Algebra 2 Semester Exam Review

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. Add.
    $(-7p^5q + 6pq) + (4p^5q - 8pq + 3) + (7pq + 7)$
    a. $-11p^5q + 13pq + 10$
    c. $-3p^5q + 5pq + 10$
    b. $-3p^5q + 21pq + 10$
    d. $-4p^5q + 5pq + 9$

2. Multiply.
    $(d + 7)(d - 7)$
    a. $d^2 - 49$
    c. $2d^2 - 49d$
    b. $d^2 + 14d + 49$
    d. $d^2 - 14d - 49$

3. Multiply.
    $(6r + 4s)^2$
    a. $36r^2 + 16s^2$
    c. $36r^2 + 24rs + 16s^2$
    b. $12r^2 + 8s^2$
    d. $36r^2 + 48rs + 16s^2$

4. Find the product $-2a^3b^4(3a^3b^2 + 4b^4)$.
    a. $-2a^7b^7 - 2a^4b^9$
    c. $-6a^9b^8 - 8b^{16}$
    b. $-6a^6b^6 - 8a^3b^8$
    d. $a^6b^6 + 2a^3b^8$

5. Find the product $(4x - 2y)^3$.
    a. $64x^3 - 8y^3$
    c. $64x^3 - 96x^2y + 48xy^2 - 8y^3$
    b. $64x^3 + 8y^3$
    d. $64x^3 + 96x^2y + 48xy^2 + 8y^3$

6. Which divisor of $-2x^3 + 2x^2 - 5x - 1$ results in a remainder of 86?
    a. $x + 3$
    b. $x + 2$
    c. $x - 2$
    d. $x - 3$

7. Which of the following is a factor of $3x^3 - 10x^2 + 3x + 10$?
    a. $x - 2$
    b. $x + 3$
    c. $x - 3$
    d. $x + 2$

8. Multiply $(3x - 2)(2x + 6)$.
    a. $6x^2 + 5x + 12$
    c. $6x^2 + 14x - 12$
    b. $6x^2 - 2$
    d. $6x^2 + 4$

9. Multiply $(3x-4)(3x+4)$.

   a. $6x^2 - 12x - 16$

   b. $9x^2 - 16$

   c. $6x^2 - 16$

   d. $9x^2 - 24x + 16$

10. Subtract.

    $$\left(x^3 - 2x + 5\right) - \left(2x^3 - 3x^2 + 4x - 3\right)$$

    a. $-x^3 - x^2 - 6x + 8$

    b. $-x^3 + 3x^2 - 6x + 8$

    c. $x^3 - x^2 + 6x - 8$
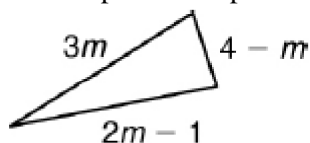
    d. $x^3 + x^2 + 6x - 8$

11. Find the product.

    $$\left(x^2 - 2x - 3\right)\left(3x^2 + 4x - 1\right)$$

    a. $3x^4 - 2x^3 - 18x^2 - 10x + 3$

    b. $3x^4 - 2x^3 - 16x^2 - 10x + 3$

    c. $3x^4 - x^3 - 18x^2 - 10x + 3$

    d. $3x^4 - x^3 - 16x^2 - 10x + 3$

12. Multiply $(2x^3y^5)(4x^2 - 3y^3)$.

    a. $8x^5y^5 - 6x^3y^8$

    b. $8x^6y^5 - 6x^3y^8$

    c. $8x^5y^5 - 6x^3y^{15}$

    d. $8x^6y^5 - 6x^3y^{15}$

13. Which expression represents the perimeter of the triangle below?

    a. $3 + 4m$

    b. $3 + 6m$

    c. $5 + 4m$

    d. $5 + 6m$

14. A rectangular garden has a length of $5a + 17$ feet and a width of $4a$ feet. Which expression represents the area of the garden in square feet?

    a. $20a + 68$

    b. $20a^2 + 68a$

    c. $20a^2 + 17$

    d. $25a^2 + 64a$

15. Find the product of $3x^2 + x - 1$ and $4x + 5$.

    a. $3x^2 + 5x + 4$

    b. $12x^3 + 4x^2 - 4x$

    c. $12x^3 + 19x^2 + x - 5$

    d. $12x^3 + 19x^2 + 9x - 5$

16. Which of the following best describes the sum of $ax^2 + bx + c$ and $mx^2 + nx + p$, where x is a variable and a, b, c, m, n, and p are real numbers?

    a. The sum is a constant.
    b. The sum is an exponential expression.
    c. The sum is a polynomial.
    d. Nothing can be determined about the sum without more information.

17. Which of the following is NOT a factor of $\left(x^4 - x^3 - 7x^2 + x + 6\right)$?

   a. $x - 1$
   b. $x - 2$
   c. $x + 1$
   d. $x + 2$

18. What is the remainder when $2x^3 + 3x^2 - x + 1$ is divided by $x + 3$?
   a. -25
   b. -23
   c. -8
   d. 25

19. If $x - 2$ is a factor of a polynomial $f(x)$, which of the following statements does NOT have to be true?
   a. $f(2) = 0$
   b. $f(-2) = 0$
   c.   2 is a root of $f(x)$.
   d.   2 is a zero of $f(x)$

20. For $p(x) = 4x^3 - 28x + 24$, $p(-3) = 0$. Which of the following must therefore be true?

   a. -3 is a factor of $p(x) = 4x^3 - 28x + 24$.
   b. $-3x$ is a factor of $p(x) = 4x^3 - 28x + 24$.
   c. $x - 3$ is a factor of $p(x) = 4x^3 - 28x + 24$.
   d. $x + 3$ is a factor of $p(x) = 4x^3 - 28x + 24$.

