Exam

Name_____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide the missing information.

1) An equation that can be written in the form $ax + b = 0$ where a and b are real numbers and $a \neq 0$ is called a _____ equation in one variable.

Answer: linear

2) A linear equation is also called a _____-degree equation because the degree of the variable is 1.

Answer: first

3) A _____ to an equation is the value of the variable that makes the equation a true statement.

Answer: solution

4) The solution _____ to an equation is the set of all solutions to the equation.

Answer: set

5) Two equations are _____ equations if they have the same solution set.

Answer: equivalent

6) The _____ property of equality indicates that adding the same real number to both sides of an equation results in an equivalent equation.

Answer: addition

7) The _____ property of equality indicates that if $a = b$, then $\frac{a}{c} = \frac{b}{c}$ provided that $c \neq 0$.

Answer: division

8) A _____ equation is one that is true for some values of the variable and false for others.

Answer: conditional

9) An _____ is an equation that is true for all values of the variable for which the expressions in the equation are defined.

Answer: identity

10) A _____ is an equation that is false for all values of the variable.

Answer: contradiction

11) A _____ equation is an equation in which each term contains a rational expression.

Answer: rational

12) If an equation has no solution, then the solution set is the _____ set and is denoted by _____.

Answer: empty (or null); { } or ∅

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

13) A train ride is $3.40 per ride. Write a model for the cost C (in $) for x rides on the train.

A) $C = 3.40x$ B) $C = 3.40 - x$ C) $Cx = 3.40$ D) $C = 3.40 + x$

Answer: A

14) A train ride is $2.85 per ride. A commuter can purchase an unlimited-ride card for $45 per month. How many rides are required for a commuter to save money by buying the card?

A) 16 rides B) 22 rides C) 20 rides D) 18 rides

Answer: A

15) In the mid-nineteenth century, explorers used the boiling point of water to estimate altitude. The boiling temperature of water T (in °F) can be approximated by the model $T = -1.83a + 212$, where a is the altitude in thousands of feet. Determine the temperature at which water boils at an altitude of 9,000 ft. Round to the nearest degree.

A) 214 °F B) 228 °F C) 196 °F D) 210 °F

Answer: C

16) In the mid-nineteenth century, explorers used the boiling point of water to estimate altitude. The boiling temperature of water T (in °F) can be approximated by the model $T = -1.83a + 212$, where a is the altitude in thousands of feet. Two campers hiking in Colorado boil water for tea. If the water boils at 196°F, approximate the altitude of the campers. Give the result to the nearest hundred feet.

A) 8,900 ft B) 8,700 ft C) 1,600 ft D) 2,900 ft

Answer: B

Determine whether the equation is a conditional equation, an identity, or a contradiction.

17) $3(z + 2) - 5z = 4\left(-\frac{1}{2}z + 1\right) + 2$

A) Conditional B) Identity C) Contradiction

Answer: B

18) $16y + 2(3 - y) = 5 + 14y + 2$

A) Conditional B) Identity C) Contradiction

Answer: C

19) $y - 12 + 3y = 2y + 4$

A) Conditional B) Identity C) Contradiction

Answer: A

Solve the rational equation.

20) $\frac{11}{2}y + \frac{1}{3} = \frac{7}{4}y$

A) $\left\{\frac{4}{87}\right\}$ B) $\left\{-\frac{1}{4}\right\}$ C) $\{-4\}$ D) $\left\{-\frac{4}{45}\right\}$

Answer: D

21) $\frac{3}{x} + \frac{5}{2} = \frac{3}{4}$

A) $\left\{-\frac{7}{12}\right\}$ B) $\left\{\frac{7}{12}\right\}$ C) $\left\{\frac{12}{7}\right\}$ D) $\left\{-\frac{12}{7}\right\}$

Answer: D

22) $\frac{6}{p - 12} = \frac{3p - 15}{p - 12} - \frac{3}{p}$

A) $\{5, 3\}$ B) $\{-6, -2\}$ C) $\{-5, -3\}$ D) $\{6, 2\}$

Answer: D

23) $\frac{3}{x} + \frac{3}{x - 7} = \frac{3x - 18}{x - 7}$

A) $\left\{-\frac{5}{2}, \frac{1}{3}\right\}$ B) $\{1\}$ C) $\{7, 1\}$ D) $\{\ \}$

Answer: B

24) $\frac{1}{x - 4} - \frac{5}{x + 1} = \frac{1}{x^2 - 3x - 4}$

A) $\{-5, 1\}$ B) $\{5\}$ C) $\{5, 1\}$ D) $\{\ \}$

Answer: B

25) $\frac{t - 8}{t - 2} = \frac{t - 23}{t^2 - 4} - \frac{1}{t + 2}$

A) $\{5, 1\}$ B) $\{5\}$ C) $\{-5, -1\}$ D) $\{-8, 8\}$

Answer: A

Determine the restrictions on x.

26) $\frac{9}{3x - 5} - \frac{6}{7x} = \frac{1}{2 - x}$

A) $x \neq \frac{3}{5}; x \neq -7; x \neq 2$

B) $x \neq \frac{5}{3}; x \neq 0; x \neq 2$

C) $\frac{3}{5}; x \neq 0; x \neq -2$

D) $x \neq \frac{5}{3}; x \neq -7; x \neq -2$

Answer: B

Solve the rational equation.

27) $\frac{-21}{x^2 - x - 12} - \frac{5}{x - 4} = \frac{3}{x + 3}$

A) { }

B) {3}

C) {-4}

D) {-3}

Answer: A

Solve for the indicated variable.

28) $-8x - 9y = 7$ for y

A) $y = \frac{8}{9}x + 7$

B) $y = -\frac{8}{9}x - \frac{7}{9}$

C) $y = -\frac{8}{9}x + 7$

D) $y = \frac{8}{9}x - \frac{7}{9}$

Answer: B

29) $3x - y = 2$ for y

A) $y = 3x - 2$

B) $y = -3x - 2$

C) $y = 3x + 2$

D) $y = -3x + 2$

Answer: A

30) $A = LW$ for L

A) $W = \frac{A}{L}$

B) $L = \frac{W}{A}$

C) $L = \frac{A}{W}$

D) $W = \frac{L}{A}$

Answer: C

31) $H = kx - kx_0$ for x

A) $x = \frac{H + kx_0}{x_0}$

B) $x = \frac{H - kx_0}{k}$

C) $x = \frac{H + kx_0}{k}$

D) $x = \frac{H - kx_0}{x_0}$

Answer: C

32) $T = cMN^2$ for N^2

A) $N^2 = \frac{cM}{T}$

B) $N^2 = \frac{T}{cM}$

C) $N^2 = cMT$

D) $N^2 = \frac{cT}{M}$

Answer: B

33) $S = \alpha(T - T_0) + S_0$ for T

A) $T = \alpha(S - S_0) + T_0$

B) $T = \frac{1}{\alpha}(S - S_0) + T_0$

C) $T = \frac{1}{\alpha}(S - S_0 + T_0)$

D) $T = \frac{S}{\alpha} - S_0 + T_0$

Answer: B

34) $q = \frac{c}{4}(h + r)$ for r

A) $r = \frac{q}{4c} - h$

B) $r = \frac{4q - h}{c}$

C) $r = \frac{4q}{c} - h$

D) $r = \frac{4c}{q} - h$

Answer: C

35) $Q = \frac{1}{3}DP$ for D

A) $D = \frac{P}{3Q}$

B) $D = \frac{3Q}{P}$

C) $D = \frac{Q}{3P}$

D) $D = \frac{3P}{Q}$

Answer: B

36) $L = \frac{1}{3}\pi q^2 s$ for s

A) $s = \frac{\pi q^2}{3L}$

B) $s = \frac{3\pi q^2}{L}$

C) $s = \frac{3L}{\pi q^2}$

D) $s = \frac{L}{3\pi q^2}$

Answer: C

37) $9x + ry = tx + 6$ for x

A) $x = \frac{tx - ry + 6}{9}$

B) $x = \frac{6 - ry}{9 - t}$

C) $x = \frac{6 - ry}{t - 9}$

D) $x = \frac{t + 6}{9 + ry}$

Answer: B

Solve the equation.

38) $5 - 2\{2 - [-3n - 2(n + 5)]\} = -8n + 2(1 + 4n) - 21$

A) {0}

B) {-2}

C) {1}

D) {5}

Answer: A

Solve the problem.

39) Dema's truck gets 32 mpg on the highway and 18 mpg in the city. The amount of gas he uses A (in gal) is given by $A = \frac{1}{18}c + \frac{1}{32}h$, where c is the number of city miles driven and h is the number of highway miles driven. If Dema drove 45 mi in the city and used 8 gal of gas, how many highway miles did he drive?

A) 176 miles B) 192 miles C) 200 miles D) 160 miles

Answer: A

Solve the equation.

40) $-\frac{1}{4}x - \frac{1}{6} = -\frac{1}{6}(x + 1) - \frac{1}{12}x$

A) $\left\{-\frac{1}{3}\right\}$ B) All real numbers C) $\{0\}$ D) $\{\ \}$

Answer: B

Find the value of a so that the equation has the given solution set.

41) $ax - 6 = 7x - 26 \quad \{5\}$

A) $a = -\frac{141}{5}$ B) $a = \frac{3}{5}$ C) $a = 3$ D) $a = 5$

Answer: C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide the missing information.

42) The formula for the perimeter P of a rectangle with length l and width w is given by _____.

Answer: $P = 2l + 2w$

43) The sum of the measures of the angles inscribed inside a triangle is _____.

Answer: 180°

44) If $6000 is borrowed at 7.5% simple interest for 2 yr, then the amount of interest is _____.

Answer: $900

45) Suppose that 8% of a solution is fertilizer by volume and the remaining 92% is water. How much fertilizer is there in a 2 L bucket of solution?

Answer: 0.16 L

46) If $d = rt$, then $t = \frac{?}{?}$

Answer: $\frac{d}{r}$

47) If $d = rt$, then $r = \frac{?}{?}$

Answer: $\frac{d}{t}$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

48) If $13,000 is borrowed at 5.8% simple interest for 10 years, how much interest will be paid for the loan?

A) $9,845.47 B) $20,540.00 C) $7,540.00 D) $22,845.47

Answer: C

49) Aaron invested a total of $4,100, some in an account earning 8% simple interest, and the rest in an account earning 5% simple interest. How much did he invest in each account if after one year he earned $211 in interest?

A) $3,200 at 8%, $900 at 5% B) $3,900 at 8%, $200 at 5%

C) $900 at 8%, $3,200 at 5% D) $200 at 8%, $3,900 at 5%

Answer: D

50) How many gallons of gasoline that is 5% ethanol must be added to 2,000 gallons of gasoline with no ethanol to get a mixture that is 3% ethanol?

A) 4,115 B) 6,000 C) 3,000 D) 1,800

Answer: C

51) A nurse mixes 90 cc of a 45% saline solution with a 10% saline solution to produce a 20% saline solution. How much of the 10% solution should he use?

