# 1 Algebra

Problems

1. Evaluate: $1 \times (2+3)^{-1} - 4 \div \frac{5}{6} + 7 \times (8)^0$

2. If x is 40% less than y and y is 30% more than z, then x is _____than z.

3. Mora Doe goes to the 25% off book sale. She buys 4 romantic novels which cost $11.95 each before the sale and includes tax. She gave the clerk 2 twenty-dollar bills. How much change should Mora receive?

4. If $9x^2 - 12x + 4 = (ax - b)^2$ then $a + b =$ _____.

5. Harry Hare drove 210 km to Myrtle Turtle's house. Part of the 4 hour trip was in town at 30 km/h and the rest was on a major highway at 60 km/h. How many km did Harry drive on the major highway?

6. Simplify: $\log_b(3xy) - \log_b(\frac{3x}{2y}) + \log_b(3y^2)$

7. Line m goes through points $(1, -1)$ and $(-3, 1)$. Line n goes through points $(1, 1)$ and (x, y). Which of the following points lies on line n if $m \perp n$?

8. Which of the equations will produce the shaded portion of the graph shown?
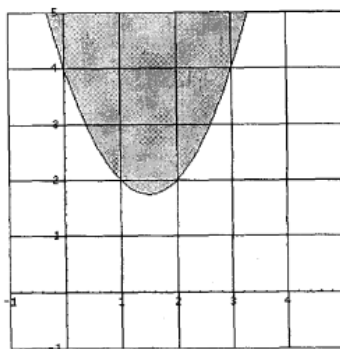
9. The first five terms of an infinite arithmetic sequence is $6\frac{1}{4}, A, B, C, 12\frac{1}{2}, \ldots$. Find $A + B + C$.

10. The numbers of integers that satisfy the inequality new $\frac{3}{7} < \frac{n}{14} < \frac{2}{3}$ is:

11. Define $n\star$ to be n^n. Compute $(2\star)\star$.

12. Evaluate: $\frac{3}{8} \div .75 \times \frac{1}{2} - .25 + \frac{1}{16}$

13. A legend on a map shows 2.5 cm representing 200 miles. The distance on the map from El Paso to Texarkana is 9.8 cm. According to the map, how far is it from El Paso to Texarkana?

14. Phil Errup's car has a gas tank with a capacity of 18 gallons. The gauge shows that it is $\frac{1}{4}$ full. How many gallons will need to be added to the tank so that it is 75% full?

15. Find the equation of the line shown.
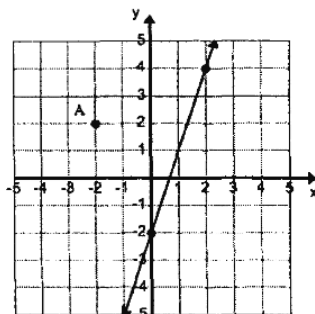
16. Let p and q be the roots of $8x^2 + 2x - 15 = 0$. Find $p^3 + 3p^2q + 3pq^2 + q^3$.

17. One of the factors of $x^3 - 3x^2 - 3x + 18$ is:

    (A) $x + 2$ **(B)** $x + 3$ **(C)** $x + 6$ **(D)** $x - 2$ **(E)** $x - 9$

18. The roots of the equation $x^3 - 5x^2 + cx + 24 = 0$ are $3, 4$, and R. Find c.

19. Let $f(x) = 2x + 5$ and $g(x) = 3x - 4$ and $h(x) = 6x$. Find $f(g(h(-1)))$.

20. The coefficient of the 2nd term of the expansion of $(3x - 4)^5$ is:

21. Solve for k if $3k - 4 = 28 - 5k$

22. Joe's dad sent him to the Burger Barn with three twenty-dollar bills and one five-dollar bill. He ordered 6 cheeseburgers for $4.85 each, one basket of fries for $5.75, 6 large cokes for $2.19 each and 6 lemon pies for $1.25 each. The tax rate is 8.25%. How much change did he receive?

23. Consider a line that is perpendicular to $\overline{BC}$ and also contains point A. If the x-intercept of ths line is $(a, 0)$, then $a = $ _____.
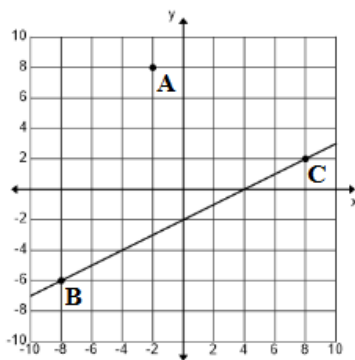
24. The Reagan High math/science team brought in the Quebe Sisters for a UIL fundraiser. Their fee to appear was $5,000. Their version of "San Antonio Rose" is outstanding. A student ticket cost $8.00 and an adult ticket cost $15.00. A total of 2100 tickets were sold and $20.375 was raised after paying the fee. How many adult tickets were sold?

25. Consider four consecutive even integers, all positive, such that five times the sum of the first two exceeds three times the sum of the first and fourth by 80. The third integer is _____.

26. Simplify: $\dfrac{\frac{c}{w} + \frac{d}{w^2}}{\frac{m}{w^2} + \frac{k}{hw}}$

27. If $f(x) = x^2 + 4$ and $h(x) = 3x - 1$, then $f(h(5)) = $ _____.

28. Find the number that is $\frac{5}{6}$ of the way from $-4\frac{1}{2}$ to $9\frac{3}{8}$.

29. Cindy rode her bike for 60 miles at 24 mph and then rode 36 miles at 30 mph. How fast does she need to ride the final 44 miles to have an overall speed of 28 mph? (nearest tenth)

30. Consider the points $A(-6, 10)$ and $B(4, -6)$. Find the equation of a line that exists such that every point on the line is the same distance from A as it is from B.

31.

x	-3	-2	-1	0	1	2
f(x)	10	-9	-10	-5	-6	-25

Find the value of $f(-4)$.

32. If $s(x)$ is the slant asymptote of $h(x) = \frac{x^3+6}{2x^2+x-1}$, then $h(20) - s(20) = $ _____ (nearest thousandth)

33. If $(x^3 - 9x^2 + kx - 12) \div (x - 1)$ has a remainder of zero, then $k = $ _____.

34. Consider the sequence $3, 5, 8, 11, 15, 20, 27, 37, m, n, 111, \ldots$ $m + n = $ _____

35. Find the distance between the points $(3, 5, 7)$ and $(-4, 1, -3)$. (nearest tenth)

36. Jeremy has 49 coins with a total value of $7.05. He only has nickels, dimes, and quarters. He has three more quarters than nickels. How many dimes does he have?

37. Find the distance between point A and the line shown on the right. (nearest tenth)
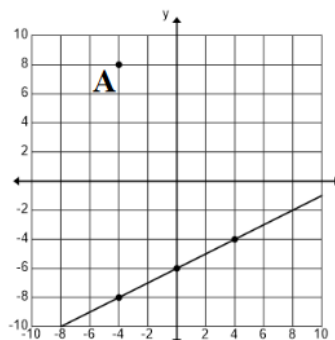
38. At Babe's in Sanger, we ordered four smoked chicken dinners for $17.95 each, four iced teas for $2.29 each and two slices of apple pie for $4.25 each. The tax rate was 8.125% and I paid with one $100 bill and one $20 bill. I told the waitress to keep the change as a tip. How much was her tip?

39. Consider the line with points $(-3, -5)$ and $(5, 7)$. The line contains the point $(0, b)$. $b = $ _____.

40. Joe sets the motor of his small boat to travel at its maximum speed. At this setting, he travels 36 miles upstream, against the current, in 9 hours and then turns around and travels 36 miles downstream, with the current, in 6 hours. What is the maximum speed of Joe's boat in still water?

41. Last summer, we drove from Lubbock, TX to McMinnville, OR to see relatives. On day 1, we drove 600 miles at an average speed of 62 mph. On day 2, we drove 620 miles at an average speed of 68 mph. On day 3, we drove 534 miles at an average speed of 60 mph. What was our overall average speed for the trip? (nearest tenth)

42. Jim can clean my pool in 75 min. Tom can clean my pool in 90 min. Julie can clean my pool in 60 min. If all three of them work together, how long would it take them to clean my pool? (nearest tenth)

43. Consider the line $y = f(x)$ which contains point P and is parallel to the line shown below. Find the value of $f(9)$.
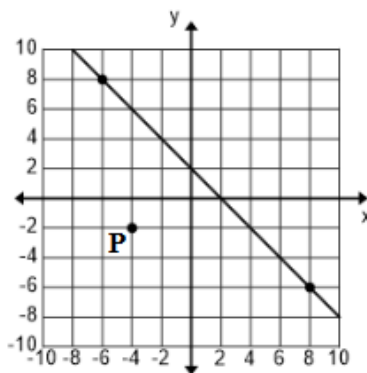
44. The UIL students at Latexo High School sold 246 tickets to the end of the year banquet. If adult tickets cost $18, student tickets cost $12, and $3816 was raised, how many student tickets were sold?