21. Use the remainder theorem to determine the remainder when $p(x) = x^3 + 3x^2 - 5x - 7$ is divided by $x + 5$.

   a. -182
   b. -32
   c. -7
   d. 168

22. Write an equivalent expression for $a^2 + 2ab + b^2$.
   a. $(a + b)(a - b)$
   b. $a^2 + b^2$
   c. $(a + b)^2$
   d. $a^2 - b^2$

23. Write an equivalent expression for $(x + y)(x - y)$.
   a. $x^2 - 2xy + y^2$
   b. $x^2 + 2xy - y^2$
   c. $(x - y)^2$
   d. $x^2 - y^2$

24. Write an equivalent expression for $(a + b)\left(a^2 - ab + b^2\right)$.
   a. $(a + b)(a - b)^2$
   b. $a^3 + b^3$
   c. $(a - b)^3$
   d. $a^3 - b^3$

25. Which expression is equivalent to $\left(x^2 + y^2\right)^2$?

   a. $(x + y)^2(x - y)^2$
   b. $\left(x^2 - y^2\right)^2 + (2xy)^2$
   c. $(x + y)\left(x^2 - xy + y^2\right)$
   d. $x^4 + y^4$

26. Expand the product $(x-2)^4$.

a. $x^4 - 4x^3 + 24x^2 - 32x - 16$ c. $x^4 - 4x^3 + 24x^2 - 32x + 16$

b. $x^4 - 8x^3 + 32x + 16$ d. $x^4 - 8x^3 + 24x^2 - 32x + 16$

27. Expand $(3p+q)^4$.

a. $81p^4 + 108p^3 q + 54p^2 q^2 + 12pq^3 + q^4$

b. $81p^4 + 27p^3 q + 9p^2 q^2 + 3pq^3 + q^4$

c. $81p^4 + q^4$

d. $3p^4 + q^4$

28. What is the second term in the expansion of $(x+y)^5$?

a. $x^4 y$ b. xy^4 c. $5x^4 y$ d. $5xy^4$

29. What is the coefficient of x^3 in the expansion of $(4x-1)^{10}$?

a. -7680

b. -64

c. 840

d. 7680

e. $-13,440$

30. Use Pascal's Triangle to expand the expression $(2x-5)^4$.

a. $16x^4 - 40x^3 + 100x^2 - 250x + 625$

b. $16x^4 - 120x^3 + 300x^2 - 250x + 625$

c. $10000x^4 - 4000x^3 + 600x^2 - 40x - 5$

d. $16x^4 - 160x^3 + 600x^2 - 1000x + 625$

31. Use the Binomial Theorem to expand the binomial $(3x-4y)^4$.

a. $81x^4 + 432x^3 y + 864x^2 y^2 + 768xy^3 + 256y^4$

b. $81x^4 + 256y^4$

c. $81x^4 - 256y^4$

d. $81x^4 - 432x^3 y + 864x^2 y^2 - 768xy^3 + 256y^4$

32. Which variable term in the expanded form of $(3x+1)^4$ has the greatest coefficient?

a. The x-term

b. The x^2-term

c. The x^3-term

d. The x^4-term

33. How many terms does the expanded form of $\left(2x^2 + 5\right)^9$ have?

    a. 8
    b. 9
    c. 10
    d. 11

34. Divide.

$\left(x^3 - x + 6\right) \div (x + 2)$

    a. $x^2 + 3$ c. $x^2 - x + 3$
    b. $x^2 - 2x + 3$ d. $(x + 1)(x - 2)$

35. Divide: $\dfrac{x^2 + 8x - 5}{x}$

    a. $x^2 + 8 - \dfrac{5}{x}$ c. $x - 5$

    b. $x + 8 - \dfrac{5}{x}$ d. $x + 8$

36. Divide $12x^2 + 4x^3 + 18 + 16x$ by $2x + 4$.

    a. $2x^2 + 2x + 3 + \dfrac{14}{x + 4}$ c. $2x^2 + 2x + 4 - \dfrac{2}{x + 4}$

    b. $2x^2 + 2x + 4 + \dfrac{2}{2x + 4}$ d. $2x^2 + 2x + 3 + \dfrac{5}{x + 4}$

37. Simplify the rational expression $\dfrac{4y^2 - 8y}{y - 2}$. Identify any excluded values.

    a. $4y;\ y \neq 2$ c. $4y;$ no excluded values
    b. $4y\left(y - 2\right);\ y \neq 2$ d. $4y;\ y \neq 2$ or 0

