) = 2x + 4$

II. They intersect at one point

III. They are the same except for one point

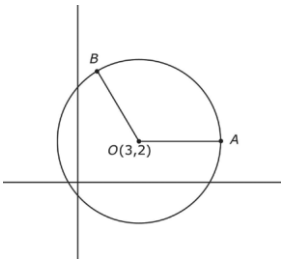
(A) I only (B) II only (C) III only
(D) I and III only (E) II and III only

45. A 25-foot ladder leans against a building. As the bottom of the ladder at point $A$ slides away from the building, the top of the ladder, $B$, slides from a height of 24 feet above the ground to a height of 16 feet. How many feet did the bottom of the ladder slide?

(A) 7 (B) 8 (C) 9 (D) 12.2 (E) 19.2

46. In parallelogram $ABCD$, $W$ is the midpoint of $\overline{AD}$, and $X$ is the midpoint of $\overline{BC}$. $\overline{CW}$ and $\overline{DX}$ are drawn and intersect at point $E$. What is the ratio of the area of $\triangle DEW$ to the area of $ABCD$?

(A) 1:2 (B) 1:4 (C) 1:6 (D) 1:8 (E) 1:16




47. Point $O$ (3,2) is the center of a circle with radius 4. $\overline{OA}$ is parallel to the $x$-axis and $m\angle AOB = 120$ degrees. To the nearest tenth, the $y$-coordinate of point $B$ is

(A) 3.5 (B) 4.0 (C) 5.5 (D) 6.6 (E) 6.9

48. The vertices of $\triangle ABC$ have coordinates $A(-7,3)$, $B(-1,0)$, and $C(-2,8)$. The coordinates of the center of the circumscribed circle are

(A) $\left(-3, 3\frac{1}{2}\right)$ (B) $\left(-2\frac{5}{6}, 3\frac{5}{6}\right)$ (C) $\left(-1\frac{1}{2}, 4\right)$

(D) $\left(-4, 1\frac{1}{2}\right)$ (E) $\left(-\frac{1}{2}, 4\frac{1}{2}\right)$

49. Each side of the base of a square pyramid is increased in length by 25%, and the height of the pyramid is decreased by $x$%, so that the volume of the pyramid is unchanged. $x$ =

(A) 20 (B) 25 (C) 36 (D) 50 (E) 64

50. If $f(x) = \frac{2x-1}{x+2}$, then $f(f(x))$ =

(A) $\frac{4x^2 - 4x + 1}{x^2 + 4x + 4}$ (B) $\frac{3x-4}{4x+3}$ (C) $\frac{4x+3}{3x-4}$

(D) $\frac{3x}{4x+3}$ (E) $\frac{3x+1}{4x+3}$