Reason Prep's ACT Math Gauntlet

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Complete this packet of problems **untimed**. You may use a calculator. Check your answers with the answer key in back. **Complete video solutions** for all problems and review of all concepts, as well as an ACT Math Fact & Formulas Sheet, can be found in the ACT Math Bootcamp - go to http://rprep.co/actmathbc

CORE PROBLEMS

1. Which of these numbers has the greatest value?
   A. .009
   B. .00909
   C. .009009
   D. .0091
   E. .000999

2. All of the following equations are correct EXCEPT
   A. $(15 + 10) + 4 = 15 + (10 + 4)$
   B. $3(4 + 5) = (3 \times 4) + (3 \times 5)$
   C. $(24 - 12) = (12 - 24)$
   D. $24 - 0 = 24$
   E. $24 + (-24) = 0$

3. If a is an odd integer and b is an odd integer, which of the following must be even?
   A. ab
   B. $a + 2b$
   C. $a(a + b)$
   D. $\frac{a}{b}$
   E. a^b

4. If p and q are positive integers such that $p < q$, which of the following could be irrational?
   A. $\sqrt{pq}$
   B. $p + q$
   C. $p - q$
   D. $\frac{p}{q}$
   E. $\frac{q}{p}$

5. A streaming video service charges $10 per month of access and $3 for each movie rental. If James uses the service for 4 months and rents 12 movies over that time period, how much money does he spend?
   A. $46
   B. $76
   C. $132
   D. $196
   E. $208

6. Maria sells cookies and earns $2 for each of the first 50 boxes she sells. For each box she sells over 50, she earns $3 per box. If she sells 75 boxes of cookies, how much does she earn?
   A. $5
   B. $100
   C. $150
   D. $175
   E. $225

7. When working on a math problem, Robert squares a number instead of taking the square root of the number. What should Robert do next to the current number to get the answer he originally intended?
   A. Take the fourth root of the number.
   B. Take the square root of the number.
   C. Square the number.
   D. Raise the number to the fourth power.
   E. Divide the number by 4.

8. When $1 \leq x \leq 10$ and $11 \leq y \leq 20$, the largest possible value for $\frac{x+y}{x}$ is:

   A. 2.1

   B. 3

   C. 10

   D. 15

   E. 21

9. Consider all products ab, where a is divisible by 5 and b is divisible by 21. Which of the following is not a factor of ab?

   A. 3

   B. 11

   C. 15

   D. 35

   E. 105

10. A sports team orders pizza after every game. The coach wants to order enough slices so that each athlete receives an equal number without remainder. If either 5, 8, or 10 athletes will be eating pizza, and if slices cannot be subdivided, what is the least possible number of slices that should be ordered?

    A. 10

    B. 20

    C. 30

    D. 40

    E. 50

11. What is the largest prime factor of 130?

    A. 65

    B. 17

    C. 13

    D. 5

    E. 2

12. What is the greatest common factor of 68 and 102?

    A. 17

    B. 34

    C. 68

    D. 102

    E. 6936

13. What is the least common denominator of $\frac{6}{11}$, $\frac{1}{3}$, and $\frac{1}{2}$?

    A. 33

    B. 66

    C. 99

    D. 132

    E. 4356

14. A pie is divided into 8 portions. Each portion is then divided in half, creating two equal slices. If Ethan eats three of these slices, what fraction of the whole pie does he eat?

    A. $\frac{3}{4}$

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

    C. $\frac{3}{8}$

    D. $\frac{5}{16}$

    E. $\frac{3}{16}$

15. A treasure chest contains coins of various metals: $\frac{1}{2}$ of the coins are gold, $\frac{1}{4}$ are silver, $\frac{1}{8}$ are bronze, and 100 are platinum. How many gold coins are in the chest?

    A. 200
    B. 400
    C. 800
    D. 1600
    E. 3200

16. What is $4\frac{2}{3} \div 3\frac{1}{5}$?

    A. $1\frac{2}{15}$
    B. $1\frac{11}{24}$
    C. $1\frac{9}{15}$
    D. $4\frac{2}{15}$
    E. $12\frac{2}{15}$

System	Number of Games
NES	26
SNES	42
N64	17
Gamecube	13
Wii	14

17. The table above shows the number of games from each video game system in Jenny's collection. Approximately what percent of the total games are <u>not</u> NES and SNES?

    A. 68%
    B. 63%
    C. 61%
    D. 44%
    E. 39%

18. 15% of 550 is equal to 25% of what number?

    A. 82.5
    B. 137.5
    C. 220
    D. 330
    E. $916\frac{2}{3}$

19. Of the 400 students at KB High School, 10% are on the football team, and 90% of the football players are not in the chess club. How many football players are in the chess club?

    A. 4
    B. 9
    C. 36
    D. 40
    E. 360

20. Dana bought a sofa with a 25% discount off the full retail price of $650. The delivery fee was $50, and she paid 7.5% tax on the total cost of the sofa and delivery. How much did she pay to the nearest cent?

    A. $228.44
    B. $574.06
    C. $577.50
    D. $577.81
    E. $752.50

21. From 1986 to 1989, the population of rattlesnakes in Bigby State Park increased 60%. If there were 840 snakes in 1989, approximately how many snakes were there in 1986?

    A. 336
    B. 504
    C. 525
    D. 1344
    E. 1400

22. On Monday, the value of Marshall's stock portfolio increased by 10%. On Tuesday, the value decreased by 20%. By what total percent did the value of his portfolio change over these two days?

    A. 10% decrease
    B. 12% decrease
    C. 2% decrease
    D. 10% increase
    E. 12% increase

23. A cake recipe calls for $3\frac{1}{2}$ cups of cake mix for every $1\frac{1}{3}$ cups of water. If Gordon has 3 cups of water and wants to use a proportional amount of cake mix, what is the amount of cake mix he needs in cups?

    A. $1\frac{2}{3}$
    B. $5\frac{1}{6}$
    C. $7\frac{7}{8}$
    D. $10\frac{1}{2}$
    E. $21\frac{1}{2}$

24. The number of red, yellow, and green balls in a bag is in the ratio of 2:4:7, respectively. If there are a total of 65 balls in the bag, how many are green?

    A. 59
    B. 35
    C. 13
    D. 7
    E. 5

25. Let k be the constant of proportionality and let q, r, s, and t be positive real number variables. If q varies directly with the cube of r, inversely with s, and inversely with the square root of t, which of the following equations is correct?

    A. $q = \frac{kr}{st}$
    B. $q = \frac{kr^3}{st^{\frac{1}{2}}}$
    C. $q = \frac{kst^{\frac{1}{2}}}{r^3}$
    D. $q = \frac{kst}{r}$
    E. $q = kr^3st^{\frac{1}{2}}$

26. Which of the following is equivalent to $3x^6 \cdot 4x^6$?

    A. $12x^{12}$
    B. $7x^6$
    C. $12x^6$
    D. $7x^{12}$
    E. $12x^{36}$

27. $\frac{(4x^6y^3)(2x^2y^5)^2}{16x^8y^{10}}$ =

    A. $x^{16}y^{20}$
    B. x^3y^3
    C. x^2
    D. x^2y^3
    E. $\frac{x^2y^3}{2}$

28. If $\frac{2^x 2^5}{(2^3)^4} = \frac{1}{4}$, then $x =$

A. -2

B. $-\frac{1}{2}$

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

D. 2

E. 5

29. If $3^{2x} = 27^{x-2}$, then $x =$

A. 8

B. 6

C. 4

D. 2

E. 0

30. The number 260000000.0 is equivalent to which of the following expressions?

A. 2.6×10^8

B. 2.6×10^9

C. 2.6×10^{10}

D. 2.6×10^{-8}

E. 2.6×10^{-9}

31. What are the simplified forms of $\sqrt{12}$, $\sqrt{24}$, and $\sqrt{60}$?

A. $2\sqrt{6}, 2\sqrt{12}, 2\sqrt{30}$

B. $2\sqrt{3}, 2\sqrt{6}, 2\sqrt{15}$

C. $3\sqrt{2}, 6\sqrt{2}, 15\sqrt{2}$

D. $2\sqrt{3}, 2\sqrt{12}, 2\sqrt{30}$

E. $3\sqrt{2}, 2\sqrt{6}, 2\sqrt{30}$

32. If $\sqrt{3x^2 - 11} = 2x + 3$, then $x =$

A. -2

B. -10

C. $-2, -10$

D. 2, 10

E. No values of x satisfy this equation.

33. If $\sqrt[3]{4x - 8} - 2 = 0$, then $x =$

A. 0

B. 2

C. 4

D. 6

E. 8

34. What is the simplified form of $\frac{30}{\sqrt{5}}$?

A. $\sqrt{6}$

B. 6

C. $6\sqrt{5}$

D. $30\sqrt{5}$

E. $\frac{6\sqrt{5}}{5}$

35. Which of the following expressions is equivalent to $x(6 + x) - 3(x^2 + 6x - 2)$?

A. $-2x^2 - 12x + 6$

B. $-2x^2 + 24x - 6$

C. $-2x^2 + 2$

D. $-2x^2 + 12x - 2$

E. $-3x^2 - 11x$

36. If $7a - 10 = 4(5 - 2a)$, what does a equal?

A. 0

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

C. $\frac{10}{3}$

D. 2

E. -30

37. If $\frac{a}{6} = 2$ and $ab = 48$, what is the value of $a + b$?

    A. 2
    B. 4
    C. 12
    D. 16
    E. 48

38. The share of votes a candidate receives, s, is modeled according to the function $s = \frac{4r + m^2}{100 - t}$, where r is the number of rallies held, m is the amount of money spent on the campaign, and t is the amount of time spent campaigning in months. What is m in terms of r, s, and t?

