Elementary Algebra

A total of 12 questions of three types are administered in this test.

- The first type involves operations with integers and rational numbers, and includes computation with integers and negative rationals, the use of absolute values, and ordering.

- The second type involves operations with algebraic expressions using evaluation of simple formulas and expressions, and adding and subtracting monomials and polynomials. Questions involve multiplying and dividing monomials and polynomials, the evaluation of positive rational roots and exponents, simplifying algebraic fractions, and factoring.

- The third type of question involves translating written phrases into algebraic expressions and solving equations, inequalities, word problems, linear equations and inequalities, quadratic equations (by factoring), and verbal problems presented in an algebraic context.

1. If A represents the number of apples purchased at 15 cents each, and B represents the number of bananas purchased at 10 cents each, which of the following represents the total value of the purchases in cents?
   A. A + B
   B. 25(A + B)
   C. 10A + 15B
   D. 15A + 10B

$$15A + 10B$$
Total Cost

2. $\sqrt{2} \times \sqrt{15} = ?$
   A. 17
   B. 30
   C. $\sqrt{30}$
   D. $\sqrt{17}$

$$1\sqrt{2} + 1\sqrt{2} = 2\sqrt{2}$$

$$\sqrt{2} \cdot \sqrt{15} = \sqrt{2 \cdot 15} = \sqrt{30}$$

3. What is the value of the expression $2x^2 + 3xy - 4y^2$ when $x =$ 2 and $y = -4$?

A. -80
B. 80
C. -32
D. 32

$$2(2)^2 + 3(2)(-4) - 4(-4)^2$$
$$2(4) + 3(-8) - 4(16)$$
$$8 \quad -24 \quad -64 = \boxed{-80}$$

4. In the figure below, both circles have the same center, and the radius of the larger circle is R. If the radius of the smaller circle is 3 units less than R, which of the following represents the area of the shaded region?

A. πR^2
B. $\pi(R-3)^2$
C. $\pi R^2 - \pi \times 3^2$
D. $\pi R^2 - \pi(R-3)^2$

$$Area = \pi r^2$$

Area Large Circle $= \pi R^2$

Area Small Circle $= \pi(R-3)^2$

Area Shaded Part $= \pi R^2 - \pi(R-3)^2$

5. $(3x - 2y)^2 =$

A. $9x^2 - 4y^2$
B. $9x^2 + 4y^2$
C. $9x^2 + 4y^2 - 6xy$
D. $9x^2 + 4y^2 - 12xy$

$$(3x - 2y)(3x - 2y)$$

F $\quad (3x)(3x) = 9x^2$

O $\quad (3x)(-2y) = -6xy$

I $\quad (-2y)(3x) = -6xy$ $\Bigg\}$ $-12xy$

L $\quad (-2y)(-2y) = 4y^2$

$$(-2y)(-2y) = 4y^2$$

$$9x^2 - 12xy + 4y^2$$

6. If $x > 2$, then $\frac{x^2 - x - 6}{x^2 - 4} =$

  A. $\frac{x-3}{2}$

  B. $\frac{x-3}{x-2}$

  C. $\frac{x-3}{x+2}$

  D. $\frac{3}{2}$

$$x^2 - x - 6 = \frac{(x-3)(x+2)}{}$$
$$x^2 - 4 = (x-2)(x+2)$$

7. $\frac{4-(-6)}{-5} =$

  A. $\frac{2}{5}$

  B. $-\frac{2}{5}$

  C. 2

  D. -2

$$4 - (-6) = 4 + 6 = 10$$

$$\frac{10}{-5} = -2$$

8. If $2x - 3(x + 4) = -5$, then $x =$

  A. 7

  B. -7

  C. 17

  D. -17

$$2x - 3(x + 4) = -5$$

$$2x - 3x - 12 = -5$$

$$-x - 12 = -5$$
$$+12 \quad +12$$

$$\frac{-x}{-1} = \frac{7}{-1}$$

$$x = -7$$

9. $-3(5 - 6) - 4(2 - 3) =$
   A. -7
   B. 7
   C. -1
   D. 1

$$-3(5-6) - 4(2-3)$$
$$-3(-1) - 4(-1)$$
$$3 + 4 = 7$$

10. Which of the following expressions is equivalent
    to $20 - \frac{4}{5}x \geq 16$?
    A. $x \leq 5$
    B. $x \geq 5$
    C. $x \geq 32\frac{1}{2}$
    D. $x \leq 32\frac{1}{2}$

$$20 - \frac{4}{5}x \geq 16$$
$$-20 \qquad\qquad -20$$

$$\frac{-\frac{4}{5}x}{-\frac{4}{5}} \geq \frac{-4}{-\frac{4}{5}}$$

$$x \leq \frac{-4}{1} \cdot \frac{-5}{4}$$

$$x \leq \frac{5}{1}$$

$$x \leq 5$$