45. Mary has 57 coins that are either nickels, dimes or quarters. The value of the coins is $8.60. She has ten more quarters than nickels. How many dimes does she have?

46. Find the number that is $\frac{3}{4}$ of the way from $-1\frac{1}{2}$ to $6\frac{5}{8}$.

47. If $f(x) = \frac{2x+5}{3-7x}$, then $f^{-1}(2) = $ _____.

48. Sixty workers could do 9 jobs in 6 days. How many days would it take 10 workers to do 12 jobs? (nearest tenth)

49. Consider the line $y = f(x)$ such that all points on the line are equidistant from the points $(-6, 8)$ and $(4, -6)$. The y-intercept of the line $y = f(x)$ is $(0, b)$. $b = $ _____.

50. Find the domain of the function $f(x) = \frac{\sqrt{3+x}}{x^2-9x+20}$.

51. Solve the system

$$\frac{2}{5}a + \frac{3}{10}c = 2\frac{1}{5}$$
$$-.5a + 1.5b = 2.5 . 75a - 2.5c = -2$$

$b = $ _____.

52. The points of intersection of the curves shown on the right are P and Q. $PQ = $ _____ (nearest tenth)
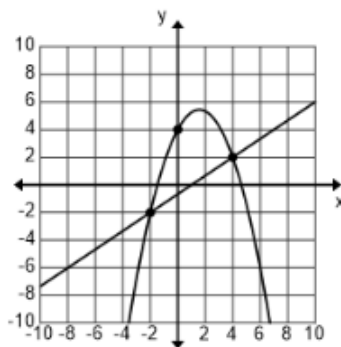
53. Joe and Arlene ate lunch at The Cotton Patch. Both ordered the Salmon Dinner which costs $15.95 each and both ordered peach iced tea which costs $2.25 each. They shared a slice of chocolate cake which costs $4.95. THe tax rate was 8.25%. Joe was feeling generous so he paid with three $20 bills and told the waitress to keep the change as a tip. How much was the tip?

54. An adult ticket to an Idaho Falls game cost $10.00 and a youth ticket cost $6.00. On Tuesday night's game, they sold 396 tickets and grossed $3224. How many adult tickets did they sell?

55. Given: $f(x) = 2x^2 - 6$ and $h(x) = e^x - 8$. $f(h(3)) = $ _____ (nearest hundredth)

56. Find the range of the function $f(x) = \frac{5}{\sqrt{x^2-1}}$.

57. Justin can wash and wax 10 cars in a 4 hours. Aryan can wash and wax 20 cars in 6 hours. Justin started work at 8:00 AM. Aryan arrived at 10:00 AM and they both worked from 10:00 AM until a total of 30 cars had been washed and waxed. What time was it when they finished if they took no breaks? (nearest minute)

58. The roots of the quadratic equation $4x^2 + bx + c = 0$ are -2.5 and 1.5. $b + c = $ _____.

59. The 5th term of an arithmetic sequence is 23 and the 13th term is 55. Find the sum of the first 15 terms of the sequence.

60. Let $A = \begin{bmatrix} 1 & -2 \\ 1 & -3 \end{bmatrix}$ and $B = \begin{bmatrix} -3 & 2 \\ -1 & 1 \end{bmatrix}$ and $AB = \begin{bmatrix} W & X \\ Y & Z \end{bmatrix}$. What is the determinant of AB?

61. Which of the following is true about the relation $h(x) = 5 - x^2$?

62. Consider the sequence $17, 21, 25, 29, 33, 37, \ldots, 129, 133$. Find the sum of the terms of the sequence.

63. Eric is solving the equation $3x^2 + 3x - 90 = 0$ by completing the square. On the third step, Eric adds _____ to both sides of the equation.

64. Consider the function $f(x) = 4x^4 - 27x^3 + cx^2 + 7x + 30$. If $f(1) = 14$, then $c = $ _____.

65. The graph of $f(x) = \frac{x^2-36}{x^3-x^2-30x}$ has _____ asymptotes.

66. The sound level of a sound is given by $\beta = 10 \log\left(\frac{I}{I_0}\right)$, where β is the sound level in dB, I is the intensity in W/m^2, and I_0 is the threshold of hearing which equals 10^{-12} W/m^2. Find the difference in sound levels for a sound with an intensity of 7.75×10^{-3} W/m^2 and a sound with an intensity of 3.10×10^{-5} W/m^2. (nearest whole number)

67. The first three terms of an infinite geometric series are 84, 72, and $61\frac{5}{7}$. Find the sum of the series.

68. Jack and Larry had supper at Bigham's Barbeque Friday night. Jack ordered the one-meat plate for $16.75, a slice of chocolate cake for $4.15, and an iced tea for $2.59. Larry ordered a two-meat plate for $18.95 and an iced tea for $2.59. The tax rate was 8.25%. Jack was feeling generous so he paid with three $20 bills and told the waitress to keep the change as a tip. How much was the tip?

69. The Wylie math team held a fundraiser for their UIL team. They flew in the 60s rock group, the Ohio Express, and the concert was a sell-out. Adult tickets were priced at $22.75 and student tickets were priced at $14.50. They sold 2500 tickets and netted $48,501.25. How many adult tickets did they sell?

70. If $f(x) = \sqrt{x^3 + 22}$ and $h(x) = \ln(x) + 6$, then $f(h(55)) = $ _____ (nearest tenth)

71. All of the houses on 6th street are the same size. Brennen can paint a house on 6th street by himself in 15 hours. If Luke works with him, they can paint a house on 6th street in 8 hr 45 min. How long does it take Luke to paint a house on 6th street by himself? (nearest whole number)

72. The y-intercept of the line that contains the points $(-6, 4)$ and $(12, -2)$ is the point $(0, b)$. $b = $ _____. (nearest tenth)

73. Find the domain of the function $f(x) = \frac{x-5}{\sqrt{9-x}}$.

74. The sound level of a sound is given by $\beta = 10 \log\left(\frac{I}{I_0}\right)$, where β is the sound level in dB, I is the intensity in W/m^2, and I_0 is the threshold of hearing which equals 10^{-12} W/m^2. If the sound level is 98 dB, then the intensity is _____W/m^2. (nearest ten-thousandth)

For problems 75 and 76, consider a line containing points $A(-5, -1)$, $B(5, 9)$, and $C(d, 12)$.

75. The value of d is _____ (nearest tenth)

76. If the point $F(e, 3)$ lies on the perpendicular bisector of $\overline{AB}$, then $e = $ _____.

77. Consider the function $f(x) = 3x^3 + bx^2 - 21x - 30$. If $f(-2) = 36$, then $b = $ _____.

78. The graph of $f(x) = \frac{x^2-16}{x^3+x^2-12x}$ has _____ asymptotes.

79. Consider the sequence $4, 11, 18, 25, 32, 39, \ldots$. Find the sum of the first 14 terms.

80. Consider the sequence $40, 32, \frac{128}{5}, \frac{512}{25}, \ldots$. Find the sum of the first 10 terms. (nearest tenth)

81. Evaluate $5! - 5 \times 5 + 5^5 \div 5$

82. Graphing calculators are on a "buy 3 get 1 free" special sale. The cost of a single calculator is \$85.50. Each calculator requires 4 batteries and a package of 6 batteries costs \$2.50 and are not sold by the individual battery. The tax rate is $8\frac{1}{2}\%$. What will the total cost be for 4 calculators, enough batteries to run them, and tax? (nearest cent)

83. The discriminant of $2x^2 - 3x + 4 = 0$ is _____.

84. If $\frac{2y}{3} - \frac{3}{4x} = \frac{5y}{6}$, then x equals _____.

85. If r, s, and t are real numbers such that $r + s + t = 14$, $t^2 = r^2 + s^2$, and $rs = 14$, find the value of t.

86. If $3^{x+y} = 9$ and $4^{x-y} = 64$ then xy equals _____.

87. Find C if the remainder when $x^3 - 2x^2 + x - 5$ is divided by $x + C$ is 31.

88. In the expansion of $(3x - 2y)^5$, the 4th term has a coefficient of _____.

89. Simplify: $(\sqrt{x^{-20}y^{40}z^{-4}})^{\frac{1}{5}}$

90. An operation "$\triangle$" is defined by: $a \triangle b = a^b - b^a$. What is the value of $(0\triangle 1)\triangle(1\triangle 2)$?


91.
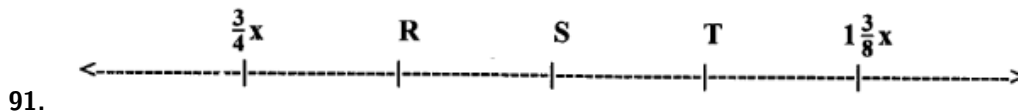
The distances between the hash marks ($|$) are equal. Find S.

92. 30 miles per hour equals _____ feet per minute.

93. The function $f(x) = |\ 1 - 2x\ | - 3$ crosses the x-axis at two points. Find the distance between the two points.

94. Dusty Rhodes flies from Durt E. Airport to Kleen X. Airport at a rate of 340 miles per hour. She rents a jeep and drives from Kleen X. Airport to Durt E. Airport at a rate of 60 miles per hour. How far is it from Kleen X. to Durt E. if the total traveling time was 2 hours and 30 minutes?

