



Chapter 10
Practice Test 2



ACT MATHEMATICS TEST

60 Minutes—60 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then darken the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed:

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

1. In a geometric sequence, the quotient of any two consecutive terms is the same. If the third term of a geometric sequence is 8 and the fourth term is 16, then what is the second term?

- A. -8
- B. -4
- C. 2
- D. 4
- E. 8

2. If the function $f(a, b)$ is defined as $f(a, b) = 2ab - (a + b)$, then $f(3, 4) = ?$

- F. 7
- G. 17
- H. 21
- J. 24
- K. 31

3. The Korean BBQ taco truck sells short rib tacos for 99¢. Christine has only pennies, nickels, dimes, and quarters in her purse. If she wants to pay with exact change, then what is the fewest number of coins Christine can use to buy a 99¢ taco?

(Note: Assume any sales tax is included in the price.)

- A. 6
- B. 7
- C. 8
- D. 9
- E. 10

4. What is the area, in square inches, of a square with a side length of 8 inches?

- F. 8
- G. 16
- H. 24
- J. 32
- K. 64

DO YOUR FIGURING HERE.

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DO YOUR FIGURING HERE.

5. If $x = 3$, then the expression $\frac{(x+1)^2}{x^2-1}$ is equal to:

- A. 2
- B. $\frac{1}{2}$
- C. 0
- D. $-\frac{1}{2}$
- E. -8

6. Which of the following is NOT a factor of 1,776 ?

- F. 12
- G. 16
- H. 18
- J. 24
- K. 37

7. Lauren's world history teacher needs to select one of his 19 students to lead the class in song. Lauren's teacher decides that the song leader, who will be chosen at random, CANNOT be any of the 4 seniors in the class. What is the probability that Lauren, who is NOT a senior, will be chosen?

- A. 0
- B. $\frac{1}{19}$
- C. $\frac{1}{15}$
- D. $\frac{4}{19}$
- E. $\frac{15}{19}$

8. If $4(x-5) + x = 45$, then $x = ?$

- F. 5
- G. 8
- H. 9
- J. 10
- K. 13

9. Joe rents a car to drive across the state to visit his family for Thanksgiving. The car rental company charges Joe \$112 for the weekend rental, plus \$0.99 for each mile he drives. If Joe drives the rental car m miles, then which of the following expressions gives Joe's total cost, in dollars, for renting the car?

- A. $0.99m - 112$
- B. $0.99m + 112$
- C. $49.95m$
- D. $112m + 0.99$
- E. $112.99m$

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10. Stella wants to buy a scooter for \$4,800. A loan company offers to finance the purchase in return for payments of \$130 a month for 4 years. If Stella were to finance the scooter, then how much more than the purchase price of the scooter will Stella have paid at the end of the 4-year period?

F. \$ 520
 G. \$ 780
 H. \$1,040
 J. \$1,300
 K. \$1,440

DO YOUR FIGURING HERE.

11. The expression $\frac{20y^8}{4y^2}$ is equivalent to:

A. $5y^4$
 B. $5y^6$
 C. $5y^8$
 D. $16y^4$
 E. $16y^6$

12. Which of the following is equal to $\frac{3 - \frac{1}{2}}{2 + \frac{3}{4}}$?

F. $\frac{10}{11}$
 G. 2
 H. 12
 J. 20
 K. $\frac{55}{2}$

13. Point C is at 3.5 on the real number line. If Point D is also on the real number line and is 8.5 units from C , then which of the following are the possible locations of D ?

A. -12 and -5
 B. -12 and 5
 C. -5 and 5
 D. 12 and -5
 E. 12 and 5

14. The mean of 4 numbers in a data set is 7. If 3 of these numbers are 2, 4, and 10, then which of the following is the fourth number?