    A. $m = \sqrt{\frac{(100 - t)s}{4r}}$
    B. $m = 100 - t + s - 4r$
    C. $m = \sqrt{100 - t + s - 4r}$
    D. $m = 100s - ts - 4r$
    E. $m = \sqrt{100s - ts - 4r}$

39. The temperature F in degrees Fahrenheit is related to the temperature C in degrees Celsius by the equation $F = \frac{9}{5}C + 32$. Which of the following is the closest temperature, in $°C$, to $104°F$?

    A. 40
    B. 58
    C. 72
    D. 130
    E. 219

40. Pedro buys 60 baseball cards to start his collection. Each week, he adds 5 cards to his collection. Lea begins her collection with 80 cards and adds 3 cards to her collection each week. Which of the following equations, when solved, gives the number of weeks, t, after starting their collections that Pedro and Lea will have the same number of cards in their collections?

    A. $60 + 3t = 80 + 5t$
    B. $60 + 5t = 80 + 3t$
    C. $60 - 3t = 80 - 5t$
    D. $60 - 5t = 80 - 3t$
    E. $60t + 5 = 80t + 3$

41. Amy works as a telemarketer for Widget World. She is asked to work on a holiday and is offered a 50% bonus to her total pay for the day. On a normal day, Amy earns \$80 plus 20% of her daily sales, S. In terms of S, which of the following expressions gives Amy's pay, in dollars, for working on that holiday?

    A. $40 + .1S$
    B. $80 + .2S$
    C. $50(80 + 20S)$
    D. $120 + .3S$
    E. $130 + .2S$

42. Abel budgeted \$600 for his vacation. He can choose between two hotels. Hotel California charges a \$75 booking fee and \$105 per night. Hotel LA charges a \$100 booking fee and \$100 per night. Which hotel, if either, will Abel be able to spend the most days, and how many more days than the other?

    A. Hotel California, 1 more day
    B. Hotel California, 2 more days
    C. Hotel LA, 1 more day
    D. Hotel LA, 2 more days
    E. Abel can afford the same number of days at both hotels.

43. Six more than the product of three and a number is equal to the square of the sum of the number and two. What are all the possible values of the number?

    A. -1
    B. 1
    C. $1, -2$
    D. $-1, 2$
    E. -2

44. Jimmy collects paintings in three sizes: small, medium, and large. He has twice as many small paintings as medium paintings, and he has 10 fewer large paintings than twice the number of small paintings. If he owns 81 paintings total, how many large paintings does he own?

    A. 42
    B. 36
    C. 30
    D. 26
    E. 13

45. Terrence has n boxes of candy bars. Each box contains c bars. He wants to distribute these bars to $3n$ children. Which of the following expressions represents the number of bars each child will receive if the bars are divided equally among the children?

    A. c
    B. $\frac{3}{c}$
    C. $3n^2c$
    D. $\frac{c}{3}$
    E. $\frac{3c}{n^2}$

46. A group of 8 friends decides to go on vacation and split the total cost of the trip equally. At the last minute, 2 friends drop out. The remaining friends now must each pay \$60 more. What is the total cost of the trip?

    A. \$360
    B. \$480
    C. \$840
    D. \$960
    E. \$1440

$$4x - y = 16$$

$$x + 2y = 13$$

47. In the system of equations above, what does y equal?

    A. 5
    B. 4
    C. $\frac{29}{9}$
    D. $\frac{44}{9}$
    E. -4

48. Given that $\frac{x}{y} = 11$ and $x + y = 36$, what does x equal?

    A. -33
    B. -3
    C. 3
    D. 24
    E. 33

$$3x + 2 \geq 6x - 10$$

49. Which of the following choices gives the solution set for the inequality above?

A. $x \leq \frac{8}{3}$

B. $x \geq \frac{8}{3}$

C. $x \leq 4$

D. $x \geq 4$

E. $\varnothing$

50. Given that $x \geq 10$ and $x + y \leq 16$, what is the greatest value that y can have?

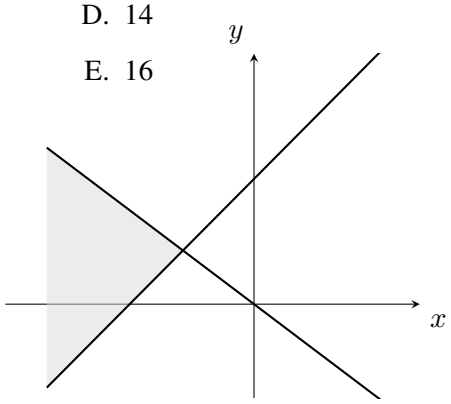
A. -6

B. 6

C. 10

D. 14

E. 16



51. The shaded portion of the graph above represents the solution set of one of the following systems of linear inequalities. Which one?

A. $y \geq \frac{3}{4}x - 4$ and $y \leq -x$

B. $y \leq \frac{3}{4}x + 4$ and $y \geq -x$

C. $y \geq \frac{4}{3}x + 4$ and $y \leq -x$

D. $y \leq \frac{4}{3}x + 4$ and $y \geq -x$

E. $y \geq -\frac{4}{3}x - 4$ and $y \leq -x$

52. Which of the following is the greatest common factor of $65xy^3 + 13x^2y^2$?

A. $5xy^2$

B. $13x^2y^3$

C. $13xy^2$

D. $13x^2y^2$

E. $65x^3y^5$

53. What is the factored form of $3x^2 + x - 14$?

A. $x(3x + 1 - 14)$

B. $(3x + 14)(x - 1)$

C. $(3x - 14)(x + 1)$

D. $(3x - 7)(x + 2)$

E. $(3x + 7)(x - 2)$

54. Which of the following expressions below is a factor of $4x^3 + 16x^2 - 240x$?

I. $x^2 + 4x + 60$

II. x

III. $x + 10$

A. I only

B. II, III only

C. I, III only

D. III only

E. I, II, III

$$2x^3 - 8x^2 + 3x - 12$$

55. Which expression is equivalent to the above expression?

A. $2x(x^2 - 4x + \frac{3}{2} - 12)$

B. $(x - 4)(2x^2 + 3)$

C. $(x + 4)(2x^2 - 3)$

D. $(2x - 4)(x^2 + 3)$

E. $(2x + 4)(x^2 - 3)$

56. For all $x \neq 3$, which of the following expressions is equivalent to $\frac{x^2+3x-18}{x-3} + x^2 - 8x$?

    A. $\frac{2x^2-5x-18}{x-3}$

    B. $x^2 - 9x + 6$

    C. $(x-6)(x-1)$

    D. $(x+6)(x+1)$

    E. $(x-6)(x+1)$

57. Which of the following polynomial expressions has solutions $-\frac{1}{2}$, 6, and 0?

    A. $x(x-\frac{1}{2})(x+6)$

    B. $(x+\frac{1}{2})(x-6)(x-1)$

    C. $(x-6)(x-3)(x-\frac{1}{2})$

    D. $2x(x+6)(x+\frac{1}{2})$

    E. $2x(x+3)(x+\frac{1}{2})(x-6)$

58. Which expression is equivalent to $(5x+3)(2x-6)$?

    A. $-32x^2$

    B. $10x^2 - 18$

    C. $10x^2 - 24x - 18$

    D. $10x^2 + 36x - 18$

    E. $10x^2 + 24x - 18$

59. For what two values of x is $x^2 + 7x + 6 = -4$?

    A. -10 and -5

    B. 10 and 5

    C. -2 and -5

    D. 2 and 5

    E. -10 and -2

60. What are the coordinates of the vertex of $x^2 - 4x + 11$?

    A. $(2, 7)$

    B. $(-2, -7)$

    C. $(-4, 11)$

    D. $(2, 11)$

    E. $(4, -11)$

61. What are the roots of the quadratic equation $x^2 + 4x + 1$?

    A. 2 only

    B. $2, -2$ only

    C. $-2 \pm \sqrt{3}$

    D. $-2 \pm \sqrt{6}$

    E. $2 \pm \sqrt{3}$

62. Given the equation $y = 2x^2 + 11x + 23$, which of the following characterizes the roots of this equation?

    A. two real roots

    B. two complex roots

    C. one real root

    D. one real root, one complex root

    E. no roots

63. $|6 - 9| + |6(-9)| =$

    A. -57

    B. 57

    C. 51

    D. -51

    E. 69

64. If $|3x - 10| = 2$, then what are all possible values of x?

    A. 4

    B. $\frac{8}{3}$

    C. $-\frac{8}{3}$

    D. 4, $\frac{8}{3}$

    E. $\frac{8}{3}, -\frac{8}{3}$

65. What is the solution set of $|x|^2 + 3|x| - 4 = 0$?

    A. 1

    B. $1, -1$

    C. $1, -4$

    D. $1, 4$

    E. $1, -1, 4, -4$

66. For all nonzero values of j and k, which of the following expressions will never equal 0?

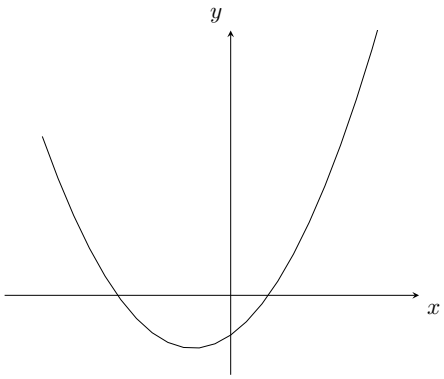
    A. $|j + k|$

    B. $|j| + |k|$

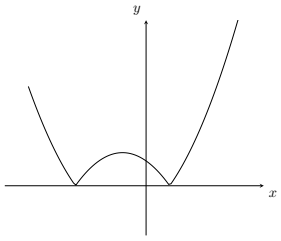
    C. $|j| - |k|$

    D. $j + k$

    E. $j - k$



67. The graph of $f(x)$ is shown above. What is $|f(x)|$?

A.


