

Mathematics Test

Time: 60 minutes for 60 questions

Directions: Each question has five answer choices. Choose the best answer for each question, and then shade in the corresponding oval on your answer sheet.

1. At a convenience store, two candy bars and two bags of potato chips cost \$4.00, and three candy bars and two bags of potato chips cost \$4.75. What is the price of one bag of potato chips?

(A) \$0.50
(B) \$0.75
(C) \$1.00
(D) \$1.25
(E) \$1.50

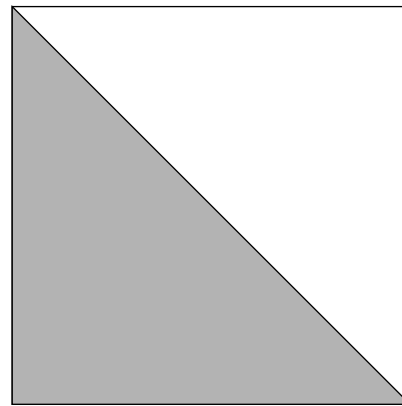
2. Which of the following is the greatest common factor of 60 and 64?

(F) 2
(G) 4
(H) 6
(J) 8
(K) 10

3. A teacher takes 5 children on a field trip to a geological museum. As a souvenir, the group receives a bag of stones. When the teacher divides the stones evenly among the children, each child receives exactly 24. If 6 children had been present, how many stones would each child have received?

(A) 15
(B) 16
(C) 18
(D) 20
(E) 21


4. In the following figure, if the perimeter of the square is 20, what is the area of the shaded region?



(F) 10
(G) 12
(H) 12.5
(J) 20.5
(K) 25

5. At a banquet of 36 people, every person had a choice among beef stroganoff, chicken divan, and linguini primavera. If 25% chose beef stroganoff and 17 people chose chicken divan, how many people chose linguini primavera?

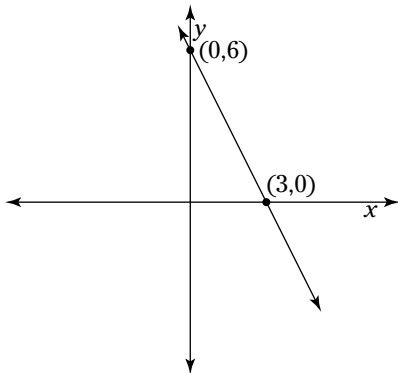
(A) 7
(B) 8
(C) 9
(D) 10
(E) 11

Go on to next page 

6. What is the value of $4v(w^2 - 3vw)$ given that $v = -1$ and $w = 4$
- (F) -84
 (G) -92
 (H) -98
 (J) -104
 (K) -112

7. Annette took 10 minutes to walk around a rectangular field. The length of the field is 4 times its width. How long would it take Annette to walk the width of the field?
- (A) 1 minute
 (B) 2 minutes
 (C) 3 minutes
 (D) 4 minutes
 (E) 5 minutes

8. What is the slope of the line in the following graph?

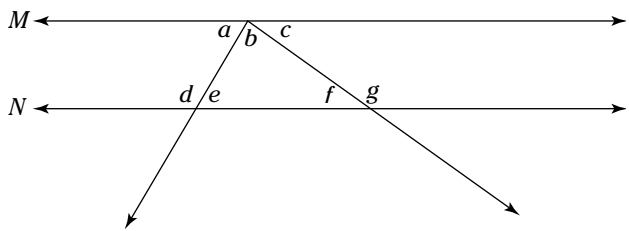


- (F) 2
 (G) -2
 (H) $-\frac{1}{2}$
 (J) $\frac{4}{3}$
 (K) $-\frac{4}{3}$
9. Two values of v satisfy the equation $|2v - 13| + 6 = 9$. What is the sum of these values?
- (A) 4
 (B) 7
 (C) 9
 (D) 13
 (E) 17

10. Damien played golf on each of the four days of his vacation. His scores on the first three days were 93, 92, and 89, and his average for the four days was 90. What was his score on the fourth day?
- (F) 84
 (G) 85
 (H) 86
 (J) 87
 (K) 88