A) 18 cc B) 180 cc C) 225 cc D) 202.5 cc

Answer: C

52) Two cars are 261 miles apart and travel toward each other on the same road. They meet in 3 hours. One car travels 3 mph faster than the other. What is the average speed of each car?

A) 40 mph; 43 mph B) 41 mph; 44 mph C) 39 mph; 42 mph D) 42 mph; 45 mph

Answer: D

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

53) A boat can travel 42 miles upstream against the current in the same amount of time it can travel 63 miles downstream with the current. If the boat's average speed in still water is 20 miles per hour, find the speed of the current.

Answer: 4 miles per hour

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

54) A consultant traveled 255 miles to attend a meeting, traveling 45 mph hours for the first part of the trip, then increasing to a speed of 60 mph for the second part. If the entire trip took 5 hours, how far did the consultant travel at the faster speed?

A) 127.5 mi B) 120 mi C) 135 mi D) 180 mi

Answer: B

55) It takes Terrell 69 minutes to weed his garden if he does it every 2 weeks, while his wife can get it done in 49 minutes. How long would it take them working together? Round to the nearest tenth of a minute.

A) 28.7 minutes B) 24.5 minutes C) 34.5 minutes D) 29.5 minutes

Answer: A

56) The JUST-SAY-MOW lawn mowing company consists of two people: Marsha and Bob. If Marsha cuts the lawn by herself, she can do it in 3 hours. If Bob cuts the same lawn himself, it takes him an hour longer than Marsha. How long would it take them if they worked together? Round to the nearest hundredth of an hour.

A) 4.00 hours B) 1.71 hours C) 3.50 hours D) 1.00 hour

Answer: B

57) The property tax on a $160,000.00 house is $2,400.00. At this rate, what is the property tax on a house that is $280,000.00?

A) $4,620.00 B) $5,040.00 C) $3,780.00 D) $4,200.00

Answer: D

58) To estimate the number of bass in a lake, a biologist catches and tags 32 bass. Several weeks later, the biologist catches a new sample of 55 bass and finds that 5 are tagged. How many bass are in the lake?

A) 275 bass B) 1,760 bass C) 160 bass D) 352 bass

Answer: D

59) The plans for a rectangular deck call for the width to be 4 feet less than the length. Sam wants the deck to have an overall perimeter of 52 feet. What should the length of the deck be?

A) 4 feet B) 28 feet C) 19 feet D) 15 feet

Answer: D

60) The perimeter of a rectangular lot of land is 436 ft. This includes an easement of x feet of uniform width inside the lot on which no building can be done. If the buildable area is 122 ft by 60 ft, determine the width of the easement.

A) 4.5 feet B) 18 feet C) 7 feet D) 9 feet

Answer: D

61) Suppose that a merchant buys a patio set from the wholesaler for $260. At what price should the merchant mark the patio set so that it may be offered at a discount of 25% but still give the merchant a 20% profit on his $260 investment?

A) $325 B) $416 C) $377 D) $312

Answer: B

62) Aliyah earned an $6,000 bonus from her sales job for exceeding her sales goals. After paying taxes at a 30% rate, she invested the remaining money in two stocks. One stock returned the equivalent of 10% simple interest after 1 yr, and the other returned 4% at the end of 1 yr. If her investments returned $240.00 (excluding commissions) how much did she invest in each stock

A) $2,750 at 4% and $1,450 at 10% B) $3,000 at 4% and $1,200 at 10%

C) $1,200 at 4% and $3,000 at 10% D) $1,450 at 4% and $2,750 at 10%

Answer: B

63) One number is 33 more than another number. The quotient of the larger number and smaller number is 5 and the remainder is 1. Find the numbers.

A) 10 and 43 B) 8 and 41 C) 5 and 38 D) 11 and 44

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide the missing information.

64) The imaginary number i is defined so that $i = \sqrt{-1}$ and i^2 = _____.

Answer: -1

65) For a positive real number, b, the value $\sqrt{-b}$ = _____.

Answer: $i\sqrt{b}$

66) Given a complex number $a + bi$, the value of a is called the _____ part and the value of b is called the _____ part.

Answer: real; imaginary

67) Given a complex number $a + bi$, the expression $a - bi$ is called the complex _____.

Answer: conjugate

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Simplify the expression in terms of *i*:

68) $\sqrt{-49}$

A) $7i$ B) $49i$ C) $i\sqrt{7}$ D) $-7i$

Answer: A

69) $\sqrt{-18}$

A) $-3i\sqrt{2}$ B) $3i\sqrt{2}$ C) $9i\sqrt{2}$ D) $3\sqrt{2i}$

Answer: B

Simplify the expression.

70) $\dfrac{\sqrt{-144}}{\sqrt{-36}}$

A) $\dfrac{1}{2}$ B) 2 C) $2i$ D) $-2i$

Answer: B

71) $\sqrt{-81} \cdot \sqrt{-3}$

A) -27 B) $9\sqrt{3}$ C) $-9\sqrt{3}$ D) $9\sqrt{-3}$

Answer: C

72) $\dfrac{\sqrt{-25}}{\sqrt{9}}$

A) $-\dfrac{\sqrt{5}}{3}$ B) $\dfrac{5}{3}$ C) $\dfrac{5}{3}i$ D) $-\dfrac{5}{3}$

Answer: C

Identify the real and imaginary parts of the complex number.

73) $11 + 13i$

A) Real: 11; imaginary: 13 B) Real: 24; imaginary: i

C) Real: 13; imaginary: 11 D) Real: 11; imaginary: $13i$

Answer: A

74) $\dfrac{4}{7}$

A) Real: $\dfrac{4}{7}$; imaginary: i B) Real: 0 ; imaginary: $\dfrac{4}{7}$

C) Real: $\dfrac{4}{7}$; imaginary: 0 D) Real: 4 ; imaginary: 7

Answer: C

Simplify and write the result in standard form, *a* + *bi*.

75) $\dfrac{14 - \sqrt{-12}}{2}$

A) $7 + 2i\sqrt{3}$ B) $7 + i\sqrt{3}$ C) $7 - 2i\sqrt{3}$ D) $7 - i\sqrt{3}$

Answer: D

76) $\dfrac{4 + \sqrt{-18}}{6}$

A) $\dfrac{2}{3} - \dfrac{\sqrt{18}}{6}i$ B) $\dfrac{2}{3} + \dfrac{\sqrt{2}}{2}i$ C) $\dfrac{3}{5} + \dfrac{\sqrt{18}}{6}i$ D) $\dfrac{2}{3} - \dfrac{\sqrt{2}}{2}i$

Answer: B

77) $\dfrac{-8 - 10i}{-2}$

A) $4 + 10i$ B) $4 - 5i$ C) $4 - 10i$ D) $4 + 5i$

Answer: D

78) $\dfrac{6 - \sqrt{-18}}{-3}$

A) $-2 - 3i\sqrt{2}$ B) $-2 - i\sqrt{2}$ C) $-2 + i\sqrt{2}$ D) $-2 + 3i\sqrt{2}$

Answer: C

Simplify.

79) i^{40}

A) -1 B) i C) 1 D) $-i$

Answer: C

80) i^{15}

A) i B) -1 C) 1 D) $-i$

Answer: D

Perform the indicated operation. Write the answer in the form *a* + *bi*.

81) $(-12 - 10i) + (17 + 14i)$

A) $29 + 24i$ B) 9 C) $9i$ D) $5 + 4i$

Answer: D

82) $(-4 - 6i) - (9 - 9i)$

A) $-28i$ B) $-13 - 15i$ C) $-10i$ D) $-13 + 3i$

Answer: D

83) $(-5 - 9i)(6 + 6i)$

A) $24 - 84i$ B) $-30 - 54i$ C) $-84 - 84i$ D) 24

Answer: A

84) $7i(-5 + 5i)$

A) $-70i$ B) $-35 - 35i$ C) $-30i$ D) $35 - 35i$

Answer: B

85) $\frac{-8 + 3i}{5 + 7i}$

A) $-\frac{19}{74} - \frac{71}{74}i$ B) $-\frac{19}{74} + \frac{71}{74}i$ C) $-\frac{8}{5} - \frac{3}{7}i$ D) $-\frac{8}{5} + \frac{3}{7}i$

Answer: B

86) $\frac{6 - i}{2 + i}$

A) $\frac{11}{5} - \frac{8}{5}i$ B) $2 - i$ C) $\frac{13}{5} - \frac{8}{5}i$ D) 2

Answer: A

87) $\frac{8 + 9i}{3 - i}$

A) $\frac{15}{8} + \frac{35}{8}i$ B) $\frac{15}{8} - \frac{35}{8}i$ C) $\frac{3}{2} - \frac{7}{2}i$ D) $\frac{3}{2} + \frac{7}{2}i$

Answer: D

88) $(6 + \sqrt{-9})(8 - \sqrt{-9})$

A) $57 - 2i\sqrt{9}$ B) $57 + 2i\sqrt{9}$ C) 39 D) $39 + 2i\sqrt{9}$

Answer: B

89) $(8 - 5i)^2 + (8 + 5i)^2$

A) $64 - 160i$ B) $78 + 160i$ C) 64 D) 78

Answer: D

Evaluate $\sqrt{b^2 - 4ac}$ for the given values of a, b, and c, and simplify.

90) $a = 4$, $b = -2$, and $c = 7$

A) $3i\sqrt{6}$ B) $6i\sqrt{3}$ C) $6\sqrt{3}$ D) $-6\sqrt{3}$

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide the missing information.

91) A _____ equation is a second degree equation of the form $ax^2 + bx + c = 0$ where $a \neq 0$.

Answer: quadratic

92) A _____ equation is a first degree equation of the form $ax + b = 0$ where $a \neq 0$.

Answer: linear

93) The zero product property indicates that if $ab = 0$, then _____ = 0 or _____ = 0.

Answer: a; b

94) The zero product property indicates that if $(5x + 1)(x - 4) = 0$, then _____ = 0 or _____ = 0.

Answer: $(5x + 1)$; $(x - 4)$

95) The square root property indicates that if $x^2 = k$, then x = _____.

Answer: $\pm\sqrt{k}$

96) The value of n that would make the trinomial $x^2 + 20x + n$ a perfect square trinomial is _____.

Answer: 100

97) Given $ax^2 + bx + c = 0$ ($a \neq 0$), write the quadratic formula.

Answer: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

98) For a quadratic equation $ax^2 + bx + c = 0$, the discriminant is given by the expression _____.

Answer: $b^2 - 4ac$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the equation.