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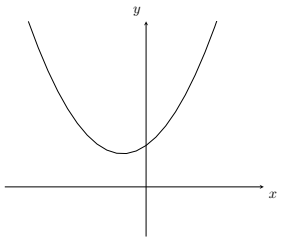

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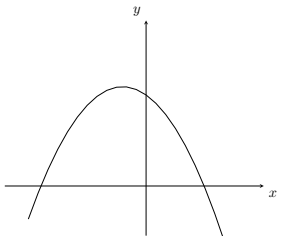
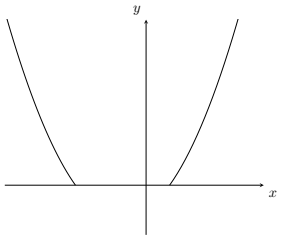
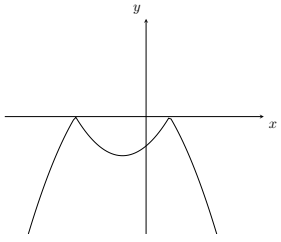


D.


E.


68. If $f(x) = -2x^3 - 6x^2 + 4x + 4$, then $f(-2) =$

A. -16

B. -12

C. 8

D. 20

E. 36

69. If $f(x) = 2x + 17$ and $f(c) = 25$, then $c =$

A. -4

B. 4

C. 8

D. 50

E. 67

70. If $f(x, y, z) = x^2y + yz^2$, then $f(2, 1, 3) =$

A. 6

B. 9

C. 13

D. 15

E. 36

a	1	2	3	4	5
h(a)	66	75	84	93	102

71. There is a linear relationship between the age of a child, a, in years and her height, $h(a)$, in cm. The height of the child is shown for her first five years in the table above. Which of the following functions represents the child's height $h(a)$?

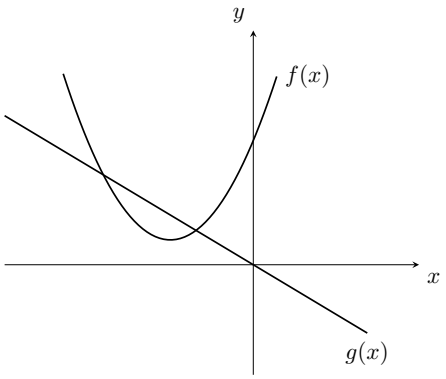
A. $h(a) = a + 65$

B. $h(a) = 16a + 50$

C. $h(a) = a$

D. $h(a) = 9a + 66$

E. $h(a) = 9a + 57$



72. The graphs of $f(x)$ and $g(x)$ are shown above. Which of the following must be true?

A. $f(x) > g(x)$

B. $g(x) > f(x)$

C. $g(x) = 0$

D. $f(x) > 0$

E. $g(x) > 0$

73. If $f(x) = 2x + 2$ and $g(x) = 3x^2$, then what does $f(g(4))$ equal?

A. 10

B. 48

C. 96

D. 98

E. 300

x	$f(x)$	$g(x)$
0	0	-5
1	3	-2
2	6	1
3	9	2
4	12	4
5	15	7
6	18	9

74. Given the values of x, $f(x)$, and $g(x)$ in the table above, what is the value of $g(f(g(2)))$?

A. 2

B. 3

C. 6

D. 9

E. 18

75. What is the slope of the line that passes through $(-4, 6)$ and $(-2, -2)$?

A. 4

B. $-\frac{1}{4}$

C. -4

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

E. $-\frac{3}{2}$

76. What is the equation of the line that passes through (1, 2) and (6, -8)?

A. No line passes through these points.

B. $y = -\frac{1}{2}x + 4$

C. $y = -2x + \frac{3}{2}$

D. $y = -\frac{1}{2}x + \frac{3}{2}$

E. $y = -2x + 4$

77. Which of the following lines is parallel to $3x + 2y = 7$?

A. $y = \frac{2}{3}x + 10$

B. $y = 3x - 7$

C. $y = \frac{3}{2}x + 11$

D. $y = 2x + 1$

E. $y = -\frac{3}{2}x + 2$

78. What is the equation of the line perpendicular to $x + 5y = 10$ and passing through (2, -6)?

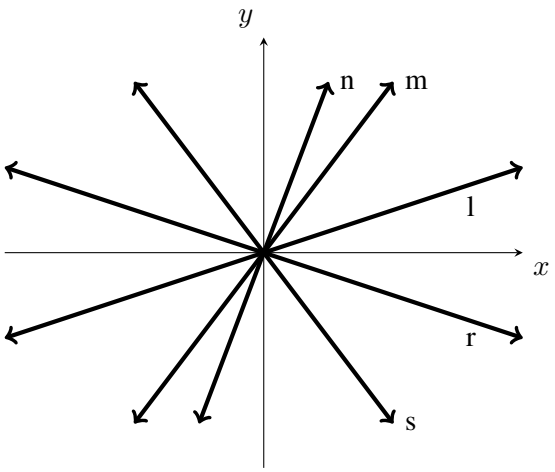
A. $y = -\frac{1}{5}x - \frac{28}{5}$

B. $y = -\frac{1}{5}x - 16$

C. $y = 5x - 16$

D. $y = 5x - \frac{28}{5}$

E. $y = 2x - 6$



79. Five lines l, m, n, r, and s are depicted in the figure above. What is the order of their slopes from least to greatest?

A. $l < r < m < s < n$

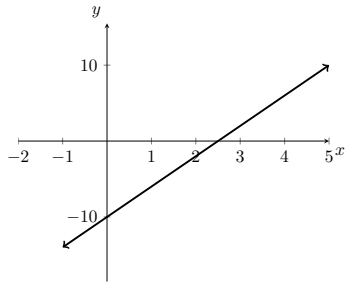
B. $n < m < l < r < s$

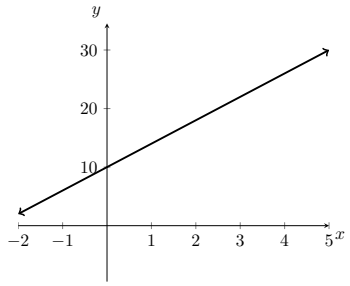
C. $n < s < m < r < l$

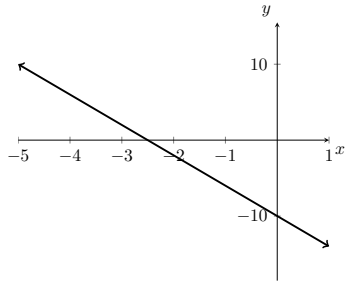
D. $s < r < l < m < n$

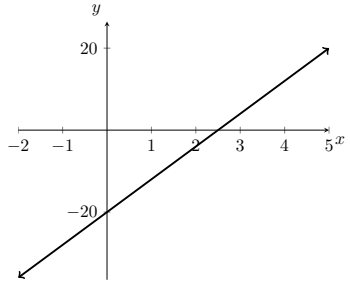
E. $r < s < l < m < n$

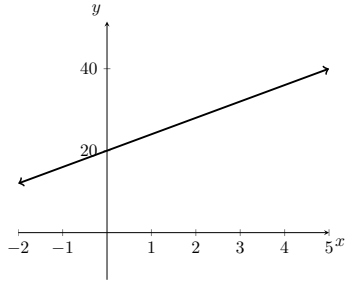
80. The relationship between total sales of socks, x, and profit, y, is given by $8x - 2y = 20$. What is the graph of this equation?

A.


B.


C.


D.


E.


81. What is the midpoint of the line segment connecting $(-2, 0)$ and $(6, 6)$?

A. $(4, 3)$

B. $(8, 6)$

C. $(-8, -6)$

D. $(-4, -3)$

E. $(2, 3)$

82. What is the distance between $(-7, 2)$ and $(6, 10)$?

A. $\sqrt{233}$

B. $\sqrt{145}$

C. 9

D. $\sqrt{65}$

E. $\sqrt{21}$

83. Point P is located at $(3, 4)$ and is rotated 90° counterclockwise about the origin and becomes P'. What are the coordinates of P'?

A. $(-3, -4)$

B. $(4, 3)$

C. $(-3, 4)$

D. $(-4, 3)$

E. $(-4, -3)$

84. Coordinates A $(-4, 2)$, B $(-1, 2)$, and C $(-3, 5)$ form $\triangle ABC$. This triangle is reflected over the y-axis, creating $\triangle A'B'C'$, and this triangle is reflected over the x-axis, creating $\triangle A"B"C"$. What are the coordinates of $A"$?

A. $(1, -2)$

B. $(2, -4)$

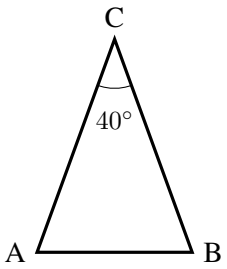
C. $(4, -2)$

D. $(4, 2)$

E. $(-2, 4)$

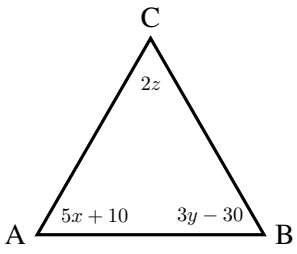
85. Consider the transformation of the standard (x, y) coordinate plane that maps each point (x, y) to the point (kx, ky) for a certain positive constant, k. When this transformation is applied twice to $(3, 6)$, the result is $(\frac{3}{4}, \frac{3}{2})$. What is the value of k?