11. Which of the following inequalities is equivalent to $7 - 3p \geq \frac{5}{2}$?
- (A) $p \geq \frac{3}{2}$
 (B) $p \leq \frac{3}{2}$
 (C) $p \geq -\frac{1}{2}$
 (D) $p \geq -\frac{3}{2}$
 (E) $p \leq -\frac{3}{2}$

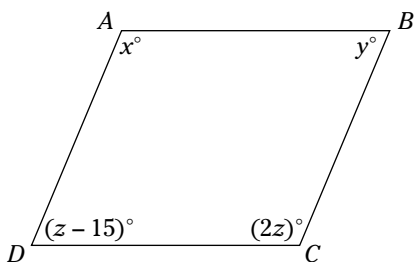
12. In the following figure, line M and line N are parallel. Which of the answer choices does NOT necessarily add up to 180° ?



- (F) $\angle a + \angle b + \angle f$
 (G) $\angle a + \angle d$
 (H) $\angle b + \angle e + \angle f$
 (J) $\angle d + \angle e$
 (K) $\angle e + \angle g$

13. On an xy -graph, what is the length of a line segment drawn from $(-3, 7)$ to $(6, -5)$?
- (A) 15
 (B) 16
 (C) 17
 (D) 18
 (E) 20
14. Which of the following is NOT a factor of $4x^2y^4 - 12x^3y^2 - 8xy^3$?
- (F) $2x^2$
 (G) $2xy^2$
 (H) $-2y$
 (J) $4y^2$
 (K) $4xy$
15. Of the 126 students who applied for a full scholarship at Oxbow College, 9 received one. What is the ratio of students who received a scholarship to those who didn't?
- (A) 1 to 10
 (B) 1 to 11
 (C) 1 to 12
 (D) 1 to 13
 (E) 1 to 14

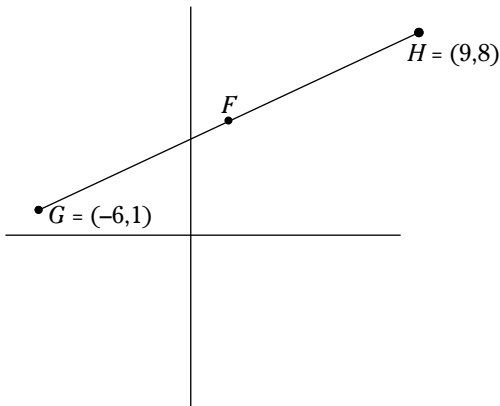
16. In the following figure, each of the four angles in the parallelogram is as shown. What is the value of y ?



- (F) 30
 (G) 35
 (H) 40
 (J) 45
 (K) 50

17. If $2x - y = 32$ and $5x + 3y = 14$, then $xy =$
- (A) 35
 (B) -40
 (C) 75
 (D) 100
 (E) -120
18. What is the value of a in terms b if $\frac{a}{b} + \frac{a+2}{3b} = \frac{1}{4}$?
- (F) $\frac{b+4}{2}$
 (G) $\frac{b-4}{2}$
 (H) $\frac{3b-2}{4}$
 (J) $\frac{3b+8}{16}$
 (K) $\frac{3b-8}{16}$
19. If p percent of 250 is 75, what is 75% of p ?
- (A) 22.5
 (B) 25
 (C) 75
 (D) 225
 (E) 250
20. What is the slope of the line $9x - 3y = 10$?
- (F) 3
 (G) -3
 (H) 9
 (J) $-\frac{1}{3}$
 (K) $-\frac{10}{3}$

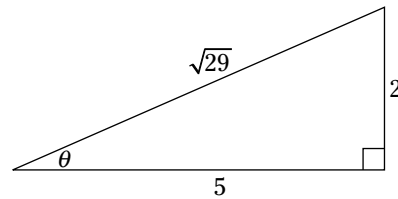
21. In the following figure, F is the midpoint of \overline{GH} . Which of the following are the coordinates of F ?