38. Simplify the rational expression $\dfrac{x - 6}{x^2 - x - 30}$.

    a. $-\dfrac{6}{x - 1}$ c. $x + 5$

    b. $\dfrac{x}{x + 5}$ d. $\dfrac{1}{x + 5}$

39. The area of a rectangle is equal to $x^2 + 15x + 44$ square units. If the length of the rectangle is equal to $x + 11$ units, what expression represents its width?

    a. $x - 4$ c. $x + 4$
    b. $x + 33$ d. $x - 33$

40. Simplify $\dfrac{x^3 + 4x^2 + 3x - 2}{x + 2}$.

    a. $(x + 1)(x - 1)$ c. $x^2 + 4x + 3$
    b. $x^2 + 2x - 1$ d. $x^3 + 4x^2 + 2x - 4$

41. Simplify $\dfrac{x^2 - 16}{2x^2 + 16x + 32}$.

    a. $-\dfrac{1}{2}$ c. $\dfrac{x-4}{x+4}$

    b. $\dfrac{1}{2}$ d. $\dfrac{x-4}{2(x+4)}$

42. Divide: $(3x^2 - 11x + 9) \div (x - 2)$

    a. $3x - 10 + \frac{4}{x-2}$ c. $6x - 22 + \frac{9}{x-2}$

    b. $3x - 5 + \frac{-1}{x-2}$ d. $3x - 17 + \frac{43}{x-2}$

43. Which expression is equivalent to the rational expression $\dfrac{x+y}{xy}$ (where $x \neq 0$ and $y \neq 0$)?

    a. $\dfrac{1}{x+y}$ c. 1

    b. $\dfrac{1}{x} + \dfrac{1}{y}$ d. $\dfrac{xy}{x+y}$

44. Subtract $\dfrac{2x^2 + x + 2}{x+1} - \dfrac{6x^2 + 6}{x+1}$. Identify any x-values for which the expression is undefined.

    a. $\dfrac{-4x^2 + x - 4}{x+1}$; The expression is undefined at $x = -1$.

    b. $\dfrac{8x^2 + x + 8}{x+1}$; The expression is always defined.

    c. $\dfrac{8x^2 + x + 8}{x+1}$; The expression is undefined at $x = -1$.

    d. $\dfrac{-4x^2 + x - 4}{x+1}$; The expression is always defined.

45. Multiply the expressions. Simplify the result.

$$(x-1)\left(\dfrac{x+2}{x^2-1}\right)$$

    a. $\dfrac{x+2}{(x-1)(x^2-1)}$ c. $\dfrac{x+2}{x-1}$

    b. $\dfrac{x-2}{x+1}$ d. $\dfrac{x+2}{x+1}$

46. Multiply $\dfrac{x+2}{4x-8} \cdot \dfrac{3x-9}{x+4} \cdot \dfrac{2x-4}{x^2-x-6}$. Simplify your answer.

    a. $\dfrac{3}{2(x+4)}$ c. $\dfrac{3}{2}$

    b. $\dfrac{3}{4(x+4)}$ d. $\dfrac{3(x+2)(x-3)}{2(x+4)(x^2-x-6)}$

47. Simplify $\dfrac{1-x^2}{x^2+x+1} \div \dfrac{x^2-2x+1}{x^3-1}$.

    a. $x+1$ c. $\dfrac{(x-1)^2}{x+1}$

    b. $-(x+1)$ d. $-\dfrac{(x-1)^2}{x+1}$

48. Divide the expressions. Simplify the result.
    $\dfrac{x^2+9x+18}{x^2-9} \div \dfrac{x+6}{x-6}$

    a. $\dfrac{x-9}{x-3}$ b. $\dfrac{9x+6}{3}$ c. $\dfrac{x+3}{x-6}$ d. $\dfrac{x-6}{x-3}$

49. Subtract and simplify. Find the excluded values.
    $\dfrac{5}{x-y} - \dfrac{3x+2y}{x^2-y^2}$

    a. $\dfrac{2x+2y}{(x-y)(x+y)}; x \neq y, x \neq -y$ and $x \neq 0$

    b. $\dfrac{5}{x-y}; x \neq y$

    c. $\dfrac{2x+3y}{(x-y)(x+y)}; x \neq y$ and $x \neq -y$

    d. $\dfrac{2x+8y}{(x-y)(x+y)}; x \neq y$ and $x \neq -y$

50. Simplify $\dfrac{\frac{n}{n+3}}{n}$.

    a. $\dfrac{1}{n+3}$ c. $\dfrac{n}{n+3}$
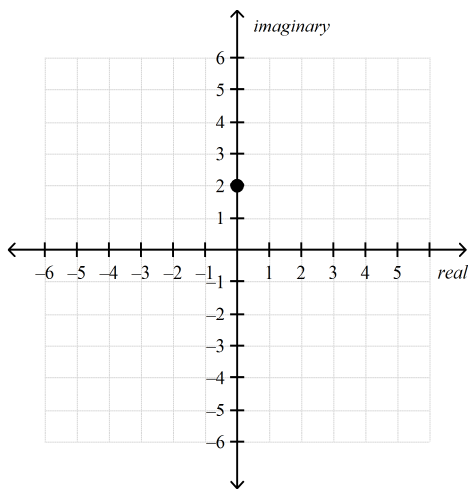
    b. $n+3$ d. $\dfrac{n^2}{n+3}$