95. $x - 1, 2x + 3$ and $4x - 5$ are factors of which of the following?

(A) $8x^3 - 10x^2 - 13x + 15$ (B) $8x^3 - 6x^2 - 17x + 15$ (C) $8x^3 + 6x^2 - 17x - 15$ (D) $8x^3 - 10x^2 - 17x + 15$ (E) $8x^3 - 6x^2 - 17x - 15$

96. The point $P(-1, 4)$ is rotated $90°$ clockwise around the origin to point Q. Then point Q is reflected across the line $y = x$ to point R. What are the coordinates of point R?

97. Mike Campbell is stacking soup cans at the Piggy Wiggy store for the weekend sale. The bottom row has 20 cans. Each successive row has 1 less can in it. If the top row has 3 cans, how many cans did Mike have on display?

98. If $a_1 = 1$, $a_2 = 3$, $a_3 = 4$ and $a_n = a_{n-1} + a_{n-2}$, where $n \geq 4$, then a_9 equals:

**99.** Which of the following is a false statement about the function f whose graph is shown here?
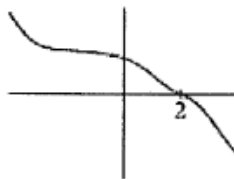
(A)decreases monotonically   **(B)**is positive at 0   **(C)**has a zero at $x = 2$
(D)decreases monotonically in quadrant I   **(E)**increases monotonically

100. Let $f(x) = 3x - 2$ and $g(x) = 2x + 1$. Find the composite function $(g \circ f)(x)$.

101. General admission tickets at the ballpark cost $3.00 for children under 12 and senior citizens over 55 and $5.00 for everyone else. On Tuesday, 2006 general admission tickets totaling $8008.00 were sold. How many children and/or seniors bought general admission tickets?

102. Simplify: $\frac{(n+2)(n+1)!}{(n-1)(n-2)!}$

103. P, Q, and R are the three real roots of $5x^3 + 4x^2 - 3x = 2$. Find $PQ + QR + PR$.

104. The range of the function $y = \mid 1x - 2 \mid + 3$ is:

105. Lotta Cash has a pocket full of change, but she can not make change for a dollar. Lotta has no half dollars and no silver dollars. What is the greatest value of coins she could have?

106. Evaluate: $(3)^3 \div (3 + 6) - 3! \times \sqrt{9}$

107. 70 miles per hour is equivalent to _____inches per second.

108. Which of the following equations has a graph of a parabola that intersects the y-axis at only one point and the x-axis at only one point? $y = $ _____.

   (A) $.5x^2 - 2x + 1$ **(B)** $x^2 - 4x - 5$ **(C)** $|2x - 4| + 1$ **(D)** $2 \pm \sqrt{x}$ **(E)** $12(x)^{-1}$

109. Tryce Ikle can get to school in 12 minutes riding his bike at an average of 15 miles per hour (mph). How many minutes would it take him to walk to school if he walks at 4 mph?

110. If $x + y = 5$ and $xy = 1$ then $x^3 + y^3 = ?$

111. Noah Sense is making a trapezoid using pennies. The bottom base is a row of 15 pennies. The next row above the base row contains 1 less penny and each successive row contains 1 less penny. He continues until the top base of the trapezoid has only 3 pennies. How much money does he need to form the trapezoid of pennies?

112. The roots of the equation $x^3 - bx^2 + 23x + d = 0$ are $-1, 9$, and R. Find R.

113. Let $A = \begin{bmatrix} 2 & 3 \\ 4 & x \end{bmatrix}$ and $B = \begin{bmatrix} y & 1 \\ -1 & -1 \end{bmatrix}$ then $AB = \begin{bmatrix} -1 & -1 \\ 1 & 1 \end{bmatrix}$. Find $x + y$.

114. Two non negative numbers x and y exist such that the sum of the numbers is 12 and that the product of one number and the square of the other number is a maximum. What is the maximum product?

115. Melody Toone's music store sells a new CD for 125% above the wholesale cost. The store will buy the CD back in used condition for 40% of the selling price. How much profit will the store make if the selling price was $19.99?

116. Which of the following system of inequalities would be best represented by the shaded region shown?
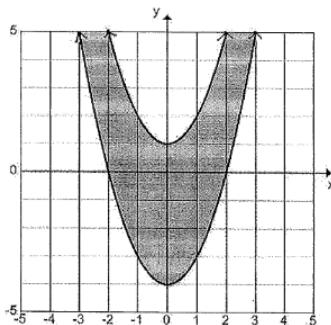
117. Mr. White and his dog walked 1 mile at an average speed of $3\frac{1}{3}$ mph and returned home the same route at an average speed of $2\frac{1}{2}$ mph. What was their average speed for the entire walk?

118. The slope of the line tangent to the curve $y = x^3 - 5x + 6$ at $x = 1$ is -2. The point of intersection of the tangent line and the curve is:

119. Find the product of all the solutions of $16^{x^2+x+4} = 32^{x^2+x}$.

120. The average of five tests is 85. If two test scores have 5 points removed from each, 1 test score has 20 points added, and the remaining two remain the same, the new average is:

121. Kandy Heart had a box of valentines. She gave $\frac{2}{3}$ of them to her classmates. She gave 5 of the remaining valentines to her brothers and sisters. SHe had 3 left over for her father, her mother, and herself. How many valentines were in the original box?

122. Line $6x - 5y = 4$ is perpendicular to line $3x - ay = 1$. What is the value of a?

**123.** Line AB is paralell to the line shown. Which of the following points could be point B?
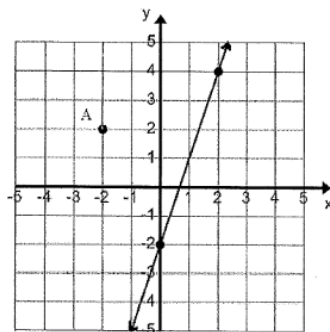
    (A) $(-7, -5)$ **(B)** $(-6, -10)$ **(C)** $(4, 21)$ **(E)** $(2, 13)$ **(E)** $(5, -1)$

124. The point $(3, 4)$ is rotated 60 degrees clockwise about the origin. The coordinates of the point after the rotation is _____. (closest approximation)

125. One of the roots of $ax^2 + bx + c = 0$ is $2 - 3i$. Find $b^2 - 4ac$, when $a = 1$.

126. Evaluate: $(\log_2 8)(\log_3 9)(\log_4 4)$

127. How many asymptotes does this function have? $f(x) = \frac{x^2+6x+8}{x^2-6x+8}$.

128. Find the remainder when $f(x) = x^3 + 2x^2 - 3x - 4$ is divided by $x - 5$.

129. If $a_1 = -3$, $a_2 = 1$ and $a_n = (a_{n-1})(a_{n-2})$, where $n \geq 3$, then a_5 equals:

130. Point $A(2, -4)$ lies in the $x - y$ plane. Point A is reflected across the line $y = -x$ to point B. Point B is reflected across the x-axis to point C. Point C is reflected across the line $y = x$ to point D. Find the coordinates of point D.

131. The value of $(0.08333\ldots)^{-1} \div (0.0625)^{-1} \times (.0555\ldots)$ is:

132. Evaluate: $[1.2 \div (\frac{3}{5})^2 - (3)^{-1}] \times 4!$

133. The distances between the hask marks (—) are equal. Find $P + R + S$.

$$\text{P} \quad -3\tfrac{1}{4} \quad \text{R} \quad \text{S} \quad 2.75$$
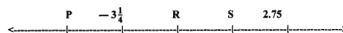
134. Phil Upp's truck gets 17 miles per gallon of gas. He has $20.00 to spend on gas. If the cost of a gallon of gas is $3.50, how far can phil drive? (nearest whole mile)

135. Line l going through points $(-1, 3)$ and $(k, -5)$ is perpendicular to $x + 4y = 5$. Find k.

136. Simplify: $\left(\frac{6w^2+7w-3}{2w^3+5w^2+3w}\right)\left(\frac{w^2-w-2}{3w^2-7w+2}\right)$

137. Ima Whett paddles her kayak at a constant speed of 5 mph relative to the water. She paddles upstream for 1 hour 20 minutes. The return trip back only takes 1 hour 5 minutes. Which of the following is the closest approximation of the speed of the current?

138. The graph best depicts Mei Strol's daily 6 minute walk. (speed is not truly linear in this case). During the time interval of 3 minutes to 4 minutes Mei is _____.

139. Let $x^5 - x^4 - px^3 - qx^2 - x - 1 = 0$, where $p, q > 0$. According to Descartes' Rule of Signs, how many possible roots are there?

140. If 5 adults and 2 teenagers work together, they can do a job in 1 day. If only 2 adults work, then 6 teenagers must in order to do the job in 1 day. If no adults work and only 1 teenager works, how long will it take the teenager to do the job?