F. 4
 G. 7
 H. 8
 J. 10
 K. 12

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15. Motorcars, Inc. made \$1,489,000 in net profit in 2007. In 2009, Motorcars, Inc. made \$1,725,000 in net profit. If the net profit increased linearly from 2007 through 2009, then what was the net profit earned in 2008 ?

- A. \$1,607,000
- B. \$1,698,000
- C. \$1,724,000
- D. \$1,779,000
- E. \$1,842,000

16. The art teacher at Valley High School is decorating her classroom by reproducing famous pictures on her walls. She has a picture 8 inches wide and 10 inches tall that she wants to replicate to scale on the wall. If the painting on the wall will be 6 feet tall, then approximately how wide will the painting be, in feet?

- F. 5
- G. 7
- H. 9
- J. 11
- K. 13

17. The equation of line l in standard form is $5x - y = 2$. Which of the following gives the formula for line l in slope-intercept form?

- A. $y = 5x + 2$
- B. $y = 5x - 2$
- C. $y = 2x - 5$
- D. $y = -5x - 2$
- E. $y = -5x + 2$

18. The expression $|2 - 14| - |-25|$ is equal to:

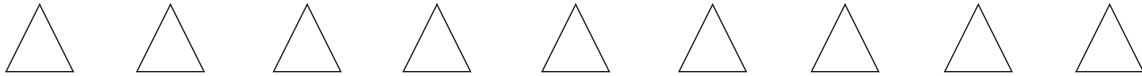
- F. 41
- G. 37
- H. 13
- J. -13
- K. -37

19. In $\triangle JKL$ the measure of $\angle J$ is exactly 37° and the measure of $\angle K$ is less than or equal to 63° . Which of the following phrases best describes the measure of $\angle L$?

- A. Exactly 120°
- B. Exactly 100°
- C. Exactly 80°
- D. Greater than or equal to 80°
- E. Less than or equal to 80°

DO YOUR FIGURING HERE.

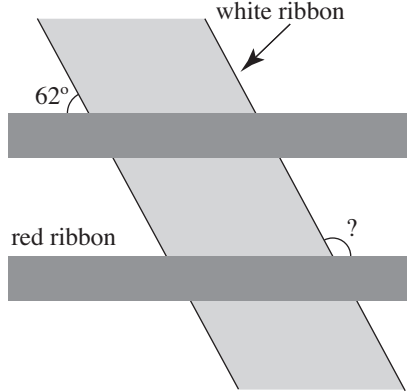
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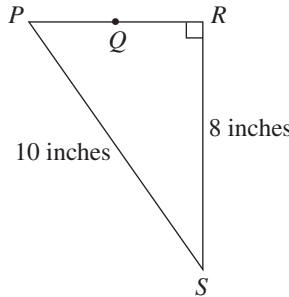
20. If $3x - 1 > 26$, then which of the following is the least possible integer value of x ?
- F. 6
 - G. 7
 - H. 8
 - J. 9
 - K. 10

21. Paul is tying red and white ribbons around a gift box. He begins by tying the white ribbon and one red ribbon around the box. These two ribbons intersect on one face of the box at a 62° angle, as shown in the figure below. Now Paul wants to tie a second red ribbon onto the box so that the two red ribbons are parallel. What is the degree measure of the angle, indicated below, between the white ribbon and the bottom red ribbon?



- A. 62°
- B. 76°
- C. 90°
- D. 104°
- E. 118°

22. In right triangle PRS shown below, Q is the midpoint of \overline{PR} . What is the length of \overline{QR} , to the nearest inch?



- F. 2
- G. 3
- H. 4
- J. 6
- K. 36

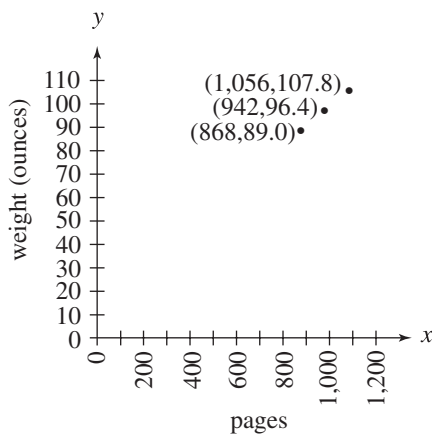
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Use the following information to answer questions 23–24.