51. Complete the square for $x^2 - 14x + \boxed{}$. Then write the resulting expression as a binomial squared.
    a. $49; (x + 7)^2$
    c. $49; (x - 7)^2$
    b. $-49; (x + 7)^2$
    d. $-49; (x - 7)^2$

52. How many terms are in the algebraic expression $2x - 9xy + 17y$?
    a. 1
    c. 3
    b. 17
    d. 4

53. What is the coefficient of x in the algebraic expression $(5a)x - 17x^2 + 14a$?
    a. -17
    c. $5a$
    b. 14
    d. 5

54. How many factors does the algebraic expression $5xy$ have?
    a. 5
    c. 4
    b. 3
    d. 1

55. Explain the meaning of the exponent 3 in the algebraic expression $(x + y)^3$.
    a. Use the binomial as a factor 3 times.
    b. Use the binomial as a term 3 times.
    c. Use the 3 as a coefficient of the binomial.
    d. Use the 3 as an exponent on both terms of the binomial.

56. Evaluate the algebraic expression $6(x + y)^2$ when $x = 5$ and $y = 3$.
    a. 384
    c. 192
    b. 2304
    d. 66

57. One way to factor $x^6 + x^3 - 72$ is to first rewrite the expression as $m^2 + m - 72$. What is the equivalent of m?
    a. $x + 9$
    c. x
    b. x^2
    d. x^3

58. In the expression $x^3 + 4x^2 + 3x + 12$, when the first two terms are grouped, and the last two terms are grouped, what is the common binomial factor?
    a. $x - 4$
    c. $x + 4$
    b. $x^2 + 3$
    d. $x + 12$

59. The volume of a box is $20x^3 + 104x^2 + 96x$. What is a possible expression for the height of the box if the width is $2x$ and the length is $5x + 6$?
    a. $5x + 6$
    c. $5x + 2$
    b. $2x + 8$
    d. $2x - 8$

60. A square has a side length $ax + b$, where a and b are integers, and an area of $25x^2 + 90x + 81$. Find the value of $a + b$.
    a. 9
    c. 14
    b. 4
    d. 45

61. Jon has rewritten the expression $10x^3 - 35x^2 + 18x - 63$ in order to factor it. Describe a reasonable next step for Jon to perform.
    a. Use the Commutative Property to rewrite the terms in a different order.
    b. Factor 7 from the second and fourth terms.
    c. Group the first two terms and factor out the greatest common term of $2x - 7$.
    d. Factor x from each of the four terms.

62. Explain whether $p + 4r^2$ will be positive or negative if p is positive. Is this always true?
    a. $p + 4r^2$ will always be positive because the value of p can never be less than 4.
    b. $p + 4r^2$ will always be positive because the value of p depends on the value of $4r^2$.
    c. $p + 4r^2$ will always be positive because the value of p is always greater than the value of $4r^2$.
    d. $p + 4r^2$ will always be positive because p and $4r^2$ are each always positive.

63. What is the correct factorization of $x^2 - 11x + 18$?
    a. $(x+2)(x-9)$
    c. $(x-2)(x-9)$
    b. $(x-2)(x+9)$
    d. $(x+2)(x+9)$

64. Factor $a^2 + 3a + 8a + 24$ by grouping.
    a. $(a+3)(a+8)$
    c. $8a(a+3)$
    b. $\left(a^2 + 3a\right)(8a + 24)$
    d. cannot be factored

65. Determine whether $p^2 - 36$ is a difference of two squares. If so, choose the correct factorization.
    a. yes; $(p-6)^2$
    c. yes; $(p+18)(p-18)$
    b. yes; $(p+6)(p-6)$
    d. no

66. Is $x\left(4x^2 + 8x + 12\right)$ completely factored? If not, what other factoring can occur?

    a. Yes; the polynomial is completely factored.
    b. No; 4 can be factored from each term of the trinomial.
    c. No; the trinomial $4x^2 + 8x + 12$ can be factored into the product of two binomials.
    d. No; 4 can be factored from each term of the trinomial AND the resulting trinomial can be factored into the product of two binomials.

67. Completely factor $3x^4 - 15x^3 - 18x^2$.
    a. $x^2\left(3x^2 + 2\right)(1x - 9)$
    c. $3x^2(x+1)(x-6)$
    b. $3\left(x^2 + 1\right)\left(x^2 - 6\right)$
    d. cannot be factored

68. Determine whether $9x^2 - 120x - 400$ is a perfect square trinomial. If so, choose the correct factorization.
   a. yes; $(3x - 20)^2$
   b. yes; $(3x + 20)^2$
   c. yes; $(3x + 20)(3x - 20)$
   d. no

69. Factor $x^2 + 16x + 48$.
   a. $(x + 4)(x + 12)$
   b. $(x + 16)(x + 48)$
   c. $(x + 1)(x + 48)$
   d. $(x + 3)(x + 16)$

70. Factor the trinomial $t^2 - 5t - 24$.
   a. $(t - 1)(t - 24)$
   b. $(t - 3)(t - 8)$
   c. $(t + 1)(t - 24)$
   d. $(t - 8)(t + 3)$

