

**M3**

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## **ALGEBRA**

The Algebra Placement Test is composed of items from three curricular areas:

- elementary algebra
- intermediate algebra

Each of these three areas is further subdivided into a number of more specific content areas. Overall, the Algebra Placement Test includes items from more than 20 content areas; however, the majority of test questions fall within the following eight content areas:

- 1) Substituting Values into Algebraic Expressions
- 2) Setting Up Equations for Given Situations
- 3) Basic Operations with Polynomials
- 4) Factoring Polynomials
- 5) Linear Equations in One Variable
- 6) Exponents and Radicals
- 7) Rational Expressions
- 8) Linear Equations in Two Variables

## **SAMPLE PROBLEMS**

### **ELEMENTARY ALGEBRA: Linear Equations in One Variable**

1. A student has earned scores of 87, 81, and 88 on the first 3 of 4 tests. If the student wants an average (arithmetic mean) of exactly 87, what score must she earn on the fourth test?
  - A) 85
  - B) 86
  - C) 87
  - D) 92
  - E) 93

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## ELEMENTARY ALGEBRA: Basic Operations with Polynomials

2. Which of the following expressions represents the product of 3 less than twice  $x$  and 2 more than the quantity 3 times  $x$ ?

- A)  $-6x^2 + 25x + 6$
- B)  $6x^2 + 5x + 6$
- C)  $6x^2 - 5x + 6$
- D)  $6x^2 - 5x - 6$
- E)  $6x^2 - 13x - 6$

## ELEMENTARY ALGEBRA: Substituting Values into Algebraic Expressions

3. If  $x = -1$  and  $y = 2$ , what is the value of the expression  $2x^3 - 3xy$ ?

- A) 8
- B) 4
- C) -1
- D) -4
- E) -8

## INTERMEDIATE ALGEBRA: Rational Expressions

4. For all  $r \neq \pm 2$ ;  $\frac{r^2 - 5r + 6}{r^2 - 4} = ?$

- A)  $\frac{r-3}{r+2}$
- B)  $\frac{r-2}{r+2}$
- C)  $\frac{r-2}{r+3}$
- D)  $\frac{r+3}{r-2}$
- E)  $\frac{r+3}{r+2}$

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**ANSWERS:**

1) D

2) D

3) B

4) A

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## MORE ALGEBRA EXAMPLES

1. If  $x = -3$ , what is the value of  $\frac{x^2-1}{x+1}$ ?

- A) -4
- B) -2
- C) 2
- D)  $3\frac{2}{3}$
- E) 5

2. Doctors use the term *maximum heart rate (MHR)* when referring to the quantity found by starting with 220 beats per minute and subtracting 1 beat per minute for each year of a person's age. Doctors recommend exercising 3 or 4 times each week for at least 20 minutes with your heart rate increased from its *resting heart rate (RHR)* to its *training heart rate (THR)*, where

$$THR = RHR + .65(MHR - RHR)$$

Which of the following is closest to the *THR* of a 43-year-old person whose *RHR* is 54 beats per minute?

- A) 197
- B) 169
- C) 162
- D) 134
- E) 80

3. When getting into shape by exercising, the subject's maximum recommended number of heartbeats per minute ( $h$ ) can be determined by subtracting the subject's age ( $a$ ) from 220 and then taking 75% of that value. This relation is expressed by which of the following formulas?

- A)  $h = .75(220 - a)$
- B)  $h = .75(220) - a$
- C)  $h = 220 - .75a$
- D)  $.75h = 220 - a$
- E)  $220 = .75(h - a)$

4. An airplane flew for 8 hours at an airspeed of  $x$  miles per hour (mph), and for 7 more hours at 325 mph. If the average airspeed for the entire flight was 350 mph, which of the following equations could be used to find  $x$ ?