- (A) $(1, 4)$
 (B) $(2, 5)$
 (C) $(\frac{3}{2}, 4)$
 (D) $(\frac{3}{2}, \frac{9}{2})$
 (E) $(2, \frac{9}{2})$
22. If $|6 - 4n| > 1$, which of the following must be true?

- (F) $\frac{5}{4} < n < \frac{7}{4}$
 (G) $-\frac{5}{4} < n < \frac{7}{4}$
 (H) $-\frac{7}{4} < n < \frac{5}{4}$
 (J) $n < \frac{5}{4}$ or $n > \frac{7}{4}$
 (K) $n < -\frac{5}{4}$ or $n > \frac{7}{4}$

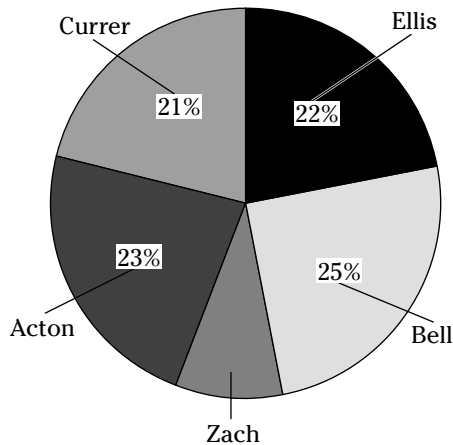
23. In the following figure, $\sin \theta =$



- (A) $\frac{2}{5}$
 (B) $\frac{5}{2}$
 (C) $\frac{\sqrt{29}}{2}$
 (D) $\frac{\sqrt{29}}{5}$
 (E) $\frac{2\sqrt{29}}{29}$
24. The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$, and the formula for the surface area of a sphere is $A = 4\pi r^2$. If a sphere has a surface area of 36π , what is its volume?
 (F) 27π
 (G) 36π
 (H) 54π
 (J) 72π
 (K) 108π
25. What is a possible value of x if $\sqrt{2x+3} - 1 = x$?
 (A) $\sqrt{2}$
 (B) $\sqrt{3}$
 (C) $\sqrt{5}$
 (D) $\sqrt{7}$
 (E) $\sqrt{11}$
26. If m and n are both factors of 75, which of the following could equal $m + n$?
 (F) 12
 (G) 18
 (H) 22
 (J) 36
 (K) 54

Go on to next page

27. The following graph shows the percentage of shares controlled by five owners of a startup software company. Zach intends to sell his shares equally among the other four owners. After this sale is final, what percentage of the company will Bell own?



- (A) 25.25%
 (B) 27.25%
 (C) 27.5%
 (D) 39.9%
 (E) 34%
28. A clown at an amusement park makes animal shapes from twisted balloons. She sells each animal based on the number of balloons it requires, according to the following chart:

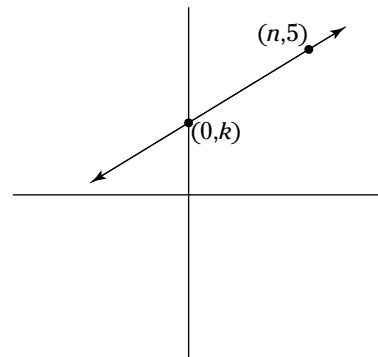
Number of balloons:							
1	2	3	4	5	6	7	
Price:							
\$4.00	\$4.50	\$5.00	\$5.50	\$6.00	\$6.50	\$7.00	

- Which of the following functions equals the dollar cost of a balloon animal that contains x balloons?
- (F) $f(x) = x$
 (G) $f(x) = x + 4$
 (H) $f(x) = 4x + 0.5$
 (J) $f(x) = 0.5x + 4$
 (K) $f(x) = 0.5x + 3.5$
29. What is the sum of the two values of x that satisfy the equation $4x^2 - 3x - 1 = 0$?
- (A) 0.75
 (B) 1.25
 (C) 2.5
 (D) -0.75
 (E) -1.25

30. What is the result when you add the matrix $\begin{bmatrix} 4 & 5 \end{bmatrix}$ to the matrix $\begin{bmatrix} 7 & -3 \end{bmatrix}$ and multiply the result by 2?

