This is a practice exam for Sacramento State’s Intermediate Algebra Diagnostic Exam (IAD). The IAD exam was created to help channel students who need a review of intermediate algebra into one of the algebra review courses offered by the Sacramento State Mathematics Department.

The IAD is a 45 question exam with a 60 minute time limit that covers a variety of topics from intermediate & elementary algebra. Depending on your next math course a score of 27 or 24 is considered a passing score. If you have questions regarding what score you need to advance to your next math course, visit the Sacramento State Mathematics Department webpage at www.csus.edu/math.

This exam is intended for students to evaluate themselves in preparing for the IAD. To take this exam give yourself a quiet place to sit. Make sure you have eaten and are well rested. Time yourself for one hour. On the IAD, you may only use scratch paper and are not allowed to write in the test booklet. Do not use a calculator. After the test, grade yourself with the key that is provided in the back of this booklet. Seek help on problems that you missed and didn’t understand.

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Date: Spring 2010
1. Subtract and simplify: \( \frac{9t}{2t + w} - 2 \)
   a) \( 5t + 2w \) b) \( \frac{9t - 2}{2t + w} \) c) \( \frac{13t + 2w}{2t + w} \) d) \( \frac{5t - 2w}{2t + w} \)

2. Which graph correctly represents the function, \( y = 4x + 1 \)?

   a) \( \)
   b) \( \)
   c) \( \)
   d) \( \)

3. Factor completely: \( -3x^2 + 15x - 18 \)
   a) \( 3(x + 3)(x - 2) \) b) \( (-3x - 9)(x + 2) \) c) \( -3(x - 3)(x - 2) \) d) \( -3(x - 3)(x + 2) \)

4. Find the zeros of \( f(x) = 5x^2 + 2x - 3 \).
   a) \( x = 3 \ or \ -1 \) b) \( x = 1 \ or \ -\frac{3}{5} \) c) \( x = \frac{3}{5} \ or \ -1 \) d) \( x = \frac{1}{5} \ or \ -3 \)

5. Simplify: \( \sqrt[3]{-54p^7} \)
   a) \( -3p^2 \sqrt[3]{18p^5} \) b) \( -3p^2 \) c) \( -3p^2 \sqrt[3]{2p} \) d) \( -3p^2 \sqrt[3]{6p} \)

6. Solve for \( w \): \( 2a + \frac{3}{w} = k \)
   a) \( \frac{3}{k - 2a} \) b) \( \frac{k - 2a}{3} \) c) \( \frac{6a}{k} \) d) \( \frac{2a - k}{3} \)
7. Write in Scientific Notation: $-205,000$

   a) $-2.0 \times 10^5$  
   b) $-20.5 \times 10^4$  
   c) $2.05 \times 10^{-5}$  
   d) $-2.05 \times 10^5$

8. Which of the following is a solution for $x$: $\left| \frac{3}{4}x + 4 \right| - 5 = 11$

   a) $-16$  
   b) $-\frac{40}{3}$  
   c) $-\frac{80}{3}$  
   d) Not Listed

9. Simplify and write with positive exponents: $\frac{- (3x^4y^2)^3}{(-3)^2}$

   a) $-3x^7y^5$  
   b) $3x^{12}y^6$  
   c) $-3x^{12}y^6$  
   d) $3x^7y^5$

10. Simplify as much as possible: $\frac{y^2 - 1}{3 - 3y}$

    a) $\frac{y + 1}{3}$  
    b) $-\frac{y + 1}{3}$  
    c) $\frac{y - 1}{3}$  
    d) $\frac{y - 1}{-3}$

11. A line has a slope of $\frac{2}{3}$ and passes through the point $(4, -5)$. Find the equation of the line.

    a) $y = \frac{2}{3}x + \frac{22}{3}$  
    b) $y = \frac{2}{3}x - 23$  
    c) $y = \frac{2}{3}x + \frac{17}{3}$  
    d) $y = -\frac{2}{3}x - 5$

12. Find the difference: $(4x^2 - 3) - (5x^3 - 3)$

    a) $-5x^3 + 4x^2$  
    b) $-x^3 - 6$  
    c) $-5x^3 + 4x^2 - 6$  
    d) $-x$
13. Simplify: $i^{1216}$
   a) 1  
   b) $i$  
   c) $-i$  
   d) 0

14. Simplify and write with rational exponents: $x^{3/5}(x^{-3/5} - x^{3/5})$
   a) $1 - x$  
   b) $1 - x^{6/5}$  
   c) $x^{-9/25} - x^{9/25}$  
   d) 0