99) $5w(5w + 12) = -32$

A) $\left\{-\frac{8}{5}, \frac{4}{5}\right\}$ B) $\left\{0, -\frac{12}{5}\right\}$ C) $\left\{-\frac{8}{5}, -\frac{4}{5}\right\}$ D) $\left\{\frac{8}{5}, \frac{4}{5}\right\}$

Answer: C

100) $t^2 - 5t = -4$

A) $\{0, 5\}$ B) $\{0, -5\}$ C) $\{-4, -1\}$ D) $\{4, 1\}$

Answer: D

101) $y^2 - 20y = 0$

A) $\{0, -20\}$ B) $\left\{0, \frac{1}{20}\right\}$ C) $\{20\}$ D) $\{0, 20\}$

Answer: D

102) $15m(m + 5) = 38m - 20$

A) $\left\{\frac{4}{5}, \frac{5}{3}\right\}$ B) $\left\{\frac{4}{5}, -\frac{5}{3}\right\}$ C) $\{0, -20\}$ D) $\left\{-\frac{4}{5}, -\frac{5}{3}\right\}$

Answer: D

103) $9s^2 = 4$

A) $\left\{\frac{3}{2}\right\}$ B) $\left\{-\frac{2}{3}, \frac{2}{3}\right\}$ C) $\left\{\frac{2}{3}\right\}$ D) $\left\{-\frac{3}{2}, \frac{3}{2}\right\}$

Answer: B

104) $(m + 3)(m - 4) = -6$

A) {-2, 3} B) {3, -4} C) {2, -3} D) {-3, 4}

Answer: A

Solve the equation by using the square root property.

105) $f^2 = 25$

A) {5} B) $\{\pm 5i\}$ C) $\{5i\}$ D) $\{\pm 5\}$

Answer: D

106) $(3x + 10)^2 = 81$

A) $\left\{\frac{61}{6}i, -\frac{61}{6}i\right\}$ B) $\left\{-\frac{1}{3}\right\}$ C) $\left\{\frac{61}{6}, -\frac{61}{6}\right\}$ D) $\left\{-\frac{1}{3}, -\frac{19}{3}\right\}$

Answer: D

107) $(c + 8)^2 = 16$

A) {12, 4} B) {8, -24} C) {-4, -12} D) {24, -8}

Answer: C

108) $(3z - 18)^2 + 59 = 14$

A) $\{14 + 3\sqrt{5}, -14 + 3\sqrt{5}\}$ B) $\{6 + i\sqrt{5}, 6 - i\sqrt{5}\}$

C) $\{3\sqrt{5} + 14\}$ D) $\{3\sqrt{5} - 14\}$

Answer: B

109) $3(x + 8)^2 - 15 = 255$

A) $-8 \pm \sqrt{265}$ B) $8 \pm 3\sqrt{10}$ C) $-8 \pm 3\sqrt{10}$ D) $8 \pm \sqrt{265}$

Answer: C

110) $\left(t - \frac{1}{6}\right)^2 = -\frac{17}{36}$

A) $\left\{-\frac{11}{36}\right\}$ B) $\left\{\frac{1}{6} \pm \frac{\sqrt{17}}{6}i\right\}$ C) $\left\{\frac{1}{6} \pm \frac{\sqrt{17}}{6}\right\}$ D) $\left\{\frac{1 - i\sqrt{17}}{6}\right\}$

Answer: B

Find the value of *n* so that the expression is a perfect square trinomial and then factor the trinomial.

111) $j^2 - 4j + n$

A) $n = 2; (j + 2)^2$ B) $n = 4; (j - 2)^2$ C) $n = 4; (j - 2)$ D) $n = 2; (j - 2)^2$

Answer: B

112) $x^2 + 20x + n$

A) $n = 100; (x + 10)^2$ B) $n = 400; (x + 20)^2$

C) $n = 100; (x + 10)(x - 10)$ D) $n = 100; (x - 10)^2$

Answer: A

113) Find the value of *n* so that the expression is a perfect square trinomial and then factor the trinomial.

$t^2 - \frac{14}{3}t + n$

A) $n = \frac{49}{9}; \left(t + \frac{7}{3}\right)^2$ B) $n = \frac{49}{9}; \left(t - \frac{7}{3}\right)^2$

C) $n = \frac{196}{9}; \left(t - \frac{49}{3}\right)^2$ D) $n = \frac{98}{9}; \left(t - \frac{98}{9}\right)^2$

Answer: B

Solve the quadratic equation by completing the square and applying the square root property.

114) $u^2 + 20u + 101 = 0$

A) $\{-10 \pm i\}$ B) $\{-10 + i\}$ C) $\{10 + i\}$ D) $\{\pm i\}$

Answer: A

115) $n^2 + 18n = -75$

A) $\{-9 - \sqrt{6}, -9 + \sqrt{6}\}$ B) $\{9 - \sqrt{6}, 9 + \sqrt{6}\}$

C) $\{-9 - \sqrt{249}, -9 + \sqrt{249}\}$ D) $\left\{\frac{-18 - \sqrt{249}}{2}, \frac{-18 + \sqrt{249}}{2}\right\}$

Answer: A

116) $y^2 + 53 = 4y$

A) $\{4 - \sqrt{37}, 4 + \sqrt{37}\}$ B) $\{4 - i\sqrt{37}, 4 + i\sqrt{37}\}$

C) $\{-2 - 7i, -2 + 7i\}$ D) $\{2 - 7i, 2 + 7i\}$

Answer: D

117) $2v^2 + 4v + 12 = 0$

A) $\{-2 - \sqrt{2}, -2 + \sqrt{2}\}$

B) $\{-2 - i\sqrt{2}, -2 + i\sqrt{2}\}$

C) $\{-1 - \sqrt{5}, -1 + \sqrt{5}\}$

D) $\{-1 - i\sqrt{5}, -1 + i\sqrt{5}\}$

Answer: D

118) $2x^2 + 6 = 9x$

A) $\{-9 - \sqrt{87}, -9 + \sqrt{87}\}$

B) $\{9 - \sqrt{87}, 9 + \sqrt{87}\}$

C) $\left\{\frac{-9 - \sqrt{33}}{4}, \frac{-9 + \sqrt{33}}{4}\right\}$

D) $\left\{\frac{9 - \sqrt{33}}{4}, \frac{9 + \sqrt{33}}{4}\right\}$

Answer: D

119) $-5v^2 = 5 + 7v$

A) $\left\{\frac{7 - \sqrt{69}}{10}, \frac{7 + \sqrt{69}}{10}\right\}$

B) $\left\{-\frac{7}{10} - \frac{\sqrt{51}}{10}i, -\frac{7}{10} + \frac{\sqrt{51}}{10}i\right\}$

C) $\left\{\frac{-7 - \sqrt{69}}{10}, \frac{-7 + \sqrt{69}}{10}\right\}$

D) $\left\{\frac{7}{10} - \frac{\sqrt{51}}{10}i, \frac{7}{10} + \frac{\sqrt{51}}{10}i\right\}$

Answer: B

120) $3x^2 + 5x - 6 = 0$

A) $-\frac{5}{3} \pm \frac{\sqrt{97}}{3}$

B) $-\frac{5}{6} \pm \frac{\sqrt{97}}{6}$

C) $-\frac{5}{6} \pm \frac{\sqrt{47}}{6}$

D) $-\frac{5}{3} \pm \frac{\sqrt{47}}{3}$

Answer: B

Solve the equation by using the quadratic formula.

121) $3x^2 + 12x - 15 = 0$

A) $\left\{\frac{1}{3}, -\frac{5}{3}\right\}$

B) $\{1, -5\}$

C) $\left\{-\frac{1}{3}, \frac{5}{3}\right\}$

D) $\{-1, 5\}$

Answer: B

122) $2x(x - 2) = 5$

A) $1 \pm \frac{\sqrt{14}}{2}$

B) $-1 + \frac{\sqrt{14}}{2}, -6 + \frac{\sqrt{14}}{2}$

C) $1 \pm \frac{\sqrt{14}}{2}i$

D) $-1 + \frac{\sqrt{14}}{2}i, -6 + \frac{\sqrt{14}}{2}i$

Answer: A

123) $6y + 3 = -4y^2$

A) $\left\{-\frac{3}{4} + \frac{i\sqrt{3}}{4}, -\frac{3}{4} - \frac{i\sqrt{3}}{4}\right\}$

B) $\left\{-\frac{9}{2}, \frac{1}{3}\right\}$

C) $\left\{-\frac{1}{4} + \frac{\sqrt{105}}{12}, -\frac{1}{4} - \frac{\sqrt{105}}{12}\right\}$

D) $\{2 + \sqrt{3}, 2 - \sqrt{3}\}$

Answer: A

124) $5y - 6 + 50y^2 = 0$

A) $\left\{\frac{5}{2}, -\frac{10}{3}\right\}$

B) $\left\{\frac{1}{3}, \frac{2}{5}\right\}$

C) $\left\{\frac{3}{5} \pm \frac{\sqrt{2,791}}{5}i\right\}$

D) $\left\{-\frac{2}{5}, \frac{3}{10}\right\}$

Answer: D

125) $6x(x - 2) = 5$

A) $\left\{-1 + \frac{\sqrt{66}}{6}, -6 + \frac{\sqrt{66}}{6}\right\}$

B) $\left\{1 \pm \frac{\sqrt{66}}{6}\right\}$

C) $\left\{1 \pm \frac{\sqrt{66}}{6}i\right\}$

D) $\left\{-1 + \frac{\sqrt{66}}{6}i, -6 + \frac{\sqrt{66}}{6}i\right\}$

Answer: B

126) $-\frac{4}{3} = \frac{1}{6}x - 5x^2$

A) $\left\{\frac{1}{10} \pm \frac{\sqrt{161}}{10}\right\}$

B) $\left\{-8, \frac{9}{30}\right\}$

C) $\left\{\frac{1}{16} \pm \frac{\sqrt{959}}{16}i\right\}$

D) $\left\{-\frac{1}{2}, \frac{8}{15}\right\}$

Answer: D

127) $0.49x^2 = 0.28x - 0.04$

A) $\left\{\pm \frac{2}{7}\right\}$

B) $\left\{\frac{2}{7}i\right\}$

C) $\left\{\frac{2}{7}\right\}$

D) $\left\{-\frac{2}{7}\right\}$

Answer: C

128) $(3w - 2)(w - 1) = -3$

A) $\left\{\frac{5}{6} - \frac{\sqrt{35}}{6}i, \frac{5}{6} + \frac{\sqrt{35}}{6}i\right\}$

B) $\left\{-\frac{5}{6} - \frac{\sqrt{37}}{6}i, \frac{5}{6} + \frac{\sqrt{37}}{6}i\right\}$

C) $\left\{-\frac{1}{3}, -2\right\}$

D) $\left\{\frac{-5 - \sqrt{35}}{6}, \frac{-5 + \sqrt{35}}{6}\right\}$

Answer: A

129) $y^2 = 4y - 9$

A) $\{4 \pm 2i\sqrt{5}\}$ B) $\{-2 \pm i\sqrt{5}\}$ C) $\{2 \pm i\sqrt{5}\}$ D) $\{-4 \pm 2i\sqrt{5}\}$

Answer: C

130) $t(t - 2) = -2$

A) $\{1 \pm 2i\}$ B) $\{-1 \pm i\}$ C) $\{-1 \pm 2i\}$ D) $\{1 \pm i\}$

Answer: D

Use the discriminant to determine the type and number of solutions.

