Student: _____
Date: _____

Instructor: Elias Kabeche
Course: Algebra 3 & Trig L2 - 2(A-C) - 24-25   **Assignment:** Exponents - Summer 2025
(2025 / AMITY REGIONAL HIGH SCHOOL)

1. Evaluate the given expression if $x = -4$ and $y = 5$.

    $$\frac{3x + 2y}{3 + 5y}$$

    $\dfrac{3x + 2y}{3 + 5y} =$ [_____] (Type an integer or a simplified fraction.)

2. The formula $C = \dfrac{5}{9}(F - 32)$ expresses the relationship between Fahrenheit temperature, F, and Celsius temperature, C. Use the formula to convert $23°F$ to its equivalent temperature on the Celsius scale.

    $23°F =$ [_____] $°C$

3. A football is kicked vertically upward from a height of 3 feet with an initial speed of 50 feet per second. The formula $h = 3 + 50t - 16t^2$ describes the ball's height above the ground, h, in feet, t seconds after it was kicked. Use this formula to find the ball's height 3 seconds after it was kicked.

    The ball's height, 3 seconds after it was kicked, was [_____] feet.

4. Find the union of the sets.

    $\{1,4,11,14\} \cup \{4,14,15\}$

    $\{1,4,11,14\} \cup \{4,14,15\} = \{$ [_____] $\}$
    (Use a comma to separate answers as needed.)

5. Find the union of the sets.

    $\{2, 4\} \cup \{1, 3\}$

    Choose the correct answer below.

    ○ **A.** $\{2, 4\} \cup \{1, 3\} = \emptyset$

    ○ **B.** $\{2, 4\} \cup \{1, 3\} = \{2, 4\}$

    ○ **C.** $\{2, 4\} \cup \{1, 3\} = \{1, 3\}$

    ○ **D.** $\{2, 4\} \cup \{1, 3\} = \{1, 2, 3, 4\}$

6. Find the union of the sets.

    $\{z,o,x,g,u\} \cup \emptyset$

    $\{z,o,x,g,u\} \cup \emptyset = \{$ [_____] $\}$ (Use a comma to separate answers as needed.)

7. List all numbers from the given set that are **a.** natural numbers, **b.** whole numbers, **c.** integers, **d.** rational numbers, **e.** irrational numbers, and **f.** real numbers.

$$\left\{ -13, \ -\frac{6}{7}, \ 0, \ 0.25, \ \sqrt{5}, \ \pi, \ \sqrt{100} \right\}$$

a. List all the natural numbers from the given set. Type each number in the same form as it appears in the problem statement.

☐

(Use a comma to separate answers as needed.)

b. List all the whole numbers from the given set. Type each number in the same form as it appears in the problem statement.

☐

(Use a comma to separate answers as needed.)

c. List all the integers from the given set. Type each number in the same form as it appears in the problem statement.

☐

(Use a comma to separate answers as needed.)

d. List all the rational numbers from the given set. Type each number in the same form as it appears in the problem statement.

☐

(Use a comma to separate answers as needed.)

e. List all the irrational numbers from the given set. Type each number in the same form as it appears in the problem statement.

☐

(Use a comma to separate answers as needed.)

f. List all the real numbers from the given set. Type each number in the same form as it appears in the problem statement.

☐

(Use a comma to separate answers as needed.)

8. Choose which group of sets the following number belongs to. Be sure to account for ALL sets.

$$\frac{3}{10}$$

○ **A.** real numbers, rational numbers

○ **B.** real numbers, irrational numbers

○ **C.** real numbers, rational numbers, natural numbers

○ **D.** rational numbers, natural numbers, integers

○ **E.** irrational numbers, natural numbers

9. Choose which group of sets the following number belongs to. Be sure to account for ALL sets.

7

○ **A.** whole numbers, integers, rational numbers, natural numbers, real numbers

○ **B.** whole numbers, integers, natural numbers, real numbers

○ **C.** whole numbers, integers, rational numbers, real numbers

○ **D.** whole numbers, integers, irrational numbers, natural numbers, real numbers

10. Determine whether the statement is true or false.

    $-4 \geq -1$

    Is the given statement true or false?

    ○ True

    ○ False

11. Determine whether the statement is true or false.

    $5 > -1$

    Is the given statement true or false?

    ○ True

    ○ False

12. Determine whether the statement is true or false.

    $-\pi \geq -\pi$

    Is the given statement true or false?

    ○ False

    ○ True

13. Determine whether the statement is true or false.

    $0 < -4$

    Is the given statement true or false?

    ○ True

    ○ False

14. Express the distance between the given numbers using absolute value. Then find the distance by evaluating the absolute value expression.

    -13 and 16

    An expression for the distance between the two numbers is [   ].
    (Do not simplify.)

    The distance between -13 and 16 is [   ].

15. Express the distance between the given numbers using absolute value. Then find the distance by evaluating the absolute value expression.

    -4 and -3

    An expression for the distance between the two numbers is [   ].
    (Do not simplify.)

    The distance between -4 and -3 is [   ].

16. Express the distance between the given numbers using absolute value. Then find the distance by evaluating the absolute value expression.

    -3.8 and -1.8

    The expression for the distance between -3.8 and -1.8 is [   ].
    (Use integers or decimals for any numbers in the expression.)

    The distance is [   ].
    (Type an integer or a decimal.)

17. State the name of the property illustrated.

    $(7 + 2) + (3 + 4) = (3 + 4) + (7 + 2)$

    Choose the correct answer below.

    ○ A. Commutative property of multiplication.

    ○ B. Distributive property of multiplication over addition.

    ○ C. Commutative property of addition.

    ○ D. Associative property of addition.

18. Determine which property is illustrated by the given equation.

    $5(-4 + 7) = -20 + 35$

    Choose the correct property below.

    ○ Identity Property of Addition   ○ Commutative Property of Addition

    ○ Identity Property of Multiplication   ○ Commutative Property of Multiplication

    ○ Inverse Property of Multiplication   ○ Associative Property of Multiplication

    ○ Associative Property of Addition   ○ Inverse Property of Addition

    ○ Distributive Property of Multiplication over   ○ None of the above
       Addition

19. State the name of the property illustrated.

    $\dfrac{1}{w - 12}(w - 12) = 1$

    Name the property illustrated. Choose the correct answer below.

    ○ A. Identity property of addition.

    ○ B. Inverse property of multiplication.

    ○ C. Identity property of multiplication.

    ○ D. Inverse property of addition.

20. Write the given algebraic expression without parentheses.

    $-(9x - 2y - 2)$

    $-(9x - 2y - 2) =$ [   ]

21. Write the algebraic expression without parentheses.

$$\frac{1}{6}(6m) + [(4a) + (-4a)]$$

$\frac{1}{6}(6m) + [(4a) + (-4a)] = $ [_____]

(Simplify your answer.)

22. Insert <, >, or = between the given pair of numbers to make a true statement.

$|-2|$ $|-18|$

$|-2|$ [_____] $|-18|$

23. Insert either <, >, or = in the area between two numbers to make a true statement.

$\left|\dfrac{9}{2}\right|$ $|-4.5|$

$\left|\dfrac{9}{2}\right|$ [_____] $|-4.5|$

24. Write the English phrase as an algebraic expression. Then simplify the expression. Let x represent the number.

Seven times the product of negative two and a number.

What is the algebraic expression?

[_____]

(Do not simplify.)

What is the simplified expression?

[_____]

25. Write the English phrase as an algebraic expression. Then, simplify the expression. Let x represent the number.

The difference between the product of three and a number and two times the number.

What is the algebraic expression?

[_____] (Do not simplify.)

What is the simplified expression?

[_____]

26. Write the English phrase as an algebraic expression. Then simplify the expression. Let x represent the number.

The difference between eight times a number and three more than six times the number.

What is the algebraic expression?

[_____]

(Do not simplify.)

What is the simplified expression?

[_____]

27. The maximum heart rate, in beats per minute, that you should achieve during exercise is 220 minus your age, $220 - a$. Your exercise goal is to improve cardiovascular conditioning. Use the following formulas to answer parts **a** and **b**.

Lower limit of range　　　　$H = \dfrac{7}{10}(220 - a)$

Upper limit of range　　　　$H = \dfrac{4}{5}(220 - a)$

**a.** What is the lower limit of the heart range, in beats per minute, for a 22-year-old with this exercise goal?

The lower limit of the heart range is [＿＿＿＿＿] beats per minute.
(Round to the nearest integer as needed.)

b. What is the upper limit of the heart range, in beats per minute, for a 22-year-old with this exercise goal?

Thus, the upper limit of the heart range is [＿＿＿＿＿] beats per minute.
(Round to the nearest integer as needed.)

28.

In 2005, the average CEO was paid 814 times as much per hour as a full-time minimum-wage earner, who earned $5.15 per hour. The graph shows the ratio of CEO compensation to minimum-wage salary from 2001 through 2005. The data in the graph can be modeled by the formula $R = 54x^2 - 263x + 829$,
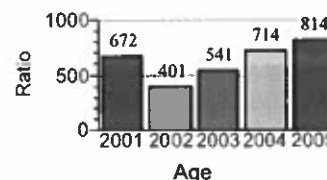
where R represents the ratio of CEO compensation to minimum-wage salary x years after 2000. According to the formula, what was the ratio of CEO compensation to minimum-wage salary in 2003? Does the formula underestimate or overestimate the actual ratio shown by the bar graph? By how much?

According to the formula, the ratio was [＿＿＿＿＿] in the year 2003.

The formula (1) ＿＿＿＿＿＿ the actual ratio by [＿＿＿＿＿].

(1) ◯ underestimates
    ◯ overestimates

---

29. You had $10,000 to invest. You put x dollars in a safe, government-insured certificate of deposit paying 5% per year. You invested the remainder of the money in noninsured corporate bonds paying 14% per year. Your total interest earned at the end of the year is given by the following algebraic expression. Answer parts (a) and (b) below.

$$0.05x + 0.14(10{,}000 - x)$$

a. Simplify the algebraic expression.

$0.05x + 0.14(10{,}000 - x) =$ [＿＿＿＿＿]

b. Use the algebraic expression to determine your total interest earned at the end of the year if you invested $7000 in the safe, government-insured certificate of deposit.

$[＿＿＿＿＿]

---

30. Evaluate the given exponential expression.

$$\dfrac{7^6}{7^3}$$

$\dfrac{7^6}{7^3} =$ [＿＿＿＿＿] (Type an integer or a fraction. Simplify your answer.)

31. Evaluate the given exponential expression.

$$2^{-6} \cdot 2$$

$2^{-6} \cdot 2 = \boxed{}$ (Type an integer or a fraction.)

32. Evaluate the given exponential expression.

$$\frac{5^2}{5^7}$$

$\dfrac{5^2}{5^7} = \boxed{}$ (Type an integer or a fraction. Simplify your answer.)

33. Simplify the exponential expression.

$$\frac{40x^2 y^5}{25x^4 y^{-6}}$$

$\dfrac{40x^2 y^5}{25x^4 y^{-6}} = \boxed{}$

(Simplify your answer. Use positive exponents only. Use integers or fractions for any numbers in the expression.)

34. Simplify the exponential expression.

$$\left(\frac{4x^5}{y}\right)^{-2}$$

$\left(\dfrac{4x^5}{y}\right)^{-2} = \boxed{}$ (Simplify your answer. Use positive exponents only.)

35. Simplify the exponential expression.

$$\left(\frac{-35a^3 b^2}{7a^6 b^{-9}}\right)^3$$

$\left(\dfrac{-35a^3 b^2}{7a^6 b^{-9}}\right)^3 = \boxed{}$ (Simplify your answer. Use positive exponents only.)

36. Simplify the exponential expression.

$$\left(\frac{4a^{-6} b^2}{13a^7 b^{-6}}\right)^0$$

$\left(\dfrac{4a^{-6} b^2}{13a^7 b^{-6}}\right)^0 = \boxed{}$ (Simplify your answer. Use positive exponents only.)

37. Write the number in scientific notation.

0.00096

$0.00096 = \boxed{}$
(Use the multiplication symbol in the math palette as needed.)

38. Write the number in scientific notation.

-0.00000000568

$-0.00000000568 = \boxed{}$

(Use the multiplication symbol in the math palette as needed.)

39. Write the answers in scientific notation. If necessary, round the decimal factor in your scientific notation answer to two decimal places.

$$\frac{4.5 \times 10^{-3}}{7.5 \times 10^{-12}}$$

$$\frac{4.5 \times 10^{-3}}{7.5 \times 10^{-12}} = \boxed{}$$

(Use scientific notation. Use the multiplication symbol in the math palette as needed. Round to two decimal places as needed.)

40. Perform the indicated computation. Write the answer in scientific notation.

$$\frac{260{,}000{,}000{,}000}{0.00013}$$

$$\frac{260{,}000{,}000{,}000}{0.00013} = \boxed{}$$

(Use the multiplication symbol in the math palette as needed.)

41. Write the answer in scientific notation. If necessary, round the decimal factor in your scientific notation answer to two decimal places.

$$\frac{0.000052 \times 0.00002}{0.00013}$$

$$\frac{0.000052 \times 0.00002}{0.00013} = \boxed{}$$

(Use scientific notation. Use the multiplication symbol in the math palette as needed.)

42. Simplify the exponential expression. Assume that variables represent nonzero real numbers.

$$\left(3x^{-9}yz^{-7}\right)(3x)^{-5}$$

$\left(3x^{-9}yz^{-7}\right)(3x)^{-5} = \boxed{}$ (Simplify your answer. Use positive exponents only.)

43. Simplify the exponential expression. Assume that the variables represent nonzero real numbers.

$$\left(\frac{x^4 y^3 z^6}{x^{-4} y^{-3} z^{-6}}\right)^{-2}$$

$$\left(\frac{x^4 y^3 z^6}{x^{-4} y^{-3} z^{-6}}\right)^{-2} = \boxed{}$$

(Use positive exponents only.)