71. Factor $2x^2 - 7x + 6$.
   a. $(x - 3)(2x - 2)$
   b. $(x - 2)(2x + 3)$
   c. $(x - 2)(2x - 3)$
   d. $(x - 2)(x - 3)$

72. Completely factor $4m^4 - 324$.
   a. $\left(4m^2 + 36\right)\left(m^2 - 9\right)$
   c. $4(m + 3)^2(m + 3)(m - 3)$
   b. $4\left(m^2 + 9\right)(m + 3)(m - 3)$
   d. cannot be factored

73. Factor $x^3 + 6x^2 - 25x - 150$.
   a. $(x - 6)(x - 5)(x + 5)$
   b. $(x - 6)(x^2 + 25)$
   c. $(x + 6)(x^2 + 25)$
   d. $(x + 6)(x - 5)(x + 5)$

74. Factor the expression $54x^6 + 16x^3y^3$.
   a. $2x^3(3x + 2y)(9x^2 + 6xy + 4y^2)$
   b. $2x^3(3x + 2y)^3$
   c. $2x^3(27x^3 + 8y^3)$
   d. $2x^3(3x + 2y)(9x^2 - 6xy + 4y^2)$

75. Factor $8x^3 + 125$.
   a. $(2x - 5)\left(4x^2 - 10x + 25\right)$
   b. $(2x - 5)\left(4x^2 + 10x + 25\right)$
   c. $(2x + 5)\left(4x^2 - 10x + 25\right)$
   d. $(2x + 5)\left(4x^2 + 10x + 25\right)$

76. Factor the polynomial $30x^3 + 28x^2 + 6x$ completely.
   a. $2x(5x + 3)(3x + 1)$
   b. $2x(5x + 1)(3x + 3)$
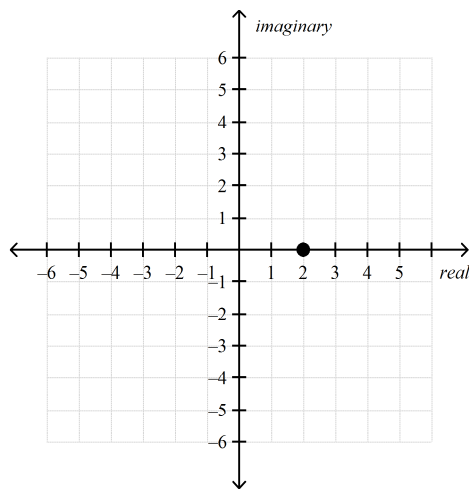   c. $(10x^2 + 6x)(3x + 1)$
   d. $2(5x + 3)(3x + 1)$

77. Which of the following is equal to $x^6 - 64$?

   a. $-64x^6$
   b. $(x^3 + 8)(x^3 - 8)$
   c. $(x^3 + 8)^2$
   d. $(x^3 - 8)^2$

78. Express $6\sqrt{-69}$ with a positive radicand.

   a. $6i\sqrt{69}$
   c. $-6i\sqrt{69}$
   b. $-6\sqrt{69}$
   d. $6\sqrt{69}$

79. What is the simplified form of $-i^8\sqrt{9}$?

   a. 3
   c. -3
   b. $3i$
   d. $-3i$

80. What does the imaginary number i represent?

   a. -1
   b. $\sqrt{1}$
   c. $\sqrt{-1}$
   d. $-\sqrt{-1}$

81. Which of the following is equivalent to $\sqrt{-121}$?

   a. 11
   b. -11
   c. $11i$
   d. $121i$

82. Simplify $(3 + 2i)(2 - 3i)$.

   a. $-5i$
   c. 7
   b. $12 - 5i$
   d. $6 - 9i$

83. Add. Write the result in the form $a + bi$.
   $(7 - 9i) + (-6 + 5i)$
   a. $12 - 15i$
   c. $-2 - i$
   b. $1 - 4i$
   d. $13 - 14i$

84. Simplify $(3 - 2i)^2$.
   a. $13 - 12i$
   c. $5 - 12i$
   b. 13
   d. $9 + 4i$

85. What is the product $6i(5 - 2i)$ in the form $a + bi$?
   a. $12 + 30i$
   c. $12 - 30i$
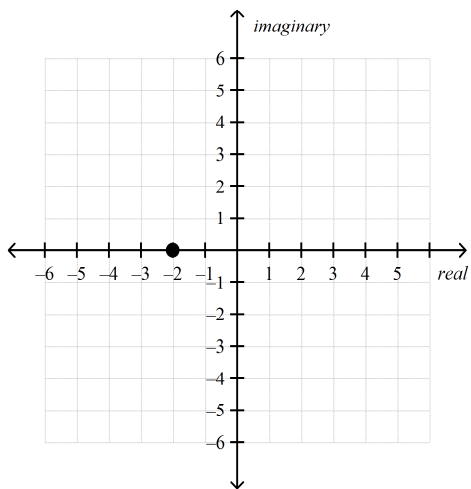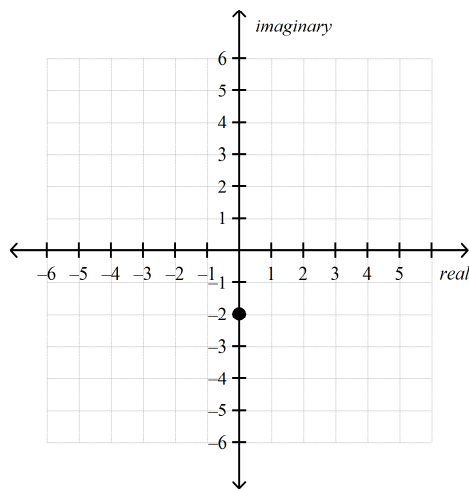   b. $-12 - 30i$
   d. $-12 + 30i$