131) $-2x^2 + 5x + 5 = 0$

A) One rational solution
B) Two rational solutions
C) Two irrational solutions
D) Two imaginary solutions

Answer: C

132) $5x^2 + 4x + 5 = 0$

A) Two imaginary solutions
B) One rational solution
C) Two rational solutions
D) Two irrational solutions

Answer: A

133) $6q^2 = 1$

A) Two rational solutions
B) Two irrational solutions
C) Two imaginary solutions
D) One rational solutions

Answer: B

Solve for the indicated variable.

134) $c = 9\sqrt{r}$ for r

A) $r = \frac{c^2}{81}$ B) $r = \frac{c}{81}$ C) $r = \frac{c^2}{9}$ D) $r = \frac{c}{9}$

Answer: A

135) $w = \frac{1}{3}kr^2$ for $r > 0$

A) $r = \frac{3\sqrt{w}}{k}$ B) $r = \sqrt{3w}$ C) $r = \frac{\sqrt{3w}}{k}$ D) $r = \frac{\sqrt{3wk}}{k}$

Answer: D

136) $m = h^2kt^2x$ for $t > 0$

A) $t = \frac{\sqrt{mkx}}{hkx}$ B) $t = \sqrt{\frac{m}{h}}$ C) $t = \frac{\sqrt{mhkx}}{hkx}$ D) $t = \frac{m}{h^2kx}$

Answer: A

137) $at^2 + uy = h$ for t

A) $t = \frac{\sqrt{a(h - uy)}}{a}$ or $t = \frac{\sqrt{a(h + uy)}}{a}$

B) $t = \pm\sqrt{a(h - uy)}$

C) $t = \sqrt{\frac{h - uy}{a}}$

D) $t = \pm\frac{\sqrt{a(h - uy)}}{a}$

Answer: D

138) $s = vt + \frac{1}{2}at^2$ for t

A) $t = \frac{v \pm \sqrt{v^2 + 2as}}{2a}$

B) $t = \frac{-v \pm i\sqrt{v^2 + 2as}}{a}$

C) $t = \frac{-v \pm \sqrt{v^2 + 2as}}{a}$

D) $t = \frac{v \pm \sqrt{v^2 + 2as}}{a}$

Answer: C

Solve the equation.

139) $y^2 + 3y - 11 = (y + 2)(y - 4)$

A) $\{-2, 4\}$ B) $\{2, -4\}$ C) $\left\{\frac{3}{5}\right\}$ D) $\left\{\frac{3}{5}, -\frac{3}{5}\right\}$

Answer: C

140) $5(x + 2) + x^2 = x(x + 5) + 10$

A) $\{0\}$ B) All real numbers C) No solution D) $2\sqrt{5}$

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide the missing information.

141) Write a formula for the area of a triangle of base b and height h.

Answer: $A = \frac{1}{2}bh$

142) Write a formula for the area of a circle of radius r.

Answer: $A = \pi r^2$

143) Write a formula for the volume of a rectangular solid of length l, width w, and height h.

Answer: $V = lwh$

144) Write the Pythagorean theorem for a right triangle with the lengths of the legs given by a and b and the length of the hypotenuse given by c.

Answer: $a^2 + b^2 = c^2$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

145) Ramon wants to fence in a rectangular portion of his back yard against the back of his garage for a vegetable garden. He plans to use 40 feet of fence, and needs fence on only three sides. Find the maximum area he can enclose. (Hint: The lengths of the 3 fenced sides of the rectangle must add up to 40.)

A) 200 sq. ft. B) 400 sq. ft. C) 100 sq. ft. D) 225 sq. ft.

Answer: A

146) The product of two consecutive positive even integers is 120. Find the integers.

A) 59 and 61 B) 12 and 14 C) 10 and 12 D) 58 and 62

Answer: C

147) The length of a rectangle is 4 yd more than twice the width x. The area is 390 yd^2. Find the dimensions of the given shape.

A) 26 yd. by 15 yd. B) 6.5 yd. by 60 yd. C) 13 yd. by 30 yd. D) 13 yd. by 26 yd.

Answer: C

148) The sum of the squares of two consecutive whole numbers is 25. Find the numbers.

A) 11 and 12 B) 2 and 3 C) 3 and 4 D) 12 and 13

Answer: C

149) The sum of an integer and its square is 30. Find the integers.

A) -6 and 36 B) 25 and 36 C) 5 and -6 D) 5 and 25

Answer: C

150) An open box is formed from a rectangular piece of cardboard that is 5 in. longer than it is wide, by removing squares of side 4 in. from each corner and folding up the sides. If the volume of the carton is then 336 in^3, what were the dimensions of the original piece of cardboard?

A) 11 in. by 16 in. B) 15 in. by 20 in. C) 19 in. by 24 in. D) 7 in. by 12 in.

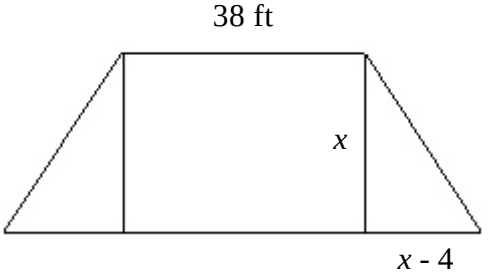
Answer: B

151) A sprinkler rotates 360° to water a circular region. If the total area watered is approximately 2,200 yd^2, determine the radius of the region (the radius is length of the stream of water). Round the answer to the nearest yard.

A) 6 yd B) 350 yd C) 26 yd D) 19 yd

Answer: C

152) A patio is configured from a rectangle with two right triangles of equal size attached at the two ends. The length of the rectangle is 38 ft. The base of the right triangle is 4 ft less than the height of the triangle. If the total area of the patio is 1,232 ft^2, determine the base and height of the triangular porti



A) base = 21 ft; height = 25 ft
B) base = 19 ft; height = 23 ft
C) base = 15 ft; height = 19 ft
D) base = 18 ft; height = 22 ft

Answer: D

153) The length of a rectangle is 6 yd more than twice the width *x*. The area is 416 yd^2. Find the dimensions of the rectangle.

A) width = 32 yd; length = 13 yd
B) width = 26 yd; length = 16 yd
C) width = 13 yd; length = 32 yd
D) width = 16 yd; length = 26 yd

Answer: C

154) The height of a triangle is 4 ft less than the base *x*. The area is 126 ft^2. Find the dimensions of the triangle.

A) base = 18 ft; height = 14
B) base = 20 ft; height = 16
C) base = 18 ft; height = 22
D) base = 9 ft; height = 28

Answer: A

155) The width of a rectangular box is 4 in. The height is one-fifth the length *x*. The volume is 180 in^2. Find the length and the height of the box.

A) length = 4 in.; height = 20 in.
B) length = 20 in.; height = 4 in.
C) length = 15 in.; height = 3 in.
D) length = 3 in.; height = 15 in.

Answer: C

156) The length of the longer leg of a right triangle is 14 ft longer than the length of the shorter leg *x*. The hypotenuse is 6 ft longer than twice the length of the shorter leg. Find the dimensions of the triangle.

A) Short leg = 11, long leg = 25, hypotenuse = 28
B) Short leg = 9, long leg = 23, hypotenuse = 28
C) Short leg = 9, long leg = 23, hypotenuse = 24
D) Short leg = 10, long leg = 24, hypotenuse = 26

Answer: D

157) A rectangular garden covers 46 yd^2. The length is 3 yd longer than the width. Find the length and width. Round to the nearest tenth of a yard.

A) length = 5.4; width = 8.4 yd
B) length = 6.8; width = 9.8 yd
C) length = 8.4; width = 5.4 yd
D) length = 9.8; width = 6.8 yd

Answer: C

158) The height of a triangular truss is 5 ft less than the base. The amount of drywall needed to cover the triangular area is 84 ft^2. Find the base and height of the triangle to the nearest tenth of a foot.

A) base = 15.9 ft; height = 10.9 ft
B) base = 12 ft; height = 7 ft
C) base = 21 ft; height = 16 ft
D) base = 15.7 ft; height = 10.7 ft

Answer: D

159) A model rocket is launched from a raised platform at a speed of 176 feet per second. Its height in fee given by

$h(t) = -16t^2 + 176t + 20$ (t = seconds after launch).

After how many seconds does the object reach its maximum height?

A) 7.5 seconds
B) 2.75 seconds
C) 5.5 seconds
D) 20 seconds

Answer: C

160) A model rocket is launched from a raised platform at a speed of 160 feet per second. Its height in fee given by

$h(t) = -16t^2 + 160t + 20$ (t = seconds after launch)

What is the maximum height reached by the rocket?

A) 840 feet
B) 420 feet
C) 210 feet
D) 440 feet

Answer: B

161) The temperature at a state park for one day in June can be approximated by the function

$T(x) = 0.289x^2 - 5.202x + 83 \qquad 0 \le x \le 18$

where T is degrees Fahrenheit and x is the number of hours after 5 PM on Friday. At what time is the temperature lowest? Round to the nearest hour.

A) 9 AM
B) 2 AM
C) 11 PM
D) 5 PM

Answer: B

162) The temperature at a state park for one day in June can be approximated by the function

$T(x) = 0.264x^2 - 4.752x + 81 \qquad 0 \le x \le 18$

where T is degrees Fahrenheit and x is the number of hours after 5 PM on Friday.
What was the lowest temperature reached? Round to the nearest whole degree.

A) 66 degrees
B) 72 degrees
C) 60 degrees
D) 64 degrees

Answer: C

163) The gas mileage for a certain vehicle can be approximated by $m = -0.05x^2 + 3.5x - 49$, where x is the speed of the vehicle in mph. Determine the speed(s) at which the car gets 9 mpg. Round to the nearest mph.

A) 23 mph and 47 mph
B) 19 mph and 51 mph
C) 27 mph and 43 mph
D) 35 mph

Answer: C

164) The daily profit in dollars made by an automobile manufacturer is

$$P(x) = -45x^2 + 2{,}430x - 15{,}000$$

where x is the number of cars produced per shift. How many cars must be produced per shift for the company to maximize its profit?

A) 29
B) 32
C) 54
D) 27

Answer: D

165) The daily profit in dollars made by an automobile manufacturer is

$$P(x) = -40x^2 + 2{,}240x - 17{,}000$$

where x is the number of cars produced per shift. Find the maximum possible daily profit.

A) $13,211
B) $14,360
C) $31,360
D) $13,642

Answer: B

166) A bad punter on a football team kicks a football approximately straight upward with an initial velocity of 89 ft/sec.

a. If the ball leaves his foot from a height of 4 ft, write an equation for the vertical height s (in ft) of the ball t seconds after being kicked.

b. Find the time(s) at which the ball is at a height of 102.2125 ft. Round to 1 decimal place.