44. Simplify the exponential expression. Assume the variables represent nonzero real numbers.

$$\frac{\left(4^{-1}x^{-2}y^{-4}\right)^{-2}\left(4x^{-4}y^{2}\right)^{-2}\left(16x^{-7}y^{8}\right)^{0}}{\left(4x^{-4}y^{-5}\right)^{2}}$$

$$\frac{\left(4^{-1}x^{-2}y^{-4}\right)^{-2}\left(4x^{-4}y^{2}\right)^{-2}\left(16x^{-7}y^{8}\right)^{0}}{\left(4x^{-4}y^{-5}\right)^{2}}=\boxed{}$$

(Simplify your answer. Use positive exponents only.)

45. The country of Alginor spends an average of $7000 per person each year on health care. What does Alginor spend each year on health care nationwide? Express the answer in scientific notation and use 2.8×10^{8} for the population of Alginor.

$\$\boxed{}$

(Use the multiplication symbol in the math palette as needed.)

46. The mass of one oxygen molecule is 5.3×10^{-23} gram. Find the mass of 50,000 molecules of oxygen. Express the answer in scientific notation.

The mass of 50,000 molecules of oxygen is $\boxed{}$ gram.
(Use the multiplication symbol in the math palette as needed.)

47. Each day we purchase 150 loaves of bread per second. Use the fact that there are approximately 3.2×10^{7} seconds in a year to approximate how many loaves of bread are purchased in one year. Write your answer in scientific notation.

Approximately how many loaves of bread are purchased in one year?

$\boxed{}$

(Use scientific notation. Use the multiplication symbol in the math palette as needed.)

1. $-\dfrac{1}{14}$

2. -5

3. 9

4. 1,4,11,14,15

5. D. {2, 4}∪{1, 3} = {1, 2, 3, 4}

6. z,o,x,g,u

7. $\sqrt{100}$

$0,\sqrt{100}$

$-13,0,\sqrt{100}$

$-13,-\dfrac{6}{7},0,0.25,\sqrt{100}$

$\sqrt{5},\pi$

$-13,-\dfrac{6}{7},0,0.25,\sqrt{5},\pi,\sqrt{100}$

8. A. real numbers, rational numbers

9. A. whole numbers, integers, rational numbers, natural numbers, real numbers

10. False

11. True

12. True

13. False

14. $|16-(-13)|$

29

15. $|-3-(-4)|$

1

16. $|-3.8-(-1.8)|$

    2

17. C. Commutative property of addition.

18. Distributive Property of Multiplication over Addition

19. B. Inverse property of multiplication.

20. $-9x+2y+2$

21. m

22. $<$

23. $=$

24. $7(-2x)$

    $-14x$

25. $3x-2x$

    x

26. $8x-(6x+3)$

    $2x-3$

27. 139

    158

28. 526

    (1) underestimates

    15

29. $1400-0.09x$

    770

30. 343

31. $\dfrac{1}{32}$

32. $\dfrac{1}{3125}$

33. $\dfrac{8y^{11}}{5x^2}$

34. $\dfrac{y^2}{16x^{10}}$

35. $-\dfrac{125b^{33}}{a^9}$

36. 1

37. 9.6×10^{-4}

38. -5.68×10^{-9}

39. 6×10^8

40. 2×10^{15}

41. 8×10^{-6}

42. $\dfrac{y}{81x^{14}z^7}$

43. $\dfrac{1}{x^{16}y^{12}z^{24}}$

44. $\dfrac{x^{20}y^{14}}{16}$

45. 1.96×10^{12}

46. 2.65×10^{-18}

47. 4.8×10^9

Student: _____
Date: _____

Instructor: Elias Kabeche
Course: Algebra 3 & Trig L2 - 2(A-C) - 24-25   **Assignment:** Exponents - Summer 2025
(2025 / AMITY REGIONAL HIGH SCHOOL)

1. Evaluate the given expression if $x = -6$ and $y = 6$.

   $$\frac{5x + y}{2 + 4y}$$

   $\dfrac{5x + y}{2 + 4y} =$ [＿＿＿＿＿] (Type an integer or a simplified fraction.)

---

2. The formula $C = \dfrac{5}{9}(F - 32)$ expresses the relationship between Fahrenheit temperature, F, and Celsius temperature, C. Use the formula to convert $77°F$ to its equivalent temperature on the Celsius scale.

   $77°F =$ [＿＿＿＿＿] $°C$

---

3. A football is kicked vertically upward from a height of 7 feet with an initial speed of 50 feet per second. The formula $h = 7 + 50t - 16t^2$ describes the ball's height above the ground, h, in feet, t seconds after it was kicked. Use this formula to find the ball's height 2 seconds after it was kicked.

   The ball's height, 2 seconds after it was kicked, was [＿＿＿＿＿] feet.

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4. Find the union of the sets.

   $\{3,4,7,12\} \cup \{4,12,13\}$

   $\{3,4,7,12\} \cup \{4,12,13\} = \{$ [＿＿＿＿＿] $\}$
   (Use a comma to separate answers as needed.)

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5. Find the union of the sets.

   $\{1, 3, 5\} \cup \{2, 4\}$

   Choose the correct answer below.

   ○ **A.** $\{1, 3, 5\} \cup \{2, 4\} = \varnothing$

   ○ **B.** $\{1, 3, 5\} \cup \{2, 4\} = \{1, 2, 3, 4, 5\}$

   ○ **C.** $\{1, 3, 5\} \cup \{2, 4\} = \{1, 3, 5\}$

   ○ **D.** $\{1, 3, 5\} \cup \{2, 4\} = \{2, 4\}$

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6. Find the union of the sets.

   $\{b,c,a,m,v\} \cup \varnothing$

   $\{b,c,a,m,v\} \cup \varnothing = \{$ [＿＿＿＿＿] $\}$ (Use a comma to separate answers as needed.)

7. List all numbers from the given set that are **a.** natural numbers, **b.** whole numbers, **c.** integers, **d.** rational numbers, **e.** irrational numbers, and **f.** real numbers.

$$\left\{-9, \ -\frac{4}{5}, \ 0, \ 0.8, \ \sqrt{2}, \ \pi, \ \sqrt{81}\right\}$$

a. List all the natural numbers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

b. List all the whole numbers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

c. List all the integers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

d. List all the rational numbers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

e. List all the irrational numbers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

f. List all the real numbers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

8. Choose which group of sets the following number belongs to. Be sure to account for ALL sets.

$$\frac{5}{7}$$

○ **A.** real numbers, rational numbers

○ **B.** real numbers, irrational numbers

○ **C.** real numbers, rational numbers, natural numbers

○ **D.** rational numbers, natural numbers, integers

○ **E.** irrational numbers, natural numbers

9. Choose which group of sets the following number belongs to. Be sure to account for ALL sets.

$$-4$$

○ **A.** integers, rational numbers, real numbers

○ **B.** whole numbers, integers, irrational numbers, natural numbers, real numbers

○ **C.** integers, natural numbers, real numbers

○ **D.** whole numbers, integers, rational numbers, natural numbers, real numbers

10. Determine whether the statement is true or false.

$$-2 \geq -5$$

Is the given statement true or false?

○ False

○ True

11. Determine whether the statement is true or false.

$$9 > -6$$

Is the given statement true or false?

○ True

○ False

12. Determine whether the statement is true or false.

$$-\pi \leq -\pi$$

Is the given statement true or false?

○ False

○ True

13. Determine whether the statement is true or false.

$$0 > -2$$

Is the given statement true or false?

○ False

○ True

14. Express the distance between the given numbers using absolute value. Then find the distance by evaluating the absolute value expression.

$$-14 \text{ and } 18$$

An expression for the distance between the two numbers is [____].
(Do not simplify.)

The distance between -14 and 18 is [____].

15. Express the distance between the given numbers using absolute value. Then find the distance by evaluating the absolute value expression.

$$-6 \text{ and } -5$$

An expression for the distance between the two numbers is [____].
(Do not simplify.)

The distance between -6 and -5 is [____].

16. Express the distance between the given numbers using absolute value. Then find the distance by evaluating the absolute value expression.

-5.6 and -1.3

The expression for the distance between -5.6 and -1.3 is $\boxed{}$.
(Use integers or decimals for any numbers in the expression.)

The distance is $\boxed{}$.
(Type an integer or a decimal.)

17. State the name of the property illustrated.

$(6+7) \cdot (5+3) = (5+3) \cdot (6+7)$

Choose the correct answer below.

○ **A.** Distributive property of multiplication over addition.

○ **B.** Commutative property of addition.

○ **C.** Commutative property of multiplication.

○ **D.** Associative property of addition.

18. Determine which property is illustrated by the given equation.

$7(-6+3) = -42+21$

Choose the correct property below.

○ Identity Property of Addition ○ Associative Property of Addition

○ Commutative Property of Addition ○ Inverse Property of Addition

○ Inverse Property of Multiplication ○ Associative Property of Multiplication

○ Identity Property of Multiplication ○ Commutative Property of Multiplication

○ Distributive Property of Multiplication over Addition ○ None of the above

19. State the name of the property illustrated.

$a + 6 + (-a - 6) = 0$

Name the property illustrated. Choose the correct answer below.

○ **A.** Inverse property of addition.

○ **B.** Identity property of addition.

○ **C.** Inverse property of multiplication.

○ **D.** Identity property of multiplication.

20. Write the given algebraic expression without parentheses.

$-(2x - 5y - 7)$

$-(2x - 5y - 7) = \boxed{}$

21. Write the algebraic expression without parentheses.

$$\frac{1}{6}(6a) + [(5k) + (-5k)]$$

$\frac{1}{6}(6a) + [(5k) + (-5k)] = \boxed{}$

(Simplify your answer.)

---

22. Insert <, >, or = between the given pair of numbers to make a true statement.

$|-18| \quad |-10|$

$|-18| \boxed{} |-10|$

---

23. Insert either <, >, or = in the area between two numbers to make a true statement.

$\left|\frac{9}{5}\right| \quad |-2|$

$\left|\frac{9}{5}\right| \boxed{} |-2|$

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24. Write the English phrase as an algebraic expression. Then simplify the expression. Let x represent the number.

Six times the product of negative four and a number.

What is the algebraic expression?

$\boxed{}$

(Do not simplify.)

What is the simplified expression?

$\boxed{}$

---

25. Write the English phrase as an algebraic expression. Then, simplify the expression. Let x represent the number.

The difference between the product of four and a number and three times the number.

What is the algebraic expression?

$\boxed{}$ (Do not simplify.)

What is the simplified expression?

$\boxed{}$

---

26. Write the English phrase as an algebraic expression. Then simplify the expression. Let x represent the number.

The difference between seven times a number and seven more than four times the number.

What is the algebraic expression?

$\boxed{}$

(Do not simplify.)

What is the simplified expression?

$\boxed{}$

27. The maximum heart rate, in beats per minute, that you should achieve during exercise is 220 minus your age, $220 - a$. Your exercise goal is to improve cardiovascular conditioning. Use the following formulas to answer parts **a** and **b**.

Lower limit of range $\qquad H = \dfrac{7}{10}(220 - a)$

Upper limit of range $\qquad H = \dfrac{4}{5}(220 - a)$

a. What is the lower limit of the heart range, in beats per minute, for a 49-year-old with this exercise goal?

The lower limit of the heart range is [_____] beats per minute.
(Round to the nearest integer as needed.)

b. What is the upper limit of the heart range, in beats per minute, for a 49-year-old with this exercise goal?

Thus, the upper limit of the heart range is [_____] beats per minute.
(Round to the nearest integer as needed.)

28.

In 2005, the average CEO was paid 824 times as much per hour as a full-time minimum-wage earner, who earned \$5.15 per hour. The graph shows the ratio of CEO compensation to minimum-wage salary from 2001 through 2005. The data in the graph can be modeled by the formula $R = 54x^2 - 263x + 845,$
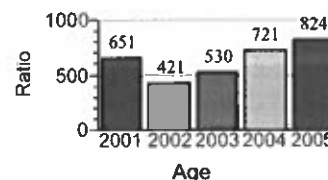
where R represents the ratio of CEO compensation to minimum-wage salary x years after 2000. According to the formula, what was the ratio of CEO compensation to minimum-wage salary in 2003? Does the formula underestimate or overestimate the actual ratio shown by the bar graph? By how much?

According to the formula, the ratio was [_____] in the year 2003.

The formula (1) _____ the actual ratio by [_____].

(1) ○ overestimates
    ○ underestimates

29. You had \$10,000 to invest. You put x dollars in a safe, government-insured certificate of deposit paying 4% per year. You invested the remainder of the money in noninsured corporate bonds paying 6% per year. Your total interest earned at the end of the year is given by the following algebraic expression. Answer parts (a) and (b) below.

$\qquad 0.04x + 0.06(10{,}000 - x)$

a. Simplify the algebraic expression.

$0.04x + 0.06(10{,}000 - x) =$ [_____]

b. Use the algebraic expression to determine your total interest earned at the end of the year if you invested \$6000 in the safe, government-insured certificate of deposit.

\$[_____]

30. Evaluate the given exponential expression.

$$\dfrac{3^9}{3^4}$$

$\dfrac{3^9}{3^4} =$ [_____] (Type an integer or a fraction. Simplify your answer.)

31. Evaluate the given exponential expression.

$$4^{-8} \cdot 4$$

$4^{-8} \cdot 4 =$ [   ] (Type an integer or a fraction.)

32. Evaluate the given exponential expression.

$$\frac{3^2}{3^4}$$

$\dfrac{3^2}{3^4} =$ [   ] (Type an integer or a fraction. Simplify your answer.)

33. Simplify the exponential expression.

$$\frac{25x^3y^4}{30x^7y^{-6}}$$

$\dfrac{25x^3y^4}{30x^7y^{-6}} =$ [   ]

(Simplify your answer. Use positive exponents only. Use integers or fractions for any numbers in the expression.)