DO YOUR FIGURING HERE.

Katie notices that the textbooks for her past 3 math courses have the same length and width, but each year's textbook has more pages and weighs more than the previous year's textbook. Katie weighs the textbooks, to the nearest 0.1 ounce, for her past 3 math courses and wonders about the relationship between the number of pages in math textbooks and the weights of those textbooks. She graphs the number of pages and corresponding weights of her 3 math textbooks in the standard (x,y) coordinate plane, as shown below, and discovers a linear relationship among these 3 points. She concludes that the equation of the line that passes through these 3 points is $y = 0.1x + 2.2$.

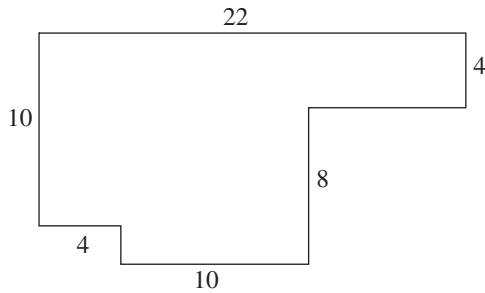


23. How much more, in ounces, does a math textbook with 1,056 pages weigh than one with 868 pages?
- A. 18.8
 B. 19.8
 C. 54.1
 D. 77.3
 E. 107.8
24. According to Katie's equation, how much would a math textbook with 1,338 pages weigh, in pounds?
- (Note: 16 ounces = 1 pound)
- F. 7.4
 G. 8.5
 H. 10.2
 J. 13.6
 K. 14.1

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25. All line segments that intersect in the polygon below do so at right angles. If the dimensions given are in centimeters, then what is the area of the polygon, in square centimeters?



- A. 168
B. 176
C. 184
D. 192
E. 200

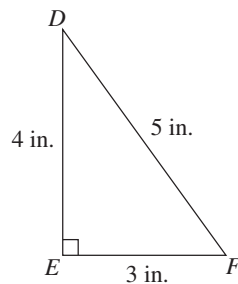
26. Mr. Baylor spent 6 days grading 996 essays. He averaged 178 essays per day for the first 3 days. Which of the following is closest to his average speed, in essays graded per day, for the final 3 days?

- F. 154
G. 157
H. 160
J. 163
K. 166

27. For all values of y , which of the following is equivalent to $(y+1)(y^2-3y+2)$?

- A. $y^3 + y^2 - y - 2$
B. $y^3 + y^2 + 2y + 2$
C. $y^3 - 2y^2 - y + 2$
D. $y^3 - 2y^2 + y - 2$
E. $y^3 + 2y + 2$

28. For $\angle D$ in $\triangle DEF$ below, which of the following trigonometric expressions has value $\frac{4}{5}$?



- F. $\sin D$
G. $\tan D$
H. $\cos D$
J. $\sec D$
K. $\csc D$

DO YOUR FIGURING HERE.

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29. Over the weekend, Shawn bought 22 songs from an online music store. He spent a total of \$17.90 on contemporary and classical songs. If contemporary songs cost \$0.95 each and classical songs cost \$0.75 each, then how many contemporary songs did Shawn buy?

(Note: There is no sales tax charged on these songs because they were purchased online.)

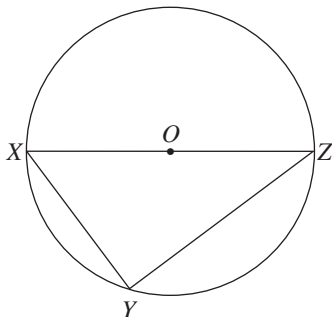
- A. 7
 B. 9
 C. 10
 D. 13
 E. 15
30. If the operation # is defined as $x \# y = \frac{x^2 - y^2}{x + y}$, where x and y are real numbers such that $x \neq -y$, then what is the value of $(-3) \# (-7)$?