86. Find the complex conjugate of $3i + 4$.
    a. $-4 - 3i$
    b. $-4 + 3i$
    c. $4 + 3i$
    d. $4 - 3i$

87. Find the absolute value $|-7 - 9i|$.
    a. -16
    b. 4
    c. $4\sqrt{2}$
    d. $\sqrt{130}$

88. Simplify $\dfrac{-2 + 2i}{5 + 3i}$.
    a. $-\dfrac{2}{17} + \dfrac{8}{17}i$
    b. $-\dfrac{2}{5} + \dfrac{2}{3}i$
    c. $-\dfrac{2}{17} - \dfrac{8}{17}i$
    d. $-\dfrac{2}{5} - \dfrac{2}{3}i$

89. Write the expression as a complex number in standard form.
    $\dfrac{8 + 7i}{3 - 4i}$
    a. $\dfrac{4}{25} + \dfrac{53}{25}i$
    b. $\dfrac{52}{7} - \dfrac{11}{7}i$
    c. $\dfrac{52}{7} + \dfrac{53}{7}i$
    d. $\dfrac{4}{25} - \dfrac{11}{25}i$

90. Simplify $\dfrac{7 + 11i}{i}$.
    a. $-7i - 11$
    b. $-7i + 11$
    c. $7i - 11$
    d. $7i + 11$

91. Write the expression $\sqrt[11]{10^8}$ by using rational exponents.
    a. $10^{\frac{8}{11}}$
    b. 10^3
    c. 10^{-3}
    d. $10^{\frac{11}{8}}$

92. Write the expression $8^{\frac{5}{3}}$ in radical form, and simplify. Round to the nearest whole number if necessary.
    a. $(\sqrt[5]{8})^3$; 3
    b. $\sqrt[\frac{5}{3}]{8}$; 32
    c. $(\sqrt[3]{8})^5$; 32
    d. $\dfrac{8^5}{8^3}$; 64

93. Simplify $625^{\frac{1}{4}}$.
    a. 25
    b. 156.25
    c. 5
    d. 50

94. Graph the complex number –2.

a.

c.

b.

d.

95. Write $y^{\frac{1}{6}}$ as a radical expression.

a. $\sqrt{y^6}$

c. $6\sqrt{y}$

b. $\sqrt[6]{y}$

d. $\dfrac{1}{\sqrt[6]{y}}$

96. Write two algebraic expressions for the square root of x.

a. $x^2 ; \sqrt{x^2}$

c. $x^{\frac{1}{3}} ; \sqrt[3]{x}$

b. $x^{\frac{1}{2}} ; \sqrt{x}$

d. $x^{\frac{1}{2}} ; \sqrt{x^2}$

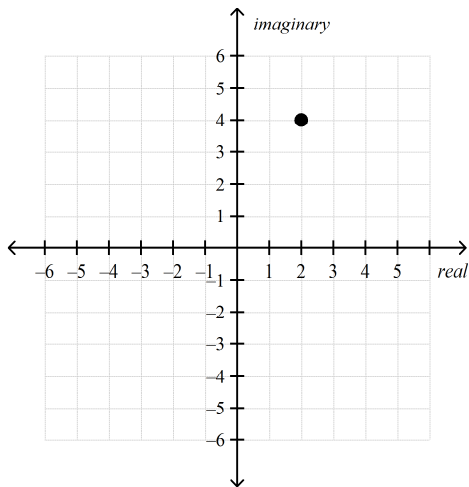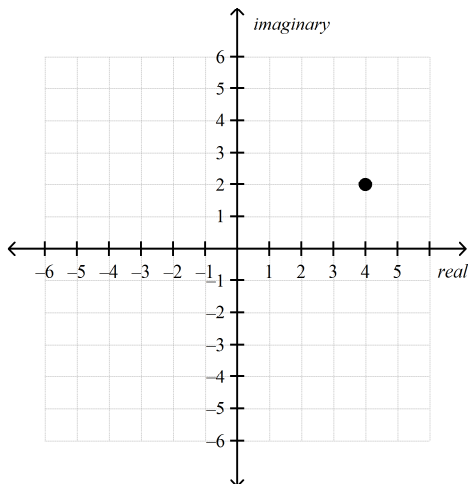97. Simplify $\left(r^{\frac{17}{18}}\right)^{18}$.

    a. r^{306} c. r^{18}

    b. r^{35} d. r^{17}

98. Graph the complex number $4 + 2i$.

    a.

    c.

    b.

    d.

