

Chapter Standardized Test

TEST-TAKING STRATEGY The mathematical portion of the SAT is based on concepts and skills taught in high school mathematics courses. The best way to prepare for the SAT is to keep up with your day-to-day studies.

1. **MULTIPLE CHOICE** What is the value of -4^0 ?

- (A) 4 (B) 1 (C) 0
(D) -1 (E) -4

2. **MULTIPLE CHOICE** What is the value of $f(x) = 7x^4 - 3x^3 + 8x^2 + x - 9$ when $x = -1$?

- (A) 8 (B) 4 (C) 2
(D) -8 (E) -14

3. **MULTIPLE CHOICE** Which statement about the end behavior of the graph of $f(x) = x^4 + 1$ is true?

- (A) $f(x) \rightarrow +\infty$ as $x \rightarrow -\infty$.
(B) $f(x) \rightarrow +\infty$ as $x \rightarrow 0$.
(C) $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$.
(D) $f(x) \rightarrow -\infty$ as $x \rightarrow 0$.
(E) $f(x) \rightarrow -\infty$ as $x \rightarrow +\infty$.

4. **MULTIPLE CHOICE** For 1992 through 1995, the number of grocery stores in the United States can be modeled by $G = 0.03t^2 - 1.5t + 171$, where G is the number of stores in thousands and t is the number of years since 1990. The average sales per grocery store can be modeled by $S = 4.7t^2 + 49.1t + 2009$, where S is sales in thousands of dollars. What were the approximate total sales in millions of dollars for grocery stores in the United States in 1994?

- (A) 3.8×10^{-1} (B) 3.8×10^1
(C) 3.8×10^5 (D) 3.8×10^8
(E) 3.8×10^{11}

5. **MULTIPLE CHOICE** Which polynomial has the factorization $(2x + 1)(4x^2 - 2x + 1)$?

- (A) $2x^3 - 1$ (B) $8x^3 - 1$
(C) $2x^3 + 1$ (D) $4x^3 + 1$
(E) $8x^3 + 1$

6. **MULTIPLE CHOICE** What are all the *real* solutions of the equation $x^5 = 256x$?

- (A) 0, ± 4 (B) 4, -4 (C) $\pm 4, \pm 4i$
(D) 0, $\pm 4i$ (E) 0, $\pm 4, \pm 4i$

7. **MULTIPLE CHOICE** What is the quotient of $(4x^3 - 11x^2 - 9x - 5) \div (x - 4)$?

- (A) $4x^3 + 5x^2 + 11x + 39$
(B) $4x^2 + 5x + 11 + \frac{39}{x - 4}$
(C) $4x^2 + 5x + 11 + \frac{39}{4x^3 - 11x^2 - 9x - 5}$
(D) $4x^2 - 27x + 99 - \frac{401}{x - 4}$
(E) $4x^2 - 27x + 99 - \frac{401}{x + 4}$

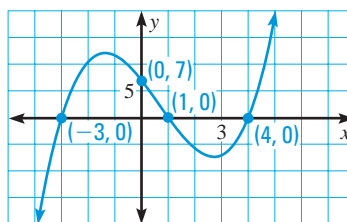
8. **MULTIPLE CHOICE** What are all the rational zeros of $f(x) = x^3 - 8x^2 + x + 42$?

- (A) -2, -3, -7 (B) 2, 3, 7
(C) 2, -3, -7 (D) 0, 6, 7
(E) -2, 3, 7

9. **MULTIPLE CHOICE** How many zeros does the function $f(x) = -3x^4 + x + 2$ have?

- (A) 0 (B) 1 (C) 2
(D) 3 (E) 4

10. **MULTIPLE CHOICE** Which function is graphed?



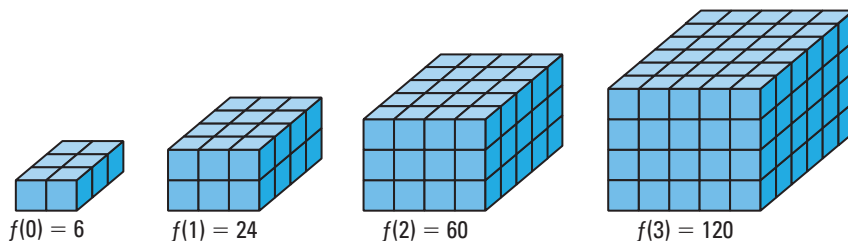
- (A) $f(x) = (x + 3)(x - 1)(x - 4)$
(B) $f(x) = 7(x + 3)(x - 1)(x - 4)$
(C) $f(x) = \frac{7}{12}(x - 3)(x + 1)(x + 4)$
(D) $f(x) = \frac{7}{12}(x + 3)(x - 1)(x - 4)$
(E) $f(x) = -\frac{7}{12}(x + 3)(x - 1)(x - 4)$

QUANTITATIVE COMPARISON In Exercises 11 and 12, choose the statement that is true about the given quantities.

- (A) The quantity in column A is greater.
- (B) The quantity in column B is greater.
- (C) The two quantities are equal.
- (D) The relationship cannot be determined from the given information.

| | Column A | Column B |
|-----|----------------------------------|--|
| 11. | x^{-2} | x^2 |
| 12. | Degree of $f(x) = x^4 - 7x + 13$ | Degree of $f(x) = 4x^3 + 2x^2 - x + 1$ |

13. **MULTI-STEP PROBLEM** You are designing a monument for the city park. The monument is to be a rectangular prism with dimensions $x + 1$ feet, $x - 5$ feet, and $x - 6$ feet.
- Write a function $f(x)$ for the volume of the monument.
 - Use a graphing calculator to graph $f(x)$ for $-10 \leq x \leq 20$.
 - Writing* Look back at your graph from part (b). Identify the local maximums and local minimums. Do these values represent maximum and minimum possible volumes of the monument? Explain.
 - If the volume of the monument is to be 220 cubic feet, what will the dimensions be?
14. **MULTI-STEP PROBLEM** The numbers in the table give the volumes of the first six prisms in a sequence.



| | | | | | | |
|----------------|---|----|----|-----|-----|-----|
| Prism (n) | 0 | 1 | 2 | 3 | 4 | 5 |
| Volume, $f(n)$ | 6 | 24 | 60 | 120 | 210 | 336 |

- Use finite differences to determine the degree of f .
- Use a system of equations to find a polynomial model for $f(n)$ in standard form.
- Writing* Factor the polynomial. Explain how the factors are related to the dimensions of the prism.
- Use your model to find the volume of the 50th prism in the sequence.
- Sketch a graph of your model and label the points that represent the first six prisms. What is the domain of the function?