- F. 10
 G. 4
 H. 1
 J. -4
 K. -10

31. Esther is making $2\frac{1}{4}$ gallons of punch for a large party. While mixing the punch, she uses $\frac{1}{2}$ gallon of pineapple juice. What fraction of the punch consists of pineapple juice?

- A. $\frac{1}{9}$
 B. $\frac{1}{6}$
 C. $\frac{2}{9}$
 D. $\frac{1}{3}$
 E. $\frac{2}{3}$

32. Point O is the center of the circle shown below, and \overline{XZ} is the diameter of the circle. If $\overline{XZ} = 8$ ft, Y lies on the circle, and $\overline{OX} = \overline{OY}$, then what is the area, in square feet, of $\triangle XYZ$?



- F. $4\sqrt{2}$
 G. $8\sqrt{3}$
 H. 16
 J. 32
 K. 64

DO YOUR FIGURING HERE.

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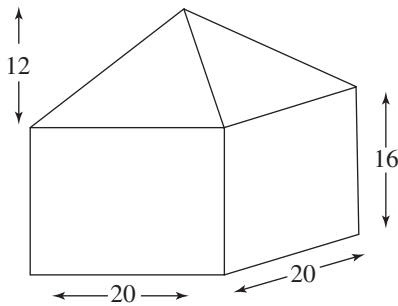
33. Which of the following values provides one of the roots for the equation $y^2 - 4y - 5 = 7$?

A. -12
 B. -6
 C. -2
 D. -1
 E. 5

DO YOUR FIGURING HERE.

34. The plastic model house shown below consists of a right pyramid atop a right rectangular prism. The length and width of the prism and of the pyramid are 20 millimeters. The height of the prism is 16 millimeters and the height of the pyramid is 12 millimeters. Which of the following is closest to the volume of the plastic model house, in cubic millimeters?

(Note: The volume of a right pyramid is given by $\frac{1}{3}lwh$, where l is the length, w is the width, and h is the height. The volume of a right rectangular prism is given by lwh , where l is the length, w is the width, and h is the height.)



E. 6,900
 G. 8,000
 H. 9,100
 J. 12,300
 K. 25,600

35. An isosceles trapezoid has bases of length 5 inches and 11 inches. The area of the trapezoid is 40 square inches. What is the height of the trapezoid, in inches?

A. 4
 B. 5
 C. 7.5
 D. 17.5
 E. 35

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36. What is the slope of the line that passes through the points $(-2,6)$ and $(3,-9)$ in the standard (x,y) coordinate plane?

- F. $\frac{1}{15}$
 G. $-\frac{1}{3}$
 H. $-\frac{3}{5}$
 J. -3
 K. -5

DO YOUR FIGURING HERE.

37. Right triangle $\triangle WXY$ is isosceles and has its right angle at Point X . Point Z is collinear with points X and Y , with Y between X and Z . What is the measure of $\angle WYZ$?

- A. 45°
 B. 90°
 C. 120°
 D. 135°
 E. 145°

38. The decimal construction of $\frac{5}{13}$ repeats and can be written as $0.384615384615\cdots$. What is the 99th digit to the right of the decimal point in this decimal construction?

- F. 1
 G. 3
 H. 4
 J. 5
 K. 6

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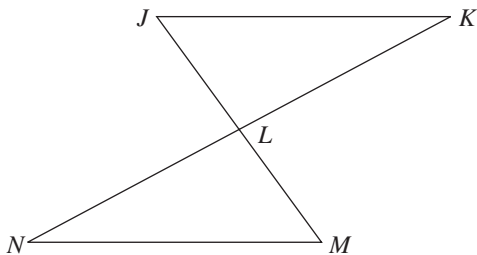


DO YOUR FIGURING HERE.