99. Write $y^{\frac{11}{17}} \cdot y^{\frac{5}{17}}$ as a radical expression.

    a. $\sqrt[17]{y^{16}}$ c. $\sqrt[289]{y^{55}}$

    b. $\sqrt[16]{y^{17}}$ d. $\sqrt[55]{y^{289}}$

100. Simplify the expression $\sqrt[4]{256z^{16}}$. Assume that all variables are positive.

    a. $\sqrt[4]{256}z^4$ c. $4z^{11}$

    b. $4z^4$ d. $\sqrt[4]{256z^{11}}$

101. Write the expression $8^{\frac{5}{3}}$ in radical form, and simplify. Round to the nearest whole number if necessary.

    a. $(\sqrt[5]{8})^3$; 3

    b. $(\sqrt[3]{8})^5$; 32

    c. $\sqrt[\frac{5}{3}]{8}$; 32

    d. $\dfrac{8^5}{8^3}$; 64

102. Simplify the expression $(27)^{\frac{1}{3}} \cdot (27)^{\frac{2}{3}}$.

    a. 729

    b. 3

    c. 9

    d. 27

103. Simplify $4^{\frac{5}{2}}$.

    a. 10

    b. 16

    c. 32

    d. 64

104. Simplify $\left(\dfrac{4}{9}\right)^{-\frac{1}{2}}$.

    a. $\dfrac{2}{9}$

    b. $\dfrac{2}{3}$

    c. $\dfrac{4}{3}$

    d. $\dfrac{3}{2}$

105. Simplify $\dfrac{\left(x^{\frac{1}{4}} y\right)^4}{\sqrt[4]{x^4}}$. All variables represent nonnegative numbers.

    a. y^4

    b. $x^2 y^2$

    c. $\dfrac{y^4}{x^2}$

    d. $\dfrac{xy^4}{x}$

106. Simplify the expression $\sqrt{16r^4 s^5}$. All variables represent nonnegative numbers.

    a. $4r^2 s^2 \sqrt{s^2}$

    b. $4\sqrt{s^2}$

    c. $4r^4 s^4 \sqrt{s}$

    d. $4r^2 s^2 \sqrt{s}$

15

107. Simplify $\sqrt{\dfrac{z^{11}}{81z}}$. All variables represent nonnegative numbers.

   a. $\sqrt{\dfrac{z^5}{9}}$

   b. $\dfrac{z^5}{9}$

   c. $\dfrac{\sqrt{z^{10}}}{9}$

   d. $\dfrac{z^{10}}{81}$

108. Simplify. All variables represent nonnegative numbers.

   $$\left(a^4 b^{\frac{1}{2}} \right)^4 \sqrt[12]{b^{12}}$$

   a. $a^{16}b^2$

   b. $a^{16}b^3$

   c. $a^8 b^{\frac{11}{2}}$

   d. $a^4 b^3$

109. Which of the following is equivalent to $\sqrt[12]{x^8 y^6}$ for all values of x and y?

   a. $\dfrac{x^8 y^6}{\sqrt[12]{xy}}$

   b. $\dfrac{xy}{\sqrt[12]{x^4 y^6}}$

   c. $\sqrt{x^2 y}$

   d. $\sqrt[6]{x^4 y^2}$

110. Which word best describes the sum of $\sqrt{5}$ and $\sqrt{7}$?

   a. imaginary
   b. irrational
   c. rational
   d. natural

111. What is the sum of $9\sqrt{7}$ and $12\sqrt{7}$? Is the sum rational or irrational?

   a. $21\sqrt{7}$; irrational

   b. $21\sqrt{7}$; rational

   c. 28; rational

   d. 28; irrational

Multiple Response
Identify one or more choices that best complete the statement or answer the question.

1. Simplify each of the following expressions to determine which are linear.

   a. $\left(x^2 + 6x + 9\right) + \left(x^2 - 4x + 4\right)$

   b. $2\left(2x^2 + x - 10\right) - \left(5x^2 - 3x + 1\right)$

   c. $4\left(3x^2 + 5x - 4\right) - 6\left(2x^2 + 2x - 1\right)$

   d. $3\left(x^2 - x + 1\right) + \left(-2x^2 + 4x - 5\right)$

   e. $4\left(2x^2 - 6x + 7\right) - 8\left(x^2 - 3x + 4\right)$

2. Use the remainder theorem and the factor theorem to determine which of the following binomials are factors of $p(x) = x^3 - 8x^2 + 5x + 14.$

   a. $x + 1$
   b. $x + 3$
   c. $x + 9$
   d. $x - 2$
   e. $x - 6$
   f. $x - 7$

3. Which of the following expressions are equivalent to $\dfrac{6x^2 + x - 2}{2x^2 + 5x - 3}?$

   a. $\dfrac{3x + 2}{x + 3}$

   b. $3 + \dfrac{1}{5} + \dfrac{2}{3}$

   c. $\dfrac{(2x - 1)(3x + 2)}{(x + 3)(2x - 1)}$

   d. $3 - \dfrac{7}{x + 3}$

   e. $\dfrac{3x}{x + 3} + \dfrac{2}{x + 3}$

   f. $\dfrac{3x - 2}{x - 3}$

4. Which of the following simplify as a quotient of two binomials when the indicated operation is performed?

   a. $\dfrac{x^2+4x}{x^2+2x-8}+\dfrac{3}{x-2}$

   b. $\dfrac{x^2+x}{x^2+2x-15}-\dfrac{3}{x-3}$

   c. $\dfrac{x^2+11x+30}{x^2+10x+21}\bullet\dfrac{x+3}{x+6}$

   d. $\dfrac{x^2-10x+25}{x^2+3x-28}\div\dfrac{x-4}{x+7}$

   e. $\dfrac{x^2-2x-24}{x^2+4x-5}\bullet\dfrac{x^2+3x-10}{x^2+x-12}\bullet\dfrac{x^2-4x+3}{x^2-8x+12}$