34. Simplify the exponential expression.

$$\left(\frac{6x^9}{y}\right)^{-2}$$

$\left(\dfrac{6x^9}{y}\right)^{-2} =$ [   ] (Simplify your answer. Use positive exponents only.)

35. Simplify the exponential expression.

$$\left(\frac{-28a^5b^8}{7a^7b^{-6}}\right)^3$$

$\left(\dfrac{-28a^5b^8}{7a^7b^{-6}}\right)^3 =$ [   ] (Simplify your answer. Use positive exponents only.)

36. Simplify the exponential expression.

$$\left(\frac{8a^{-2}b^8}{14a^4b^{-5}}\right)^0$$

$\left(\dfrac{8a^{-2}b^8}{14a^4b^{-5}}\right)^0 =$ [   ] (Simplify your answer. Use positive exponents only.)

37. Write the number in scientific notation.

0.00085

$0.00085 =$ [   ]
(Use the multiplication symbol in the math palette as needed.)

38. Write the number in scientific notation.

   -0.00000000472

   $-0.00000000472 = \boxed{}$

   (Use the multiplication symbol in the math palette as needed.)

39. Write the answers in scientific notation. If necessary, round the decimal factor in your scientific notation answer to two decimal places.

   $$\frac{4.8 \times 10^{-3}}{9.6 \times 10^{-9}}$$

   $$\frac{4.8 \times 10^{-3}}{9.6 \times 10^{-9}} = \boxed{}$$

   (Use scientific notation. Use the multiplication symbol in the math palette as needed. Round to two decimal places as needed.)

40. Perform the indicated computation. Write the answer in scientific notation.

   $$\frac{48{,}000{,}000{,}000}{0.0000016}$$

   $$\frac{48{,}000{,}000{,}000}{0.0000016} = \boxed{}$$

   (Use the multiplication symbol in the math palette as needed.)

41. Write the answer in scientific notation. If necessary, round the decimal factor in your scientific notation answer to two decimal places.

   $$\frac{0.0028 \times 0.00004}{0.0016}$$

   $$\frac{0.0028 \times 0.00004}{0.0016} = \boxed{}$$

   (Use scientific notation. Use the multiplication symbol in the math palette as needed.)

42. Simplify the exponential expression. Assume that variables represent nonzero real numbers.

   $$\left(3x^{-8}yz^{-8}\right)(3x)^{-2}$$

   $\left(3x^{-8}yz^{-8}\right)(3x)^{-2} = \boxed{}$ (Simplify your answer. Use positive exponents only.)

43. Simplify the exponential expression. Assume that the variables represent nonzero real numbers.

   $$\left(\frac{x^3 y^6 z^2}{x^{-3} y^{-6} z^{-2}}\right)^{-3}$$

   $$\left(\frac{x^3 y^6 z^2}{x^{-3} y^{-6} z^{-2}}\right)^{-3} = \boxed{}$$

   (Use positive exponents only.)

44. Simplify the exponential expression. Assume the variables represent nonzero real numbers.

$$\frac{\left(2^{-1}x^{-5}y^{-6}\right)^{-5}\left(2x^{-3}y^5\right)^{-5}\left(8x^{-9}y^6\right)^0}{\left(2x^{-5}y^{-5}\right)^5}$$

$$\frac{\left(2^{-1}x^{-5}y^{-6}\right)^{-5}\left(2x^{-3}y^5\right)^{-5}\left(8x^{-9}y^6\right)^0}{\left(2x^{-5}y^{-5}\right)^5} = \boxed{}$$

(Simplify your answer. Use positive exponents only.)

45. The country of Alginor spends an average of $4000 per person each year on health care. What does Alginor spend each year on health care nationwide? Express the answer in scientific notation and use 2.8×10^8 for the population of Alginor.

$\$\boxed{}$

(Use the multiplication symbol in the math palette as needed.)

46. The mass of one oxygen molecule is 5.3×10^{-23} gram. Find the mass of 30,000 molecules of oxygen. Express the answer in scientific notation.

The mass of 30,000 molecules of oxygen is $\boxed{}$ gram.

(Use the multiplication symbol in the math palette as needed.)

47. Each day we purchase 1.8 thousand cans of beans per minute. Use the fact that there are approximately 5.3×10^5 minutes in a year to approximate how many cans of beans are purchased in one year. Write your answer in scientific notation.

Approximately how many cans of beans are purchased in one year?

$\boxed{}$

(Use scientific notation. Use the multiplication symbol in the math palette as needed.)

1. $-\dfrac{12}{13}$

2. 25

3. 43

4. 3,4,7,12,13

5. B. {1, 3, 5}∪{2, 4} = {1, 2, 3, 4, 5}

6. b,c,a,m,v

7. $\sqrt{81}$

   $0,\sqrt{81}$

   $-9,0,\sqrt{81}$

   $-9,-\dfrac{4}{5},0,0.8,\sqrt{81}$

   $\sqrt{2},\pi$

   $-9,-\dfrac{4}{5},0,0.8,\sqrt{2},\pi,\sqrt{81}$

8. A. real numbers, rational numbers

9. A. integers, rational numbers, real numbers

10. True

11. True

12. True

13. True

14. $|18-(-14)|$

   32

15. $|-5-(-6)|$

   1

16. $|-5.6 - (-1.3)|$

   4.3

17. C. Commutative property of multiplication.

18. Distributive Property of Multiplication over Addition

19. A. Inverse property of addition.

20. $-2x + 5y + 7$

21. a

22. $>$

23. $<$

24. $6(-4x)$

   $-24x$

25. $4x - 3x$

   x

26. $7x - (4x + 7)$

   $3x - 7$

27. 120

   137

28. 542

   (1) overestimates

   12

29. $600 - 0.02x$

   480

30. 243

31. $\dfrac{1}{16384}$

32. $\dfrac{1}{9}$

33. $\dfrac{5y^{10}}{6x^4}$

34. $\dfrac{y^2}{36x^{18}}$

35. $-\dfrac{64b^{42}}{a^6}$

36. 1

37. 8.5×10^{-4}

38. -4.72×10^{-9}

39. 5×10^5

40. 3×10^{16}

41. 7×10^{-5}

42. $\dfrac{y}{3x^{10}z^8}$

43. $\dfrac{1}{x^{18}y^{36}z^{12}}$

44. $\dfrac{x^{65}y^{30}}{32}$

45. 1.12×10^{12}

46. 1.59×10^{-18}

47. 9.54×10^8

Student: _____
Date: _____

Instructor: Elias Kabeche
Course: Algebra 3 & Trig L2 - 2(A-C) - 24-25   **Assignment:** Exponents 2 - Summer 2025
(2025 / AMITY REGIONAL HIGH SCHOOL)

1. Evaluate the expression, or state that the expression is not a real number.

    $$\sqrt{25 - 16}$$

    Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

    ○ **A.** The expression is a real number. $\sqrt{25 - 16}$ = [   ] (Type an integer or a decimal.)

    ○ **B.** The expression is not a real number.

2. Evaluate the square roots first, then subtract the result. Do not use a calculator or a square root table.

    $$\sqrt{400} - \sqrt{256}$$

    $\sqrt{400} - \sqrt{256}$ = [   ]

3. Simplify the given expression.

    $$\sqrt{(-8)^2}$$

    $\sqrt{(-8)^2}$ = [   ]

4. Use the quotient rule to simplify the following expression. Assume that $x > 0$.

    $$\frac{\sqrt{16x^3}}{\sqrt{4x}}$$

    $\dfrac{\sqrt{16x^3}}{\sqrt{4x}}$ = [   ]

5. Simplify using the quotient rule for square roots. Assume that $x > 0$.

    $$\frac{\sqrt{24x^6}}{\sqrt{3x}}$$

    $\dfrac{\sqrt{24x^6}}{\sqrt{3x}}$ = [   ]

6. Divide and, if possible, simplify. Assume that all variables represent positive real numbers.

    $$\frac{\sqrt{315x^3}}{\sqrt{5x^{-7}}}$$

    $\dfrac{\sqrt{315x^3}}{\sqrt{5x^{-7}}}$ = [   ]

    (Simplify your answer. Type an exact answer, using radicals as needed.)

7. In the following problem, add or subtract terms whenever possible. Simplify the answer.

$$\sqrt{50x} - \sqrt{8x}$$

$\sqrt{50x} - \sqrt{8x} =$ [_____] (Type an exact answer, using radicals as needed.)

8. In the following problem, add or subtract terms whenever possible. Simplify the answer.

$$3\sqrt{12} + 6\sqrt{48}$$

$3\sqrt{12} + 6\sqrt{48} =$ [_____]
(Type an exact answer using radicals as needed.)

9. Add or subtract by first simplifying each radical and then combining any like radical terms.

$$5\sqrt{18} - \sqrt{44} + \sqrt{99} - \sqrt{8}$$

$5\sqrt{18} - \sqrt{44} + \sqrt{99} - \sqrt{8} =$ [_____]

10. Rationalize the denominator. Then simplify, if possible.

$$\frac{8}{1 + \sqrt{2}}$$

$\dfrac{8}{1 + \sqrt{2}} =$ [_____] (Type an exact answer, using radicals as needed.)

11. Rationalize the denominator. Simplify if possible.

$$\frac{16}{\sqrt{5} - 1}$$

$\dfrac{16}{\sqrt{5} - 1} =$ [_____]
(Simplify your answer. Type an exact answer using radicals as needed.)

12. Rationalize the denominator. Simplify the answer.

$$\frac{4}{\sqrt{7} + \sqrt{5}}$$

$\dfrac{4}{\sqrt{7} + \sqrt{5}} =$ [_____]
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed.)

13. Evaluate the following expression, or indicate that the expression is not a real number.

$$\sqrt[4]{(-7)^4}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** The expression is a real number. $\sqrt[4]{(-7)^4} =$ [_____]

○ **B.** The expression is not a real number.

14. Simplify the expression. Include absolute value bars where necessary.

$$\sqrt[13]{(-9)^{13}}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** The expression is a real number. $\sqrt[13]{(-9)^{13}} =$ [ ] (Simplify your answer.)

○ **B.** The expression is not a real number.

---

15. Evaluate the given expression.

$$\sqrt[3]{-\frac{1}{125}}$$

$\sqrt[3]{-\frac{1}{125}} =$ [ ] (Type an integer or a simplified fraction.)

---

16. Add or subtract terms whenever possible.

$$2\sqrt[4]{32} + \sqrt[4]{162}$$

$2\sqrt[4]{32} + \sqrt[4]{162} =$ [ ]
(Type an exact answer, using radicals as needed.)

---

17. Add or subtract terms whenever possible.

$$\sqrt[5]{486xy^5} - y\sqrt[5]{2048x}$$

$\sqrt[5]{486xy^5} - y\sqrt[5]{2048x} =$ [ ]
(Type an exact answer, using radicals as needed.)

---

18. Add or subtract terms whenever possible.

$$\sqrt{3} - \sqrt[3]{27}$$

$\sqrt{3} - \sqrt[3]{27} =$ [ ]
(Simplify your answer. Type an exact answer, using radicals as needed.)

---

19. Simplify by reducing the index of the radical.

$$\sqrt[2]{x^4}$$

$\sqrt[2]{x^4} =$ [ ]

---

20. Simplify by reducing the index of the radical.

$$\sqrt[4]{x^8}$$

$\sqrt[4]{x^8} =$ [ ]

---

21. Simplify by reducing the index of the radical.

$$\sqrt[15]{x^{10}y^5}$$

$\sqrt[15]{x^{10}y^5} =$ [ ]
(Simplify your answer. Type an exact answer, using radicals as needed.)

22. Simplify the given expression. Assume that all variables represent positive numbers.

$$\left(\frac{x^{-3/4}\,y^{1/4}}{x^{-1/4}}\right)^{-8}$$

$$\left(\frac{x^{-3/4}\,y^{1/4}}{x^{-1/4}}\right)^{-8} = \boxed{}$$

---

23. The bar graph shows spam as a percentage of e-mail for four selected years. The data can be modeled by $y = 18.7\sqrt{x} + 22$, where y is the percentage of e-mail that is spam and x is the number of years after 2000.
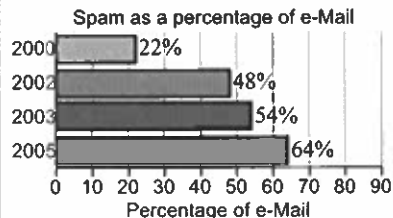
   a. According to the model, what percentage of e-mail was spam in 2002? Use a calculator to estimate. Does this underestimate or overestimate the actual percentage given in the bar graph? By how much?
   b. According to the model, what percentage of e-mail will be spam in 2012?

Spam as a percentage of e-Mail

Year	
2000	22%
2002	48%
2003	54%
2005	64%

Percentage of e-Mail (0 10 20 30 40 50 60 70 80 90)

a. According to the model, the percentage of e-mail that was spam in 2002 was $\boxed{}$ %.
(Round to one decimal place as needed.)

This percentage (1) _____ the actual percentage by $\boxed{}$ %.

b. According to the model, the percentage of spam in 2012 will be $\boxed{}$ %.
(Round to one decimal place as needed.)

(1) ○ underestimates
    ○ overestimates

---

24. Find the perimeter and area of the rectangle to the right.

$\sqrt{216}$ feet

$2\sqrt{96}$ feet
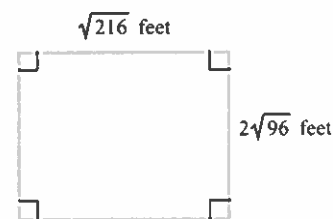
The perimeter of the rectangle is $\boxed{}$ feet.
(Type an exact answer, using radicals as needed.)

The area of the rectangle is $\boxed{}$ square feet.
(Type an exact answer, using radicals as needed.)