- (F) $\begin{bmatrix} 26 \end{bmatrix}$
 (G) $\begin{bmatrix} 11 & 2 \end{bmatrix}$
 (H) $\begin{bmatrix} 22 & 4 \end{bmatrix}$
 (J) $\begin{bmatrix} 28 & -15 \end{bmatrix}$
 (K) $\begin{bmatrix} 54 & -30 \end{bmatrix}$

31. If the equation for the line shown in the following graph is $y = \frac{1}{3}x + 3$, what is the value of kn ?



- (A) 9
 (B) 12
 (C) 15
 (D) 18
 (E) 24
32. Alfred and Rani both picked different two-digit numbers. If you multiply Alfred's number by 5 and double Rani's number, the sum is 300. If you double Alfred's number and multiply Rani's number by 3, the sum of the two numbers is 252. What is the sum of their two numbers?
- (F) 96
 (G) 112
 (H) 128
 (J) 144
 (K) 150

33. What is the equation for a line that intersects the origin and is perpendicular to $2x - 4y = 13$?

- (A) $y = -2$
- (B) $y = 2x$
- (C) $y = -2x$
- (D) $y = \frac{1}{2}x$
- (E) $y = \frac{1}{2}x - \frac{13}{4}$

34. This semester, Gerry scored an average of 93 on his five history exams. He got the same score on his first two exams, and then he got a 94, an 85, and a 90 on the remaining exams. What score did he receive on his first two exams?

- (F) 95
- (G) 96
- (H) 97
- (J) 98
- (K) 99

35. What is the value of x if $\frac{2x + 3y - 19}{y + 5} = 3$?

- (A) 17
- (B) -17
- (C) 29
- (D) -29
- (E) Cannot be determined from the information given.

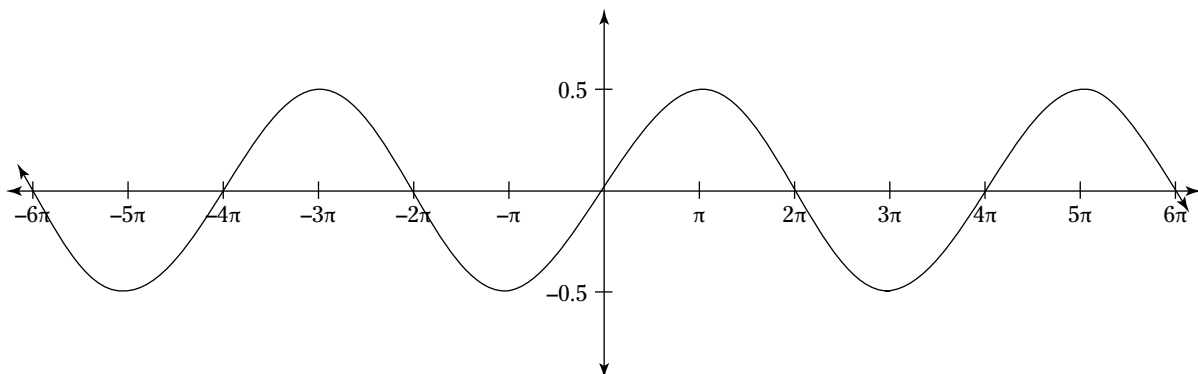
36. A scientist performs an experiment in which she measures four values two times each, with the following results:

	w	x	y	z
First measurement	0.2	6	0.5	10
Second measurement	0.6	3	1	30

Which of the following conclusions does the experiment provide evidence for?

- (F) w and y are directly proportional.
- (G) w and z are inversely proportional.
- (H) x and y are inversely proportional.
- (J) x and z are inversely proportional.
- (K) y and z are directly proportional.