5. Which of the following are equal to $\left(p^{-3}\right)^{\frac{2}{5}}$? Assume that p is positive.

   a. $\sqrt[5]{p^{-6}}$

   b. $\dfrac{1}{\sqrt{p^{15}}}$

   c. $\dfrac{1}{p^{30}}$

   d. $\sqrt[5]{p^{-13}}$

   e. $\dfrac{1}{p\sqrt[5]{p}}$

   f. $\sqrt[10]{p^{-1}}$

Matching

Match each expression with its equivalent factored form.

   a. $(n-4)\left(n^2+4n+16\right)$ d. $(n+4)\left(n^2-4n+16\right)$

   b. $(n+4)^3$ e. $(n+4)(n-4)$

   c. $(n+8)^2$ f. $(n+8)(n-8)$

1. n^2-64

2. $n^2+16n+64$

3. n^3-64

4. n^3+64

Match each number with its equivalent form.

a. -8

b. -2

c. $-2\sqrt{2}$

d. $-20\sqrt{2}$

e. $-2i$

f. $8i$

g. $2i\sqrt{2}$

h. $20i\sqrt{2}$

5. $-\sqrt{8}$

6. $\sqrt{-8^2}$

7. $\sqrt[3]{-8}$

8. $\sqrt{-8}$

9. $\sqrt{-800}$

Match each radical expression with its equivalent rational exponent. Assume that w is nonnegative.

a. $w^{\frac{5}{3}}$

b. $w^{\frac{3}{5}}$

c. $w^{\frac{1}{5}}$

d. $w^{\frac{1}{3}}$

e. $w^{\frac{2}{5}}$

f. $w^{\frac{2}{3}}$

g. $w^{\frac{5}{2}}$

h. $w^{\frac{3}{2}}$

10. $\sqrt[3]{w^5}$

11. $\sqrt[5]{w^3}$

12. $\sqrt{w^5}$

13. $\sqrt[3]{w}$

Short Answer

1. Use the remainder theorem and the factor theorem to show that $x-5$ is a factor of $p(x) = x^3 - 7x^2 + 2x + 40$. Then factor $p(x) = x^3 - 7x^2 + 2x + 40$ completely.

2. Use the remainder theorem to determine the remainder when $p(x) = x^4 - 4x^3 - 11x^2 + 66x - 72$ is divided by $x - 4$. Then use polynomial long division to verify the remainder.

3. Expand $\left(2x^2 - 3\right)^6$.

4. If $\dfrac{2x^2 + 11x - 23}{x + 7} = 2x + a - \dfrac{2}{x + 7}$, what is the value of a? Show your work.

5. Simplify $\dfrac{2}{x + 3} + \dfrac{3}{x^2 + 7x + 12}$.

6. Simplify $\dfrac{x^2 - 9x - 36}{x^2 - 3x - 18} \div \dfrac{2x^2 - 21x - 36}{2x^2 + 15x + 18}$.

7. Determine whether the binomial is a difference of two squares. If so, factor it. If not, explain why.

   $p^2 - 30$
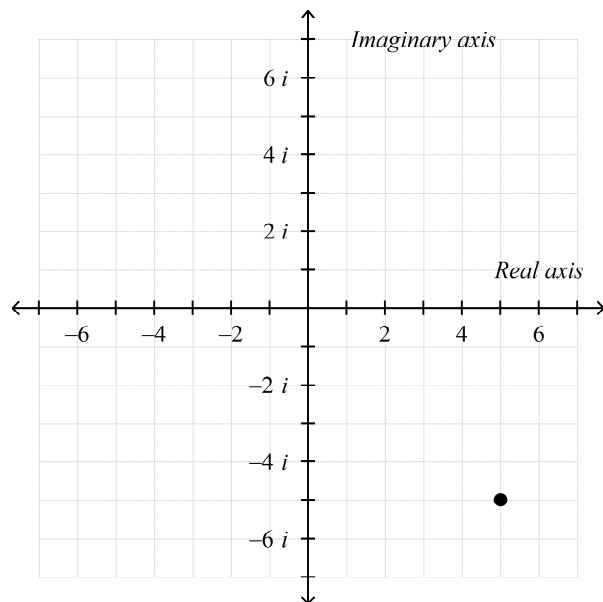
8. Factor $21a^3 + 14a^2 - 9a - 6$ by grouping.

9. Determine whether the binomial is a difference of two squares. If so, factor it. If not, explain why.

   $64x^6 - y^2$

10. Write $x^6 - 729$ in factored form. Show your work.

11. What complex number is represented by the point shown on the graph?

12. Simplify $625^{-\frac{1}{2}}$.

13. Write $\left(c^{-9} d^{12} \right)^{-\frac{5}{6}}$ using only positive exponents. Assume c and d are both positive. Show all work.