A. $\frac{1}{2}$
B. $\frac{1}{4}$
C. 0
D. 2
E. 4



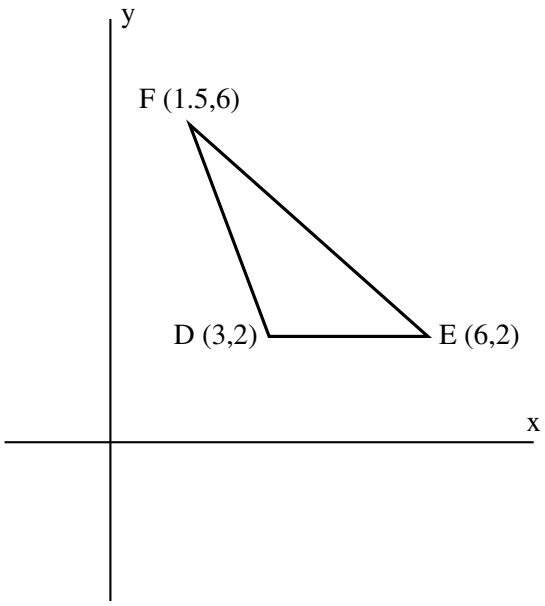
86. In the triangle above, $\overline{AC} \cong \overline{BC}$ and the measure of $\angle C$ is 40°. What is the measure of $\angle A$?

A. 40°
B. 60°
C. 70°
D. 110°
E. 140°



87. Given the equilateral triangle above and the angles with given measures in terms of x, y, and z, what is $x + y + z$?

A. 30
B. 60
C. 70
D. 90
E. 180

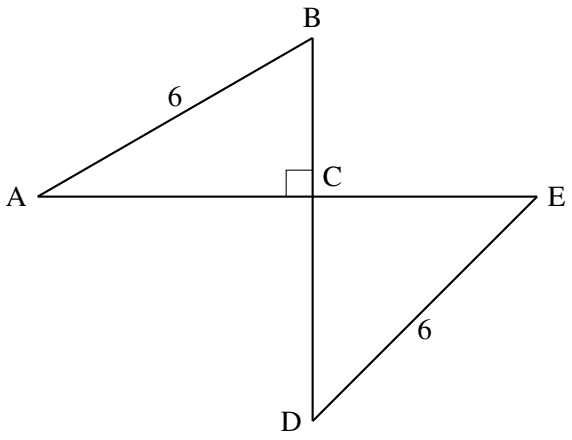


88. What is the length, in coordinate units, of the altitude of the triangle from base $\overline{DE}$?

A. 1.5
B. 3
C. 4
D. 5
E. 6

89. The lengths of the legs of a right triangle are 12 and 13, respectively. Which of the choices is the closest to the length of the hypotenuse?

A. 5.0
B. 12.5
C. 13.5
D. 17.7
E. 25.0



90. In the figure above, $\angle A$ is $30°$ and $\angle D$ is $45°$. What is the length of $\overline{AE}$?

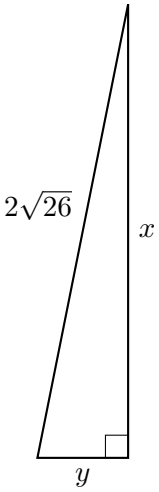
A. $3(\sqrt{3}+\sqrt{2})$

B. $3\sqrt{5}$

C. $3+3\sqrt{2}$

D. $6\sqrt{3}+6\sqrt{2}$

E. 12



Note: Figure not drawn to scale.

91. Regulations require that the incline of a ramp be equal to $\frac{1}{5}$ – that is, the ramp should rise 1 foot vertically for every 5 feet horizontally. If a ramp needs to be $2\sqrt{26}$ feet long, what are its dimensions x and y?

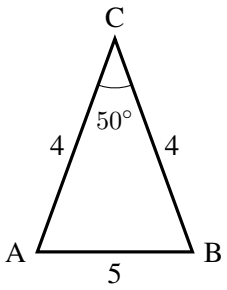
A. $x=2, y=\sqrt{26}$

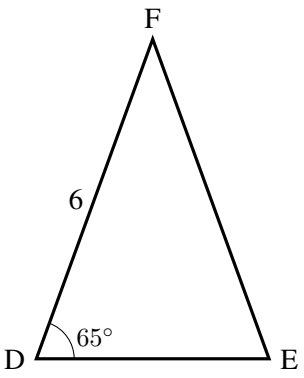
B. $x=2, y=2\sqrt{26}$

C. $x=1, y=\sqrt{26}$

D. $x=1, y=5$

E. $x=2, y=10$





92. Triangles ABC and DEF are shown above. $\overline{DF}$ is congruent to $\overline{EF}$. What is the perimeter of $\triangle DEF$?

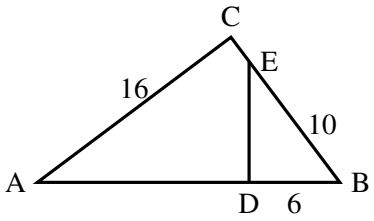
A. 20.5

B. 19.5

C. 18

D. 12

E. 11



93. In the triangles above, $\overline{BC}$ is perpendicular to $\overline{AC}$, and $\overline{DE}$ is perpendicular to $\overline{AB}$. If $EB = 10$, $DB = 6$, and $AC = 16$, what is the length of $\overline{AD}$?

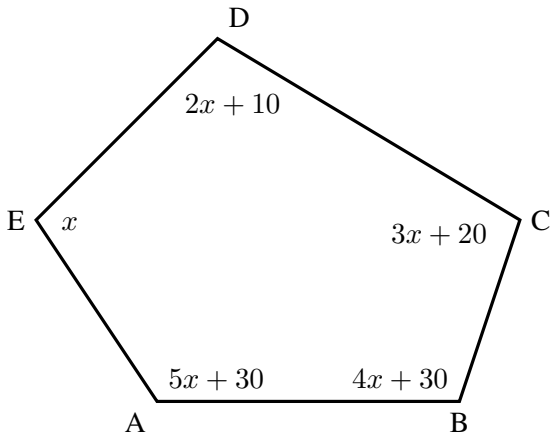
A. 10

B. 12

C. 14

D. 16

E. 20



94. The angles of the pentagon above have angle measures as shown. What is the measure of x?

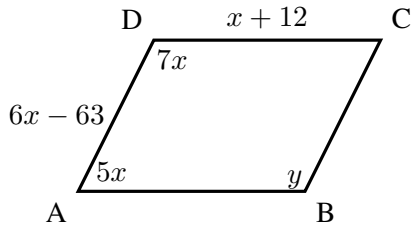
A. 5

B. 10

C. 20

D. 30

E. 40



95. The angle measures and side lengths of parallelogram ABCD are given above. What is the value of y?

A. 105

B. 90

C. 85

D. 75

E. 60

96. The diameter of circle A is three times the sum of the diameter of circle B and 2. If the sum of the circumferences of A and B is 26π, what is the radius of circle A?

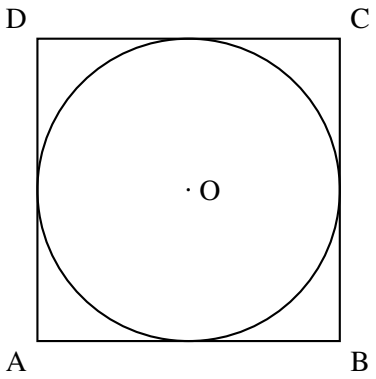
A. 2.5

B. 5

C. 10.5

D. 21

E. 42



97. The area of square ABCD above is 36. What is the area of circle O?

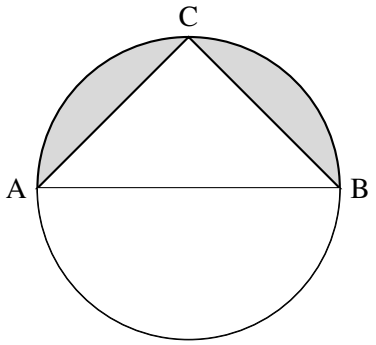
A. 36π

B. 24π

C. 12π

D. 9π

E. 6π



98. In the figure above, $\overline{AC} \cong \overline{BC}$ and $\overline{AC} \perp \overline{BC}$. If the diameter of the circle is 8, what is the area of the shaded region?

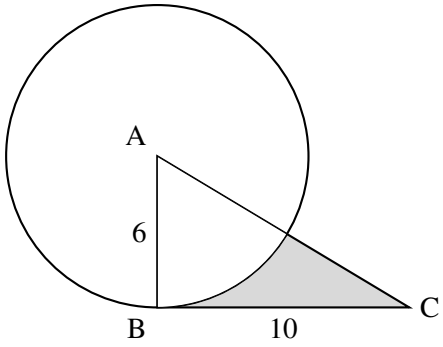
A. $8(\pi - 1)$

B. $8(\pi - 4)$

C. $8(\pi - 2)$

D. 8π

E. 16π



99. Given that $\angle B$ is a right angle, what is the approximate area of the shaded region?

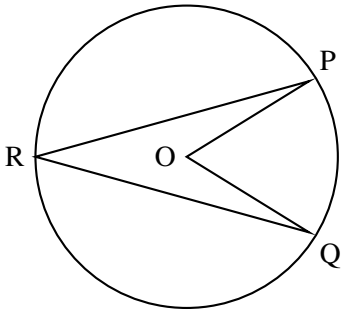
A. 20.3

B. 18.5

C. 15

D. 13.6

E. 11.5



100. If $\angle POQ = s + 44$ and $\angle PRQ = s + 14$, then the measure of arc PQ equals

A. 60°

B. 44°

C. 30°

D. 16°

E. 8°

Media	Number Owned
DVD	25
CD	15
mp3	45
VHS	10
Cassette	5
Book	50
TOTAL	150

101. The table above shows the media in Jennifer's collection. If this data were used to create a circle graph, what would be the central angle for the sector representing CDs?