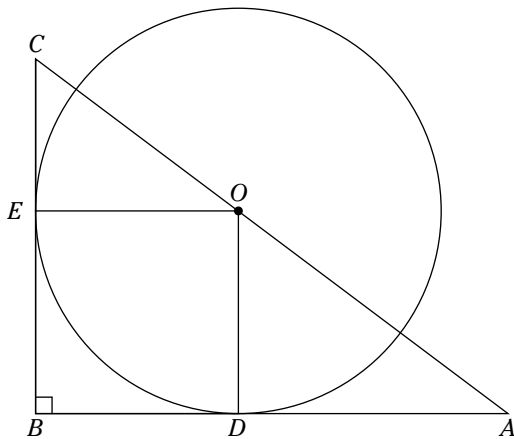
37. Which of the following is the amplitude of the function shown in the following graph?



- (A) 0.5
- (B) 1
- (C) π
- (D) 2π
- (E) 4π

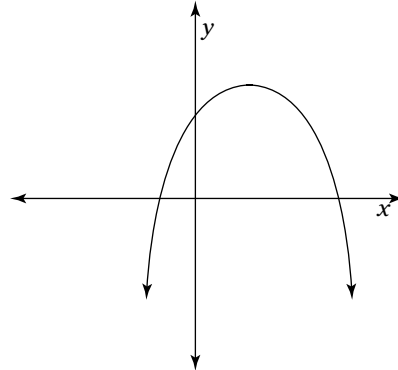
Go on to next page

38. In the following figure, O is the center of the circle, \overline{AB} is tangent to the circle at D , and \overline{BC} is tangent to the circle at E . Which of the following must be true?



- (F) $\overline{OC} \cong \overline{OD}$
 (G) $\triangle ABC$ is isosceles
 (H) $\triangle ABC \cong \triangle OEC$
 (J) $\triangle OEC \cong \triangle ADO$
 (K) $DBEO$ is a square
39. If $g(x)$ is a transformation that moves $f(x)$ three units to the right and then reflects it across the x -axis, then $g(x) =$
- (A) $f(-x) + 3$
 (B) $f(-x) - 3$
 (C) $f(x) + 3$
 (D) $-f(x + 3)$
 (E) $-f(x - 3)$

40. The following figure shows the graph of an equation $y = ax^2 + bx + c$. Which of the answer choices CANNOT be true?

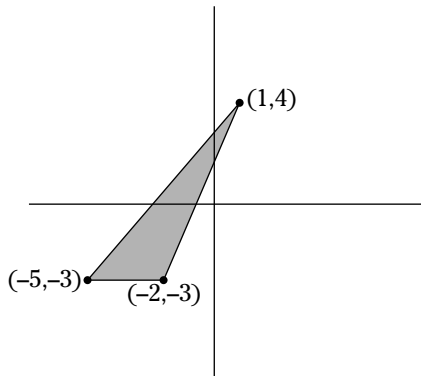


- (F) $a < b$
 (G) $a > b$
 (H) $a < c$
 (J) $b < c$
 (K) $b > c$
41. Which of the following is the domain of the function $f(x) = \frac{3-x}{\sqrt{x^2-9}}$?
- (A) $-3 > x > 3$
 (B) $-3 \leq x \leq 3$
 (C) $-3 \leq x < 3$
 (D) $x < -3$ or $x < 3$
 (E) $x \leq -3$ or $x \geq 3$
42. If a number sequence begins 1, 3, 4, 6, 7, 9, 10, 12 . . . , which of the following numbers does NOT appear in the sequence?
- (F) 34
 (G) 43
 (H) 57
 (J) 65
 (K) 72

43. A two-digit number from 10 to 99, inclusive, is chosen at random. What is the probability that this number is divisible by 5?