15. Solve for $x$: $\frac{2}{x+1} + \frac{1}{x-1} = \frac{5}{x^2 - 1}$
   a) $x = \frac{5}{3}$  
   b) $x = 2$  
   c) $x = \frac{2}{5}$  
   d) $x = \frac{4}{3}$

16. Consider the function, $f(x) = 3x^2 - 2x + 1$. Find the value of $f(-4)$.
   a) $-3$  
   b) $-39$  
   c) $57$  
   d) $-15$

17. Which inequality has the following graph for it’s set of solutions?

   ![Graph of inequality]

   a) $2 \leq x$ or $x > -3$  
   b) $-3 \leq x < 2$  
   c) $x \leq -3$ or $x > 2$  
   d) $-3 < x$ or $x \geq 2$

18. Simplify: $\frac{(m-2)^4 m^5}{m^{-3}}$
   a) $m^{-6}$  
   b) $1$  
   c) $-1$  
   d) $m^{10}$
19. Divide, then simplify if possible: \( \frac{(3x + 18)}{(x^2 + 7x + 6)} ÷ \frac{9x}{(x + 1)} \)
   a) \( \frac{3x + 18}{9x(x + 6)} \)  b) \( \frac{1}{3x} \)  c) \( \frac{1}{3x} \)  d) \( \frac{(x + 6)(x + 1)}{3x(x^2 + 7x + 6)} \)

20. The point \((1, -2)\) is a solution to which system of equations:
   a) \( \{ \begin{align*} 2x - 3y &= 8 \\ 3x + 2y &= -4 \end{align*} \)  
   b) \( \{ \begin{align*} 3x + 5y &= -7 \\ 4x - 2y &= 8 \end{align*} \)  
   c) \( \{ \begin{align*} 3x - 2y &= 6 \\ 2x + 4y &= -6 \end{align*} \)  
   d) \( \{ \begin{align*} 3x - 2y &= 6 \\ 3x + 2y &= -4 \end{align*} \)

21. Find the product: \((3x + 2)(x^2 - 4x - 7)\)
   a) \(3x^3 - 12x^2 - 21x - 14\)  b) \(3x^3 - 14x^2 - 29x - 14\)
   c) \(3x^3 - 10x^2 - 29x - 14\)  d) \(3x^3 - 10x^2 - 13x + 14\)

22. Rationalize the denominator and express in \(a + bi\) form: \(\frac{3 + 7i}{11 - i}\)
   a) \(0 + i\)  b) \(\frac{1}{3} + \frac{2}{3}i\)  c) \(\frac{13}{61} + \frac{40}{61}i\)  d) \(\frac{13}{60} - \frac{40}{60}i\)

23. Rationalize the denominator: \(\frac{1}{\sqrt[3]{5c^2}}\)
   a) \(\frac{\sqrt[3]{5}}{5}\)  b) \(\frac{1}{c^2 \sqrt[3]{5}}\)  c) \(\frac{\sqrt[3]{5c^2}}{\sqrt[3]{25c^2}}\)  d) \(\frac{\sqrt{25c}}{5c}\)

24. For what values of \(x\) is the following expression undefined? \(\frac{5x - 9}{x^2 - 14x + 45}\)
   a) \(x = 9, x = 5\)  b) \(x = 15, x = 3\)  c) \(x = 9\)  d) \(x = 5, x = 9, x = \frac{9}{5}\)
25. If \( f(x) = 5x - 4 \) and \( g(x) = x^2 \), find \( g(-2) - f(3) \).
   a) -14  b) -23  c) -7  d) -3

26. Solve this equation for \( x \): \( 3^{x-1} = 27^{2x} \)
   a) \( \frac{1}{5} \)  b) -1  c) \( -\frac{1}{35} \)  d) No Solution

27. Simplify and express with positive exponents: \( \left( \frac{m^{-3}w^5a^3}{-3} \right)^2 \)
   a) \( -w^{10}a^8 \)  b) \( 3^4w^5a^4 \)  c) \( w^{10}a^5 \)  d) \( 3^8w^{10}a^8 \)

28. Write the following without negative exponents: \( (a^{-1} + b^{-1})^{-1} \)
   a) \( \frac{1}{a} + \frac{1}{b} \)  b) \( \frac{ab}{a+b} \)  c) \( \frac{1}{a} - \frac{1}{b} \)  d) \( a + b \)