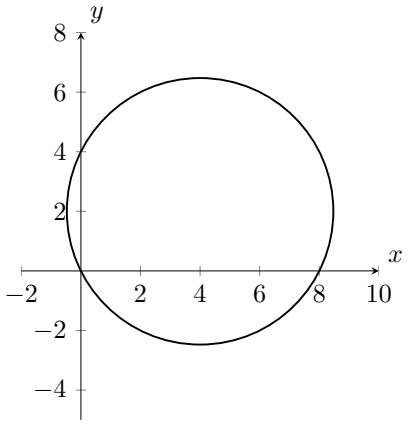
A. $15°$

B. $30°$

C. $36°$

D. $60°$

E. $120°$



102. The circle above is centered at $(4, 2)$. What is the equation of this circle?

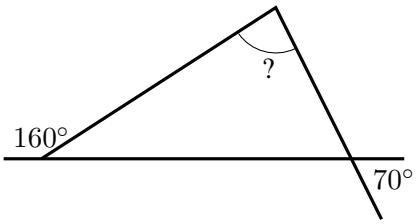
A. $(x+4)^2 + (y+2)^2 = \sqrt{20}$

B. $(x+4)^2 + (y+2)^2 = 20$

C. $(x-4)^2 + (x-2)^2 = 400$

D. $(x-4)^2 + (x-2)^2 = 20$

E. $(x-4)^2 + (x-2)^2 = \sqrt{20}$



Note: Figure not drawn to scale.

103. Given the triangle and angle measures given above, what is the measure of the missing angle?

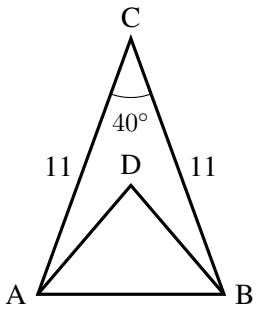
A. $110°$

B. $100°$

C. $90°$

D. $80°$

E. $70°$



104. In the figure above, $\overline{AD}$ bisects $\angle CAB$, and $\overline{BD}$ bisects $\angle CBA$. If $\overline{AC} = \overline{BC} = 11$, what is the measure of $\angle ADB$?

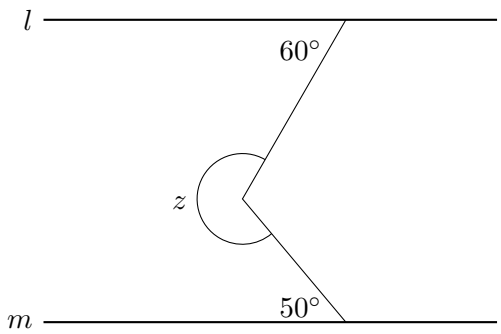
A. $40°$

B. $50°$

C. $70°$

D. $110°$

E. $140°$



105. Given that line l is parallel to line m and the angle measures above, what is the measure of z?

A. $110°$

B. $170°$

C. $210°$

D. $250°$

E. $300°$

106. In the trapezoid above, $\overline{AB} \cong \overline{CD}$, $BC = 13$ and $AD = 23$. If the height of the trapezoid is 12, what is the perimeter of trapezoid $ABCD$?

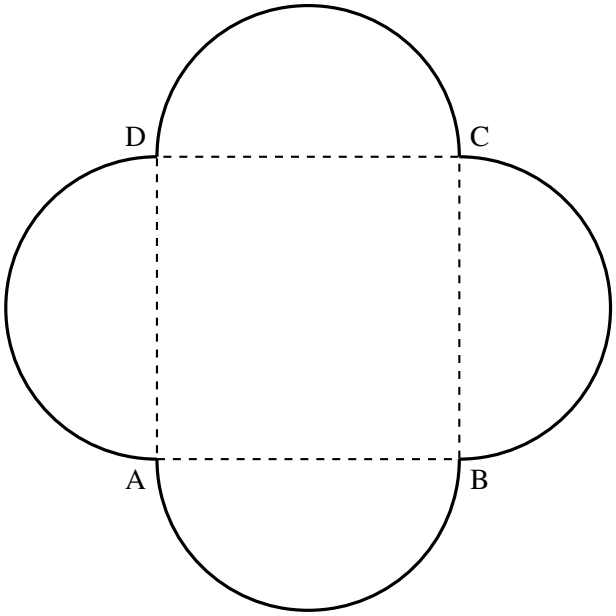
A. 46

B. 58

C. 62

D. 74

E. 86



107. The perimeter of the figure above, a square surrounded by four semicircles, is 30π. What is the perimeter of square $ABCD$?

A. 15

B. 30

C. 60

D. 90

E. 120

108. The perimeter of a triangle is 90. The sides are in the ratio 1:2:3. What is the length of the longest side?

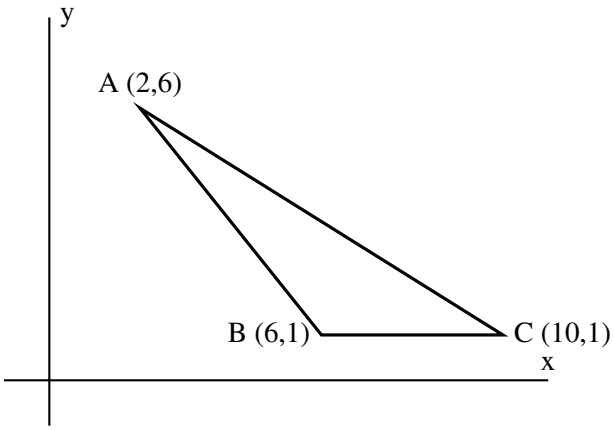
A. 45

B. 30

C. 15

D. 10

E. 3



109. The area of the triangle above is equal to the area of circle O. What is the diameter of circle O?

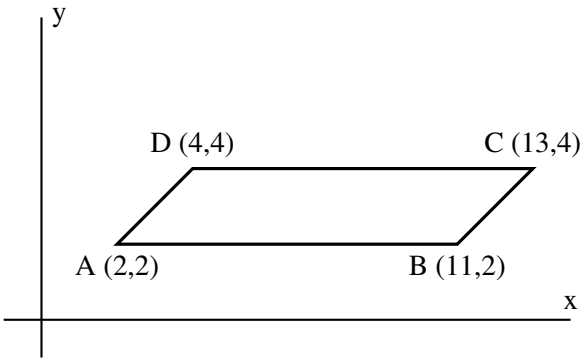
A. $2\sqrt{\frac{10}{\pi}}$

B. $\sqrt{\frac{10}{\pi}}$

C. $\frac{1}{2}\sqrt{\frac{10}{\pi}}$

D. $2\sqrt{10}$

E. $\sqrt{10}$



110. What is the area of parallelogram $ABCD$?

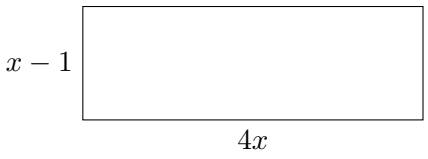
A. $9\sqrt{2}$

B. 9

C. $18\sqrt{2}$

D. 18

E. Cannot be determined from the information given.



111. The rectangle above has area equal to $84 + 12x$. What are all the possible values of x?

A. 3, -7

B. 3

C. -3

D. 7, -3

E. 7

112. One base of trapezoid is three times the size of the other base. If the height of the trapezoid is equal to the smaller of the two bases, and if the area of the trapezoid is 32, what is the height of the trapezoid?

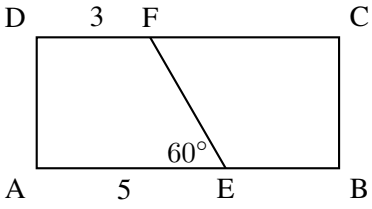
A. 20

B. 16

C. 12

D. 8

E. 4



113. As shown above, $\overline{FE}$ divides rectangle $ABCD$ into two congruent trapezoids. The measure of $\angle AEF$ is 60°, $AE = 5$, and $DF = 3$. What is the area of rectangle $ABCD$?

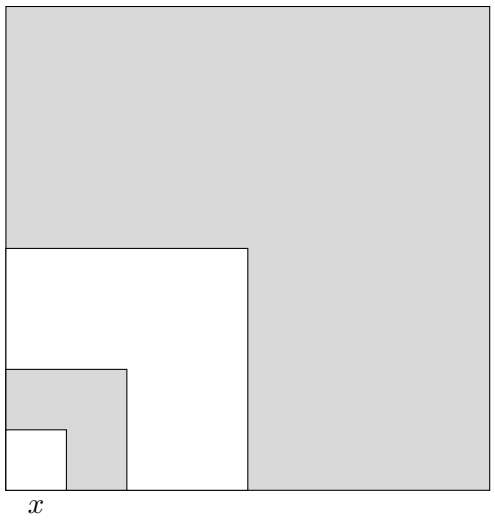
A. $16\sqrt{3}$

B. $16\sqrt{2}$

C. $8\sqrt{3}$

D. $8\sqrt{2}$

E. 24



114. The figure above is composed of squares on top of squares. The first (smallest) square has side length x. The next square has a side length double the side length of the first, and each square thereafter has a side length double the length of the previous square. What is the area of the shaded region in terms of x?

A. $64x^2$

B. $51x^2$

C. $48x^2$

D. $33x^2$

E. $13x^2$

115. A rectangular box is $\frac{1}{2}$ inch deep, $\frac{1}{2}$ inch wide, and 1 inch long. What is its volume in cubic inches?

A. 2

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

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

D. $\frac{1}{8}$

E. 1

116. A cylindrical holding tank has a height of 10 feet and a radius of 6 feet. Cylindrical drums with a height of 2 feet and radius of 1 foot are filled with toxic waste and need to be transferred to this holding tank. Twenty filled drums are poured into the holding tank. How many more drums can be poured into the holding tank without overflowing?