(A) $\frac{1}{5}$
 (B) $\frac{2}{9}$
 (C) $\frac{19}{90}$
 (D) $\frac{18}{91}$
 (E) $\frac{19}{91}$

44. What is the area of the shaded region in the following figure?

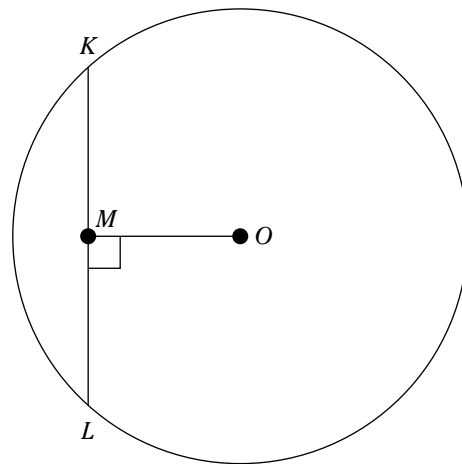


- (F) 10.5
 (G) 12.5
 (H) 18
 (J) 21
 (K) 24
45. An isosceles triangle contains three angles that measure 40° , x° , and y° . Which of the following CANNOT be true?
- (A) $x = y$
 (B) $x = 50$
 (C) $x - y = 60$
 (D) $x = 70$
 (E) $x = 100$

46. In the complex numbers, where $i^2 = -1$, what is the value of $5 + 6i$ multiplied by $3 - 2i$?

(F) 27
 (G) $27i$
 (H) $27 + 8i$
 (J) $15 + 8i$
 (K) $15 - 18i$

47. In the following figure, \overline{KL} is a chord of the circle centered at O , with $\overline{KL} \perp \overline{MO}$. If $KL = 12$ and $MO = 6$, what is the area of the circle?

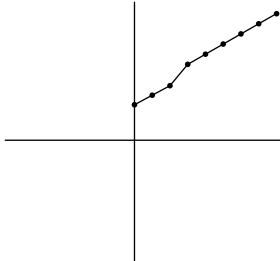


(A) 36π
 (B) 48π
 (C) 72π
 (D) 96π
 (E) 144π

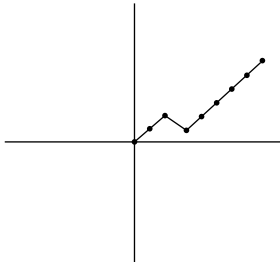
Use the following information to answer Questions 48 and 49: Eldridge opened a savings account with an initial balance of \$1,000. After that, every month for 8 months, she made one deposit to the account, always for the same amount. During that time, she made just one withdrawal.

48. Which of the following graphs accurately describes these transactions over an 8-month period?

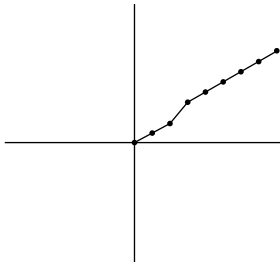
(F)



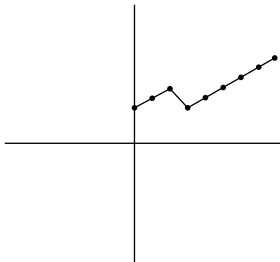
(G)



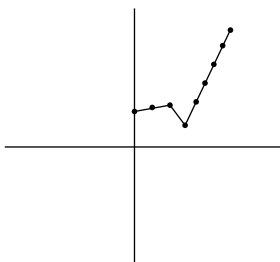
(H)



(J)



(K)



49. If each of Eldridge's 8 deposits was in the amount of \$200 and her withdrawal was \$350, how much money did her account have at the end of 8 months?

(A) \$850
 (B) \$1,550
 (C) \$2,250
 (D) \$2,350
 (E) \$2,950

50. Martha picked out a pair of shoes she wanted and brought them to the front of the store to pay. The cashier told her that the shoes were on sale for 30% off the original price. She rang up the sale price plus 5% sales tax, so Martha ended up paying \$58.80 for the shoes. What was the original price for the shoes?