1. A. The expression is a real number. $\sqrt{25-16}$ = [3] (Type an integer or a decimal.)

2. 4

3. 8

4. $2x$

5. $2x^2\sqrt{2x}$

6. $3x^5\sqrt{7}$

7. $3\sqrt{2x}$

8. $30\sqrt{3}$

9. $13\sqrt{2} + \sqrt{11}$

10. $-8 + 8\sqrt{2}$

11. $4\left(\sqrt{5} + 1\right)$

12. $2\sqrt{7} - 2\sqrt{5}$

13. A. The expression is a real number. $\sqrt[4]{(-7)^4}$ = [7]

14. A. The expression is a real number. $\sqrt[13]{(-9)^{13}}$ = [-9] (Simplify your answer.)

15. $-\dfrac{1}{5}$

16. $7\sqrt[4]{2}$

17. $-y\sqrt[5]{2x}$

18. $\sqrt{3} - 3$

19. x^2

20. x^2

21. $\sqrt[3]{x^2 y}$

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

23. 48.4

   (1) overestimates

   0.4

   86.8

24. $28\sqrt{6}$

   288

Student: _____
Date: _____

Instructor: Elias Kabeche
Course: Algebra 3 & Trig L2 - 2(A-C) - 24-25   **Assignment:** Polynomials - Summer 2025
(2025 / AMITY REGIONAL HIGH SCHOOL)

1. Is the algebraic expression a polynomial? If it is, write the polynomial in standard form.

   $6x^2 + 6x^3 - 5$

   Select the correct choice below and, if necessary, fill in the answer box within your choice.

   ○ **A.** Yes, the expression $6x^2 + 6x^3 - 5$ is a polynomial. The expression written in standard form is
   [   ].

   ○ **B.** No, the expression $6x^2 + 6x^3 - 5$ is not a polynomial.

2. Is the algebraic expression a polynomial? If it is, write the polynomial in standard form.

   $\dfrac{5x + 6}{x}$

   Select the correct choice below and fill in any answer boxes within your choice.

   ○ **A.** The expression is a polynomial. Written in standard form, $\dfrac{5x + 6}{x}$ = [   ].

   ○ **B.** The expression is not a polynomial.

3. Find the degree of the polynomial.

   $4x^4 + 9x^2 + 7$

   The degree is [   ]. (Type a whole number.)

4. Find the degree of the polynomial.

   $x^3 - 3x^9 + 3x + 9x^4 - 3$

   The degree is [   ]. (Type a whole number.)

5. Perform the indicated operation.

   $\left(-2x^3 + 8x^2 - 2x + 10\right) + \left(3x^3 + 9x^2 - 9x - 10\right)$

   Write the polynomial in standard form.

   $\left(-2x^3 + 8x^2 - 2x + 10\right) + \left(3x^3 + 9x^2 - 9x - 10\right) =$ [   ]

   What is the degree of the polynomial?

   [   ]

   (Type a whole number.)

6. Perform the indicated operation.

$$\left(5x^3 - 5x^2 + 8x - 2\right) - \left(10x^3 - 3x^2 - 4x + 8\right)$$

Write the polynomial in standard form.

$$\left(5x^3 - 5x^2 + 8x - 2\right) - \left(10x^3 - 3x^2 - 4x + 8\right) = \boxed{}$$

What is the degree of the polynomial?

$\boxed{}$

(Type a whole number.)

7. Add or subtract as indicated and find the degree of the resulting polynomial.

$$\left(4x^2 + 4x - 9\right) + \left(5x^2 + 7x + 12\right) - \left(9x^2 - 11\right)$$

$\left(4x^2 + 4x - 9\right) + \left(5x^2 + 7x + 12\right) - \left(9x^2 - 11\right) = \boxed{}$ (Do not factor.)

The degree of the result above is $\boxed{}$.

8. Find the product.

$$(9x - 4)(9x + 7)$$

$(9x - 4)(9x + 7) = \boxed{}$

9. Find the product

$$\left(6x^2 - 5\right)\left(5x^2 - 6\right)$$

$\left(6x^2 - 5\right)\left(5x^2 - 6\right) = \boxed{}$ (Simplify your answer.)

10. Use the FOIL method to multiply the binomials.

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

$\left(5x^3 + 2\right)\left(x^2 - 4\right) = \boxed{}$ (Simplify your answer.)

11. Find the product.

$$(x + 2)^3$$

$(x + 2)^3 = \boxed{}$
(Simplify your answer.)

12. Find the product.

$$(3x + 5)^3$$

$(3x + 5)^3 = \boxed{}$

13. Find the product.

$$(x - 5)^3$$

$(x - 5)^3 = \boxed{}$

14. Find the product.

$$(3x-4)^3$$

$(3x-4)^3 = $ [_____]
(Simplify your answer.)

---

15. Find the product.

$$[9y + (8x+1)][9y - (8x+1)]$$

$[9y + (8x+1)][9y - (8x+1)] = $ [_____]

---

16. Find the product.

$$(x+y+5)^2$$

$(x+y+5)^2 = $ [_____]

---

17. Find the product $(5x+y+1)^2$.

$(5x+y+1)^2 = $ [_____]

---

18. Perform the indicated operation.

$$\frac{(5x-6)^5}{(5x-6)^3}$$

$\dfrac{(5x-6)^5}{(5x-6)^3} = $ [_____]

---

19. The bar graph to the right shows the median, or middlemost, annual income for adults in a region, by level of education. The polynomial models below describe the median annual income for men, M, and for women, W, who have completed x years of education. Complete parts (a) through (c).

$$M = -18x^3 + 910x^2 - 9611x + 48,912$$
$$W = 17x^3 - 488x^2 + 6331x - 14,991$$

Median Annual Income, by Level of Education
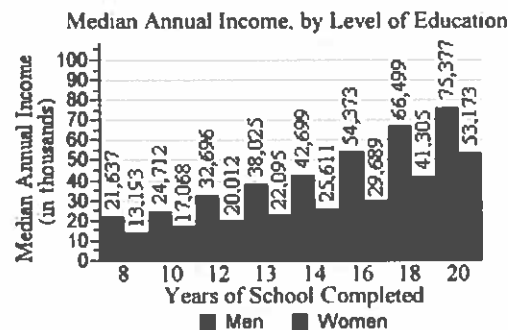
(a) Use the equations defined by polynomials of degree 3 to find a mathematical model for M − W.

M − W = [_____]

(b) According to the model in part (a), what is the difference in the median annual income between men and women with 13 years of education?

The difference is $ [_____].

(c) According to the data displayed by the graph, what is the actual difference in the median annual income between men and women with 13 years of education? Did the model in part (b) underestimate or overestimate this difference? By how much?

The actual difference is $ [_____].

The model (1) _____ the difference by $ [_____].

(1) ○ overestimates
     ○ underestimates

20. The volume, of a rectangular solid with length L, width W, and height H is given by the formula $V = LWH$.

   Use this formula to write a polynomial in standard form that models, or represents, the volume of the open box.

   $7-2x$

   $11-2x$

   x
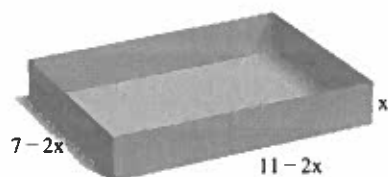
   The volume of the open box is [ ].
   (Simplify your answer. Type your answer in standard form.)

21. Use the figure shown to the right to write a polynomial that represents the area of the shaded region. Express the polynomial in standard form, that is, in descending powers of x.

   $x+9$

   $x+5$

   $x+5$

   $x+1$
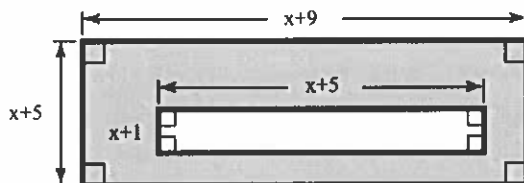
   The polynomial that represents the area of the shaded region is [ ].
   (Simplify your answer. Type your answer in standard form.)

22. Factor out the greatest common factor in the expression.

   $8x^4 - 16x^3 + 24x^2$

   Select the correct choice below and fill in any answer boxes within your choice.

   ○ **A.** $8x^4 - 16x^3 + 24x^2 =$ [ ]

   ○ **B.** The polynomial is prime.

23. Factor the given polynomial completely.

   $x(x + 3) - 15(x + 3)$

   Select the correct choice below and fill in any answer boxes within your choice.

   ○ **A.** $x(x + 3) - 15(x + 3) =$ [ ]

   ○ **B.** The polynomial is prime.

24. Factor out the greatest common factor in the expression.

   $x^2(x - 3) + 16(x - 3)$

   Select the correct choice below and fill in any answer boxes within your choice.

   ○ **A.** $x^2(x - 3) + 16(x - 3) =$ [ ]

   ○ **B.** The polynomial is prime.

25. Factor by grouping.

   $x^3 - 9x^2 + 8x - 72$

   Select the correct choice below and fill in any answer boxes within your choice.

   ○ **A.** $x^3 - 9x^2 + 8x - 72 =$ [ ]

   ○ **B.** The polynomial is prime.

26. Factor by grouping.

$$x^2 + 8x - 6x - 48$$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $x^2 + 8x - 6x - 48 = $ [_____]

○ **B.** The polynomial is prime.

---

27. Factor the expression by grouping.

$$5x^3 - 3x^2 - 30x + 18$$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $5x^3 - 3x^2 - 30x + 18 = $ [_____]

○ **B.** The polynomial is prime.

---

28. Factor the trinomial, or state that the trinomial is prime.

$$5y^2 + 28y - 12$$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $5y^2 + 28y - 12 = $ [_____]

○ **B.** The polynomial is prime.

---

29. Factor the trinomial completely.

$$2a^2 + 5ab + 3b^2$$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $2a^2 + 5ab + 3b^2 = $ [_____]

○ **B.** The polynomial is prime.

---

30. Factor the trinomial, or state that the trinomial is prime.

$$5a^2 - 4ab - 28b^2$$

Select the correct choice below and fill in any answer box within your choice.

○ **A.** $5a^2 - 4ab - 28b^2 = $ [_____]

○ **B.** The polynomial is prime.

---

31. Factor the difference of two cubes.

$$x^3 - 27$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** $x^3 - 27 = $ [_____] (Simplify your answer.)

○ **B.** The polynomial is prime.

32. Factor using the formula for the sum or difference of two cubes.

$64x^3 - 27$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $64x^3 - 27 =$ [_____]

○ **B.** The polynomial is prime.

---

33. Factor using the formula for the sum or difference of two cubes.

$64x^3 + 1$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $64x^3 + 1 =$ [_____]

○ **B.** The polynomial is prime.

---

34. This problem contains a polynomial in several variables. Factor the polynomial and check using multiplication.

$t^2y - n^2y - t^2x + n^2x$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $t^2y - n^2y - t^2x + n^2x =$ [_____]

○ **B.** The polynomial is prime.

---

35. Factor completely, or state that the polynomial is prime.

$x^2y - 4y + 20 - 5x^2$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $x^2y - 4y + 20 - 5x^2 =$ [_____]

○ **B.** The polynomial is prime.

---

36. Factor completely, or state that the polynomial is prime.

$3x^3 - 27a^2x + 42x^2 + 147x$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $3x^3 - 27a^2x + 42x^2 + 147x =$ [_____]

○ **B.** The polynomial is prime.

---

37. Factor the algebraic expression.

$x^{4/8} - x^{1/8}$

$x^{4/8} - x^{1/8} =$ [_____] (Type exponential notation with positive exponents.)

38. Factor and simplify the algebraic expression.

$$(x+9)^{1/4} - (x+9)^{5/4}$$

$(x+9)^{1/4} - (x+9)^{5/4} = $ [_____] (Type exponential notation with positive exponents.)

---

39. Factor and simplify the algebraic expression.

$$(x+9)^{-1/4} - (x+9)^{-5/4}$$

$(x+9)^{-1/4} - (x+9)^{-5/4} = $ [_____] (Type exponential notation with positive exponents.)

---

40. Factor and simplify the algebraic expression.

$$(9x-4)^{1/2} - \frac{1}{5}(9x-4)^{3/2}$$

$(9x-4)^{1/2} - \frac{1}{5}(9x-4)^{3/2} = $ [_____] (Type exponential notation with positive exponents.)

---

41. Find the formula for the area of the shaded region and express it in factored form.
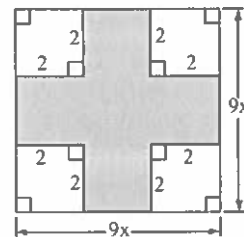
The area of the shaded region is [_____] .
(Factor completely.)

---

42. **a.** Write an expression for the area of the shaded region.
    b. Write the expression in factored form.
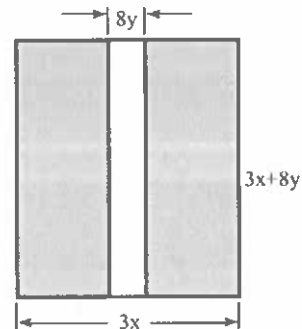
a. The area of the shaded region is [_____] . (Do not factor.)

b. The factored form of the expression is [_____] .

---

43. **a)** Find the volume of the shaded figure by subtracting the smaller volume from the larger. The formula for the volume of a rectangular solid is $V = lwh$.
    b) Write the expression obtained in part **a)** in factored form.
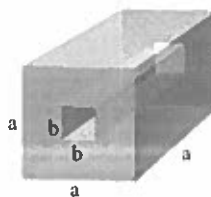
a) The volume of the shaded region is [_____] . (Do not factor.)

b) In factored form, the volume is [_____] .

44. Find the product.

$$(8x - 3)(2x + 3)$$

$(8x - 3)(2x + 3) =$ ⬚

---

45. Subtract the polynomials.

$$(x - 8) - (7x + 5)$$

The difference is ⬚ . (Simplify your answer.)