A. 180

B. 160

C. 120

D. 60

E. 30

117. A sphere of ectoplasm with radius 2 feet is poured into a container in the shape of a cube with an edge equal to 5 feet. Assuming the ectoplasm spreads evenly throughout the container, approximately how high is the ectoplasm in the container in feet? (Volume of sphere = $\frac{4}{3}\pi r^3$)

A. 1.3

B. 3.7

C. 5

D. 6.7

E. 9.0

118. A cone (volume = $\frac{1}{3}\pi r^2 h$) has a volume of 100. The cone's height is halved and its radius is doubled. What is the new volume of the cone?

A. 25

B. 50

C. 100

D. 200

E. 400

119. Jill is putting blocks into a toy chest. The blocks has dimensions of 2 x 2 x 2 inches. The toy box has dimensions of 3 x 2 x 2 feet. What is the maximum number of blocks that can fit in the toy chest?

A. 10368

B. 2592

C. 648

D. 18

E. 1.5

120. José is decorating his cube shaped room. He wants to cover the walls (not the floor or ceiling) with posters. If his room has a volume of 1000 ft^3, and each poster is 1 x 2 feet, what is the maximum number of posters that can fit on the four walls without overlap?

A. 4000

B. 1000

C. 500

D. 400

E. 200

121. Points A, B, C, and D are on a number line. B is between A and C. D is between B and C. Which of the following must be true?

A. $BD > CD$

B. $BD < CD$

C. $AB > BC$

D. $CD < BC$

E. $AD > CD$

If it rained today, the street is wet.

122. If the above statement is true, which of the following statements must be true?

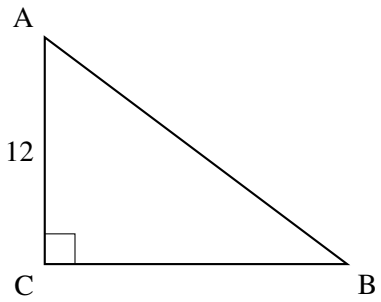
A. If the street is not wet, it rained today.

B. If the street is not wet, it did not rain today.

C. If the street is wet, it rained today.

D. If it did not rain today, the street is not wet.

E. If it did not rain today, the street is wet.



123. If the $\tan B = \frac{3}{4}$, then the $\sin A$ =

A. $\frac{3}{4}$

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

C. $\frac{4}{5}$

D. $\frac{5}{4}$

E. $\frac{4}{3}$

124. In a right triangle ABC with $\angle C = 90°$, $\sin A = \frac{99}{101}$. What is the $\sin B$?

A. $\frac{2}{101}$

B. $\frac{2}{99}$

C. $\frac{20}{99}$

D. $\frac{20}{101}$

E. $\frac{99}{101}$

125. The angle of elevation to the top of a building from a spot on level ground 500 feet from the base of the building is $50°$. Which of the following is the approximate height of the building in feet?

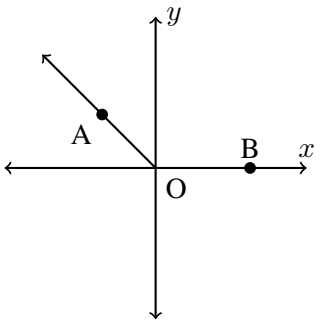
A. 296

B. 321

C. 383

D. 420

E. 596



126. If $\angle AOB = 135$ and $AO = 1$, what are the coordinates of A?

A. $(-\frac{\sqrt{3}}{2}, \frac{1}{2})$

B. $(-\frac{1}{2}, \frac{\sqrt{3}}{2})$

C. $(-\frac{\sqrt{2}}{2}, \frac{1}{2})$

D. $(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$

E. $(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

127. Olly is shooting a bow and arrow to a target at the top of a tree. He is standing 36 meters from the base of the tree, and the arrow leaves his bow from a point 2 meters above the ground. If the tree is 100 meters tall, at what angle does Olly need to fire the bow with respect to the level ground to hit his target?

A. $\sin^{-1}(\frac{98}{36})$

B. $\tan^{-1}(\frac{98}{36})$

C. $\sin^{-1}(\frac{100}{36})$

D. $\tan^{-1}(\frac{100}{36})$

E. $\cos^{-1}(\frac{100}{36})$

128. The mean of Bruce's first 8 history test scores is 63. The final exam counts twice in his average. For example, if he scores an 84 on the final, two scores of 84 will be averaged with his previous 8 tests. What is the minimum score Bruce needs to earn on the final exam if he wants his average to be a 65?

A. 73

B. 74

C. 75

D. 76

E. 77

Number of Days	Amount Spent Per Day
6	$18
3	$20
2	$24
2	$48
1	$108

129. Shaun went on a 14-day business trip and set his daily food budget at $20 per day. The table above shows how much Shaun spent per day on his trip. Unfortunately, Shaun went over budget. On average, how much less should he have spent per day in order to have spent an average of $20 per day?

A. $10

B. $20

C. $40

D. $100

E. $140

130. Henrietta hired a tutor to help her improve her math scores. While working with the tutor, she took four tests. She scored 10 points better on the second test than she did on the first, 20 points better on the third test than on the first, and 30 points better on the fourth test than on the first. If the mean of these four tests was 70, what was her score on the third test?

A. 55

B. 65

C. 75

D. 85

E. 95

131. Jane has a list of 11 integers with median m. She adds the numbers $m + 10$ and $m - 10$ to the list. All the numbers of the list are then doubled. What is the new median?

A. m

B. $2m$

C. $2m + 20$

D. $2m - 20$

E. It cannot be determined from the information given.

Donation Range	Frequency
$2001-$2700	1
$1001-$2000	3
$501-$1000	6
$101-$500	8
$51-$100	10
$0-$50	12

132. A set of 40 donations to a presidential campaign from a local district are shown in the table above. Which donation range contains the median of the donations?

A. $51-$100

B. $101-$500

C. $501-$1000

D. $1001-$2000

E. $2001-$2700

A: 10, 6, 8, 4, 9, 3
B: 1, 3, 10, 7, 9, 8, 100

133. Two lists of numbers, A and B, are shown above. The median of list A $= x$ and the median of list B $= y$. What is $2x - y$?

A. -1
B. 6
C. 7
D. 8
E. 9

134. Given a set of 901 numbers, if all the numbers of the set are increased by 10, which of the following properties of the list does not change?

I. median
II. mode
III. range

A. I only
B. II only
C. III only
D. I and II only
E. I and III only

135. A bag contains 20 pieces of candy: 6 cherry, 8 orange, 4 grape, and 2 lemon. If one piece is selected randomly from the bag, what is the probability of selecting one orange or one lemon?

A. $\frac{1}{10}$
B. $\frac{1}{5}$
C. $\frac{1}{4}$
D. $\frac{2}{5}$
E. $\frac{1}{2}$

136. A basket contains 30 balls numbered from 1 to 30. What is the probability that a ball drawn at random will have a prime number?

A. 0
B. $\frac{3}{10}$
C. $\frac{1}{3}$
D. $\frac{11}{30}$
E. $\frac{2}{5}$

137. A deck of cards are marked with the letters A, B, C, and D. There are twice as many A cards as B cards and two more C cards than A cards. There are 31 D cards. If the probability of drawing a D card is $\frac{1}{3}$, what is the probability of drawing a C card?

A. $\frac{34}{65}$
B. $\frac{26}{93}$
C. $\frac{1}{2}$
D. $\frac{2}{3}$
E. $\frac{11}{78}$

A: $\{4, 0, -1, -3\}$
B: $\{5, 3, 2, 0\}$

138. If one number a is drawn from set A and one number b is drawn at random from Set B, what is the probability that $b - a < 0$?

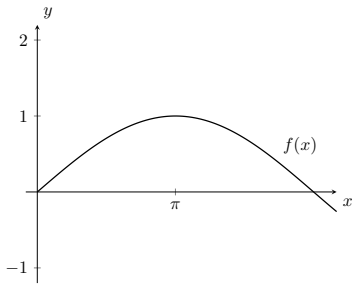
A. $\frac{1}{8}$
B. $\frac{3}{16}$
C. $\frac{1}{4}$
D. $\frac{7}{8}$
E. $\frac{13}{16}$

ADVANCED PROBLEMS

139. What is the amplitude of

$$f(x) = 4\cos(\frac{1}{2}x - 3) + 5$$

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



140. What is the period of the function f(x) depicted above?

A. $\frac{1}{2}$
B. 2
C. π
D. 2π
E. 4π

141. What is the period of

$$f(x) = 6\cos(\pi x - \frac{\pi}{2})$$

A. 6
B. $\frac{\pi}{2}$
C. π
D. 2π
E. 2

142. Which of the following is equivalent to

$$\frac{\tan^2 x}{\sec^2 x} - \csc^2 x \sin^2 x$$

A. $-\cos^2 x$
B. $\cos^2 x$
C. $\frac{\sin^2 x}{\cos^4 x} - 1$
D. $\sin^2 x - \tan^2 x$
E. 0

$$\frac{\sin^4 x + \sin^2 x \cos^2 x}{\cos^2 x}$$

143. Which of the following is equivalent to the above expression?

A. $\sin^2 x$

B. $\tan^2 x$

C. $\sin^4 x + \sin^2 x$

D. $\sin^6 x$

E. 1

144. What are the values of θ between 0 and 2π when $2\sin\theta = 1$?

A. $\frac{\pi}{6}, \frac{11\pi}{6}$ only

B. $\frac{\pi}{6}$ only

C. $\frac{5\pi}{6}$ only

D. $\frac{\pi}{6}, \frac{5\pi}{6}$ only

E. No solutions

145. What are the values of θ that satisfy $2\cos^2\theta - \cos\theta = 1$ when $0° \leq \theta < 360°$?

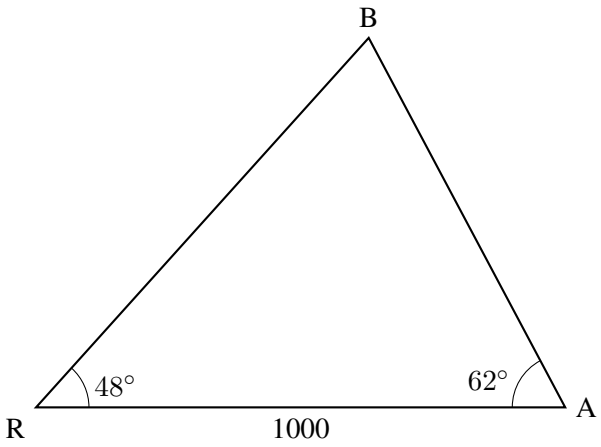
A. $0°$

B. $0°, 120°, 240°$

C. $0°, 60°$

D. $120°, 240°$

E. $0°, 60°, 120°, 240°$



146. A radar station located at point R locates two boats at positions A and B. If the distance between R and A is 1000 m, which expression gives the distance, in meters, between boats A and B?