39. Points $W(-2,2)$, $X(2,2)$, and $Y(2,-2)$ lie in the standard (x,y) coordinate plane and are 3 of the vertices of square $WXYZ$. What is the length, in coordinate units, of \overline{XZ} ?
- A. 2
 B. 4
 C. 16
 D. $2\sqrt{2}$
 E. $4\sqrt{2}$

40. The equation $y = x^2$ is graphed in the standard (x,y) coordinate plane, then reflected across the x -axis. Which of the following is the equation of this reflection?
- F. $y = x^2$
 G. $y = -x^2$
 H. $y = (-x)^2$
 J. $y = |x|$
 K. $|y| = |x|$

41. In the figure below, $\overline{JK} \parallel \overline{MN}$, and \overline{JM} and \overline{KN} intersect at L . Which of the following statements must be true?



- A. $\overline{JK} \cong \overline{MN}$
 B. $\overline{JL} \cong \overline{LM}$
 C. $\triangle JKL \cong \triangle MNL$
 D. $\triangle JKL$ is similar to $\triangle MNL$
 E. \overline{JM} bisects \overline{KN}

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Use the following information to answer questions 42–44.

DO YOUR FIGURING HERE.

The Wildcat athletic department at Wilson High School needs to raise \$3,000.00 to fill a gap in its annual budget. The athletic department can choose 1 of the 2 options below to raise the needed funds.

Sell “Wildcat baseball caps” option: After paying a one-time fee of \$23.00 to rent the necessary equipment, the athletic department can sell baseball caps featuring the school’s logo. The athletic department will buy plain caps and print the school logo on each, at a cost of \$3.50 per cap. The athletic department will sell each cap for \$5.00.

Sell “Wildcat T-shirts” option: After paying a one-time fee of \$19.00 to rent the necessary equipment, the athletic department can sell T-shirts featuring the school’s logo. The athletic department will buy plain T-shirts and print the school logo on each, at a cost of \$2.25 per T-shirt. The athletic department will sell each T-shirt for \$4.00.

42. For the “Wildcat baseball caps” option, at least how many baseball caps must be sold in order to cover the one-time fee of renting the necessary equipment?

F. 14
G. 15
H. 16
J. 17
K. 23

43. The Wildcat athletic department sold 540 tickets to Friday’s football game. Of those tickets, 60% were adult tickets and the remainder were student tickets. The revenue from these ticket sales had already been factored into the annual budget. Jordan suggested raising the price of the adult tickets \$2.00 to help fill the budget gap. If the athletic department had raised the price of each adult ticket \$2.00, then by approximately what percent would the budget gap have been filled?

A. 22%
B. 23%
C. 24%
D. 25%
E. 26%

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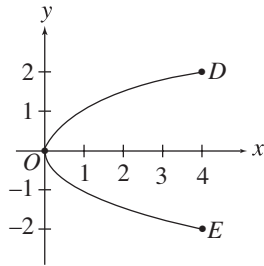
44. The Wildcat athletic department chose the “Wildcat T-shirt” option and successfully filled the budget gap. What is the minimum number of T-shirts the athletic department must have sold?

F. 1,480
 G. 1,664
 H. 1,709
 J. 1,726
 K. 1,812

DO YOUR FIGURING HERE.

45. The graph of $y^2 = x$ is shown in the standard (x,y) coordinate plane below for values of x such that $0 \leq x \leq 4$. The x -coordinates of points D and E are both 4. What is the area of $\triangle DEO$, in square coordinate units?

A. $\frac{5}{2}$
 B. 4
 C. 8
 D. 12
 E. 16



46. In $\triangle XYZ$ below, the length of \overline{XY} is 12 centimeters. How long is \overline{YZ} , to the nearest tenth of a centimeter?