---

46. Simplify the given expression.

$$7\sqrt{5} + 9\sqrt{5}$$

$7\sqrt{5} + 9\sqrt{5} =$ ⬚ (Type an exact answer, using radicals as needed.)

---

47. In the following problem, add or subtract terms whenever possible. Simplify the answer.

$$\sqrt{108x} - \sqrt{12x}$$

$\sqrt{108x} - \sqrt{12x} =$ ⬚ (Type an exact answer, using radicals as needed.)

---

48. Simplify the given algebraic expression.

$$3 - 4[9 - (7y - 2)]$$

$3 - 4[9 - (7y - 2)] =$ ⬚

---

49. Multiply using the rule for the square of a binomial.

$$(8 - 3t)^2$$

$(8 - 3t)^2 =$ ⬚ (Simplify your answer.)

---

50. Use properties of rational exponents to simplify the expression. Assume that all variables represent positive numbers.

$$\left(9x^{10}y^8\right)^{1/2}$$

$\left(9x^{10}y^8\right)^{1/2} =$ ⬚

(Use integers or fractions for any numbers in the expression. Type exponential notation with positive exponents.)

---

51. Evaluate the expression without using a calculator.

$$8^{-2/3}$$

$8^{-2/3} =$ ⬚

---

52. Perform the indicated operation.

$$\left(4x^3 - 5x^2 + 9x - 4\right) - \left(2x^3 - 2x^2 - 6x + 4\right)$$

Write the polynomial in standard form.

$\left(4x^3 - 5x^2 + 9x - 4\right) - \left(2x^3 - 2x^2 - 6x + 4\right) =$ ⬚

What is the degree of the polynomial?

⬚

(Type a whole number.)

53. Find the product.

$$(8x + 3)\left(x^2 + 7x + 5\right)$$

$(8x + 3)\left(x^2 + 7x + 5\right) = $ [_____]
(Simplify your answer.)

54. Simplify the given exponential expression.

$$x^5 \cdot x^9$$

$x^5 \cdot x^9 = $ [_____]

55. Use the FOIL method to multiply the binomials.

$$(x - 2y)(3x + 4y)$$

$(x - 2y)(3x + 4y) = $ [_____] (Simplify your answer.)

56. Find the union of the sets.

$$\{5,9,10,13\} \cup \{9,13,15\}$$

$\{5,9,10,13\} \cup \{9,13,15\} = \{$ [_____] $\}$
(Use a comma to separate answers as needed.)

57. Find the intersection of the sets.

$$\{2,4,6,7\} \cap \{4,6,10\}$$

$\{2,4,6,7\} \cap \{4,6,10\} = \{$ [_____] $\}$
(Use a comma to separate answers as needed.)

58. Subtract the polynomials. Indicate the degree of the resulting polynomial.

$$\left(5x^4y^2 - 4x^3y + 12y\right) - \left(12x^4y^2 + 10x^3y + 6y - 11x\right)$$

$\left(5x^4y^2 - 4x^3y + 12y\right) - \left(12x^4y^2 + 10x^3y + 6y - 11x\right) = $ [_____]

The degree of the resulting polynomial is [_____].

59. Simplify the exponential expression.

$$\frac{20x^2y^2}{35x^6y^{-4}}$$

$\dfrac{20x^2y^2}{35x^6y^{-4}} = $ [_____]

(Simplify your answer. Use positive exponents only. Use integers or fractions for any numbers in the expression.)

60. Multiply and simplify. Give answers using positive exponents.

$$\left(2m^{-12}y^{20}\right) \cdot \left(-9m^{-4}y^{-3}\right)$$

$\left(2m^{-12}y^{20}\right) \cdot \left(-9m^{-4}y^{-3}\right)$

= [_____]
(Simplify your answer. Type exponential notation with positive exponents.)

61. Simplify by reducing the index of the radical.

$\sqrt[5]{x^{10}}$

$\sqrt[5]{x^{10}} = \boxed{}$

62. Find the product.

$[5y + (2x + 8)][5y - (2x + 8)]$

$[5y + (2x + 8)][5y - (2x + 8)] = \boxed{}$

63. Find the product.

$(x + y + 7)^2$

$(x + y + 7)^2 = \boxed{}$

64. Perform the indicated computation. Write the answer in scientific notation.

$$\frac{2.6 \times 10^{-2}}{1.3 \times 10^{6}}$$

$\dfrac{2.6 \times 10^{-2}}{1.3 \times 10^{6}} = \boxed{}$

(Use the multiplication symbol in the math palette as needed.)

65. Simplify the radical expression.

$$\frac{\sqrt[5]{4096x^6}}{\sqrt[5]{4x}}$$

$\dfrac{\sqrt[5]{4096x^6}}{\sqrt[5]{4x}} = \boxed{}$

66. Multiply using the rule for finding the product of the sum and difference of two terms.

$\left(9 - y^7\right)\left(9 + y^7\right)$

$\left(9 - y^7\right)\left(9 + y^7\right) = \boxed{}$

67. Multiply using the rule for the square of a binomial.

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

$\left(5x^2 - 3\right)^2 = \boxed{}$

68. Multiply and simplify by factoring.

$\sqrt{15} \cdot \sqrt{10}$

$\sqrt{15} \cdot \sqrt{10} = \boxed{}$

(Type an exact answer, using radicals as needed.)

69. Rationalize the denominator. Simplify if possible.

$$\frac{25}{\sqrt{6} - 1}$$

$\frac{25}{\sqrt{6} - 1} = \boxed{}$

(Simplify your answer. Type an exact answer using radicals as needed.)

---

70. Rationalize the denominator. If possible, simplify the rationalized expression by dividing the numerator and denominator by the greatest common factor.

$$\frac{1}{\sqrt{11}}$$

$\frac{1}{\sqrt{11}} = \boxed{}$ (Type a simplified fraction. Simplify your answer.)

---

71. Factor the trinomial completely.

$$2x^2 - 9x - 5$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** $2x^2 - 9x - 5 = \boxed{}$ (Factor completely.)

○ **B.** The polynomial is prime.

---

72. Factor the trinomial completely.

$$x^2 + 33x + 17$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** $x^2 + 33x + 17 = \boxed{}$ (Factor completely.)

○ **B.** The polynomial is prime.

---

73. Factor the expression completely, or state that the polynomial is prime.

$$x^3 + 6x^2 - 9x - 54$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** $x^3 + 6x^2 - 9x - 54 = \boxed{}$

○ **B.** The polynomial is prime.

---

74. Factor the trinomial, or state that the trinomial is prime.

$$5a^2 - 4ab - 28b^2$$

Select the correct choice below and fill in any answer box within your choice.

○ **A.** $5a^2 - 4ab - 28b^2 = \boxed{}$

○ **B.** The polynomial is prime.

75. Factor completely, or state that the polynomial is prime. Check the factorization using multiplication or a graphing utility.

$$y^7 - 256y^3$$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $y^7 - 256y^3 = \boxed{}$

○ **B.** The polynomial is prime.

---

76. Factor completely, or state that the polynomial is prime. Check factorization using multiplication.

$$100y^4 - 16y^2$$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $100y^4 - 16y^2 = \boxed{}$
(Factor completely.)

○ **B.** The polynomial is prime.

---

77. Factor completely, or state that the polynomial is prime.

$$x^2 - 14x + 49 - 36y^2$$

Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $x^2 - 14x + 49 - 36y^2 = \boxed{}$

○ **B.** The polynomial is prime.

---

78. Factor and simplify the algebraic expression.

$$2x^{-5/4} + 4x^{1/4}$$

$2x^{-5/4} + 4x^{1/4} = \boxed{}$ (Type exponential notation with positive exponents.)

---

79. Factor and simplify the algebraic expression.

$$(x+4)^{-1/5} - (x+4)^{-6/5}$$

$(x+4)^{-1/5} - (x+4)^{-6/5} = \boxed{}$ (Type exponential notation with positive exponents.)

80. List all numbers from the given set that are **a.** natural numbers, **b.** whole numbers, **c.** integers, **d.** rational numbers, **e.** irrational numbers, and **f.** real numbers.

$$\left\{ -11, \ -\frac{3}{5}, \ 0, \ 0.8, \ \sqrt{2}, \ \pi, \ \sqrt{100} \right\}$$

a. List all the natural numbers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

b. List all the whole numbers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

c. List all the integers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

d. List all the rational numbers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

e. List all the irrational numbers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

f. List all the real numbers from the given set. Type each number in the same form as it appears in the problem statement.

[   ]

(Use a comma to separate answers as needed.)

---

81. Rewrite the expression without absolute value bars.

$$\left| \sqrt{11} - 7 \right|$$

$\left| \sqrt{11} - 7 \right| = $ [   ]

(Simplify your answer. Type an exact answer, using radicals as needed.)

---

82. Each day we purchase 1.7 thousand cartons of eggs per minute.   Use the fact that there are approximately 5.3×10^5 minutes in a year to approximate how many cartons of eggs are purchased in one year. Write your answer in scientific notation.

Approximately how many cartons of eggs are purchased in one year?

[   ]

(Use scientific notation. Use the multiplication symbol in the math palette as needed.)

---

83. In 2005, the total waste generated in a certain country was 4.986×10^9 pounds. Also in 2005, the country's population was 2.78×10^5 people. Determine the garbage per capita (per person) in that country in the year 2005.

The country produced [   ] pounds of garbage per person in 2005.

(Use scientific notation. Use the multiplication symbol in the math palette as needed. Round to two decimal places as needed.)

84.

In 2005, the average CEO was paid 807 times as much per hour as a full-time minimum-wage earner, who earned $5.15 per hour. The graph shows the ratio of CEO compensation to minimum-wage salary from 2001 through 2005. The data in the graph can be modeled by the formula $R = 54x^2 - 263x + 837$,
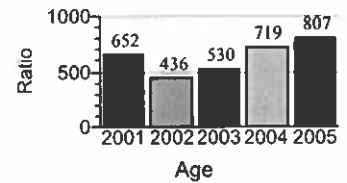
where R represents the ratio of CEO compensation to minimum-wage salary x years after 2000. According to the formula, what was the ratio of CEO compensation to minimum-wage salary in 2001? Does the formula underestimate or overestimate the actual ratio shown by the bar graph? By how much?

According to the formula, the ratio was [ ] in the year 2001.

The formula (1) _____ the actual ratio by [ ].

(1) ○ underestimates
    ○ overestimates

1. A. Yes, the expression $6x^2 + 6x^3 - 5$ is a polynomial. The expression written in standard form is $\boxed{6x^3 + 6x^2 - 5}$.