141. Missy Klas was absent the day of the algebra exam. She took the test the next day and made a 96. Her score raised the class average from 71 to 72. How many students, including Missy, took the test?

142. If the roots of $x^3 + bx^2 + cx + d = 0$ are $-5, 1$, and 3, then $b + c + d$ equals:

143. Mr. White's college math class has 40 students. 75% of the students are math majors. 32 of the students passed the final exam. 75% of those who passed the final exam are math majors. What percentage of the class who were not math majors passed the final exam?

144. If $y^2 = -4 + 0i$ and $y^3 = 0 - 8i$ where $y = a + bi$ then $a + b$ equals:

145. How many of the following numbers are NOT solutions to $7 - 5|3x + 1| \geq -1$?

$$-0.987 \qquad -0.777\ldots \qquad .222\cdots \qquad 0.3 \qquad .12$$

146. Let $f(x) = 4 - x$ and $g(x) = 3x - 5$ and $h(x) = 2x$. Find $h(f(g(0)))$.

147. How many asymptotes does $f(x) = \frac{2-3x^2}{x-1}$ have?

148. Evaluate: $2(3 \times 4! \div (5 - 6) + 7^2 - 8)$

149. What is 25% of $\frac{3}{4}$ of 50 plus 75% of $\frac{5}{8}$ of 40?

150. The Cheep Choppe is having a February Sale. The regular price of their special coats is $89.95. They are on sale for 30% off the regular price. A newspaper coupon offers 10% off of the sale price. What would the selling price be if the customer brings in the coupon?

151. Find an equation of the line shown.
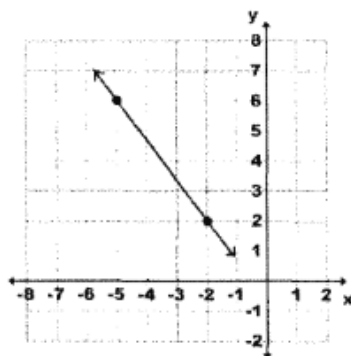
152. Betty Wheel rides her bicycle up and down the hilly streets from her house to school. The graph best depicts her 6 minute ride. (speed is not truly linear in this case). During the time interval of 2 minutes to 3 minutes Betty is _____.

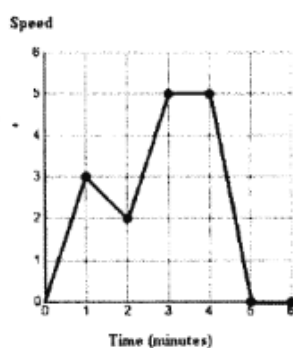**153.** If 5 men working 5 hours a day for 5 days can dig a tunnel 5 km in length, then how long of a tunnel can 10 men working 10 hours a day for 10 days dig?

154. Lesleys Kwik runs the 400 meter dash at the local track meet. She runs the first 100 meters in 15 seconds, the second 100 meters in 16 seconds, the third 100 meters in 17.2 seconds and the last 100 meters in 18.5 seconds. What was her average speed? (nearest thousandth)

155. How many ordered pairs (x, y) are solutions to the equation $5x + 3y < 40$, where x, y are integers and $0 < y < x < 9$?

156. Find the smallest integer k so that $4x^2 = 3x + k = 0$ has two imaginary roots.

157. Let $f(x) = 2x + 1$ and $g(x) = 4 - 3x$, then $f^{-1}[g^{-1}(-1)]$ equals:

158. If $p + q = 12$ and $p \times q = 22$ then $(p - q)^2 =$?

159. Noah Kanwen won 40 of 75 games. How many of the next 25 games can Noah lose in order to have won 60% overall?

160. Three students in Miss Woik's class were absent the day of the exam. The average of the other 12 students was 84. What would the three absent students have to average on their make-up exam in order to bring the entire class average to 86?

**161.** Find the determinant: $A = \begin{bmatrix} -1 & 2 & 3 \\ 1 & -2 & 3 \\ 1 & 2 & -3 \end{bmatrix}$

162. Simplify: $\frac{(n-1)!(n+2)!}{(n+1)!(n-2)!}$

163. Simplify: $((a^2b)^{-3} \times (ab^2) \div (a^2b^{-3}) \times (ab))^{-1}$, where $a, b > 0$.

164. In 3 years Sid Upp will be twice as old as his son, Stan Upp. Five years ago Stan's age was $\frac{1}{3}$ of his father's age at that time. What is the sum of their ages now?

165. Point $P(2, -3)$ is reflected across the origin to point Q. Then point Q is translated horizontally 3 units to the right to point R. Point R is reflected across the origin to point S. The coordinates of point S is (x, y). Find $x + y$.

166. If $9^{(x+2y)} = 81$ and $9^{(2x-y)} = \frac{1}{9}$, then $3^{xy} =$?

167. Evaluate: $30 - 24 \div 18 \times 12 + 6$

168. Reid Moore went to the Ye Olde Book store to buy 3 copies of the same book for gifts. The regular price of the book is \$19.95. Because he is buying 3 copies, he gets 25% off of the regular price of the second copy and 40% off the regular price of the third copy. What would the total cost of the 3 books be before taxes? (to the nearest cent)

169. Using the partial ruler shown below, find the distance from A to B.

170. Which of the following is not a solution to $|8x - 6| - 4 \geq 2$?

(A) $-2\frac{1}{5}$ **(B)** $-\frac{2}{5}$ **(C)** $\frac{3}{5}$ **(D)** $1\frac{4}{5}$ **(E)** 2

171. The function $f(x) = x^2 - x - 12$ crosses the x-axis at two points. Find the distance between the two points.

172. A male zebra fish has 8 stripes. A female zebra fish has 7 stripes. What is the ratio of male fish to female fish, if the total number of stripes on all of the zebra fish in an aquarium totals 87?

173. Noah Sense has 28 coins consisting of pennies, nickels, and quarters. He has four times as many nickels as pennies and half as many quarters as nickels. How much money does he have?

174. If $8^{(k-1)} = 16^{(3k)}$, then $4^{(k^{-1})} =$?

175. Find the determinant of the 2×2 matrix $A = \begin{bmatrix} -2 & 3 \\ 5 & -7 \end{bmatrix}$

176. Given the arithmetic sequence $15, a, b, c, 47, \ldots$, find $a + b + c$.

177. The number of integers that satisfy the inequality $\frac{4}{15} \leq \frac{n}{5} \leq 1\frac{1}{30}$ is:

178. Simplify: $\frac{(n+1)! - (n-1)!}{(n-2)!}$

179. Simplify: $a^5 \div b^{-4} \times a^{-4} \times b^5 \div a^3 \times b^{-3}$

180. Simplify: $\frac{x^2 - 9}{4x + 12} \div \frac{x^2 - x - 6}{x^2 + 2x}$

181. The distance from Abilene to Dallas by way of I30 is 185 miles. Ima Slow is leaving Abilene on I30 at 9:00 a.m. driving towards Dallas at 55 mph. Ura Quick is leaving Dallas on I30 at 9:00 a.m. driving toward Abilene at 70 mph. What time will they meet? (nearest minute)

182. If $a_1 = 2, a_2 = 4.5$, and $a_3 = 7$ are the first 3 terms of an arithmetic sequence, then $a_9 =$?

183. The operation "$\triangle$" is defined by: $a \triangle b = a^b - b^a$. What is the value of $(0 \triangle 1) \triangle (2 \triangle 3)$?

184. Slim Sails rents kayaks and life vests for white water rafting. The kayak rental fee lats year was \$40 and the life vest rental fee last year was \$12. This year, the kayak rental fee increased 15% and the life vest fee decreased 25%. What is the overall percent increase in rental fees for the kayak and vest from last year to this year? (nearest tenth)

185. If $-3(2 - x) = 2(x + 3)$ then $(2x - 3)$ equals:

186. Find the slope of a line perpendicular to the line drawn in the graph below.
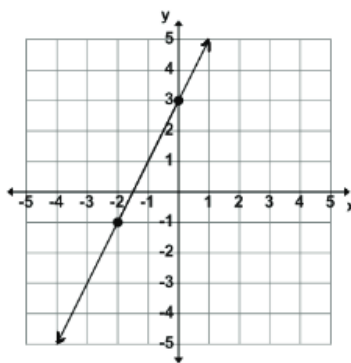
187. Let $f(x) = 2 - 5x$ and $g(x) = 3x + 5$. If $h(x)$ is the inverse function of $\frac{f(x)}{g(x)}$, then $h(-4) =$?

188. The polynomial $2x^4 - 8x^2 + x + 5$ has at most _____negative zeros.

189. Evaluate: $\frac{7}{8} + \frac{3}{4} \div \left(\frac{5}{8} - \frac{1}{2}\right) \times \frac{3}{8} + \frac{1}{4} - \frac{1}{8}$

190. Using the partial ruler shown below, find the distance from A to B.

191. May B. Fishy has a salt water aquarium. She mixes 5 gallons of water with some salt to make a 20% saline solution. The fish require a 16% solution. How much water will she have to add to make the required 16% saline solution?