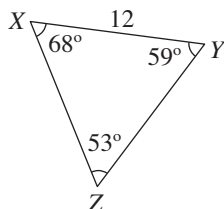
(Note: The law of sines states that in $\triangle ABC$ with sides

length a , b , and c opposite $\angle A$, $\angle B$, and $\angle C$, respectively,

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}.)$$

(Note: $\sin 53^\circ \approx 0.799$, $\sin 59^\circ \approx 0.857$, $\sin 68^\circ \approx 0.927$)

F. 9.6
 G. 10.3
 H. 11.1
 J. 12.9
 K. 13.9



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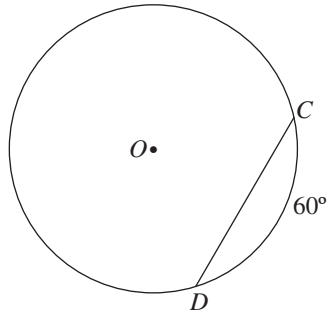


47. Jacob used the quadratic equation to find that the solutions to an equation are $x = 3 \pm \sqrt{-16c^2}$, where c is a positive real number. Which of the following expressions gives these solutions as complex numbers?

- A. $3 \pm 1ci$
- B. $3 \pm 2ci$
- C. $3 \pm 4ci$
- D. $3 \pm 8ci$
- E. $3 \pm 16ci$

DO YOUR FIGURING HERE.

48. Points C and D are on the circle with center O as shown in the figure below. The length of \overline{CD} is 12 millimeters and the measure of \widehat{CD} is 60° . What is the length of the diameter of this circle?



- F. 12
 - G. 16
 - H. 20
 - J. 24
 - K. 28
49. A nylon cord is stretched from the top of a vertical playground pole to the ground. The cord is 25 feet long and makes a 19° angle with the ground. Which of the following expressions gives the horizontal distance, in feet, between the pole and the point where the cord touches the ground?
- A. $\frac{\sin 19^\circ}{25}$
 - B. $\frac{\cos 19^\circ}{25}$
 - C. $25 \tan 19^\circ$
 - D. $25 \sin 19^\circ$
 - E. $25 \cos 19^\circ$
50. What are the coordinates of the center of the circle with the equation $x^2 + 8x + y^2 - 2y + 8 = 0$ in the standard (x, y) coordinate plane?
- F. $(-4, 1)$
 - G. $(-1, -4)$
 - H. $(1, -4)$
 - J. $(4, -1)$
 - K. $(4, 1)$

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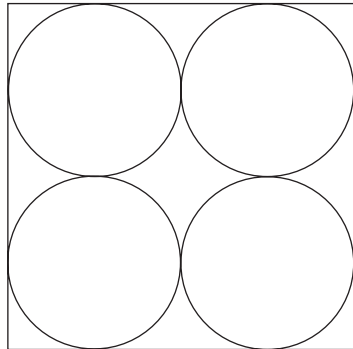
51. Scott's swimming pool has a depth of 8 feet and holds 13,000 gallons of water when full. Because of the warm weather, 10% of the water in the pool evaporates each day. Scott fills the pool with water and comes back the next day to measure the amount of water remaining in the pool. He considers this "Day 1" because it was taken 1 day after the pool was filled, and labels his measurement as such. The next day, he measures the amount of water again, and labels the results "Day 2" because it is now 2 days after he filled the pool. If Scott continues, on which day will he measure the pool that it is less than half full?

- A. 5
- B. 6
- C. 7
- D. 8
- E. 9

52. If $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$, then $\begin{vmatrix} 2d & 2c \\ 2a & 2b \end{vmatrix} = ?$

- F. $2da - 2cb$
- G. $2db - 2ca$
- H. $4da - 4cb$
- J. $4db - 4ca$
- K. $ad - bc$

53. The figure below shows 4 congruent circles, each tangent to 2 other circles and to 2 sides of the square. If the length of a side of the square is 24 inches, then what is the area, in square inches, of 1 circle?