2. B. The expression is not a polynomial.

3. 4

4. 9

5. $x^3 + 17x^2 - 11x$

   3

6. $-5x^3 - 2x^2 + 12x - 10$

   3

7. $11x + 14$

   1

8. $81x^2 + 27x - 28$

9. $30x^4 - 61x^2 + 30$

10. $5x^5 - 20x^3 + 2x^2 - 8$

11. $x^3 + 6x^2 + 12x + 8$

12. $27x^3 + 135x^2 + 225x + 125$

13. $x^3 - 15x^2 + 75x - 125$

14. $27x^3 - 108x^2 + 144x - 64$

15. $81y^2 - 64x^2 - 16x - 1$

16. $x^2 + 2xy + y^2 + 10x + 10y + 25$

17. $25x^2 + 10xy + y^2 + 10x + 2y + 1$

18. $25x^2 - 60x + 36$

---

19. $-35x^3 + 1398x^2 - 15{,}942x + 63{,}903$

    16,024

    15,930

    (1) overestimates

    94

---

20. $4x^3 - 36x^2 + 77x$

---

21. $8x + 40$

---

22. A. $8x^4 - 16x^3 + 24x^2 = \boxed{8x^2\left(x^2 - 2x + 3\right)}$

---

23. A. $x(x+3) - 15(x+3) = \boxed{(x-15)(x+3)}$

---

24. A. $x^2(x-3) + 16(x-3) = \boxed{\left(x^2 + 16\right)(x-3)}$

---

25. A. $x^3 - 9x^2 + 8x - 72 = \boxed{(x-9)\left(x^2 + 8\right)}$

---

26. A. $x^2 + 8x - 6x - 48 = \boxed{(x+8)(x-6)}$

---

27. A. $5x^3 - 3x^2 - 30x + 18 = \boxed{(5x-3)\left(x^2 - 6\right)}$

---

28. A. $5y^2 + 28y - 12 = \boxed{(y+6)(5y-2)}$

---

29. A. $2a^2 + 5ab + 3b^2 = \boxed{(2a+3b)(a+b)}$

---

30. A. $5a^2 - 4ab - 28b^2 = \boxed{(a+2b)(5a-14b)}$

---

31. A. $x^3 - 27 = \boxed{(x-3)\left(x^2 + 3x + 9\right)}$ (Simplify your answer.)

---

32. A. $64x^3 - 27 = \boxed{(4x-3)\left(16x^2 + 12x + 9\right)}$

---

33. A. $64x^3 + 1 = \boxed{(4x+1)\left(16x^2 - 4x + 1\right)}$

34. A. $t^2y - n^2y - t^2x + n^2x = \boxed{(y-x)(t+n)(t-n)}$

35. A. $x^2y - 4y + 20 - 5x^2 = \boxed{(x+2)(x-2)(y-5)}$

36. A. $3x^3 - 27a^2x + 42x^2 + 147x = \boxed{3x(x+7+3a)(x+7-3a)}$

37. $x^{1/8}\left(x^{3/8} - 1\right)$

38. $-(x+9)^{1/4}(x+8)$

39. $\dfrac{(x+8)}{(x+9)^{5/4}}$

40. $\dfrac{9}{5}(9x-4)^{1/2}(1-x)$

41. $(9x+4)(9x-4)$

42. $3x(3x+8y) - 8y(3x+8y)$

$(3x+8y)(3x-8y)$

43. $a^3 - ab^2$

$a(a+b)(a-b)$

44. $16x^2 + 18x - 9$

45. $-6x - 13$

46. $16\sqrt{5}$

47. $4\sqrt{3x}$

48. $28y - 41$

49. $9t^2 - 48t + 64$

50. $3x^5y^4$

51. $\dfrac{1}{4}$

52. $2x^3 - 3x^2 + 15x - 8$

     3

53. $8x^3 + 59x^2 + 61x + 15$

54. x^{14}

55. $3x^2 - 2xy - 8y^2$

56. $5, 9, 10, 13, 15$

57. $4, 6$

58. $-7x^4y^2 - 14x^3y + 6y + 11x$

     6

59. $\dfrac{4y^6}{7x^4}$

60. $\dfrac{-18y^{17}}{m^{16}}$

61. x^2

62. $25y^2 - 4x^2 - 32x - 64$

63. $x^2 + 2xy + y^2 + 14x + 14y + 49$

64. 2×10^{-8}

65. $4x$

66. $81 - y^{14}$

67. $25x^4 - 30x^2 + 9$

68. $5\sqrt{6}$

69. $5\left(\sqrt{6}+1\right)$

70. $\dfrac{\sqrt{11}}{11}$

71. A. $2x^2 - 9x - 5 = \boxed{(2x+1)(x-5)}$ (Factor completely.)

72. B. The polynomial is prime.

73. A. $x^3 + 6x^2 - 9x - 54 = \boxed{(x+6)(x+3)(x-3)}$

74. A. $5a^2 - 4ab - 28b^2 = \boxed{(5a-14b)(a+2b)}$

75. A. $y^7 - 256y^3 = \boxed{y^3\left(y^2+16\right)(y+4)(y-4)}$

76. A. $100y^4 - 16y^2 = \boxed{4y^2(5y+2)(5y-2)}$ (Factor completely.)

77. A. $x^2 - 14x + 49 - 36y^2 = \boxed{(x-7+6y)(x-7-6y)}$

78. $\dfrac{2\left(1+2x^{3/2}\right)}{x^{5/4}}$

79. $\dfrac{(x+3)}{(x+4)^{6/5}}$

80. $\sqrt{100}$

   $0,\sqrt{100}$

   $-11,0,\sqrt{100}$

   $-11,-\dfrac{3}{5},0,0.8,\sqrt{100}$

   $\sqrt{2},\pi$

   $-11,-\dfrac{3}{5},0,0.8,\sqrt{2},\pi,\sqrt{100}$

81. $7 - \sqrt{11}$

82. 9.01×10^8

83. 1.79×10^4

84. 628

   (1) underestimates

   24

Student: _____
Date: _____

Instructor: Elias Kabeche
Course: Algebra 3 & Trig L2 - 2(A-C) - 24-25   **Assignment:** Functions 1 - Summer 2025
(2025 / AMITY REGIONAL HIGH SCHOOL)

1. Graph the equation $y = |x| + 2$. Let $x = -3, -2, -1, 0, 1, 2,$ and 3.

   Find the following y-values. Then choose the correct graph of the equation to the right.

x	y
-3	
-2	
-1	
0	
1	
2	
3	

   ○ **A.**
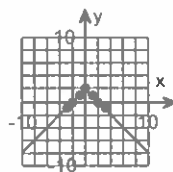
   ○ **B.**
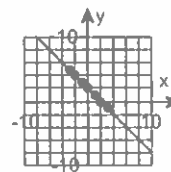
   ○ **C.**
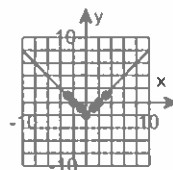
   ○ **D.**

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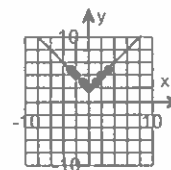
2. Find seven ordered pairs to the equation $y = 1 - x^2$. Then determine its graph.

x	y
-3	
-2	
-1	
0	
1	
2	
3	

   Choose the graph that connects the points.

   ○ **A.**
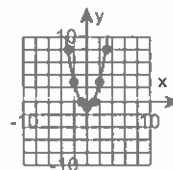
   ○ **B.**
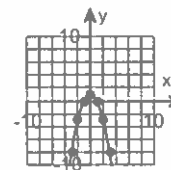
   ○ **C.**
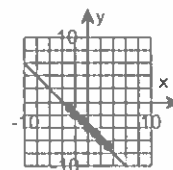
   ○ **D.**

---
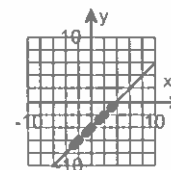
3. Find seven ordered pairs for the equation $y = x^3 - 2$ using the given values of x. Then determine its graph.

x	y
-3	
-2	
-1	
0	
1	
2	
3	

   Choose the correct graph below.

   ○ **A.**
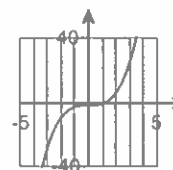
   ○ **B.**
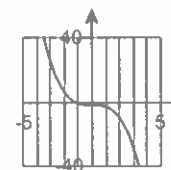
   ○ **C.**
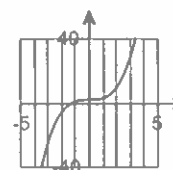
   ○ **D.**
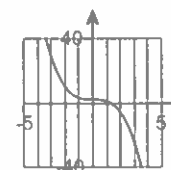
4. Select the figure that illustrates the viewing rectangle [−3,3,1] by [−9,9,1].

Choose the correct answer below.
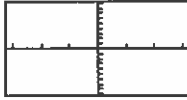
○ A.   ○ B.   ○ C.   ○ D.

---
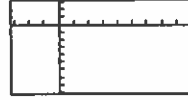
5. The table of values was generated by a graphing utility with a TABLE feature.

Use the table to determine at which point the graph of Y_2 crosses the x-axis.

X	Y_1	Y_2
−3	0	−2
−2	−1	1
−1	−2	0
0	−3	−1
1	−4	−2
2	−5	−3
3	−6	−4

The graph crosses the x-axis at [   ].
(Type an ordered pair.)

---

6. The table of values was generated by a graphing utility with a TABLE feature.

Use the table to determine the points where the graphs of Y_1 and Y_2 intersect.

X	Y_1	Y_2
−3	10	4
−2	5	5
−1	2	6
0	1	7
1	2	8
2	5	9
3	10	10

The graphs of Y_1 and Y_2 intersect at the points [   ].
(Type ordered pairs. Use a comma to separate answers as needed.)

---

7. Identify the intercepts of the graph.

What are the x-intercept(s), if any? Select the correct choice below and fill in any answer boxes within your choice.

○ A. [   ]
    (Type an integer. Use a comma to separate answers as needed.)

○ B. There are no x-intercepts.

What are the y-intercepts, if any? Select the correct choice below and fill in any answer boxes within your choice.

○ A. [   ]
    (Type an integer. Use a comma to separate answers as needed.)

○ B. There are no y-intercepts.
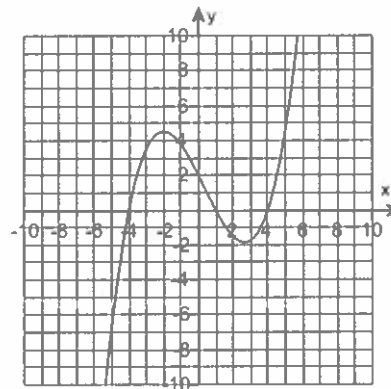
8. Use the graph and **a.** determine the x-intercepts, if any; **b.** determine the y-intercepts, if any.
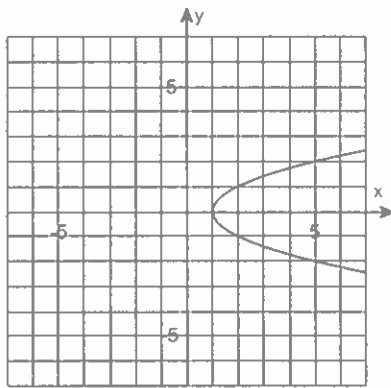
Type the x-intercept(s) in the box below. Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** [   ]
  (Type an integer or a simplified fraction.
  Use a comma to separate answers
  as needed.)

○ **B.** There are no x-intercepts.

Type the y-intercept(s) in the box below. Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** [   ]
  (Type an integer or a simplified fraction.
  Use a comma to separate answers
  as needed.)

○ **B.** There are no y-intercepts.

---

9. The line graph shows the number of awakenings during the night for a particular group of people. Use the graph to estimate at which age women have the least number of awakenings during the night and what the average number of awakenings at that age is.

Women have the least number of awakenings during the night at the age of [   ].
(Type a whole number.)

The average number of awakenings at that age is [   ].
(Type a whole number.)

---
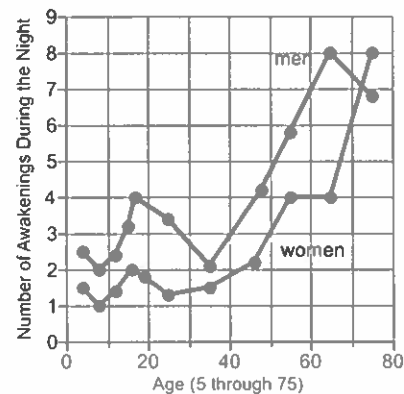
10. The line graph shows the average number of awakenings during the night for men and women of different ages. Use the graph to estimate the difference between the average number of awakenings during the night between 25-year-old men and 25-year-old women.

The difference between the average number of awakenings during the night between 25-year-old men and 25-year-old women is

[   ].

(Round your answer to the nearest tenth as needed.)
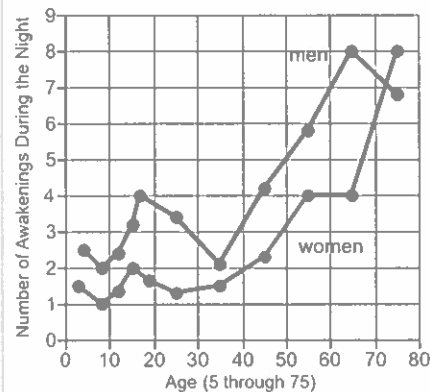
11. Determine whether the following relation represents a function. Give the domain and range for the relation.

$\{(-9,8), (-1,6), (-7,-7), (6,6)\}$

Does the given relation represent a function?

○ Yes

○ No

What is the domain?

○ $\{-9, -1, -7, 6\}$

○ $\{-9, 6, -7\}$

○ $\{8, 6, -7\}$

○ $\{8, -1, -7, 6\}$

What is the range?

○ $\{8, -1, -7, 6\}$

○ $\{8, 6, -7\}$

○ $\{-9, -1, -7, 6\}$

○ $\{-9, 6, -7\}$

12. Determine whether the following relation represents a function. If it is a function, state the domain and range.

$\{(-7,5), (3,-8), (-6,-6), (-8,-8)\}$

Does the given relation represent a function?

○ Yes

○ No

What is the domain?

○ $\{-7, -8, -6\}$

○ $\{5, -8, -6\}$

○ $\{5, 3, -6, -8\}$

○ $\{-7, 3, -6, -8\}$

What is the range?

○ $\{5, 3, -6, -8\}$

○ $\{5, -8, -6\}$

○ $\{-7, -8, -6\}$

○ $\{-7, 3, -6, -8\}$

13. Determine whether the relation is a function. Give the domain and range for the relation.

{(3, 8), (3, 9), (3, 10)}

The domain of the relation is {⬚}.
(Use a comma to separate answers as needed.)

The range of the relation is {⬚}.
(Use a comma to separate answers as needed.)

Is the relation a function? Choose the correct answer below.

○ Yes

○ No

---

14. Determine whether the following equation defines y as a function of x.

$x + y = 33$

Does the equation $x + y = 33$ define y as a function of x?

○ Yes

○ No

---

15. Determine whether the equation defines y as a function of x.

$x + y^3 = 9$

Choose the correct answer below.

○ The equation defines y as a function of x.

○ The equation does not define y as a function of x.

---

16. Determine whether the following equation defines y as a function of x.

$xy + 8y = 7$

Does the equation $xy + 8y = 7$ define y as a function of x?

○ Yes

○ No

---

17. Determine whether the following equation defines y as a function of x.

$|x| - y = 7$

Does the equation $|x| - y = 7$ define y as a function of x?

○ Yes

○ No

18. Evaluate the function $f(r) = \sqrt{r+7} + 5$ at the given values of the independent variable and simplify.

    a. $f(-7)$ **b.** $f(18)$ **c.** $f(x-7)$

a. $f(-7) =$ [_____] (Simplify your answer.)

b. $f(18) =$ [_____] (Simplify your answer.)

c. $f(x-7) =$ [_____] (Simplify your answer.)

---

19. Evaluate the function at the given values of the independent variable and simplify.

$$f(x) = \frac{7x^2 - 1}{x^2}$$

    (a) $f(3)$ (b) $f(-3)$ (c) $f(-x)$

(a) $f(3) =$ [_____] (Type an integer or a fraction. Simplify your answer.)

(b) $f(-3) =$ [_____] (Type an integer or a fraction. Simplify your answer.)

(c) $f(-x) =$ [_____] (Simplify your answer.)

20.
Evaluate the function $f(x) = \dfrac{x}{|x|}$ at the given values of the independent variable and simplify.

    a. $f(4)$ **b.** $f(-4)$ **c.** $f(r^2)$

a. $f(4) =$ [_____] (Simplify your answer.)

b. $f(-4) =$ [_____] (Simplify your answer.)

c. $f(r^2) =$ [_____] (Simplify your answer.)