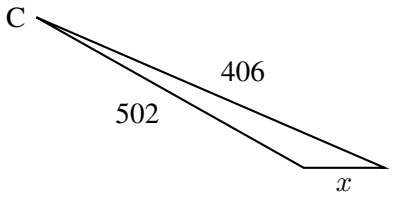
A. $\frac{1000}{\sin 70}$

B. $\frac{1000}{\sin 62}$

C. $1000\tan 48$

D. $\frac{\sin 70}{1000\sin 48}$

E. $\frac{1000\sin 48}{\sin 70}$



147. If the measure of $\angle C$ is $6°$, what is the value of x?

A. $502\tan 6$

B. $\sqrt{406^2 + 502^2 - 2(406)(502)\cos 6}$

C. $406^2 + 502^2 - 2(406)(502)\cos 6$

D. $\sqrt{502^2 + 406^2}$

E. $\frac{502 + 406}{2}$

148. A triangle has sides 10 and 12. What is <u>not</u> a possible length of the third side?

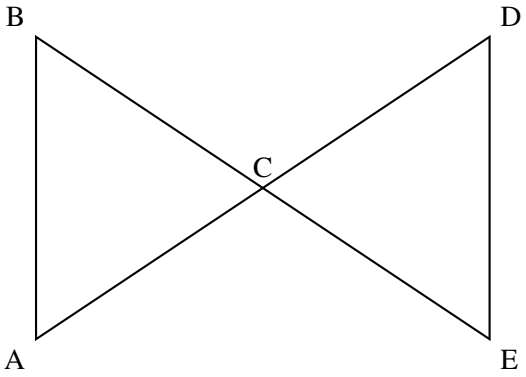
A. 3

B. 4

C. 10

D. 20

E. 22



149. In figure above, C is the midpoint of $\overline{AD}$ and $\overline{BC} \cong \overline{CE}$. Which of the following theorems can be used to prove that $\triangle ABC \cong \triangle CDE$?

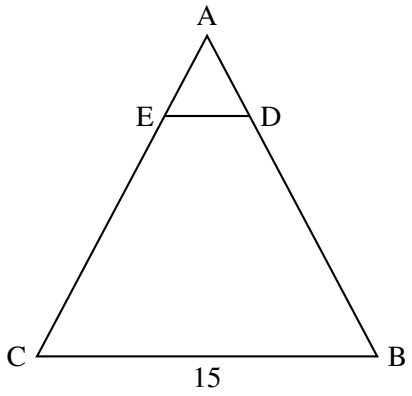
A. SSA

B. SSS

C. ASA

D. SAS

E. The triangles are not congruent.



150. In the isosceles triangle above, ED is parallel to BC, D is on AB, and E is on AC. The ratio of $AD : DB$ is 1:3. If $AC = 16$, what is the perimeter of $BCED$?

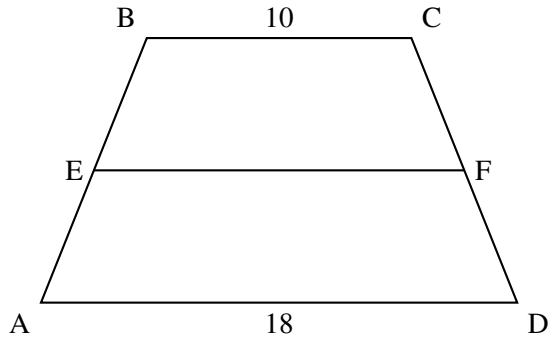
A. 42.75

B. 44

C. 47

D. 52

E. 54.25



151. In the trapezoid above, E and F are midpoints of sides AB and CD. If the height of trapezoid $ADFE$ is 5, what is the area of trapezoid $ADFE$?

A. 70

B. 80

C. 90

D. 140

E. 160

152. The growth of a population of bacteria is modeled by the equation $B(t) = 120(1.05)^t$, where t is the time in minutes. What is the approximate population of the bacterial colony after 2 hours?

A. 130

B. 250

C. 2250

D. 42000

E. 45000

153. The half life of a radioactive substance is the amount of time it takes for one half of the substance to decay. Phosphorous-32 (P-32) has a half life of 14 days. If you start with a 200 g sample of P-32, how many grams of P-32 remain (i.e. how much has not yet decayed) after 56 days?

A. 3200

B. 187.5

C. 50

D. 25

E. 12.5

154. Marcia opens up a high interest savings account that earns 3% annual interest, compounded daily. If she deposits $3000 dollars and neither deposits nor withdraws any money, which of the following expressions shows the amount of money in her account after t years?

A. $3000e^{.03t}$

B. $3000(1.03)^t$

C. $3000(1 + \frac{.03}{365})^{365t}$

D. $3000(1.03)^{\frac{t}{365}}$

E. $3000 + 365(3000)(.03)(t)$

$$f(x) = \frac{6 - x}{x^2 - 3x}$$

155. The domain of the function above is all real numbers except

A. 6

B. 0

C. 3

D. 0, 3

E. 0, 3, 6

$$f(x) = \frac{(x - 7)(x + 2)}{(x - 3)(x + 3)(x + 1)}$$

156. At what values of x does the function above have vertical asymptotes?

A. 0, 3

B. $7, -2$

C. $-3, -1, 3$

D. $3, -3, 1$

E. $-3, -2, -1, 3, 7$

157. What is the range of $y = x^2 + 2$?

A. $y > 0$

B. $y \geq -2$

C. $y \geq 0$

D. $y \geq 2$

E. all real numbers

$$f(x) = \frac{3x^3 + 3x^2 - 6}{2x^3 - 10x}$$

158. What is the equation of the horizontal asymptote of the function above?

A. $y = 3$

B. $y = \frac{3}{2}$

C. $y = -2$

D. $y = -5$

E. $y = 1$

159. Given $\log_{2x}(3x^2+9)=2$ and $x>0$, what is the value of x?

A. No values of x satisfy the equation.

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

C. 1

D. 2

E. 3

160. If $\log_b r = x$ and $\log_b s = y$, then $\log_b(\frac{r^2}{s^3}) =$

A. $\frac{x^2}{y^3}$

B. x^2y^3

C. x^2-y^3

D. $2x-3y$

E. $6xy$

161. $3\begin{bmatrix}0&1\\2&3\end{bmatrix}+3\begin{bmatrix}-2&3\\-3&2\end{bmatrix}=$

A. $3\begin{bmatrix}0&3\\-6&6\end{bmatrix}$

B. $\begin{bmatrix}0&9\\-18&18\end{bmatrix}$

C. $\begin{bmatrix}-6&12\\-3&15\end{bmatrix}$

D. $\begin{bmatrix}-6&12\\-1&5\end{bmatrix}$

E. $\begin{bmatrix}-2&4\\-1&5\end{bmatrix}$

$$A=\begin{bmatrix}4\\3\\2\end{bmatrix}\quad B=\begin{bmatrix}6&3\\2&4\\1&0\end{bmatrix}\quad C=\begin{bmatrix}3&0&2\\-2&6&4\\4&3&2\\8&9&0\end{bmatrix}$$

162. Which matrix product is defined?

A. AC

B. AB

C. BA

D. CB

E. BC

163. What is the product of $\begin{bmatrix}4&0&-1\\2&2&6\end{bmatrix}$ and $\begin{bmatrix}1\\2\\3\end{bmatrix}$?

A. $\begin{bmatrix}4&0&-1\\4&4&12\end{bmatrix}$

B. $\begin{bmatrix}11\\16\end{bmatrix}$

C. $\begin{bmatrix}1\\24\end{bmatrix}$

D. $\begin{bmatrix}5&2&2\\3&4&9\end{bmatrix}$

E. $\begin{bmatrix}4&0&-3\\2&4&18\end{bmatrix}$

164. A bag is filled with 4 green balls, 5 yellow balls, and 3 red balls. One ball is drawn at random and put back into the bag. A second ball is then drawn at random. What is the probability of drawing a red ball first AND a red ball second?

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

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

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

D. $\frac{1}{9}$

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

165. A bag is filled with 4 green balls, 5 yellow balls, and 3 red balls. One ball is drawn at random and put back into the bag. A second ball is then drawn at random. What is the probability of drawing AT LEAST one red ball?

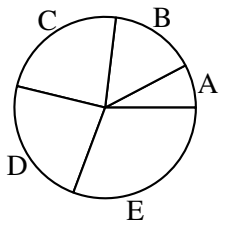
A. $\frac{1}{16}$

B. $\frac{1}{8}$

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

D. $\frac{7}{16}$

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



166. In the pie chart above, the central angles of sectors A, B, C, D, and E are in the ratio of 1:2:3:3:4, respectively. If a point inside the pie chart is selected randomly, what is the probability that the point is located in sector E?