192. Find $f(5) + f(-1) + f(2)$ if $f(x) = \begin{cases} x - 3 & \text{if } x < 0 \\ 3x & \text{if } 0 < x < 3 \\ 3 - x & \text{if } x > 3 \end{cases}$

193. If $y = 1 - x$ and $y = \frac{2}{x}$ then $(x + y)(x^2 - xy + y^2) =$?

194. Find the quotient: $(x^4 + 2x^3 - 10x^2 + 22x - 15) \div (x^2 - 2x + 3)$

195. Les Moolah has 28 coins. The coins are nickels and quarters and have a total value of $4.00. How many more nickels than quarters does Les have?

196. Find k if $x + 4$ is a factor of $x^3 - x^2 + kx + 12$.

197. On the map legend, 1 inch represents 120 miles. Beautiful downtown Millersview is 45 miles from San Angelo. How far is it on the map?

198. Which of the following is not a solution of $3 + 2|5x - 1| \le 4$?

   (A) $\frac{1}{4}$ **(B)** $\frac{2}{5}$ **(C)** $\frac{1}{6}$ **(D)** $\frac{2}{7}$ **(E)** $\frac{1}{8}$

199. Which of the equations will produce the shaded portion of the graph shown?
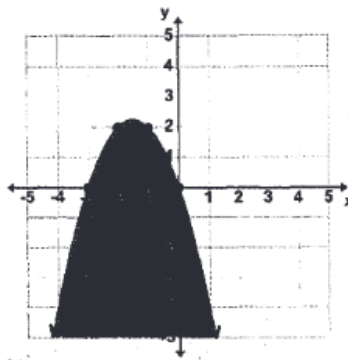
200. The Azusa Aztec band is selling band calendars to make money for their trip. They get 30% of the sales for the first 100 sold, 40% of the sales above 100 but less than or equal to 200, and 50% of the sales over 200. How much will the band make if they sell 275 calendars if each calendar sells for $10.

201. Simplify: $a^{-2} \times b^2 \div a^3 \div b^{-3} \times a \div b$

**202.** The points $(2, 3)$ and $(-4, k)$ lie on the line $5x - 6y = C$. Find k.

203. Les Quik, Moe Fass, and Willie Makit run in a 100 meter race. Les beat Moe by 10 meters and Moe beat Willie by 20 meters. If the runners ran at a constant speed, by how much did Les beat Willie?

204. Point $P(-3, 2)$ and point $Q(4, -5)$ line on the $x - y$ plane. P is translated horizontally 2 units to the left. Q is reflected across the y-axis. What is the distance between the points after the translations? (nearest tenth of a unit)

205. If $a_1 = 2$, $a_2 = 3$, $a_3 = 5$ and $a_n = a_{n-1} + a_{n-2} - a_{n-3}$, where $n \geq 4$, then a_8 equals:

206. Find $f(g(1 - x))$ when $f(x) = 3x - 1$ and $g(x) = x - 3$.

207. Find an equation of a line parallel to line AB and passing through point $(-2, -3)$.
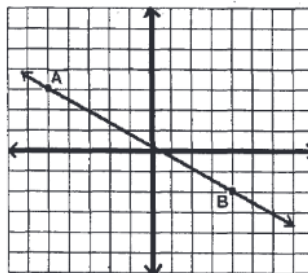
208. Find the determinant of the 3×3 matrix. $\begin{bmatrix} 1 & 1 & 2 \\ 2 & 1 & 3 \\ -1 & 0 & 1 \end{bmatrix}$

209. R_1, R_2 and R_3 are the roots of the equations $24x^3 + 26x^2 - 19x - 6 = 0$. R_1 and R_2 are the roots of the equation $12x^2 - 5x - 2 = 0$ as well. Find R_3.

210. Let $x = \cfrac{1}{2 + \cfrac{1}{3 + \cfrac{1}{2 + \cfrac{1}{3 + \ldots}}}}$ be the continued fraction. Find x.

211. Simplify: $\frac{(n+1)!}{(n-1)!} \div \frac{(n+2)!}{n!}$

212. Evaluate: $4! \times (4)^{-2} + (4^2)^{\frac{1}{4}} - 4 \div 2$

213. Lotta Cash received a $50.00 gift card for graduation. She went shopping at the Cheap Shoppe. She bought 2 pairs of shorts at $7.99 each, 3 pair of flip-flop sandals at $4.50 each, a bottle of suntan lotion at $8.25,

a sun hat at $9.89, and 2 bottles of water at 75¢each. She got 15% off for using a gift card instead of a credit card. How much does she have left on her gift card if the tax rate was 7.5%.

214. If 45% of A is $4\frac{1}{5}$ of B, then B is what percent of A?

215. Which of the inequalities is best represented by the graph below?
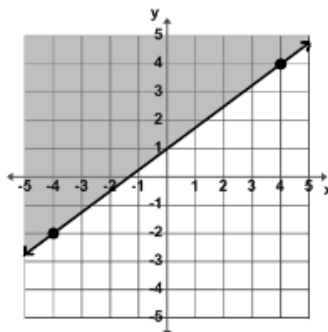
216. Simplify: $\left(\frac{2x^2-7x+5}{4x^2+8x-12}\right) \div \left(\frac{4x^2-8x-5}{2x^2+73}\right)$

217. If $4x^2 - x + c = (ax + b)(x + 1)$ then $a + b + c =$_____.

218. The line $y = mx + b$ contains the point $(-5, -2)$ and has a slope of $-\frac{3}{4}$. The y-intercept is:

219. A rectangular swimming pool is twice as long as it is wide and has a 10 foot-wide concrete border around it. If the border has an area of 2800 sq. ft., find the perimeter of the pool.

220. If $27^{(k)} = 9^{(k+1)}$, then $3^{(k+2)} =$?

221. Let $f(x) = x - 2$, $g(x) = 2x - 1$, $h(x) = 3x$, and $g(f(x)) + f(h(x)) = -4$. Find x.

222. Which of the following does not have an inverse function?

   (A) $y = 2x - 4$ **(B)** $y = \frac{1}{4}x + 2$ **(C)** $y = -x^2 + 4$ **(D)** $y = \ln(x + 4)$ **(E)** $y = \sqrt{2x - 4}$

223. Phil Dewallit got a $20.00 allowance for mowing his parent's lawn this week. They agreed to increase his previous week's allowance 80¢each week for the next 24 weeks. Phil decides to put half of his allowance in his piggy bank each week. How much will he have in the bank at the end of the 25 week period?

224. In the expansion of $(3x - 2)^5$, the sum of the coefficients of the 3rd and the 4th term is:

225. $\sum\limits_{k+1}^{3}(-1)^k(kx - (k + 1)y - k) =$?

226. Sameer, Anisha, and Ian worked a total of 125 problems on the number sense test at the math camp. Sameer worked 28% of the total problems, Anisha worked 40 less problems than Ian did. What percent of problems did Ian work?

227. Find $a + b + c + d$ given the arithmetic sequence: $-11, a, b, c, 3, d, \ldots$

228. Let $f(x) = ax^3 - bx + 3$ where a and b are integers. If $f(2) = -4$, then $f(-2) =$?

229. Coach Ball has 22 students in his PE class. 9 of the students play football, 10 play basketball, 5 play tennis and basketball but not football, 5 play basketball and football but not tennis, and 2 play tennis only. How many students do not play any of these 3 sports?

230. I. Cee and U. Saul used a 2 in. × 12 in. × 16 ft. board to make a teeter-totter with the center being on a fulcrum. Cee weighs 85 pounds and is sitting 8 feet from the center of the teeter-totter. Saul weighs 100 pounds and is sitting on the opposite end. How far from the center should Saul sit if the teeter-totter has a slope of zero? (nearest inch)

231. If $\log_6(16) - \log_6(4x) = \log_6(x + 2)$, then x equals _____.

232. Let $g(x) = 3x^2 - 2x + 1$. Find k is $g(k-1) - g(k) = 11$.

233. How many ordered pairs of positive integers (a, b) with $a+b \leq 50$, satisfy the equation: $(a+b^{-1}) \div (a^{-1} + b) = 13$.

234. If $x < y$ and $x < 0$, which of the following is never greater than any of the others?

(A) $x + y$ **(B)** $x - y$ **(C)** $x + |y|$ **(D)** $x - |y|$ **(E)** $-|x + y|$

235. Given the sequence, $\frac{7}{(1 \times 1+1)} - \frac{7}{(2 \times 2-1)} + \frac{7}{(3 \times 3+1)} - \frac{7}{(5 \times 5-1)} + \frac{7}{(8 \times 8+1)} - \dots$, find the digit in the ten-thousandths place.

236. Evaluate: $\sqrt[3]{1728} \div (16)^{\frac{1}{2}} + 8 \times (2)^{-1} - 4$

237. Two and one-fourth million is added to three hundred twenty thousand five hundred. One million one thousand one hundred is subtracted from the sum. The difference is divided by eleven. The quotient is truncated to the units place. Which digit appears the most in the final results?