---

21. Graph the given functions, f and g, on one coordinate plane.

    $f(x) = |x|$
    $g(x) = |x| - 5$

Which is the correct graph of the two functions?
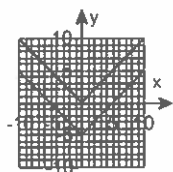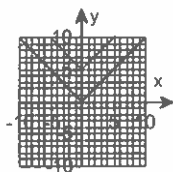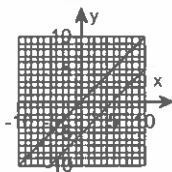
  ○ **A.**   ○ **B.**   ○ **C.**   ○ **D.**
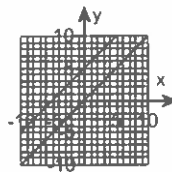
22. Graph the given functions, f and g, in the same rectangular coordinate system. Then describe how the graph of g is related to the graph of f.

$$f(x) = x^3$$

$$g(x) = x^3 + 2$$

Which is the correct graph of f(x) and g(x)?

○   ○   ○   ○
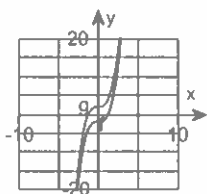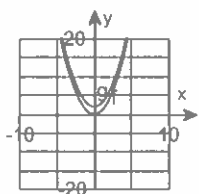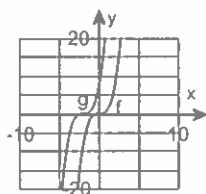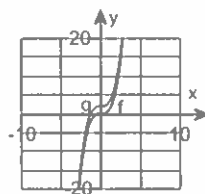
How is the graph of f(x) shifted to get the graph of g(x)?

○ **A.** up by 2 units.

○ **B.** right by 2 units.

○ **C.** down by 2 units.

○ **D.** left by 2 units.

---

23. Graph the given functions, f and g, in the same rectangular coordinate system. Describe how the graph of g is related to the graph of f.

$$f(x) = 1 \qquad g(x) = 5$$

Use the graphing tool to graph the functions.

Describe how g is related to f.

The graph of g is

○ the graph of f shifted up 4 units.

○ the graph of f shifted down 4 units.

○ the graph of f shifted left 4 units.

○ the graph of f shifted right 4 units.
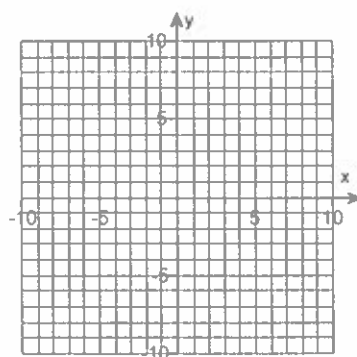
24. Graph the given functions, f and g, in the same rectangular coordinate system. Use the integer values of x given to the right of the functions to obtain ordered pairs. Describe how the graph of g is related to the graph of f.

$f(x) = \sqrt{x}$ $x = 0, 1, 4, 9$
$g(x) = \sqrt{x - 3}$ $x = 3, 4, 7, 12$

(Simplify your answers.)

x	f(x)
0	
1	
4	
9	

Fill in the appropriate values for f(x).

(Simplify your answers.)

x	g(x)
3	
4	
7	
12	

Fill in the appropriate values for g(x)

Which of the following shows the graphs of $f(x) = \sqrt{x}$ and $g(x) = \sqrt{x - 3}$?
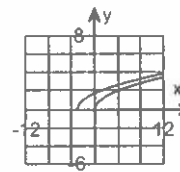
○ A.   ○ B.
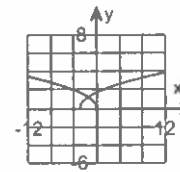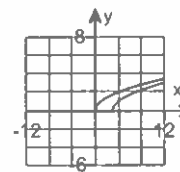
○ C.   ○ D.
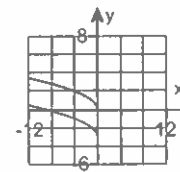
Describe how the graph of g is related to the graph of f.

The graph of g is

○ A. the graph of f shifted up 3 units.

○ B. the graph of f shifted right 3 units.

○ C. the graph of f shifted left 3 units.

○ D. the graph of f shifted down 3 units.

25. Use the vertical line test to identify graphs in which y is a function of x.

Which of the following statements is correct?

○ y is not a function of x

○ y is a function of x
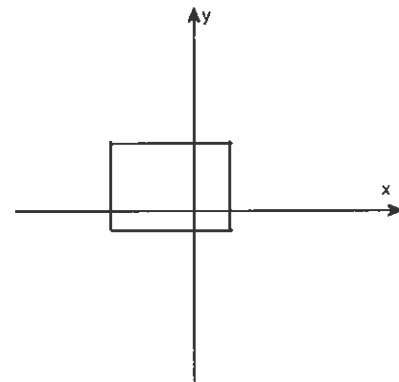
26. Use the vertical line test to determine if y is a function of x in the graph.
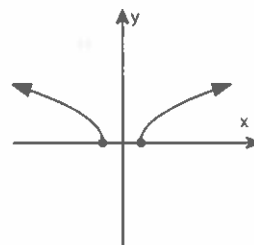
Which of the following statements is correct?

○ y is a function of x

○ y is not a function of x

27. Use the graph of g to find g(−8).

g(−8) = [   ]
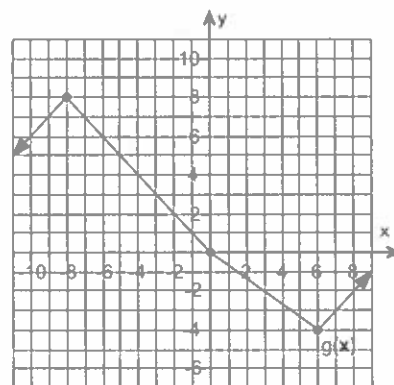
28. Use the graph of g to find g(−7).

g(−7) = [   ]
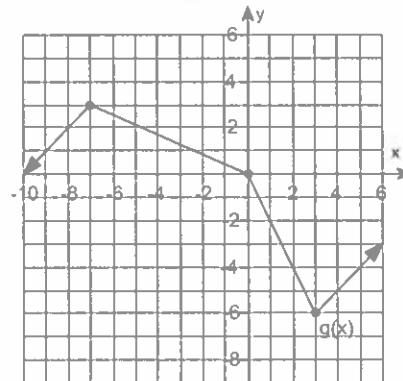
29. For what value of x is g(x) = −7?

x = [   ]
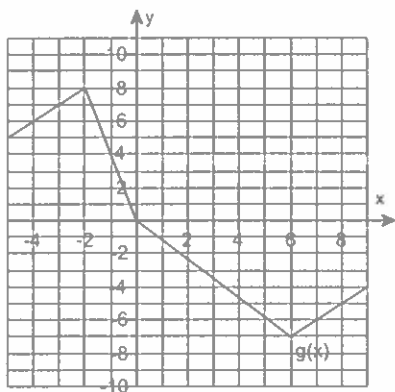
30. Use the graph to determine **a.** the function's domain; **b.** the function's range; **c.** the x-intercepts, if any; **d.** the y-intercept, if there is one; **e.** the following function values.

f(0)
f(4)
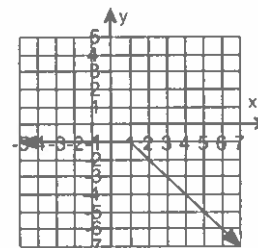
a. What is the domain?

[   ] (Type your answer in interval notation.)

b. What is the range?

[   ] (Type your answer in interval notation.)

c. Enter the x-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** The x-intercept(s) is(are) [   ].
(Type an integer. Use a comma to separate answers as needed.)

○ **B.** There is no x-intercept.

d. Enter the y-intercept. Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** The y-intercept is [   ].
(Type an integer.)

○ **B.** There is no y-intercept.

e. What are the values of the function?

f(0) = [   ]
f(4) = [   ]

31. Use the graph to determine **a.** the function's domain; **b.** the function's range; **c.** the x-intercepts, if any; **d.** the y-intercept, if any; and **e.** the missing function value, indicated by the question mark, below.

$f(-1) = ?$

Graph approaches but never touches the x-axis.
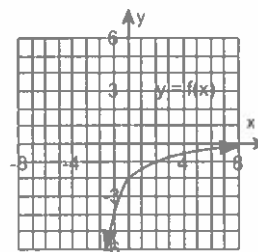
a. The domain is [   ]. (Use interval notation.)

b. The range is [   ]. (Use interval notation.)

c. Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** The x-intercept(s) is (are) [   ].
(Type an integer. Use a comma to separate answers as needed.)

○ **B.** There is no x-intercept.

d. Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** The y-intercept is [   ]. (Type an integer.)

○ **B.** There is no y-intercept.

e. $f(-1) =$ [   ]

---

32. Use the graph to determine **a.** the function's domain; **b.** the function's range; **c.** the x-intercepts, if any; **d.** the y-intercept, if any; and **e.** the missing function value, indicated by the question mark, below.

$f(-2) + f(2) = ?$
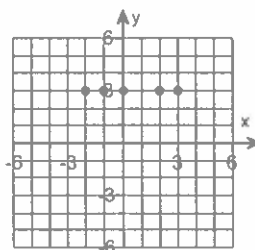
a. The domain is { [   ] }. (Use a comma to separate answers as needed.)

b. The range is { [   ] }. (Use a comma to separate answers as needed.)

c. Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** The x-intercept(s) is (are) [   ].
(Type an integer. Use a comma to separate answers as needed.)

○ **B.** There is no x-intercept.

d. Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** The y-intercept is [   ]. (Type an integer.)

○ **B.** There is no y-intercept.

e. $f(-2) + f(2) =$ [   ]

33. Let $f(x) = x^2 - x - 5$ and $g(x) = 5x - 4$. Find $g(4)$ and $f(g(4))$.

$g(4) =$ [   ] (Simplify your answer.)

$f(g(4)) =$ [   ] (Simplify your answer.)

---

34. The graphs below show that more people in a certain community are ordering their food to go (shown by model T), instead of dining inside restaurants (shown by model R). In each model, x represents the number of years after 1984. Answer parts **a** through **c**.
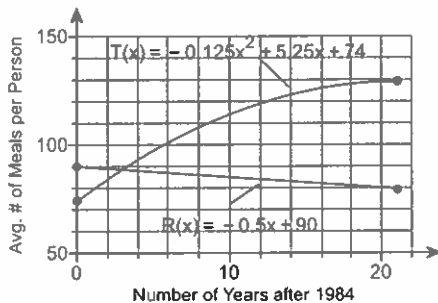
a. Use the equation for function T to find and interpret T(20).

$T(20) =$ [   ] (Simplify your answer.)

T(20) represents the average number of meals each person in this community ordered to go in the year [   ].

b. Use the equation for function R to find and interpret R(0).

$R(0) =$ [   ] (Simplify your answer.)

R(0) represents the average number of meals each person in this community ordered for eating in restaurants in the year [   ].

c. According to the graphs, in which year did the average number of takeout orders approximately equal the average number of in-restaurant orders?

This happened in [   ].
(Round to the nearest year as needed.)

Use the equations for T and R to find the average number of meals per person for each kind of order in that year.

For that year, the average number of meals per person for each kind of order was [   ].
(Round to the nearest integer as needed.)

---

35. A company that manufactures bicycles has a fixed cost of $7,000. It cost $700 to produce each bicycle. The total cost for the company is the sum of its fixed cost and variable costs. Write the total cost, C, as a function of the number of bicycles produced, x. Then, find C(90).

Find the cost function.

$C(x) =$ [   ] (Simplify your answer. Do not factor.)

Using the cost function C, find C(90).

$C(90) = \$$ [   ] (Simplify your answer.)

36. A man commutes to work a distance of 30 miles and returns on the same route at the end of the day. His average rate on the return trip is 30 miles per hour faster than his average rate on the outgoing trip. Write the total time, T, in hours, devoted to his outgoing and return trips as a function of his rate on the outgoing trip, x. Then find and interpret T(30). Hint: Time traveled = $\dfrac{\text{Distance traveled}}{\text{Rate of travel}}$.

T(x) = [   ] (Simplify your answer.)

T(30) = [   ] (Simplify your answer.)

What does T(30) mean?

○ A. It is the average rate of travel for the two trips combined.

○ B. It is the total time devoted to the man's commute when his rate of travel for the return trip is 30 miles per hour faster then his rate of travel for the outgoing trip.

○ C. It is the total time devoted to the man's commute when his rate of travel for the outgoing trip is 30 miles per hour faster then his rate of travel for the return trip.

○ D. It is the total time devoted to the man's commute when his rate of travel for the outgoing trip is 30 miles per hour.

---

37. Use the graph to determine

(a) open intervals on which the function is increasing, if any.

(b) open intervals on which the function is decreasing, if any.

(c) open intervals on which the function is constant, if any.

(a) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. The function is increasing on the interval(s) [   ].
(Type your answer in interval notation. Use a comma to separate answers as needed.)

○ B. The function is never increasing.

(b) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. The function is decreasing on the interval(s) [   ].
(Type your answer in interval notation. Use a comma to separate answers as needed.)

○ B. The function is never decreasing.

(c) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. The function is constant on the interval(s) [   ].
(Type your answer in interval notation. Use a comma to separate answers as needed.)

○ B. The function is never constant.

38. Use the graph to determine

   (a) open intervals on which the function is increasing, if any.

   (b) open intervals on which the function is decreasing, if any.

   (c) open intervals on which the function is constant, if any.

(a) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

  ◯ **A.** The function is increasing on the interval(s) [　　　　].
      (Type your answer in interval notation. Use a comma to separate answers as needed.)

  ◯ **B.** The function is never increasing.

(b) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

  ◯ **A.** The function is decreasing on the interval(s) [　　　　].
      (Type your answer in interval notation. Use a comma to separate answers as needed.)

  ◯ **B.** The function is never decreasing.

(c) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

  ◯ **A.** The function is constant on the interval(s) [　　　　].
      (Type your answer in interval notation. Use a comma to separate answers as needed.)

  ◯ **B.** The function is never constant.

---

39. Use the graph to determine the following.

  (a) Find the numbers at which f has a relative maximum. What are these relative maxima?