29. Find the \( x \)-intercept of this equation: \( 3x - 5y = 45 \)
   a) \((0,0)\)  b) \((-9,0)\)  c) \(\left( \frac{3}{5}, 0 \right)\)  d) \((15,0)\)

30. Factor completely: \( 4a^3 + a^2 - 3a \)
   a) \( a(4a+3)(a-1) \)  b) \( a(4a^2 + a + 3) \)  c) \( a(4a - 3)(a+1) \)  d) \( a(4a - 3)(a - 1) \)
31. What would you add to $x^2 + 3x$ to complete the square?

a) 9  

b) $\frac{9}{4}$  

c) $\frac{3}{2}$  

d) 1

32. Multiply and simplify if possible. ($x$ is a positive real number.) $\sqrt{x^2(x + 6)}\sqrt{x^4(x + 6)}$

a) $(x + 6)x^6$  

b) $\sqrt{x^6(x + 6)^2}$  

c) $x^3\sqrt{x + 6}$  

d) $x^3(x + 6)$

33. Solve for $x$: $\frac{7x - 23}{x - 4} = 2$

a) 1  

b) 3  

c) −3  

d) 4

34. Solve for $x$ in the following right triangle:

![Right Triangle](image)

a) 10  

b) $\sqrt{194}$  

c) 12  

d) 7

35. Simplify as much as possible using the properties of logarithms: $\log_7 16 + 2\log_7 M$

a) $\log_7 16 + 2M$  

b) $\log_7(32M)$  

c) $\log_7(16M)^2$  

d) $\log_7(16M^2)$
36. Simplify this fraction as much as possible: \[ \frac{(-4^2)^5}{(-4)^3} \]

   a) \(4^7\)   b) \(-4^4\)   c) \(4^2\)   d) \(-4^7\)

37. Simplify: \[ \frac{(2p - 1)^2(2p + 1)}{(4p^2 - 1)(1 - 2p)} \]

   a) \(\frac{2p + 1}{4p^2 - 1}\)   b) \(1\)   c) \(-1\)   d) \(\frac{(2p - 1)^2}{4p^2 - 1}\)

38. What is the distance between the points \((-1, -1)\) and \((-2, 2)\)?

   a) 10   b) 4   c) \(\sqrt{10}\)   d) \(\sqrt{18}\)

39. Factor completely: \((2x - 3)^2 - (3x + 25)^2\)

   a) Prime   b) \((4x + 3)(2x - 5)(3x + 7)\)
   c) \(-(x + 28)(5x + 22)\)   d) \(((2x - 3)(3x + 25))^2\)

40. What is the vertex of \(y = x^2 - 4x - 12\)?

   a) \((2, 0)\)   b) \((2, 16)\)   c) \((2, -16)\)   d) \(-16\)

41. Simplify by rationalizing the denominator: \[ \frac{3}{\sqrt{5} + 3} \]

   a) \(\sqrt{5} + 3\)   b) \(\frac{9 - 3\sqrt{5}}{4}\)   c) \(\frac{1}{\sqrt{5}}\)   d) \(\frac{3(\sqrt{5} + 3)}{14}\)
42. Solve this formula for \( m \): \( \frac{B}{m} = c^3 \)
   a) \( m = \frac{c^3}{B} \)    b) \( m = Bc^3 \)    c) \( m = \frac{B}{c^3} \)    d) \( m = \frac{1}{c^3B} \)

43. A 20 foot tall flag pole needs a support wire to hold it upright. If the support wire, which is attached to the top of the pole, is 30 ft long, how far from the pole should the wire be secured?
   a) \( \sqrt{10} \) ft    b) \( 10\sqrt{3} \) ft    c) 25 ft    d) \( 10\sqrt{5} \) ft

44. Solve for \( K \): \( 5 \log_4 K = 5 \)
   a) \( K = 5 \)    b) \( K = 4 \)    c) \( K = 10 \)    d) \( K = 1 \)

45. Simplify as much as possible: \( \frac{(-x^3)^3}{(-x)^4} \)
   a) \( -x^5 \)    b) \( -x^2 \)    c) \( x^5 \)    d) \( x^2 \)
26. a b c d
27. a b c d
28. a b c d
29. a b c d
30. a b c d
31. a b c d
32. a b c d
33. a b c d
34. a b c d
35. a b c d
36. a b c d
37. a b c d
38. a b c d
39. a b c d
40. a b c d
41. a b c d
42. a b c d
43. a b c d
44. a b c d
45. a b c d