238. If $(3x + 1)(x - 3)(2x) = ax^3 + bx^2 + cx + d$ then $a + b + c + d =$ _____.

239. A line parallel to the line shown through the point $(1, -1)$ has x-intercept at point (a, b) and y-intercept at point (c, d). Find $a + b + c + d$.
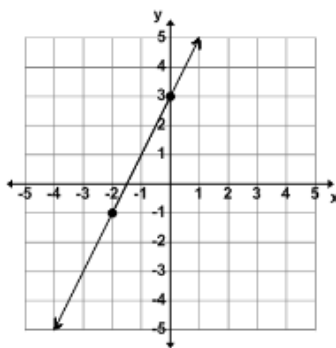
240. Max Whale likes to mix his regular blend coffee with a boost blend coffee at a ratio of 3 to 1. The regular blend sells for $11.00 per pound and the boost blend sells for $8.00 per pound. Find the cost per pound of Max's special mixture of regular blend and boost blend. (nearest cent)

241. What is the only real number which, when divided by itself, is 2020 times itself?

242. What is the smallest perfect square that can be written as the sum of three different prime numbers?

243. Gerry arrived at the bus stop x hours past noon. Dale arrived 4 hours later. Pat arrived at 5 P.M., x hours after Dale. At which time did Gerry arrive at the bus stop?

244. For what value of $x > 0$ does $\frac{x^2+2021x+2020}{x^2-2020x-2021} = 2$?

245. What is the greatest integer that always divides the difference of the squares of any two different positive odd integers?

246. Of the positive integers between 1000 and 10000 that are divisible by 8, how many have a hundreds digit of 5?

247. Les Square increased the length of two opposite sides of a square by 20%, and decreased the other two opposite sides by 50%. What percent of the area of the original square is the area of the new rectangle?

248. If $\frac{x+5}{2x-1} + \frac{Ax+B}{3x+2} = \frac{-7x^2+30x+6}{6x^2+x-2}$, where A and B are constants, then $A + B$ equals:

249. Let $f(x) = 2x - 1$ and $g(x) = 2 - 3x$ and $h(x) = x + 3$. Find $g(h(f(1 - x)))$.

250. The graph of $f(x) = Ax^3 + Bx^2 + Cx + D$ is shown here. Find $A + B + C + D$.
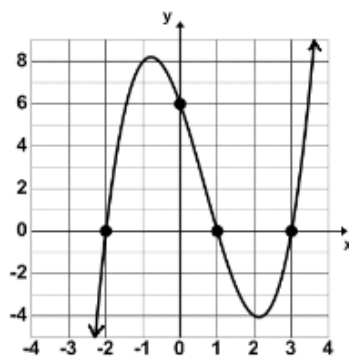
251. Les Qwik and Lotta Speed worked together to finish their research project in 12.5 hours. Lotta works 2.5 times faster than Les. How long would it have taken Lotta to do the project alone?

252. How many negative real roots will $x^5 + x^4 - 2x^3 + x^2 - 1 = 0$ have?

253. Which of the following is true about the function $f(x) = \frac{x^2+4}{x^3-3}$?

   I. $f(x)$ is odd   II. $f(x)$ is even   III. $f(x)$ has 3 asymptotes.

254. Find k if $GCF(48, k) = 8$ and $LCM(48, k) = 336$.

255. $\{(x, y) | x, y \in \text{Integers}, -10 \le x \le 10, \text{and} \ -10 \le y \le 10\}$ is the solution set of $2x + 5y = 10$. How many such ordered pairs exist?

256. Find C if the remainder when $(3x^3 + 2x^2 - x + C) \div (x + 1)$ is 4.

257. Ester Bunnee had a box of chocolate eggs. She hid half of them in the yard for the big hunt. Then she put two of the remaining eggs in her room for a late night snack. The remaining six eggs were put in the refrigerator for a later day. How many chocolate eggs were in the original box?

258. If $12x^2 + ax - 5 = (bx - 5)(2x + c)$ then $abc = $ _____.

259. Let $e^{(2x-3)} = 4e^{5x+6}$. Find $e^{(x)}$. (nearest hundredth)

260. Let $f(x) = ax + 4$ and $g(x) = bx - 1$, where a and b are positive integers. Find $a + b$ if $f(g(x)) = g(f(x))$.

261. In honor of Valentines day, let $x = 2 + \cfrac{14}{2 + \cfrac{14}{2 + \cfrac{14}{2 + \cfrac{14}{2 + \dots}}}}$. Find x. (nearest tenth)

262. The fraction $\frac{30}{\sqrt{3}+\sqrt{5}+\sqrt{8}}$ can be written as $a\sqrt{30} + b\sqrt{3} + c\sqrt{5} + d\sqrt{8}$. Find $a + b + c + d$.

263. Let $f(x) = \sqrt{6 - \sqrt{2x + 7}}$. The domain of $f(x)$ is $x | p \le x \le q$. Find $\frac{P+Q}{2}$.

264. Given: $9x - 6y = 21$ and $6x - 4y = k$. Find the value of k such that the system of equations has an infinite number of solutions.

265. Evaluate $[4! - (3)^3] + 2^{-2} \times \sqrt{2^4 \div 3^4}$

266. Will Itkosmoor wants to buy 4 new calculators for his math team. He can buy 2 at the regular price, 2 at the half price, and pay 8% of the total price for shipping and handling. He can get 16% off and pay no shipping if he buys 4 at the regular price. If the regular price is $89.95, how much will he save if he takes the best deal? (tax exempt)

267. Evaluate: $1 + 11^2 \div (2 + 9) + 1 \times 9$

268. Mae B. Tulong had twelve yards of rope. She cut off a length of rope that was 2 yards 1 foot 8 inches long. Then she divided the remaining length of rope into four equal parts. How long was each of the four equal parts of rope?

269. Which of the following points lies on a line parallel to the line shown and containing point $(0, 3)$?
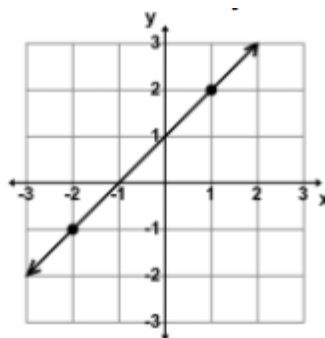
(A) $(9,6)$ **(B)** $(7,11)$ **(C)** $(11,15)$ **(D)** $(-7,-4)$ **(E)** $(-12,-12)$

270. Let $4x^2 + 17x - 15 = (ax + b)(cx + d)$. Find $a + b + c + d$.

271. Let $(2x - 1)^2(2x + 1) = ax^3 + bx^2 + cx + d$. Find $a + b + c + d$.

272. Simplify: $\left(\frac{x^2-3x-10}{x^2+2x-35}\right) \div \left(\frac{x^2+9x+14}{x^2+4x-21}\right)$

273. If $\frac{3x+2}{x-1} - \frac{x-3}{2x+1} = \frac{ax^2+bx+c}{dx^2+ex+f}$, then $a + b + c + d + e + f$ equals:

274. If $a_1 = 1, a_2 = 3, a_3 = -5$ and $a_n = a_{n-1} + a_{n-3} - a_{n-2}$, where $n \geq 4$, then a_6 equals:

275. Let $x - 3y = 5$ and $2y + z = 3$ and $2 - z = x$. Find $x + yz$.

276. If $f(x) = x^2 - 3x + 2$ and $g(x) = 2x^2 - x + 3$, then $g(f(4)) =$?

277. $(8x^3 - 4x^2 - 2x + 1) \div (2x + 1)$ has a remainder of _____.

278. Find the absolute value difference between coefficients of the x^2y^3 term and the x^3y^2 term in the expansion of $(3x + 2y)^5$.

279. Find the 20th term of the sequence: $3, 8, 15, 24, 35, 48, \ldots$

280. The Shawk Electric Company charges a monthly base fee of \$10.50 and a usage fee of 8¢per kilowatt hour used. The company offers a \$25.00 credit if the kilowatt usage is over 1200 kWh. How much would the bill be before taxes if the monthly usage was 1450 kWh.

281. Two billion three hundred four million five thousand sixty-seven is added to twenty-three million four hundred fifty-two thousand six hundred seven. Which of the following digits appears the most in the sum?

282. Soh Yung is 3 times as old as her sister Tu Yung. In 4 years Soh will only be twice as old as Tu. What will the sum of their ages be in 10 years?

283. PurtyDurty detergent contains 80% soap and 20% bleach. WishyWashy detergent contains 55% soap and 45% bleach. If PurtyDurty is mixed with WishyWashy, what percent of the mixture should be PurtyDurty if the final mixture is 35% bleach?

284. Let P and Q be the roots of $4x^2 + 17x = 15$. Find $(P + Q)(PQ)$.

285. Let $\begin{bmatrix} -1 & -2 \\ 1 & 3 \end{bmatrix} \times \begin{bmatrix} 2 & 1 \\ -3 & -4 \end{bmatrix} = \begin{bmatrix} a & c \\ b & d \end{bmatrix}$. Find $a + b + c + d$.