A) $s = -9.8t^2 + 89t + 4$; 2.5 sec and 6.6 sec
B) $s = -9.8t^2 + 89t + 4$; 1.5 sec and 4 sec
C) $s = -16t^2 + 89t + 4$; 1.5 sec and 4 sec
D) $s = -16t^2 + 89t + 4$; 2.5 sec and 6.6 sec

Answer: C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide the missing information.

167) A _____ equation is an equation that has one or more radicals containing a variable.

Answer: radical

168) Given an equation of the form $u^{m/n} = k$, raise both sides to the _____ power to isolate u (that is, to obtain u^1 on the left side).

Answer: $\frac{n}{m}$

169) The equation $m^{2/3} + 10m^{1/3} + 9 = 0$ is said to be in _____ form, because making the substitution $u =$ _____ results in a new equation that is quadratic.

Answer: quadratic; $m^{1/3}$

170) Consider the equation $(4x^2 + 1)^2 + 4(4x^2 + 1) + 4 = 0$. If the substitution $u =$ _____is made, then the equation becomes $u^2 + 4u + 4 = 0$.

Answer: $4x^2 + 1$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the equation.

171) $x^2(x^2 + 31) = 180$

A) $\{\pm 5i, \pm 6\}$ B) $\{\pm 5, \pm 6\}$ C) $\{\pm 5, \pm 6i\}$ D) $\{\pm\sqrt{5}, \pm 6i\}$

Answer: D

172) $2x(3x - 1)(x + 7)^2$

A) $\left\{0, \frac{1}{3}, \pm 7\right\}$ B) $\left\{\frac{1}{3}, -7\right\}$ C) $\left\{0, \frac{1}{3}, -7\right\}$ D) $\{0, 3, \pm 7\}$

Answer: C

173) $-5(w^2 - 7)(w^2 + 4)$

A) $\{\pm\sqrt{7}\}$ B) $\{0, \pm\sqrt{7}, \pm 2i\}$ C) $\{\pm\sqrt{7}, \pm 2i\}$ D) $\{0, \pm\sqrt{7}\}$

Answer: C

174) $180x^3 + 36x^2 - 5x - 1 = 0$

A) $\left\{\frac{1}{5}, \pm\frac{1}{6}i\right\}$ B) $\left\{-\frac{1}{5}\right\}$ C) $\left\{-\frac{1}{5}, \pm\frac{1}{6}\right\}$ D) $\{-5, \pm 6\}$

Answer: C

175) $100x^3 + 25x^2 + 4x + 1 = 0$

A) $\left\{-\frac{1}{4}, \pm\frac{1}{5}\right\}$ B) $\left\{-\frac{1}{4}, \pm\frac{1}{5}i\right\}$ C) $\{-4, \pm 5\}$ D) $\left\{-\frac{1}{4}\right\}$

Answer: B

176) $2n^2(n^2 + 6) = 54 + 9n^2$

A) $\left\{\frac{9}{2}, -6\right\}$ B) $\left\{\pm\frac{3\sqrt{2}}{2}, \pm i\sqrt{6}\right\}$ C) $\left\{\frac{3\sqrt{2}}{2}, i\sqrt{6}\right\}$ D) $\{0, \pm i\sqrt{6}\}$

Answer: B

177) $x^3 - 8 = x - 2$

A) $\{2, 1 \pm \sqrt{3}\}$ B) $\{2, -1 \pm i\sqrt{2}\}$ C) $\{2, 1 \pm i\sqrt{3}\}$ D) $\{2, -1 \pm \sqrt{2}\}$

Answer: B

178) $\frac{2z}{z - 2} + \frac{3}{z - 4} = 1$

A) $\left\{-\frac{1}{2} \pm \frac{\sqrt{57}}{2} i\right\}$ B) $\left\{-\frac{1}{2} \pm \frac{\sqrt{57}}{2}\right\}$ C) $\left\{\frac{1}{2} \pm \frac{\sqrt{57}}{2} i\right\}$ D) $\left\{\frac{1}{2} \pm \frac{\sqrt{57}}{2}\right\}$

Answer: B

179) $\frac{5z}{z - 5} + \frac{1}{z - 4} = -1$

A) $\left\{\frac{7}{3} \pm \frac{\sqrt{106}}{6}\right\}$ B) $\left\{-\frac{7}{3} \pm \frac{\sqrt{106}}{6}\right\}$ C) $\left\{-\frac{7}{3} \pm \frac{\sqrt{106}}{6} i\right\}$ D) $\left\{\frac{7}{3} \pm \frac{\sqrt{106}}{6} i\right\}$

Answer: A

180) $\frac{3}{x} + \frac{3}{x - 4} = \frac{3x - 9}{x - 4}$

A) $\left\{-\frac{5}{2}, \frac{1}{3}\right\}$ B) $\{1\}$ C) $\{\ \}$ D) $\{4, 1\}$

Answer: B

181) $\frac{5}{v - 4} - \frac{8}{v + 1} = \frac{34}{v^2 - 3v - 4}$

A) $\{-1, 4\}$ B) $\varnothing$ C) $\{1\}$ D) $\{-4, 1\}$

Answer: C

182) $4x - 5 = \frac{3}{x}$

A) $\left\{\frac{5 \pm \sqrt{73}}{8}\right\}$ B) $\left\{\frac{5 \pm \sqrt{73}}{4}\right\}$ C) $\left\{\frac{5 \pm \sqrt{37}}{8}\right\}$ D) $\left\{\frac{5 \pm \sqrt{37}}{4}\right\}$

Answer: A

183) $\frac{20}{c^2 - 2c} + 5 = \frac{10}{c - 2}$

A) $\{\pm 2\}$ B) $\{0, 2\}$ C) $\{2\}$ D) $\{\ \}$

Answer: D

Solve the problem.

184) Fernando's motorboat can travel 35 mi/h in still water. If the boat can travel 7 miles downstream in the same time it takes to travel 3 miles upstream, what is the rate of the river's current?

A) 9 mi/h B) 4 mi/h C) 14 mi/h D) 35 mi/h

Answer: C

Solve the absolute value equation.

185) $|6z - 3| = 7$

A) $\left\{-\frac{2}{3}\right\}$ B) $\left\{\frac{5}{3}, -\frac{2}{3}\right\}$ C) $\{7, -6\}$ D) $\left\{\frac{5}{3}\right\}$

Answer: B

186) $|12x - 6| - 15 = -15$

A) $\{12, -15\}$ B) $\{\ \}$ C) $\left\{\frac{1}{2}, -\frac{1}{2}\right\}$ D) $\left\{\frac{1}{2}\right\}$

Answer: D

187) $|b + 4| - 2 = 4$

A) $\{10, -10\}$ B) $\{-10, 6\}$ C) $\{-10, 2\}$ D) $\{6, 2\}$

Answer: C

188) $3 - |3w + 9| = 6$

A) $\{\ \}$ B) $\{2, -2\}$ C) $\{-1\}$ D) $\{-1, -5\}$

Answer: A

189) $-\frac{17}{4} + \frac{2}{3}|3y - 9| = -4$

A) $\left\{-3, \frac{4}{3}\right\}$ B) $\left\{\frac{23}{8}, \frac{25}{8}\right\}$ C) $\left\{-\frac{1}{8}, \frac{1}{8}\right\}$ D) $\{\ \}$

Answer: B

190) $|2v| = |-13 - 3v|$

A) $\left\{-13, -\frac{13}{5}\right\}$ B) $\left\{\frac{5}{13}, 0\right\}$ C) $\{-13\}$ D) $\{0, 16\}$

Answer: A

191) $-2|x - 4| + 6 = -8$

A) $\{-3, 11\}$ B) $\{-6, 14\}$ C) $\{2, 6\}$ D) $\{3, 5\}$

Answer: A

192) $|2r + 3| = |5r - 17|$

A) $\left\{\frac{20}{3}\right\}$ B) $\left\{-\frac{20}{3}, \frac{20}{3}\right\}$ C) $\left\{2, \frac{20}{3}\right\}$ D) $\emptyset$

Answer: C

Solve the equation.

193) $-3 + \sqrt{5x + 5} = 5$

A) $\left\{\frac{69}{5}\right\}$ B) $\left\{\frac{59}{5}\right\}$ C) $\left\{\frac{64}{5}\right\}$ D) $\left\{-\frac{1}{5}\right\}$

Answer: B

194) $\sqrt{m + 55} + 1 = m$

A) $\{-12, 9\}$ B) $\{-12\}$ C) 8 D) $\{9\}$

Answer: D

195) $6 + \sqrt[4]{m} = 8$

A) $\{\pm 16\}$ B) $\{4\}$ C) $\{16\}$ D) $\{\pm 4\}$

Answer: C

196) $-15 = -11 + (q - 2)^{1/3}$

A) $\{66\}$ B) $\{62\}$ C) $\{-62\}$ D) $\{\ \}$

Answer: C

197) $\sqrt[5]{10z + 2} = \sqrt[5]{7z + 11}$

A) $\{0\}$ B) $\{3\}$ C) $\{6\}$ D) $\{-3\}$

Answer: B

198) $\sqrt{4x - 5} + 1 = \sqrt{4x + 5}$

A) $\left\{\frac{61}{16}\right\}$ B) $\left\{\frac{101}{4}\right\}$ C) $\left\{\frac{141}{16}\right\}$ D) $\left\{\frac{101}{16}\right\}$

Answer: D

199) $5 - \sqrt{x + 10} = \sqrt{7 - x}$

A) $\{6, -9\}$ B) $\{12, -18\}$ C) $\{6, -18\}$ D) $\{12, -9\}$

Answer: A

200) $\sqrt{11 - p} - \sqrt{2 + p} = -1$

A) $\{7, 2\}$ B) $\{2\}$ C) $\{\pm 2\}$ D) $\{7\}$

Answer: D

201) $4d^{2/3} - 9d^{1/3} - 9 = 0$

A) $\left\{\frac{27}{64}, 3\right\}$ B) $\left\{-\frac{27}{64}, 27\right\}$ C) $\left\{\frac{27}{64}, 27\right\}$ D) $\left\{-\frac{3}{4}, 3\right\}$

Answer: B

202) $3(x - 4)^{2/3} = 48$

A) $\{-60, 68\}$ B) $\{-68, 60\}$ C) $\{-20, 12\}$ D) $\{-12, 20\}$

Answer: A

203) $(2x + 4)^{3/2} = 64$

A) ± 16 B) 6 C) 16 D) ± 6

Answer: B

204) $\sqrt{-3 + p} = 7 - \sqrt{32 - p}$

A) $\{28\}$ B) $\{7\}$ C) $\{7, 28\}$ D) $\{\pm 28\}$

Answer: C

205) $6(x - 1)^{6/7} = 12$

A) $\{1^{7/6} + 2\}$ B) $\{2^{7/6} + 1\}$ C) $\{2^{6/7} + 1\}$ D) $\{1^{6/7} + 2\}$

Answer: B

206) $n^{4/5} = 3$

A) $\left\{\pm\frac{15}{4}\right\}$ B) $\{\pm 3^{5/4}\}$ C) $\left\{\frac{15}{4}\right\}$ D) $\{3^{5/4}\}$

Answer: D

207) $4p^{2/3} = \frac{1}{4}$

A) $\left\{\pm\frac{1}{64}\right\}$ B) $\left\{\frac{1}{16}\right\}$ C) $\left\{\pm\frac{1}{16}\right\}$ D) $\left\{\frac{1}{64}\right\}$

Answer: A

Solve the problem.