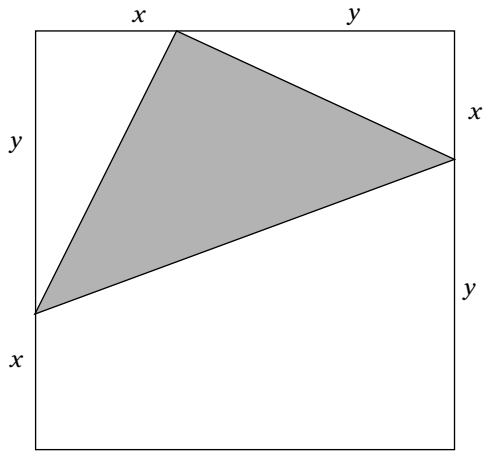
(F) \$70
 (G) \$75
 (H) \$80
 (J) \$85
 (K) \$90

51. Which of the following is equivalent to $\frac{\tan n \csc n}{\sin n \sec n}$?

(A) 1
 (B) $\sin n$
 (C) $\cos n$
 (D) $\cot n$
 (E) $\csc n$

Go on to next page

52. In the following figure, the large quadrilateral is a square. What is the area of the shaded region in terms of x and y ?



- (F) $\frac{x^2 + y^2}{2}$
 (G) $\frac{(x+y)^2}{2}$
 (H) $\frac{\sqrt{x^2 + y^2}}{2}$
 (J) $\frac{x^2 + y^2}{4}$
 (K) $\frac{(x+y)^2}{4}$

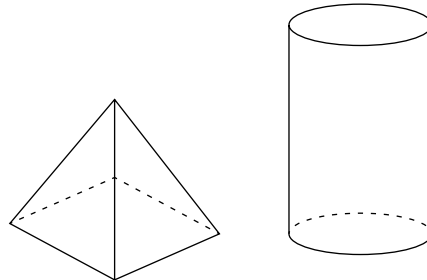
53. If $\frac{f}{g} = \frac{1}{4}$ and $\frac{g}{h} = \frac{2}{5}$, what is the ratio of $f:h$?

- (A) 1:6
 (B) 1:8
 (C) 1:10
 (D) 1:12
 (E) 1:20

54. If $49^{3y} = \sqrt{7^{y+1}}$, then $y =$

- (F) $\frac{1}{2}$
 (G) $\frac{1}{3}$
 (H) $\frac{1}{5}$
 (J) $\frac{1}{7}$
 (K) $\frac{1}{11}$

55. In the following figure, the base of the pyramid has the same area as the base of the cylinder, and the cylinder is twice the height of the pyramid. What is the ratio of the volume of the pyramid to the volume of the cylinder?



- (A) 1 to 3
 (B) 1 to 6
 (C) 2 to 3
 (D) 3 to 2
 (E) 6 to 1

56. Which of the following is a possible solution for x in terms of k for the equation

$$x = \frac{2k}{x+2}?$$

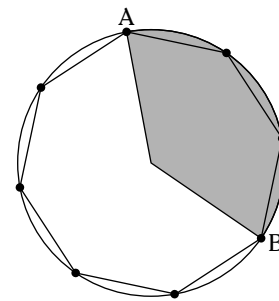
- (F) $\sqrt{2k}$
 (G) $\sqrt{-2k}$
 (H) $1 - \sqrt{1+2k}$
 (J) $\sqrt{1+2k} + 1$
 (K) $\sqrt{1+2k} - 1$

57. If $\frac{a^2 + 2ab + b^2}{a^2 - b^2} = 2a + 2b$, what is the value of $a - b$?
- (A) 1
 (B) -1
 (C) 2
 (D) $\frac{1}{2}$
 (E) $-\frac{1}{2}$

58. Which of the following functions has a range of $f(x) \geq 4$?
- (F) $f(x) = |x + 4|$
 (G) $f(x) = |x - 4|$
 (H) $f(x) = |x + 4| - 4$
 (J) $f(x) = |x - 4| + 4$
 (K) $f(x) = |x - 4| - 4$

59. If $\log_a \sqrt{b} = \frac{1}{4}$, then $a =$
- (A) \sqrt{b}
 (B) b
 (C) b^2
 (D) b^4
 (E) b^8

60. The following figure shows a regular octagon inscribed in a circle. The arc length from A to B is 6π . What is the area of the shaded region of the circle?



- (F) 8π
 (G) 16π
 (H) 24π
 (J) 36π
 (K) 64π