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- A)  $x + 325 = 2(350)$
- B)  $x + 7(325) = 15(350)$
- C)  $8x - 7(325) = 350$
- D)  $8x + 7(325) = 2(350)$
- E)  $8x + 7(325) = 15(350)$

5. Which of the following is equivalent to  $3a + 4b - (-6a - 3b)$ ?

- A)  $16ab$
- B)  $-3a + b$
- C)  $-3a + 7b$
- D)  $9a + b$
- E)  $9a + 7b$

6. What is the sum of the polynomials  $3a^2b + 2a^2b^2$  and  $-ab^2 + a^2b^2$ ?

- A)  $3a^2b - ab^2 + 3a^2b^2$
- B)  $3a^2b - ab^2 + 2a^2b^2$
- C)  $2a^2b + 3a^2b^2$
- D)  $2a^2b^3 + 2a^4b^4$
- E)  $-3a^3b^3 + 2a^4b$

7. Which of the following is a factor of the polynomial  $x^2 - x - 20$ ?

- A)  $x - 5$
- B)  $x - 4$
- C)  $x + 2$
- D)  $x + 5$
- E)  $x + 10$

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8. Which of the following is a factor of  $x^2 - 5x - 6$ ?

- A)  $(x + 2)$
- B)  $(x - 6)$
- C)  $(x - 3)$
- D)  $(x - 2)$
- E)  $(x - 1)$

9. If  $2(x - 5) = -11$ , then  $x = ?$

- A)  $-\frac{21}{2}$
- B)  $-8$
- C)  $-\frac{11}{2}$
- D)  $-3$
- E)  $-\frac{1}{2}$

10. If  $\frac{4}{5} + (-\frac{3}{10}) = x + 1\frac{1}{2}$ , then  $x = ?$

- A) 2
- B) 1
- C) -1
- D) -2
- E) -10

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11. For all nonzero  $r$ ,  $t$ , and  $z$  values,  $\frac{16r^3tz^5}{-4rt^3z^2} = ?$

- A)  $-\frac{4z^3}{r^2t^2}$
- B)  $-\frac{4r^2z^3}{t^2}$
- C)  $-\frac{4rz}{t}$
- D)  $-4r^4t^4z^7$
- E)  $-4r^2t^2z^3$

12. For all  $x > 0$  and  $y > 0$ , the radical expression  $\frac{\sqrt{x}}{3\sqrt{x}-\sqrt{y}}$  is equivalent to:

- A)  $\frac{3x-\sqrt{xy}}{9x+y}$
- B)  $\frac{3x-\sqrt{xy}}{3x+y}$
- C)  $\frac{3x+\sqrt{xy}}{9x-y}$
- D)  $\frac{3x+\sqrt{xy}}{3x-y}$
- E)  $\frac{x}{3x-y}$

13. For all  $x \neq -4$ , which of the following is equivalent to the expression below?

$$\frac{x^2 + 12x + 32}{x + 4}$$

- A)  $x + 3$
- B)  $x + 8$
- C)  $x + 11$
- D)  $x + 16$
- E)  $x + 28$



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14. Which of the following is a simplified expression equal to  $\frac{9-x^2}{x-3}$ ; for all  $x < -3$ ?

- A)  $3x$
- B)  $x+3$
- C)  $x-3$
- D)  $-x+3$
- E)  $-x-3$

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## CORRECT ANSWERS FOR SAMPLE ALGEBRA ITEMS

<b>Item Number</b>	<b>Correct Answer</b>	<b>Content Category</b>
1	A	Substituting Values into Algebraic Expressions
2	D	Substituting Values into Algebraic Expressions
3	A	Setting Up Equations for Given Situations
4	E	Setting Up Equations for Given Situations
5	E	Basic Operations with Polynomials
6	A	Basic Operations with Polynomials
7	A	Factoring Polynomials
8	B	Factoring Polynomials
9	E	Linear Equations in One Variable
10	C	Linear Equations in One Variable
11	B	Exponents
12	C	Exponents
13	B	Rational Expressions
14	E	Rational Expressions

**Additional practice with Algebra**

<http://www.algebrahelp.com/>

*Check out the lessons and worksheets*