208) The amount of time it takes an object dropped from an initial height of h_0 feet to reach a height of h feet is given by the formula

$$t = \sqrt{\frac{h_0 - h}{16}}$$

How long would it take an object to reach the ground from the top of a building that is 470 feet tall? to the nearest tenth of a second.

A) 29.4 seconds B) 4 seconds C) 0.3 seconds D) 5.4 seconds

Answer: D

209) The amount of time it takes an object dropped from an initial height of h_0 feet to reach a height of h feet is given by the formula

$$t = \sqrt{\frac{h_0 - h}{16}}.$$

An object dropped from the top of the Sears Tower in Chicago takes 9.7 seconds to reach the ground the above equation to approximate the height of the Sears Tower to the nearest foot.

A) 1,032 feet B) 1,219 feet C) 1,584 feet D) 1,505 feet

Answer: D

210) The yearly depreciation rate for a certain vehicle is modeled by $r = 1 - \left(\frac{V}{C}\right)^{1/n}$, where V is the value of the car after n years, and C is the original cost.

a. Determine the depreciation rate for a car that originally cost \$18,000 and is worth \$11,000 after 3 yr. Round to the nearest tenth of a percent.

b. Determine the original cost of a truck that has a yearly depreciation rate of 14% and is worth \$12,000 after 5 yr. Round to the nearest \$100.

A) **a.** 15.1% per year; **b.** \$25,500 B) **a.** 77.2% per year; **b.** \$25,500

C) **a.** 77.2% per year; **b.** \$14,000 D) **a.** 15.1% per year; **b.** \$14,000

Answer: A

Solve the equation by using substitution.

211) $(t + 3)^2 - (t + 3) - 12 = 0$

A) $\{-7, 0\}$ B) $\{-1, 6\}$ C) $\{4, -3\}$ D) $\{1, -6\}$

Answer: D

212) $3(t^2 - 9)^2 + 16(t^2 - 9) = -5$

A) $\left\{\pm\frac{\sqrt{78}}{3}, \pm 2\right\}$ B) $\left\{\pm\frac{\sqrt{78}}{3}i, \pm i2\right\}$ C) $\left\{-\frac{1}{3}, -5\right\}$ D) $\left\{\pm\frac{1}{3}, \pm 5\right\}$

Answer: A

Solve the equation.

213) $4z^4 + 68z^2 + 225 = 0$

A) $\left\{-\frac{5\sqrt{2}}{2}i, -\frac{3\sqrt{2}}{2}i, \frac{3\sqrt{2}}{2}i, \frac{5\sqrt{2}}{2}i\right\}$ B) $\left\{-\frac{5\sqrt{2}}{2}, -\frac{3\sqrt{2}}{2}, \frac{3\sqrt{2}}{2}, \frac{5\sqrt{2}}{2}\right\}$

C) $\left\{-\frac{25}{2}, -\frac{9}{2}\right\}$ D) $\left\{\frac{9}{2}, \frac{25}{2}\right\}$

Answer: A

214) $30m^2 = 216 - m^4$

A) $\{-6i, -i\sqrt{6}, i\sqrt{6}, 6i\}$ B) $\{-6, -\sqrt{6}, \sqrt{6}, 6\}$

C) $\{-\sqrt{6}, \sqrt{6}, -6i, 6i\}$ D) $\{-6, 6, -i\sqrt{6}, i\sqrt{6}\}$

Answer: C

215) $2a^4 + 1 = 7a^2$

A) $\left\{-\frac{\sqrt{7+\sqrt{41}}}{2}, -\frac{\sqrt{7-\sqrt{41}}}{2}, \frac{\sqrt{7-\sqrt{41}}}{2}, \frac{\sqrt{7+\sqrt{41}}}{2}\right\}$

B) $\left\{\frac{-7-\sqrt{41}}{4}, \frac{-7+\sqrt{41}}{4}\right\}$

C) $\left\{\frac{7-\sqrt{41}}{4}, \frac{7+\sqrt{41}}{4}\right\}$

D) $\left\{-\frac{\sqrt{7+\sqrt{41}}}{2}i, -\frac{\sqrt{7-\sqrt{41}}}{2}i, \frac{\sqrt{7-\sqrt{41}}}{2}i, \frac{\sqrt{7+\sqrt{41}}}{2}i\right\}$

Answer: A

216) $9 + 24u^{-2} = 58u^{-1}$

A) $\left\{\frac{33}{58}\right\}$ B) $\left\{\frac{4}{9}, 6\right\}$ C) $\left\{-\frac{9}{10}\right\}$ D) $\left\{-6, -\frac{4}{9}\right\}$

Answer: B

Solve the equation by using substitution.

217) $z^{2/3} + 2z^{1/3} - 15 = 0$

A) $\{27, 125\}$ B) $\{9, 25\}$ C) $\{6, -6\}$ D) $\{27, -125\}$

Answer: D

218) $(4y + 7)^2 = 4(4y + 7) + 6$

A) $\{2 + \sqrt{10}, 2 - \sqrt{10}\}$ B) $\{-2 + \sqrt{10}, -2 - \sqrt{10}\}$

C) $\left\{\frac{5}{4} + \frac{\sqrt{10}}{4}, \frac{5}{4} - \frac{\sqrt{10}}{4}\right\}$ D) $\left\{-\frac{5}{4} + \frac{\sqrt{10}}{4}, -\frac{5}{4} - \frac{\sqrt{10}}{4}\right\}$

Answer: D

Solve and express your solution in simplified form.

219) $x^4 - 3x^2 + 2 = 0$

A) $\{1, \sqrt{2}\}$ B) $\{\pm 1, \pm 2\}$ C) $\{\pm 1, \pm\sqrt{2}\}$ D) $\{1, 2\}$

Answer: C

220) $x^4 - 13x^2 - 48 = 0$

A) $\{16, 3\}$ B) $\{16, 3i\}$ C) $\{\pm 4, \pm\sqrt{3}\}$ D) $\{\pm 4, \pm i\sqrt{3}\}$

Answer: D

Solve the equation.

221) $\left(2 + \frac{9}{y}\right)^2 + 4\left(2 + \frac{9}{y}\right) = -3$

A) $\left\{-\frac{9}{4}, \frac{5}{4}\right\}$ B) $\{-27, -45\}$ C) $\left\{-\frac{9}{5}, -3\right\}$ D) $\{1, 3\}$

Answer: C

Make an appropriate substitution and solve the equation.

222) $(3x + 7)^2 + 2(3x + 7) - 15 = 0$

A) $\left\{-\frac{2}{3}, -\frac{10}{3}\right\}$ B) $\left\{-4, -\frac{10}{3}\right\}$ C) $\left\{-4, -\frac{4}{3}\right\}$ D) $\left\{-\frac{2}{3}, -\frac{4}{3}\right\}$

Answer: C

223) $(x^2 + 4x)^2 - 17(x^2 + 4x) = -60$

A) $\{-1, -2, 6, 5\}$ B) $\{-5, -12\}$ C) $\{-5, -6, 2, 1\}$ D) $\{12, 5\}$

Answer: C

224) $-\frac{5}{a^2} + \frac{6}{a} + 1 = 0$

A) $\{-3 + \sqrt{14}, -3 - \sqrt{14}\}$ B) $\left\{\frac{-3 + \sqrt{14}}{5}, \frac{-3 - \sqrt{14}}{5}\right\}$

C) $\{3 + \sqrt{14}, 3 - \sqrt{14}\}$ D) $\left\{\frac{3 + \sqrt{14}}{5}, \frac{3 - \sqrt{14}}{5}\right\}$

Answer: A

225) $\frac{3}{(n + 4)^2} - \frac{1}{n + 4} = 4$

A) $\left\{-5, -\frac{13}{4}\right\}$ B) $\left\{-1, \frac{4}{3}\right\}$ C) $\left\{-5, \frac{4}{3}\right\}$ D) $\left\{-1, \frac{19}{3}\right\}$

Answer: A

226) $\left(m - \frac{12}{m}\right)^2 - 10\left(m - \frac{12}{m}\right) - 11 = 0$

A) $\{-4, -1, 3, 12\}$ B) $\{-1, 11\}$ C) $\{-12, -4, 1, 3\}$ D) $\{1, -11\}$

Answer: A

227) $n^{1/2} + 3n^{1/4} - 40 = 0$

A) $\{625\}$ B) $\{625, 4{,}096\}$ C) $\{25\}$ D) $\{5, -8\}$

Answer: A

228) $400x^{-4} - 41x^{-2} + 1 = 0$

A) $\{-5, -4, 4, 5\}$ B) $\left\{\frac{1}{5}, \frac{1}{4}\right\}$ C) $\{4, 5\}$ D) $\left\{-\frac{1}{4}, -\frac{1}{5}, \frac{1}{5}, \frac{1}{4}\right\}$

Answer: A

229) $9t - 16\sqrt{t} = 0$

A) $\left\{0, \frac{4}{3}\right\}$ B) $\left\{0, \frac{256}{81}\right\}$ C) $\left\{0, \frac{3}{4}\right\}$ D) $\left\{0, \frac{81}{256}\right\}$

Answer: B

Solve the equation for the indicated variable.

230) Solve for p: $h = \sqrt{2pq}$

A) $p = \frac{h^2}{2q}$ B) $p = \frac{h^2}{4q^2}$ C) $p = \frac{h^2q^2}{4}$ D) $p = \frac{h^2q}{2}$

Answer: A

231) Solve for n: $M = \frac{Gp_1p_2}{n^2}$

A) $n = \frac{\pm\sqrt{Gp_1p_2}}{M}$ B) $n = \pm\sqrt{M + Gp_1p_2}$

C) $n = \pm\sqrt{M - Gp_1p_2}$ D) $n = \frac{\pm\sqrt{Gp_1p_2M}}{M}$

Answer: D

232) Solve for p: $T = 2\pi\sqrt{\frac{p}{n}}$

A) $p = n(T - 2\pi)^2$ B) $p = \frac{T^2}{4\pi^2} + n$ C) $p = n\left(\frac{T}{2\pi}\right)^2$ D) $p = \left(\frac{nT}{2\pi}\right)^2$

Answer: C

233) Solve for x: $25 + \sqrt{x^2 - y^2} = z$

A) $x = z^2 + y^2 - 50z + 625$

B) $x = \pm\sqrt{z + y^2 - 5}$

C) $x = \sqrt{z - y^2 - 5}$

D) $x = \pm\sqrt{(z - 25)^2 + y^2}$

Answer: D

234) Solve for K_2: $\dfrac{R_1Z_1}{K_1} = \dfrac{R_2Z_2}{K_2}$

A) $K_2 = \dfrac{R_2Z_2K_1}{R_1Z_1}$

B) $K_2 = \dfrac{R_2Z_2R_1Z_1}{K_1}$

C) $K_2 = \dfrac{R_1Z_1}{R_2Z_2K_1}$

D) $K_2 = \dfrac{K_1}{R_2Z_2R_1Z_1}$

Answer: A

Solve the equation.