286. Let $f(x) = ax^2 + bx + 5$ where a and b are integers. If $f(1) = 2$ and $f(2) = 3$, then $f(3) =$?

287. 8,051 is the product of the two prime factors. The sum of these two prime factors is?

288. Which of the following is/are not function(s)?

I. $\{(2, 6), (-3, 6), (4, 9), (2, 10)\}$

II. $\{(1, 3), (2, 3), (3, 3), (4, 3)\}$

III. $\{(-2, 2), (-1, 1), (0, 0), (1, 1)\}$

289. Which of the following points does not lie on the line containing the point $(-2, -3)$ and having a slope of -1.5?

(A) $(-5, 1.5)$ (B) $(-8, 6)$ (C) $(7, -15.5)$ (D) $(4, -12)$ (E) $(9, -19.5)$

290. Let function f be defined as $f(x) = 2x - 6$ for all real numbers.

Let function g be defined as follows for all integers that $-3 \le x \le 3$:

x	−3	−2	−1	0	1	2	3
g(x)	12	15	16	15	12	7	0

Which of the following is true about both functions f and g?

(A) They reach their maximum value at the same domain value
(B) They have the same y-intercept   (C) They are both odd functions
(D) They share an x-intercept   (E) none of these are true

291. After math practice on Thursday, the Holliday math team drove to the Whataburger in Wichita Falls for supper. The principal gave them $50 to spend. They ordered 5 cheeseburger combos. A combo cost $7.85 plus tax. If the tax rate is 8.25% and if an apple pie cost $1.25 plus tax, how many apple pies could they order?

292. To pay for some new HP Prime G2 calculators for Mr. C's math team, Crosby, Stills, and Nash agreed to perform at SHS with all proceeds going to the math department. Student tickets cost $15.00 and adult tickets cost $25.00. If they raised $7,700 by selling 372 tickets, how many adult tickets were sold?

293. Line L_1 contains the points $(-8, 6)$ and $(4, -10)$. Line L_2 is parallel to L_1 and contains the point $(-6, -12)$. The y-intercept of L_2 is $(0, b)$. The value of b is _____.

294. Tal rented a car at the airport where his plane landed in Boise. The city of Boise charges an upfront fee of $20 to rent a car at the airport. He was also charged $25 per day and $0.55 per mile. If Tal used his car for five days and his final bill was $241.25, how many miles did he drive during his stay?

295. Anthony can wash and wax a car in 45 minutes while Jacob needs one hour to wash and wax a car. If Anthony works by himself for two hours before being joined by Jacob, how much time will it take for them to wash and wax 16 cars? (nearest minute)

296. The value of Warith's house is increased by 9.35 percent each year. If his house is worth $378,000 on January 1st, 2023, what should it be worth on January 1st, 2035? (nearest dollar)

297. If the values of the roots of the function $f(x) = 7x^2 + 14x - 105$ are a and b, then $\frac{a+b}{ab} = $ _____.

Use the following graph for problems 298 and 299.
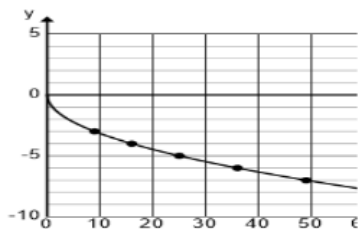
298. The graph of $y = h(x)$ begins at the point $(0, 0)$. $h(121) = $ _____.

299. If $g(x)$ is the inverse function of $h(x)$, find the domain of $g(x)$.

300. The number of 2-liter cokes sold at Walmart each month varies inversely as the price. In a month when the price was $1.80, they sold 3448 2-liter cokes. If the price is reduced to $1.20 the next month, what is the expected number of cokes that will be sold?

301. Consider $f(x) = 2x^3 + bx^2 + 4x - 8$. If $f(3) = 31$, then $b = $ _____.

302. Consider four consecutive even negative integers (in increasing order) such that the product of the first and third is 122 greater than the product of -25 and the fourth. Find the sum of the four integers.

303. Consider an arithmetic sequence in which the sixth term is 47 and the twelfth term is 95. What is the product of the eighteenth and nineteenth terms?

304. If $f(x) = \frac{3x-4}{5x-6}$ and $h(x) = \frac{-2x+5}{-3x-8}$, then $\left(h^{-1} \circ f^{-1}\right)(1) =$

305. Three of the roots of the fourth-degree polynomial $x^4 + bx^3 + cx^2 + dx + e$ are $-2, 3$, and $1 - \sqrt{5}$. If b, c, d, and e are rational numbers, then $b + c + d + e =$ _____.

306. The sound level in decibels, β is given by $\beta = 10 \log \left(\frac{I}{10^{-12}}\right)$, where I is the intensity of sound in W/m^2. Andrew is playing his trumpet, producing a sound level of 88 dB. If twelve other musicians join him and they all play their trumpets at the same intensity as Andrew, what is the sound level of all of the trumpets playing together? (nearest whole number)

307. Evaluate: $1 + 1 \times 2 - (3 + 5) \div 8 \times 13 + 21$

308. Five plumbers work for 4 hours to put in 40 tubs. If they work at the same rate, how long will it take 3 plumbers to put in 24 tubs?

309. Let $f(x) = 4 - x$ and $g(x) = 3x - 5$ and $h(x) = 2x$. Find $h(f(g(0)))$.

310. $e^{i\pi} =$ _____

311. Consider the formula for a thin lens, $\frac{1}{f} = \frac{1}{d_0} + \frac{1}{d_i}$, where f is the focal length of the lens, d_0 is the distance from the lens to the object, and d_i is the distance from the lens to the image. If the focal length of the lens is 24 cm and the distance from the lens to the object is 36 cm, find the distance from the lens to the image.

312. During the tax-free weekend, Penelope, Sydney, and Alexa went to Academy Sports and purchased some cross country attire. Penelope purchased 4 shirts, 3 shorts and some shoes. The shoes cost $82 and she spent a total of $196. Alexa purchased 6 shirts, 4 shorts and some shoes. The shoes cost $98 and she spent a total of $260. All shirts were the same price and all shorts were the same price. If Sydney purchased 2 shirts and 3 shorts, how much did she spend?

313. Five times Rose's age is 2 more than Carrie's age. In 10 years, Arlene will be twice as old as Carrie. Two years ago, Arlene was 14 times as old as Rose. How old is Arlene?

314. Caleb took a three-day tripe from Sanger to Aberdeen, a distance of 1383 miles. On day one, he drove 577 miles at an average speed of 62 mph. On day two, he drove 464 miles at an average speed of 72 mph. If the total driving time on the trip was 20 hr 48 min, what was his average speed on day three? (nearest tenth)

315. Ronita flew from Portland to Dallas to visit her favorite sister. The round-trip ticket cost $882. She rented a car for $48 per day plus $0.32 per mile. She drove a total of 448 miles during the 12 days she was there. She also spent $366 on Texas Rangers shirts and hats. How much did the trip cost?

316. Consider an arithmetic sequence in which the fourth term is 37 and the eleventh term is 93. Find the sum of the first 16 terms.

317. Consider the sequence $2, 5, 9, 14, 20, 27, 35, \ldots$. The sum of the first 24 terms is _____.

318. Evaluate: $2 + 15 \div 3 - 16 \div 20 + 1 \times 9$

319. Les Cash bought five radios at the local flea market at a cost of $50.00 each. He sold three of them making a 20% profit and the other two were sold at a 10% loss. How much did Les net from his sales?

320. Let $(2x - 3)^3 = ax^3 + bx^2 + cx + d$. Find $a + b + c + d$.

321. Let $27x^3 + 27x^2 + 9x + 1 = (3x + 1)(ax^2 + bx + c)$. Find $a + b + c$.

322. Mr. Ruiz sold tickets for the local one-act play. He sold 15 more adult tickets than children tickets and he sold three times as many senior tickets as children tickets. In total, he sold 300 tickets. How many adult tickets did Mr. Ruiz sell?

323. Find the range of the function $f(x) = 2 - 3|x + 4|$.

324. Let $2x - y = 5$ and $3x + y = 6$. Find $20x + 19y$.

325. The roots of $x^4 + x^3 - 7x^2 - x + 6 = 0$ are p, q, r, and s. Find $(p+q+r+s)+(pqr+pqs+prs+qrs)-(pqrs)$.

326. Which point is the reflection of the point $(-7, 5)$ over $y = -x$?

327. The point of intersection of the two lines shown is (h, k). Find $h + k$.
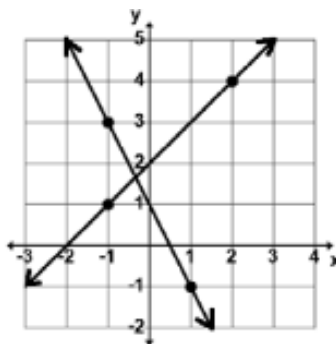
328. Find $f(4) - f(0) + f(1)$ if $f(x) = \begin{cases} x - 1 & \text{if } x < 1 \\ x + 4 & \text{if } 1 \le x \le 4 \\ 1 - x & \text{if } x > 4 \end{cases}$

329. Find the digit in the hundred-thousandth place of the sum of $1 + 3 + \frac{9}{2} + \frac{27}{6} + \frac{81}{24} + \dots$.