  (b) Find the numbers at which f has a relative minimum. What are these relative minima?

(a) The number(s) at which f has a relative maximum is/are [　　　　].
(Type an integer or a decimal. Use a comma to separate answers as needed.)

The relative maximum/maxima is/are [　　　　].
(Type an integer or a decimal. Use a comma to separate answers as needed.)

(b) The number(s) at which f has a relative minimum is/are [　　　　].
(Type an integer or a decimal. Use a comma to separate answers as needed.)

The relative minimum/minima is/are [　　　　].
(Type an integer or a decimal. Use a comma to separate answers as needed.)

40. The graph and equation of the function f are given.
   a. Use the graph to find any values at which f has a relative maximum, and use the equation to calculate the relative maximum for each value.
   b. Use the graph to find any values at which f has a relative minimum, and use the equation to calculate the relative minimum for each value.

$$f(x) = 2x^3 - 3x^2 - 36x + 3$$

[-5,5,1] by [-100,100,10]

a. Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

   ○ **A.** The function f has (a) relative maxima(maximum) at [   ] and the
      relative maxima(maximum) are(is) [   ].
      (Use a comma to separate answers as needed.)

   ○ **B.** The function f has no relative maxima.

b. Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

   ○ **A.** The function f has (a) relative minima(minimum) at [   ] and the
      relative minima(minimum) are(is) [   ].
      (Use a comma to separate answers as needed.)

   ○ **B.** The function f has no relative minima.

---

41. Determine whether the function is even, odd, or neither.

   $$f(x) = x\sqrt{1 - x^2}$$

The function $f(x) = x\sqrt{1 - x^2}$ is (1) _____ function.

   (1) ○ an even
       ○ an odd
       ○ neither an even nor an odd

---

42. Using the given graph of the function f, find whether the function is even, odd, or neither.

Determine whether the function is even, odd, or neither.

   ○ Odd
   ○ Even
   ○ Neither

43. Use possible symmetry of the graph to determine whether it is the graph of an even function, an odd function, or a function that is neither even nor odd.

○ The function is odd.

○ The function is neither even nor odd.

○ The function is even.

44. Use the graph of f to determine each of the following. Where applicable, use interval notation.

(a) the domain of f
(b) the range of f
(c) the number at which f has a relative minimum
(d) the relative minimum of f

(a) What is the domain of f?

[ ] (Use interval notation.)

(b) What is the range of f?

[ ] (Use interval notation.)

(c) What is the number at which f has a relative minimum?

[ ]

(d) What is the relative minimum of f?

[ ]

45. Use the graph of f to determine each of the following. Where applicable, use interval notation.

(a) the zero(s) of f
(b) f(5.5)
(c) the value of x for which f(x) = 3
(d) Is f(4) positive or negative?

(a) Find the zero(s) of f.

[   ]

(Type an integer or decimal. Use a comma to separate answers as needed.)

(b) What is f(5.5)?

f(5.5) = [   ]

(c) What is the value of x for which f(x) = 3?

x = [   ]

(d) Is f(4) positive or negative?

○ Positive

○ Negative

---

46. The domain of the piecewise function is $(-\infty, \infty)$.
a. Graph the function.
b. Use your graph to determine the function's range.

$$f(x) = \begin{cases} 7 & \text{if } x \le -3 \\ -7 & \text{if } x > -3 \end{cases}$$

a. Choose the correct graph below.

○ **A.**   ○ **B.**   ○ **C.**   ○ **D.**

b. The range of f(x) is the set { [   ] } . (Use a comma to separate answers as needed.)

47. The domain of the piecewise function is $(-\infty, \infty)$.
a. Graph the function.
b. Use your graph to determine the function's range.

$$f(x) = \begin{cases} \dfrac{1}{4}x^2 & \text{if } x < 1 \\ 3x - 1 & \text{if } x \ge 1 \end{cases}$$

a. Choose the correct graph below.

○ **A.**

○ **B.**

○ **C.**

○ **D.**

b. The range of f(x) is [____]. (Type your answer in interval notation.)

---

48. The domain of the piecewise function is $(-\infty, \infty)$.
a. Graph the function.
b. Use your graph to determine the function's range.

$$f(x) = \begin{cases} 0 & \text{if } x < -4 \\ -x & \text{if } -4 \le x < 0 \\ x^2 & \text{if } x \ge 0 \end{cases}$$

a. Choose the correct graph below.

○ **A.**

○ **B.**

○ **C.**

○ **D.**

b. The range of f(x) is [____]. (Type your answer in interval notation.)

49.
Find the difference quotient of f; that is, find $\dfrac{f(x+h) - f(x)}{h}$, $h \ne 0$, for the following function. Be sure to fully simplify.

$f(x) = \sqrt{5x}$

$\dfrac{f(x+h) - f(x)}{h} = $ [____] (Simplify your answer.)

50. Graph $f(x) = |x - 10| + |x + 10|$ in the viewing window $[-20, 20, 1]$ by $[0, 40, 5]$. Determine where the function is increasing, decreasing, or constant.

Choose the correct graph of $f(x) = |x - 10| + |x + 10|$ in the viewing window $[-20, 20, 1]$ by $[0, 40, 5]$.

○ **A.**

○ **B.**

○ **C.**

○ **D.**

Where is the function increasing?

○ **A.** It is never increasing.

○ **B.** $(10, \infty)$

○ **C.** $(-\infty, -10)$

○ **D.** $(-\infty, 10)$ and $(10, \infty)$

Where is the function decreasing?

○ **A.** $(-\infty, 10)$

○ **B.** $(-\infty, -10)$

○ **C.** $(-\infty, 0)$

○ **D.** $(10, \infty)$

Where is the function constant?

○ **A.** $(-10, 10)$

○ **B.** It is never constant.

○ **C.** $(-\infty, 10)$

○ **D.** $(-\infty, -10)$

51. Use a graphing utility to graph the function. Use a $[-5,5,1]$ by $[-5,5,1]$ viewing rectangle. Then find the intervals on which the function is increasing, decreasing, or constant.

$$g(x) = -x^{2/5}$$
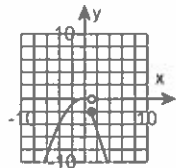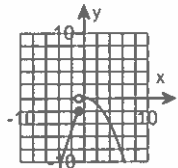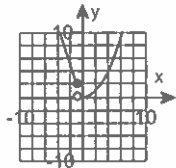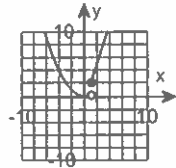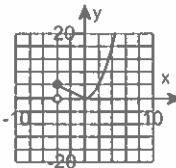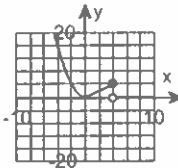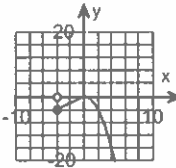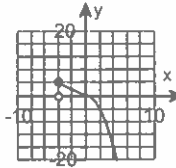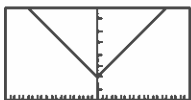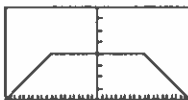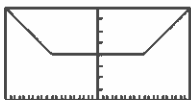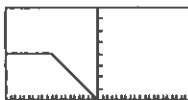
Choose the correct graph below.

○ A.

○ B.
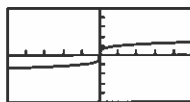
○ C.
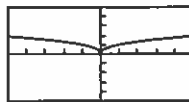
○ D.
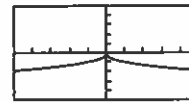
What are the interval(s) on which the function is increasing?

○ A. $(0,\infty)$

○ B. There are no intervals on which the function is increasing.

○ C. $(-\infty,\infty)$

○ D. $(-\infty,0)$

What are the interval(s) on which the function is decreasing?

○ A. $(0,\infty)$

○ B. There are no intervals on which the function is decreasing.

○ C. $(-\infty,\infty)$

○ D. $(-\infty,0)$

What are the interval(s) on which the function is constant?

○ A. $(-\infty,0)$

○ B. $(-\infty,\infty)$

○ C. There are no intervals on which the function is constant.

○ D. $(0,\infty)$

1. 5

   4

   3

   2

   3

   4

   5
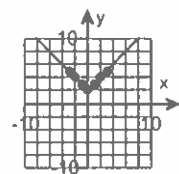
D.

---

2. − 8
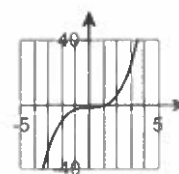
   − 3

   0

   1

   0

   − 3

   − 8
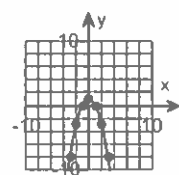
B.

---

3. − 29

   − 10

   − 3

   − 2

   − 1

   6

   25

A.

4.
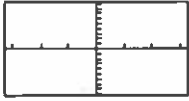
B.

---

5. $(-1, 0)$

---

6. $(-2, 5), (3, 10)$

---

7. A. ☐ $-4, 1, 4$ (Type an integer. Use a comma to separate answers as needed.)

A. ☐ 2 (Type an integer. Use a comma to separate answers as needed.)

---

8. A. ☐ 1 (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

B. There are no y-intercepts.

---

9. 8

1

---

10. 2.2

---

11. Yes

$\{-9, -1, -7, 6\}$

$\{8, 6, -7\}$

---

12. Yes

$\{-7, 3, -6, -8\}$

$\{5, -8, -6\}$

---

13. 3

8, 9, 10

No

---

14. Yes

---

15. The equation defines y as a function of x.

---

16. Yes

---

17. Yes

18. 5

10

$\sqrt{x} + 5$

---

19. $\dfrac{62}{9}$

$\dfrac{62}{9}$

$\dfrac{7x^2 - 1}{x^2}$

---

20. 1

−1

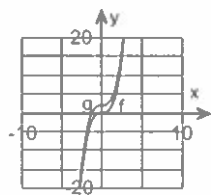1

21.
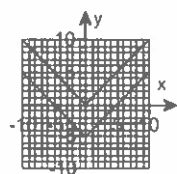
A.

22.
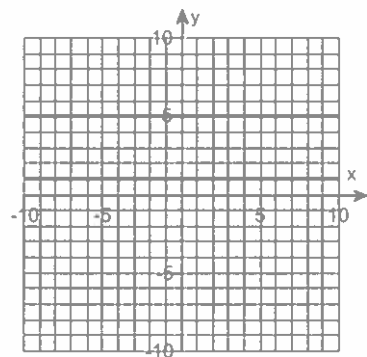

A. up by 2 units.

23.

the graph of f shifted up 4 units.
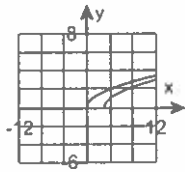
24. 0

   1

   2

   3

   0

   1

   2

   3

C.

B. the graph of f shifted right 3 units.

25. y is not a function of x

26. y is a function of x

27. 8

28. 3

29. 6

30. $(-\infty,\infty)$

   $(-\infty,-1]$

   B. There is no x-intercept.

   A. The y-intercept is [−1].(Type an integer.)

    −1

    −4

31. $(-\infty,\infty)$

   $(-\infty,0)$

   B. There is no x-intercept.

   A. The y-intercept is [−2]. (Type an integer.)

    −4

32. $-2, -1, 0, 2, 3$

    3

    B. There is no x-intercept.

    A. The y-intercept is [3]. (Type an integer.)

    6

---

33. 16

    235

---

34. 129

    2004

    90

    1984

    1987

    89

---

35. $7,000 + 700x$

    70,000

---

36. $\dfrac{30}{x} + \dfrac{30}{x+30}$

    $\dfrac{3}{2}$

    D. It is the total time devoted to the man's commute when his rate of travel for the outgoing trip is 30 miles per hour.

---

37. A. The function is increasing on the interval(s) $(-\infty, -2), (-1, 0)$.
    (Type your answer in interval notation. Use a comma to separate answers as needed.)

    A. The function is decreasing on the interval(s) $(-2, -1), (0, \infty)$.
    (Type your answer in interval notation. Use a comma to separate answers as needed.)

    B. The function is never constant.

---

38. A. The function is increasing on the interval(s) [$(-4, 4)$].
    (Type your answer in interval notation. Use a comma to separate answers as needed.)

    B. The function is never decreasing.

    A. The function is constant on the interval(s) $(-\infty, -4), (4, \infty)$.
    (Type your answer in interval notation. Use a comma to separate answers as needed.)

---

39. -3

    3

    $-4, -2$

    $-1, -1$

40. A. The function f has (a) relative maxima(maximum) at [−2] and the relative maxima(maximum) are(is) [47].
(Use a comma to separate answers as needed.)

A. The function f has (a) relative minima(minimum) at [3] and the relative minima(minimum) are(is) [−78].
(Use a comma to separate answers as needed.)

---

41. (1) an odd

---

42. Even

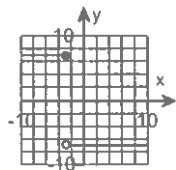43. The function is neither even nor odd.
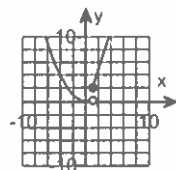
---

44. $(-\infty, \infty)$

$[-2, \infty)$

1

-2

---

45. 0,6

1
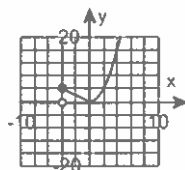
3

Positive

46.

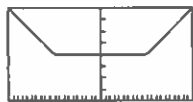A.

$-7,7$

47.

D.

$[0, \infty)$

48.

A.

$[0, \infty)$

49. $\dfrac{\sqrt{5}}{\sqrt{x+h}+\sqrt{x}}$

50.

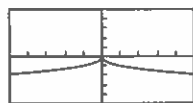C.

B. $(10,\infty)$

B. $(-\infty,-10)$

A. $(-10,10)$

51.

D.

D. $(-\infty,0)$

A. $(0,\infty)$

C. There are no intervals on which the function is constant.