235) $\sqrt{x + \sqrt{x + 2}} = 4$

A) $\left\{\dfrac{33 - \sqrt{73}}{2}\right\}$

B) $\left\{\dfrac{33 + \sqrt{73}}{2}\right\}$

C) $\left\{\dfrac{33 \pm \sqrt{73}}{2}\right\}$

D) { }

Answer: A

Solve the problem.

236) The equation $r = \sqrt[3]{\dfrac{3V}{4\pi}}$ gives the radius r of a sphere of volume V. If the radius of a sphere is 6 in., find the exact volume.

A) 96π in.^{3}

B) 288π in.^{3}

C) 144π in.^{3}

D) $\sqrt[3]{\dfrac{9}{2\pi}}$ in.^{3}

Answer: B

237) The distance d (in miles) that an observer can see on a clear day is approximated by $d = \dfrac{49}{40}\sqrt{h}$, where h is the height of the observer in feet. It Rita can see 24.5 mi, how far above ground is her eye level?

A) 400 ft

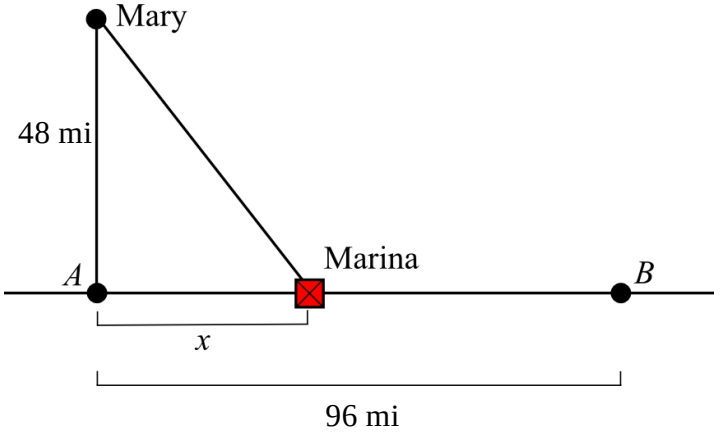
B) 40 ft

C) 20 ft

D) 6 ft

Answer: A

238) Mary is in a boat in the ocean 48 mi from point *A*, the closest point along a straight shoreline. She needs to dock the boat at a marina *x* miles farther up the coast, and then drive along the coast to point B, 96 mi from point A. Her boat travels 10 mph, and she drives 60 mph. If the total trip took 7 hr, determine the distance *x* along the shoreline.



A) 47 mi B) 36 mi C) 32 mi D) 43 mi

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide the missing information.

239) If a compound inequality consists of two inequalities joined by the word "and," the solution set is the _____ of the solution sets of the individual inequalities.

Answer: intersection

240) The compound inequality $a < x$ and $x < b$ can be written as the three-part inequality _____.

Answer: $a < x < b$

241) If a compound inequality consists of two inequalities joined by the word "or," the solution set is the _____ of the solution sets of the individual inequalities.

Answer: union

242) If *k* is a positive real number, then the inequality $|x| < k$ is equivalent to _____ $< x <$ _____.

Answer: $-k$; k

243) If *k* is a positive real number, then the inequality $|x| > k$ is equivalent to $x <$ ____ or x ____ k.

Answer: $-k$; $>$

244) If *k* is a positive real number, then the solution set to the inequality $|x| > -k$ is _____.

Answer: $\mathbb{R}$

245) If k is a positive real number, then the solution set to the inequality $|x| < -k$ is _____.

Answer: { }

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the inequality. Write the solution set in interval notation.

246) $9(x - 3) - 8x \geq -3$

A) $(24, \infty)$ B) $[0, \infty)$ C) $[24, \infty)$ D) $(-\infty, 24]$

Answer: C

247) $-2(7y - 7) + y > 2y - (-5 + y)$

A) $\left(-\infty, \frac{9}{14}\right]$ B) $\left(\frac{9}{14}, \infty\right)$ C) $\left(\frac{2}{7}, \infty\right)$ D) $\left(-\infty, \frac{9}{14}\right]$

Answer: A

Solve the inequality. Write the solution set in interval notation using fractions.

248) $0.21n - 3 \leq -0.1(-10 - n)$

A) $\left(-\infty, \frac{97}{9}\right]$ B) $\left(-\infty, \frac{400}{11}\right]$ C) $\left[\frac{97}{9}, \infty\right)$ D) $\left(-\infty, \frac{400}{11}\right)$

Answer: B

Solve the inequality. Write the solution set in interval notation.

249) $-1 - 2(2x + 1) < x - (-1 - x)$

A) $\left(-\infty, -\frac{2}{3}\right]$ B) $\left[-\frac{2}{3}, \infty\right)$ C) $\left(-\frac{2}{3}, \infty\right)$ D) $(-\infty, -1)$

Answer: C

250) $\frac{4}{5}y - \frac{1}{6} \geq y + \frac{2}{5}$

A) $\left(-\infty, -\frac{17}{6}\right]$ B) $\left(-\infty, \frac{1}{2}\right]$ C) $\left[\frac{17}{6}, \infty\right)$ D) $\left(-\infty, -\frac{1}{2}\right]$

Answer: A

251) $-2(4y - 7) + y \geq 2y - (-8 + y)$

A) $\left(\frac{3}{4}, \infty\right)$ B) $\left(-\infty, \frac{3}{4}\right)$ C) $\left(-\frac{1}{4}, \infty\right)$ D) $\left(-\infty, \frac{3}{4}\right]$

Answer: D

252) $0.31 \geq 0.04a + 0.07$

A) $[6, \infty)$ B) $(-\infty, 6]$ C) $[0.6, \infty)$ D) $(-\infty, 0.6]$

Answer: B

253) $\frac{1}{2}(x - 2) - \frac{3}{4}(x - 2) \geq \frac{1}{5}x + 1$

A) $\left[-\frac{10}{9}, \infty\right)$ B) $\left(-\infty, -\frac{10}{9}\right]$ C) $\left(-\infty, \frac{2}{3}\right]$ D) $\left[\frac{2}{3}, \infty\right)$

Answer: B

254) $7 - 5[1 - 2(x - 1)] \geq 5\{1 - [2 - (x + 1)]\}$

A) $\left[\frac{8}{5}, \infty\right)$ B) $\left(-\infty, \frac{2}{7}\right]$ C) $\left[\frac{2}{7}, \infty\right)$ D) $\left(-\infty, -\frac{8}{5}\right]$

Answer: A

255) $20 > 3x$ and $11 + 2x \geq 2$

A) $\left[-\frac{20}{3}, \frac{9}{2}\right)$ B) $\left(-\infty, -\frac{9}{2}\right) \cup \left[\frac{20}{3}, \infty\right)$ C) $\left[-\frac{9}{2}, \frac{20}{3}\right)$ D) { }

Answer: C

256) $\frac{9}{8} - 5y < \frac{5}{4}$ and $\frac{4}{7}y + 1 < \frac{9}{14}$

A) $(-\infty, \infty)$ B) { } C) $\left(-\frac{5}{8}, -\frac{1}{40}\right)$ D) $\left(-\infty, -\frac{5}{8}\right)$

Answer: B

257) $-2 < -2y + 11 < 6$

A) $\left(\frac{5}{2}, \frac{13}{2}\right)$ B) $\left[\frac{5}{2}, \frac{13}{2}\right]$ C) $\left(\frac{13}{2}, 6\right)$ D) $\left(\frac{13}{2}, \frac{5}{2}\right)$

Answer: A

Solve the compound inequality. Write the answer in interval notation.

258) $4x \leq 12$ or $9 - x < 0$

A) { } B) $(-\infty, 9)$ C) $(-\infty, \infty)$ D) $(-\infty, 3] \cup (9, \infty)$

Answer: D

259) $2x \leq 4$ or $14 - x < 8$

A) { } B) $(-\infty, 2] \cup (6, \infty)$ C) $(-\infty, \infty)$ D) $(-\infty, 6)$

Answer: B

260) $23 < 3x$ or $-8 + 2x \leq -15$

A) $\left[-\frac{7}{2}, \frac{23}{3}\right)$

B) $\left[-\frac{23}{3}, \frac{7}{2}\right)$

C) $(-\infty, \infty)$

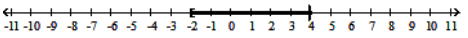
D) $\left(-\infty, -\frac{7}{2}\right] \cup \left(\frac{23}{3}, \infty\right)$

Answer: D

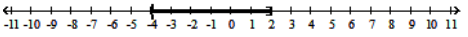
Solve the compound inequality. Graph the solution set, and write the solution set in interval notation.

261) $-8 < -5x + 2 \leq 22$

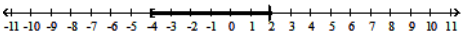
A) $[-2, 4)$



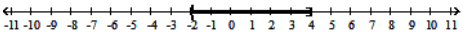
B) $(-4, 2]$



C) $[-4 , 2)$



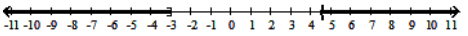
D) $(-2, 4]$



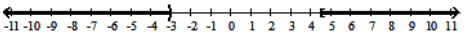
Answer: C

262) $-1 \leq \frac{2x + 3}{3} < 4$

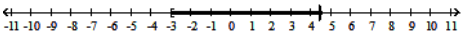
A) $\left(-\infty, -3\right] \cup \left[\frac{9}{2}, \infty\right)$



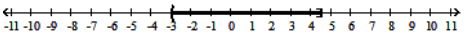
B) $\left(-\infty, -3\right) \cup \left[\frac{9}{2}, \infty\right)$



C) $\left[-3, \frac{9}{2}\right)$



D) $\left(-3, \frac{9}{2}\right]$



Answer: C

Solve the absolute value inequality. Write the solution in interval notation.