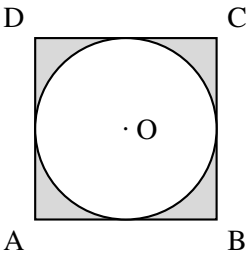
A. $\frac{9}{13}$

B. $\frac{4}{11}$

C. $\frac{4}{12}$

D. $\frac{4}{13}$

E. $\frac{1}{90}$



167. Circle O is inscribed in square $ABCD$. The radius of circle O is 1. If a point inside the square is selected randomly, what is the probability that the point is located in the shaded region?

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

B. $\frac{4-\pi}{4}$

C. $1-\pi$

D. $\frac{1+\pi}{4}$

E. $\frac{36}{36+\pi}$

Probability	Prize
50%	$0
25%	$2
15%	$5
5%	$20
4%	$100
1%	$1000

168. Parker buys a raffle ticket. The table above shows the probability of winning a prize and the value of that prize. What is the expected value of Parker's ticket?

A. $188.00

B. $11.27

C. $20.00

D. $0

E. $16.25

$$2x + 3y = 12$$

$$ax + 3by = 6$$

169. For what values of a and b does the system of equations above have no solution?

A. $a = 2$; $b = 3$

B. $a = 2$; $b = 2$

C. $a = 4$; $b = 2$

D. $a = 4$; $b = 6$

E. $a = 6$; $b = 6$

$$2x + 3y = 12$$

$$ax + 3by = 6$$

170. For what values of a and b does the system of equations above infinite solutions?

A. $a = 1$; $b = .5$

B. $a = 1$; $b = 1$

C. $a = 2$; $b = 1$

D. $a = 2$; $b = 2$

E. $a = 4$; $b = 2$

$$f(x) = 2x^2 + 12x + 11$$

171. What is the minimum value of the above function?

A. 65

B. 43

C. 11

D. -7

E. -43

172. Austin has 5 sweaters, 3 shirts, 6 pairs of pants, and 4 pairs of shoes. If he wears one of each type of clothing, how many total outfits could he create out of this wardrobe?

A. 18

B. 56

C. 360

D. 480

E. 720

173. Adam, Brenda, Carl, and Dana will arrange themselves in a line. If Brenda will NOT be first, how many different orders can they arrange themselves in?

A. 256

B. 192

C. 81

D. 24

E. 18

174. How many ways are there to arrange the letters TALLAHASSEE if all letters must be used?

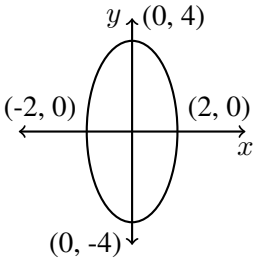
A. $\frac{11!}{3! \cdot 2! \cdot 2! \cdot 2!}$

B. $11!$

C. $\frac{11!}{3! \cdot 2!}$

D. $2!$

E. $\frac{11!}{24!}$



175. The ellipse in the above intersects the x and y axes at the points shown. What is the equation of this ellipse?

A. $x^2 + y^2 = 64$

B. $\frac{x^2}{4} - \frac{y^2}{16} = 1$

C. $\frac{x^2}{4} + \frac{y^2}{8} = 1$

D. $\frac{x^2}{4} + \frac{y^2}{16} = 1$

E. $\frac{x^2}{2} + \frac{y^2}{4} = 1$

$$\frac{(x-6)^2}{16} - \frac{y^2}{25} = 1$$

176. What is the shape of the above equation when it is graphed?

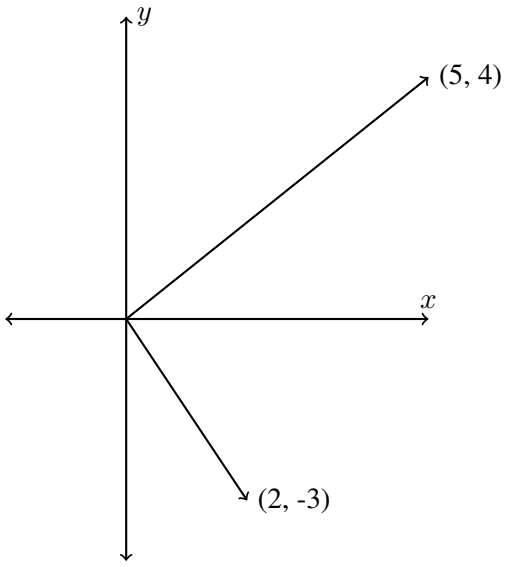
A. line

B. circle

C. ellipse

D. hyperbola

E. parabola



177. Vector **a** terminates at the point (5, 4) and vector **b** terminates at the point (2, -3). What is the length of the vector that results from the sum of **a** and **b**?

A. $\sqrt{10}$

B. 5

C. $5\sqrt{2}$

D. 8

E. 50

178. If $< 6, 3 > + < x, y >$ = $< 4, 4 >$, then $< x, y >$ =

A. $< -2, -1 >$

B. $< 6, 3 >$

C. $< -2, 1 >$

D. $< 4, 4 >$

E. $< 2, -1 >$

179. $\frac{6+i}{2-i} =$

A. -3

B. 7

C. $\frac{11}{5}$

D. $\frac{11+8i}{5}$

E. $\frac{13+8i}{3}$

180. If $i = \sqrt{-1}$, then $i^{21} =$

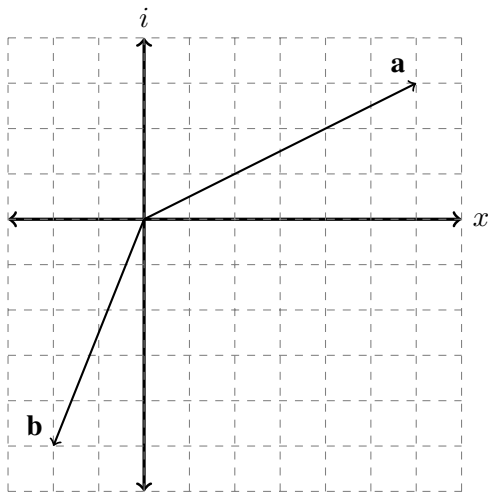
A. 0

B. $-i$

C. 1

D. i

E. -1



181. What is **a** + **b** in $a + bi$ form?

A. 12

B. $-12 + 15i$

C. $8 + 8i$

D. $8 + 4i$

E. $4 - 2i$

$2, 7, 12, 17, ...$

182. Given the arithmetic sequence above, what is the 19th term?

A. 88

B. 90

C. 92

D. 95

E. 97

$2, 7, 12, 17, ...$

183. Given the arithmetic sequence above, what is the sum of the first 30 terms?

A. 152

B. 860

C. 1635

D. 2235

E. 2310

$$\frac{1}{2}, \frac{1}{3}, \frac{2}{9}, \ldots$$

184. Given the geometric sequence above, what is the 6th term?

A. $\frac{8}{81}$

B. $\frac{13}{18}$

C. $\frac{2}{243}$

D. $\frac{16}{243}$

E. $\frac{5}{27}$

185. John and Lisa race around a track that is 1000m long per lap. They run 4 laps, and John takes 10 minutes longer to finish. If Lisa finishes the 4 laps in 20 minutes, how much slower is John's average speed in km/hr than Lisa's?

A. 1

B. 2

C. 4

D. 8

E. 12

186. Bob can paint a fence in 6 hours and Clyde can paint the fence in 9 hours. If they work together, how long will it take for them to finish the fence?

A. $\frac{1}{15}$ hour

B. 3 hr

C. 3.6 hr

D. 7 hr

E. 15 hr

187. Which of the following polar coordinates represents the same location as $(6, 30°)$?

A. $(6, 150°)$

B. $(6, -150°)$

C. $(6, 330°)$

D. $(6, -210°)$

E. $(6, -330°)$

Answer Key

Complete video solutions for all problems and review of all concepts, as well as an ACT Math Fact & Formulas Sheet, can be found in the ACT Math Bootcamp - go to

http://rprep.co/actmathbc

1) D	20) D	39) A	58) C	77) E
2) C	21) C	40) B	59) C	78) C
3) C	22) B	41) D	60) A	79) D
4) A	23) C	42) E	61) C	80) A
5) B	24) B	43) C	62) B	81) E
6) D	25) B	44) A	63) B	82) A
7) A	26) A	45) D	64) D	83) D
8) E	27) D	46) E	65) B	84) C
9) B	28) E	47) B	66) B	85) A
10) D	29) B	48) E	67) A	86) C
11) C	30) A	49) C	68) B	87) C
12) B	31) B	50) B	69) B	88) C
13) B	32) E	51) C	70) C	89) D
14) E	33) C	52) C	71) E	90) A
15) B	34) C	53) E	72) D	91) E
16) B	35) A	54) B	73) D	92) B
17) E	36) D	55) B	74) A	93) C
18) D	37) D	56) C	75) C	94) D
19) A	38) E	57) E	76) E	95) A

96) C
97) D
98) C
99) E
100) A
101) C
102) D
103) C
104) D
105) D
106) C
107) C
108) A
109) A
110) D
111) E
112) E
113) A
114) B
115) C
116) B
117) A
118) D
119) B
120) E
121) D
122) B
123) C
124) D
125) E
126) D
127) B
128) A
129) A
130) C
131) B
132) A
133) B
134) C
135) E
136) C
137) B
138) B
139) D
140) E
141) E
142) A
143) B
144) D
145) B
146) E
147) B
148) E
149) D
150) A
151) B
152) D
153) E
154) C
155) D
156) C
157) D
158) B
159) E
160) D
161) C
162) D
163) C
164) C
165) D
166) D
167) B
168) E
169) C
170) A
171) D
172) C
173) E
174) A
175) D
176) D
177) C
178) C
179) D
180) D
181) E
182) C
183) D
184) D
185) C
186) C
187) E