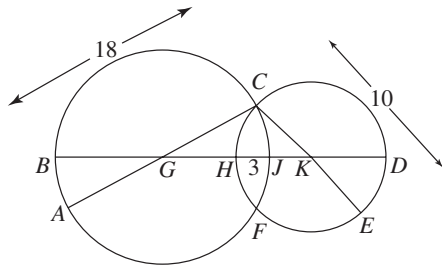
- A. 9
 - B. 9π
 - C. 36
 - D. 36π
 - E. 144
54. Andy has 30 collectible comic books, which he bought in 2005 for \$28.95 each. These comic books are currently valued at \$34.35 each. Andy will sell these 30 comic books when their combined value is exactly \$600.00 more than he paid for them. How much more will the average value per comic book have risen when Andy sells these 30 comic books?
- F. \$14.60
 - G. \$12.72
 - H. \$10.05
 - J. \$ 7.84
 - K. \$ 5.40

DO YOUR FIGURING HERE.

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55. Circles with centers G and K intersect at points C and F , as shown below. Points B , G , H , J , K , and D are collinear. The lengths of \overline{AC} , \overline{CE} , and \overline{HJ} are 18 cm, 10 cm, and 3 cm, respectively. What is the length, in centimeters, of \overline{BD} ?



- A. 22
B. 25
C. 26
D. 28
E. 29

56. A parabola with vertex $(-3, -2)$ and axis of symmetry $y = -2$ crosses the y -axis at $(0, -2 + 3\sqrt{3})$. At what other point does the parabola cross the y -axis?

- F. No other point
G. $(0, 2 + 3\sqrt{3})$
H. $(0, 2 - 3\sqrt{3})$
J. $(0, -2 - 3\sqrt{3})$
K. Cannot be determined from the given information

57. If $z \neq 4$ and $z \neq -4$, then which of the following is equivalent

to the expression $\frac{3z}{4-z} + \frac{3z}{z^2-16}$?

- A. $\frac{3z^2 + 15z}{z^2 - 16}$
B. $\frac{9z^2 - 12z}{z^2 - 16}$
C. $\frac{-12z}{z^2 - 16}$
D. $\frac{-3z^2}{z^2 - 16}$
E. $\frac{-3z^2 - 9z}{z^2 - 16}$

DO YOUR FIGURING HERE.

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58. The sides of the angle with measure θ are the positive x -axis and a portion of the line $y = -x$, as shown in the standard (x, y) coordinate plane below. What is the value of $\tan \theta$?

DO YOUR FIGURING HERE.

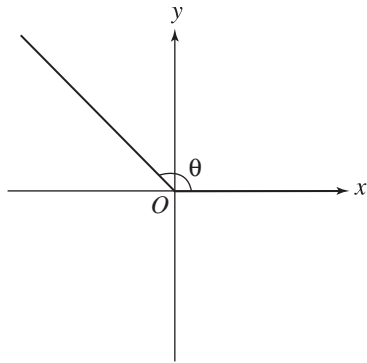
F. 1

G. $\frac{\sqrt{2}}{2}$

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

J. $-\frac{\sqrt{2}}{2}$

K. -1



59. The n th term of an arithmetic sequence, a_n , is given by $a_n = a_1 + dn - d$, where a_1 is the 1st term and d is the common difference between terms. Which of the following expressions gives d in terms of a_n , a_1 , and n ?

A. $\frac{a_n - a_1}{n - 1}$

B. $\frac{n - 1}{a_n - a_1}$

C. $\frac{a_n - a_1}{n}$

D. $\frac{a_n}{a_1 + n}$

E. $a_n - a_1 - n$

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2**2****DO YOUR FIGURING HERE.**

60. For all real positive values of x and y , $2\sqrt{x} \times 3\sqrt{y} = 12y$.
What is x in terms of y ?

- F. $2y$
- G. $3y$
- H. $4y$
- J. $6y$
- K. $7y$

END OF TEST.
STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.