263) $|y| > 13$

A) $(-13, 13)$

B) $(13, \infty)$

C) $(-\infty, -13) \cup (13, \infty)$

D) $(-\infty, -13)$

Answer: C

264) $|x + 6| < 15$

A) $(-9, 21)$

B) $(-9, 9)$

C) $(-21, 9)$

D) $(-\infty, -21) \cup (9, \infty)$

Answer: C

265) $24 \le 2 + |-15t + 1|$

A) $\left[-\frac{21}{15}, \frac{23}{15}\right]$

B) $\{-22, 22\}$

C) $\left(-\infty, -\frac{21}{15}\right] \cup \left[\frac{23}{15}, \infty\right)$

D) $\{\ \}$

Answer: C

266) $|2b - 23| \ge -15$

A) $[4, 19]$ B) $\{\ \}$ C) $(-\infty, 4] \cup [19, \infty)$ D) $(-\infty, \infty)$

Answer: D

267) $3|x - 9| + 9 < 15$

A) $(1, 17)$ B) $(7, 11)$ C) $(-\infty, 7) \cup (11, \infty)$ D) $(-\infty, 1) \cup (17, \infty)$

Answer: B

268) $3|x - 5| + 12 \ge 15$

A) $[4, 6]$ B) $(-\infty, -4] \cup [14, \infty)$ C) $(-\infty, 4] \cup [6, \infty)$ D) $[-4, 14]$

Answer: C

269) $\left|\frac{m - 12}{4}\right| < 19$

A) $(-\infty, -16) \cup (22, \infty)$

B) $(-88, 64)$

C) $(-64, 88)$

D) $(-16, 22)$

Answer: C

270) $|2x + 7| + 7 > 6$

A) $(-\infty, -4) \cup (-3, \infty)$ B) $(-4, -3)$ C) $(-\infty, \infty)$ D) $\{\ \}$

Answer: C

Solve the problem.

271) In order to ride certain amusement park rides, riders must be at least 46" tall, but no more than 79" tall. Let h represent the height of a prospective rider. Write an inequality that represents the allowable heights.

A) $h \le 79$ and $h \ge 46$

B) $h \le 46$ or $h \ge 79$

C) $h \le 79$ or $h \ge 46$

D) $h \le 46$ and $h \ge 79$

Answer: A

272) A skydiving company insists that its customers weigh at least 130 pounds, but no more than 280 pounds, including parachute and other gear. If the total weight of all gear is 25 pounds, write and solve a compound inequality that represents the weight range without gear that is acceptable.

A) $155 \le w \le 255$ B) $105 \le w \le 305$ C) $105 \le w \le 255$ D) $155 \le w \le 305$

Answer: C

273) Sparky has scores of 71, 60, and 69 on his first three Sociology tests. If he needs to keep an average of 70 to stay eligible for lacrosse, what scores on the fourth exam will accomplish this?

A) He must score more than 84
B) He must score 84 or higher.
C) He must score 80 or higher.
D) He must score more than 80

Answer: C

Write the requested inequality.

274) The cost for a long-distance telephone call is $0.35 for the first minute and $0.10 for each additional minute or a portion thereof. The total cost of the call cannot exceed $3. Write an inequality representing the number of minutes m, a person could talk without exceeding $3.

A) $m \leq 27$ B) $m \leq 28$ C) $m \leq 29$ D) $m \leq 26$

Answer: A

Solve the problem.

275) The width of a rectangle is fixed at 30 cm, and the perimeter can be no greater than 170 cm. Find the maximum length of the rectangle.

A) 140 cm B) 110 cm C) 70 cm D) 55 cm

Answer: D

276) Pressure-treated wooden studs can be purchased for $4.88 each. How many studs can be bought if a project's budget allots no more than $200 for studs?

A) 43 studs B) 42 studs C) 41 studs D) 40 studs

Answer: D

277) Rita earns scores of 75, 82, 69, 82, and 67 on her five chapter tests for a certain class and a grade of 68 on the class project. The overall average for the course is computed as follows: the average of the five chapter tests makes up 55% of the course grade; the project accounts for 10% of the grade; and the final exam accounts for 35%. What scores can Rita earn on the final exam to earn a “B” in the course if the cut-off for a “B” is an overall score greater than or equal to 80, but less than 90? Assume that 100 is the highest score that can be earned on the final exam and that only whole-number scores are given.

A) 96 through 119 inclusive
B) 92 through 100 inclusive
C) 96 through 100 inclusive
D) 92 through 119 inclusive

Answer: B

Write an absolute value inequality equivalent to the expression.

278) "All real numbers whose distance from 0 is more than 82."

A) $|x - 82| \geq 0$ B) $|x - 82| > 0$ C) $|x| \geq 82$ D) $|x| > 82$

Answer: D

279) "All real numbers whose distance from 13 is at most 5"

A) $|y - 13| \leq 5$ B) $|y - 13| > 5$ C) $|y - 5| \leq 13$ D) $|y - 13| < 5$

Answer: A

280) The results of a political poll indicate that the leading candidate will receive 52% of the votes with a margin of error of no more than 5%. Let x represent the true percentage of votes received by this candidate. Write an absolute value inequality that represents an interval in which to estimate x.

A) $|x - 52| \geq 0.05$ B) $|x - 0.05| \geq 52$ C) $|x - 0.05| \leq 52$ D) $|x - 52| \leq 0.05$

Answer: D

Determine the set of values of x for which the radical expression would produce a real number.

281) $\sqrt{15 - x}$

A) $\{x \mid x \leq 15\}$ B) $\{\ \}$ C) $\{x \mid x > 15\}$ D) $\{x \mid x \geq 15\}$

Answer: A

282) $\sqrt[3]{x + 15}$

A) all real numbers B) $\{x \mid x \geq -15\}$ C) $\{x \mid x > -15\}$ D) $\{x \mid x > 15\}$

Answer: A

In Calculus you will see the symbol y'. Treat y' as a variable and solve the equation for y'.

283) $\frac{6x}{23} + \frac{6y}{7}y' = 0$

A) $y' = \frac{42x}{23y}$ B) $y' = -\frac{42x}{23y}$ C) $y' = -\frac{7x}{23y}$ D) $y' = \frac{7x}{23y}$

Answer: C

284) $3xy^3 + 5x^2y^2y' - y' = 1$

A) $y' = \frac{1 - 3xy^3}{5x^2y^2 - 1}$ B) $y' = \frac{1 - 3y}{5x - 1}$ C) $y' = \frac{1 - 3xy^3}{5x^2y^2}$ D) $y' = \frac{3y}{5x}$

Answer: A

285) $6y^2y' + 30xy + 6x^2y' = 5y^2 + 25xyy'$

A) $y' = \frac{5y(y - 6x)}{6x^2 - 25xy + 6y^2}$ B) $y' = \frac{y(y - 6x)}{6x^2 - 5xy + 6y^2}$

C) $y' = \frac{y - 6x}{6x^2 - 5x + 6y}$ D) $y' = \frac{5y(y - x)}{x^2 - 25xy + y^2}$

Answer: A

286) $-5(x + y)^2 - 5(x + y)^2y' + 5y^2y' = -5x^2$

A) $-\frac{y(2x + y)}{x(2y + x)}$ B) $\frac{x^2 + y^2}{(x + y)^2}$ C) $\frac{x(2x + y)}{y(2y + x)}$ D) $\frac{x^2 - y^2}{(x + y)^2}$

Answer: A

Simplify the expression. Do not rationalize the denominator.

287) $2x\sqrt{3x - 4} + x^2\left(\frac{1}{4}\right)\frac{1}{\sqrt{3x - 4}}(4)$

A) $\frac{7x^2 - 8}{\sqrt{3x - 4}}$ B) $\frac{x(7x - 4)}{\sqrt{3x - 4}}$ C) $\frac{x(7x - 8)}{\sqrt{3x - 4}}$ D) $\frac{7x^2 - 4}{\sqrt{3x - 4}}$

Answer: C

288) $\frac{(1)(x^2 - 8)^{1/2} - x\left(\frac{1}{3}\right)(x^2 - 8)^{-1/2}(3x)}{\left[(x^2 - 8)^{1/2}\right]^2}$

A) $\frac{1 - x^2}{(x^2 - 8)^{5/2}}$ B) $\frac{1 - x^2}{(x^2 - 8)^{3/2}}$ C) $-\frac{8}{(x^2 - 8)^{5/2}}$ D) $-\frac{8}{(x^2 - 8)^{3/2}}$

Answer: D

289) $\frac{-10x(8x + 1) - (-5x^2)(8)}{(8x + 1)^2}$

A) $-\frac{10x(4x - 1)}{(8x + 1)^2}$ B) $\frac{40x^2}{(8x + 1)^2}$ C) $-\frac{40x^2}{(8x + 1)^2}$ D) $-\frac{10x(4x + 1)}{(8x + 1)^2}$

Answer: D

290) $\sqrt{16 - x^2} - x\left(\frac{1}{2}\right)\frac{1}{\sqrt{16 - x^2}}(2x)$

A) $\frac{x^2 - 8}{\sqrt{16 - x^2}}$ B) $\frac{2(x^2 - 6)}{\sqrt{16 - x^2}}$ C) $\frac{8 - x^2}{\sqrt{16 - x^2}}$ D) $\frac{2(8 - x^2)}{\sqrt{16 - x^2}}$

Answer: D

Find the values of *x* for which the expression equals zero.

291) $\frac{-8x(7x + 1) - (-4x^2)(7)}{(7x + 1)^2}$

A) $\left\{0, -\frac{1}{7}\right\}$ B) $\left\{0, \frac{2}{7}\right\}$ C) $\{0\}$ D) $\left\{0, -\frac{2}{7}\right\}$

Answer: D

292) $\sqrt{4 - x^2} - x\left(\frac{1}{2}\right)\frac{1}{\sqrt{4 - x^2}}(2x)$

A) $\{\pm\sqrt{2}\}$ B) $\{\sqrt{2}, 2\}$ C) $\{\pm 2\}$ D) $\{\pm\sqrt{2}, \pm 2\}$

Answer: A

Some applications of calculus use a mathematical structure called a power series. To find the interval of convergence of a power series, it is often necessary to solve an absolute value inequality. Solve the absolute value inequality below to find the interval of convergence

293) $\left|\frac{x + 1}{4}\right| < 1$

A) $[0, 3]$ B) $(-5, 3)$ C) $[-5, 3]$ D) $(0, 3)$

Answer: B

Solve the problem.

294) A 6-ft person walks away from a lamppost. At the instant the person is 14 ft away from the lamppost, the person's shadow is 10 ft long. Find the height of the lamppost

A) 52 ft B) 32 ft C) 28 ft D) 13 ft

Answer: D

295) A water trough has a cross section in the shape of an equilateral triangle with sides of length 1 m. The length is 4 m. Determine the volume of water when the water level is $\frac{3}{4}$ m.

A) $\frac{3}{8}\sqrt{2}$ m^2 B) $\frac{3}{8}\sqrt{3}$ m^2 C) $\frac{3}{4}\sqrt{3}$ m^2 D) $\frac{3}{4}\sqrt{2}$ m^2

Answer: C

296) A contractor builds a swimming pool with cross section in the shape of a trapezoid. The deep end is 9 ft deep and the shallow end is 3 ft deep. The length of the pool is 60 ft and the width is 25 ft. As the pool is being filled, find the volume of water when the depth is 4 ft.

A) 4,500 ft^3 B) 4,000 ft^3 C) 1,620 ft^3 D) 2,000 ft^3

Answer: D