Date Completed: _____
Mentor Initials: _____

Choose Values

1. For all nonzero values a and b, the value of which of the following expressions is always positive?

A) $-|a| + |b|$
B) $|a| - |b|$
C) $-3|a| + |b|$
D) $(ab)^4$

2. If $a, b,$ and c are positive integers such that $a^b = x$ and $c^b = y$, then which of the following is equivalent to $\frac{x}{y}$?

A) $\left(\frac{a}{c}\right)^b$
B) $\frac{a}{c}$
C) $\left(\frac{a}{c}\right)^{2b}$
D) 1

3. If a and b are odd integers, then which of the following also produces an odd integer?

A) $a + b$
B) $a - b$
C) $2ab$
D) ab

4. Which of the following expressions, if any, are equal for all real numbers x?

I. $\sqrt{x^4}$
II. $(-x)^2$
III. $(-|x|)^2$

A) I and II only
B) I and III only
C) II and III only
D) I, II, and III

5. Clara's personal record for the high jump increased by 10% during her first year on the track team and then increased by 25% during her second year after she began a new training regimen. By what percent did her personal record for the high jump increase over those two years?

A) 37.5%
B) 35%
C) 25%
D) 15%

6. Let a equal $3b + 2c - 7$. What happens to the value of a if the values of b and c both increase by 2?

A) It increases by 4
B) It increases by 10
C) It remains the same.
D) Cannot be determined from the given information.

7. Which of the following expressions is equivalent to $\frac{a^2+11a+18}{a+5}$?

A) $a + 6 - \frac{12}{a+5}$
B) $a + 6 + \frac{48}{a+5}$
C) $a + 16 - \frac{12}{a+5}$
D) $a + 16 + \frac{48}{a+5}$

8. $$\frac{x-4}{x^2-4^2}$$

Which of the following is equivalent to the expression above where $x > 4$?

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

9. Which of the following inequalities is false for all positive integers n?

A) $n \geq n^2$
B) $n \leq \sqrt{n}$
C) $n \geq (n+1)^3$
D) $n \geq \sqrt{n+1}$

10. The set of all values of y that satisfies $|y+3| < 6$ is the same as the set of all values of y that satisfies:

A) $0 < y < 3$
B) $0 < y < 9$
C) $-9 < y < 3$
D) $-9 < y < 9$

11. For every pair of real numbers w and z such that $wz = 0$ and $\frac{w}{z} = 0$, which of the following statements is true?

A) $w \neq 0$ and $z \neq 0$
B) $w = 0$ and $z \neq 0$
C) $w \neq 0$ and $z = 0$
D) None of the statements is true for every such pair of real numbers w and z.

12. $$B(h) = 30(3)^h$$

The function $B(h)$ models the number of gallons of a fluid in a tank after h hours. Which of the following models the number of gallons of the fluid in the tank after m minutes?

A) $B(m) = 30(3)^m$
B) $B(m) = 30(3)^{\frac{m}{60}}$
C) $B(m) = 30(3)^{60m}$
D) $B(m) = 30(3)^{\frac{60}{m}}$

13. Which of the following represents the positive number q increased by 7%?

A) $.07q$
B) $1.07q$
C) $7q$
D) $100q$

14. $x^4 - 18x^2 + 81$

Which of the following is equivalent to the expression above?

A) $(x-3)^4$
B) $(x-9)^4$
C) $(x^2+9)(x+3)(x-3)$
D) $(x-3)^2(x+3)^2$

15. During an ice age, the average annual global temperature was at least 40 degrees Fahrenheit lower than the modern average. If the average annual temperature of an ice age is a degrees Fahrenheit and the modern average annual temperature is b degrees Fahrenheit, which of the following must be true?

A) $a \leq b - 40$
B) $a \geq b - 40$
C) $a \geq b + 40$
D) $a \leq b + 40$