330. Les Stickum has $\$60.00$ to buy some 48-cent stamps and some 1-dollar stamps. He has to buy twice as many 48-cent stamps as 1-dollar stamps. What is the greatest number of 48-cent stamps can he buy?

331. Let $e^{(3x+2)} = 4e^{(x-5)}$. Find $e^{(x)}$. (nearest hundredth)

332. If $A + B = 14$ and $A \times B = 26$, then $|B - A| = $ _____.

333. $(2x^2 + kx + 1) \div (x + 3)$ has a remainder of 43. Find k.

334. Let $f(x) = \frac{2x^3 + x^2 + 11x + 5}{x^2 + 5}$ and $s(x)$ be the slant asymptote of f. Find the value of $s(-3)$.

335. Expand $10^B \div (10^{(2B)} - 10^B - 1)$ for $B = 3$. What is the 21st digit after the decimal place?

336. Glven: $x^2y + xy^2 + x + y = 63$ and $xy = 6$. Find $x^2 + y^2$.

337. Given: $25! \div 5^k$ is an integer. What is the greatest value of k?

338. Solve for k: $k - 20 \div (3 + 1) \times 2 + 0! = 22$

339. Phil Detank travels 25 miles each way driving to and from work every day, Mondah through Friday. His vehicle has a 15 gallon tank and averages 20 mpg. The tank is full when he heads to work on Monday. How much will it cost him to fill his tank when he gets home from work on Friday if gas costs $\$2.35$ per gallon? (nearest cent)

340. A line with a slope of $-\frac{5}{6}$ intersects the x-axis at $x = 4$ and intersects the y-axis at $y = $?

341. Papa Jawn is three times as old as Dom Knowles and Lil Seizer is 3 years younger than Dom. The sum of their ages 3 years ago was 63 years. How long from now will Papa's age be equal to the sum of the ages of Lil and Dom?

342. If $-2, -1$, and 3 are the roots of $2x^3 + bx^2 + cx + d = 0$, then $b + c + d$ equals?

Solutions

1. $2\frac{2}{5}$

2. 22% less

3. $4.15

4. 5

5. 180 km

6. $4\log_b(6y)$

7. $(-1, -3)$

8. $y > x^2 - 3x + 4$

9. $28\frac{1}{8}$

10. 3

11. 256

12. .0625

13. 784 miles

14. 9

15. $3x - y = 2$

16. $-\frac{1}{64}$

17. A

18. -2

19. -39

20. -1620

21. 4

22. $4.93

23. 2.0

24. 1225

25. 26

26. $\frac{chw+dh}{hm+kw}$

27. 200

28. $7\frac{1}{16}$

29. 33.8 mph

30. $5x - 8y = -21$

31. 55

32. 0.025

33. 20

34. 127

35. 12.8

36. 12

37. 14.3

38. $23.27

39. -0.50

40. 5.0 mph

41. 63.3 mph

42. 24.3 min

43. -15

44. 102

45. 19

46. $4\frac{19}{32}$

47. $\frac{1}{16}$

48. 48.0 days

49. $\frac{12}{7}$

50. $x \geq -3, x \neq 4, 5$

51. 3

52. 7.2

53. $15.24

54. 212

55. 286.12

56. $(0, \infty)$

57. 2:17 PM

58. -11

59. 525

60. 1

61. even function

62. 2250

63. $\frac{1}{4}$

64. 0

65. 3

66. 24 dB

67. 588

68. $11.26

69. 1485

70. 32.0

71. 21 hr

72. 2.0

73. $x \in R, x < 9$

74. 0.0063

75. 8

76. 1

77. 12

78. 3

79. 693

80. 178.5

81. 720

82. $286.44

83. -23

84. $-\frac{9}{2y}$

85. 6

86. -1.25

87. -4

88. -720

89. $x^{-2}y^4z^{-.4}$

90. 0

91. $1\frac{1}{16}x$

92. 2640

93. 3

94. 127.5 miles

95. B

96. $(1, 4)$

97. 207

98. 76

99. E

100. $6x - 3$

101. 1011

102. $n^3 + 3n^2 + 2n$

103. $-\frac{3}{5}$

104. $y : y \geq 3$

105. $1.19

106. -15

107. 1232

108. D

109. 45

110. 110

111. $1.17

112. 4

113. 4

114. 256

115. $3.11

116. $y \geq x^2 - 4$
$y \leq x^2 + 1$

117. $2\frac{6}{7}$ mph

118. $(-2, 8)$

119. -16

120. 87

121. 24

122. -3.6

123. B

124. $(5, -.6)$

125. -36

126. $1\frac{5}{6}$

127. 3

128. 156

129. 9

130. $(2, 4)$

131. $\frac{1}{24}$

132. 72

133. -5.75

134. 76 miles

135. -3

136. $\frac{1}{w}$

137. $\frac{1}{2}$ mph

138. walking at a constant speed

139. 3 or 1

140. $8\frac{2}{3}$ days

141. 25

142. -1

143. 80%

144. 2

145. 3

146. 18

147. 2

148. -62

149. 28.125

150. $56.67

151. $4x + 3y = -2$

152. increasing speed

153. 40 km

154. 5.997 m/sec

155. 14

156. 1

157. $\frac{1}{3}$

158. 56

159. 5

160. 94

161. 24

162. $n^2 + n - 2$

163. $a^6 b^{-3}$

164. 42

165. -4

166. 1

167. 20

168. $46.88

169. $1\frac{7}{16}$"

170. C

171. 7

172. $\frac{1}{3}$

173. $2.84

174. $\frac{1}{64}$

175. -1

176. 93

177. 4

178. $n^3 - 2n + 1$

179. $a^{-2}b^6$

180. $\frac{x}{4}$

181. 10:29 a.m.

182. 22

183. 0

184. 5.8%

185. 21

186. -.5

187. $-\frac{22}{7}$

188. 2

189. $2\frac{9}{16}$

190. $1\frac{9}{16}]''$

191. 120 oz

192. 3

193. 8

194. $x^2 + 5x - 6$

195. 2

196. 8

197. $1\frac{1}{8}''$

198. C

199. $y \le -(x^2 + 3x)$

200. $1375.00

201. $a^0 b^{-2}$

202. -2

203. 10 meters

204. 9.5

205. 9

206. $-7 - 3x$

207. $y = \frac{5x - 17}{9}$

208. 1

209. -4

210. $\frac{\sqrt{15}+1}{2}$

211. $\frac{n+1}{n}$

212. 1.5

213. $5.12

214. $10\frac{5}{7}\%$

215. $3x - 4y \leq -4$

216. $\frac{1}{4}$

217. -6

218. $(0, -5\frac{3}{4})$

219. 240 ft

220. 81

221. $\frac{3}{5}$

222. C

223. $370.00

224. 360

225. $-(2x - 3y - 2)$

226. 52%

227. -5.5

228. 10

229. 6

230. 6' 10"

231. $\sqrt{5} - 1$

232. -1

233. 3

234. D

235. 4

236. 3

237. 2

238. -16

239. -1.5

240. $10.25

241. $\frac{1}{2020}$

242. 16

243. 12:30 P.M.

244. 6062

245. 8

246. 108

247. 60%

248. -1

249. $6x - 10$

250. 0

251. 17.5 hrs

252. 2 or 0

253. none of these

254. 56

255. 5

256. 4

257. 16

258. -24

259. .03

260. 2

261. 4.9

262. 6

263. 5.5

264. 14

265. $-2\frac{8}{9}$

266. $10.79

267. 21

268. 2 yrds 1' 1"

269. D

270. 7

271. 3

272. $\frac{x-3}{x+7}$

273. 15

274. 3

275. -103

276. 69

277. 0

278. 360

279. 440

280. $101.50

281. 7

282. 36

283. 40%

284. 15.9375

285. -7

286. 8

287. 180

288. I only

289. C

290. D

291. 5

292. 212

293. -20

294. 175

295. 7 hr 43 min

296. $1,104,885

297. $0.1\overline{3}$

298. -11

299. $(-\infty, 0]$

300. 5172

301. -3

302. -100

303. 21,593

304. -13

305. 29

306. 99 dB

307. 11

308. 4

309. 18

310. -1

311. 72 cm

312. $84

313. 86

314. 67.7 mph

315. $1967.36

316. 1168

317. 2900

318. 4.35

319. $20.00

320. -1

321. 16

322. 72

323. $y \leq 2$

324. 32.6

325. -6

326. $(-5, 7)$

327. $1\frac{1}{3}$

328. 14

329. 3

330. 60

331. 0.06

332. $2\sqrt{23}$

333. -8

334. -5

335. 3

336. 69

337. 6

338. 31

339. $29.38

340. $3\frac{1}{3}$

341. 18 yrs

342. -26