

Complete the table below based on which type of study is best used the answer each question.

	Survey	Experimental	Observational
13. Is there a correlation between attending an SAT Prep class and scores achieved on the SAT Exam for this school year?	A	B	C
14. How often do homeowners pressure wash their driveway?	A	B	C
15. Does the color of a basketball influence the number of times a shooter sinks a basket?	A	B	C

$$\sin^2 \theta + \cos^2 \theta = 1$$

16. Given  $\sin \theta = -0.65$  and  $\pi < \theta < \frac{3\pi}{2}$ , what is the  $\tan \theta$ , rounded to the nearest hundredth?

- A. 0.14 B. 0.86 C. 0.67 D. 0.91 E. 0.59

17. What is the inverse of  $f(x) = \frac{6}{5}x + 3$ ?

- A.  $f^{-1}(x) = \frac{5}{6}x - 3$  D.  $f^{-1}(x) = \frac{5}{6}x + \frac{3}{5}$   
 B.  $f^{-1}(x) = -\frac{6}{5}x - 3$  E.  $f^{-1}(x) = \frac{5}{6}x + 3$   
 C.  $f^{-1}(x) = \frac{5}{6}x - \frac{5}{2}$

18. The 5<sup>th</sup> term of the sequence is 32. Each term is two times the previous term. Which of these explicit functions would model the general term of the sequence  $f(n)$ . **Select All.**

- A.  $f(n) = 32(5)^{n-2}$  D.  $f(n) = 16(2)^{n-4}$   
 B.  $f(n) = 32(2)^{n-5}$  E.  $f(n) = 4(2)^{n-2}$   
 C.  $f(n) = 2^n$  F.  $f(n) = 8(2)^{n-3}$

19. A pipe is being driven into the ground. The first strike drives the pipe 36 inches into the ground. Each additional strike drives the stake  $\frac{5}{6}$  the distance farther into the ground than the previous strike. What is the total distance (to the nearest inch) that the pipe is driven into the ground after 9 strikes?

- A. 174 in B. 181 in C. 192 in D. 199 in E. 203 in

20. A rock is dropped from a hot air balloon at a height of 45 meters. The rock's height from the ground in meters,  $h(t)$ , is modeled by the formula  $h(t) = -4.9t^2 + 45$ , where  $t$  is the time in seconds. What is the average rate of change in m/s of the height of the rock between 1 and 3 seconds?

- A. -0.73 B. -3.4 C. -8.9 D. -14.7 E. -19.6

1. Which expression is equivalent to  $\sqrt{16a^4x^6}$ , given  $a, x > 0$ .

- A.  $4a^2x^3$  B.  $4a^2x^4$  C.  $8a^2x^3$  D.  $8a^2x^4$  E.  $16a^2x^3$

2. When solving  $\sqrt{3x + 10} - 2 = x$ , what value is an extraneous solution?

- A. 2 B. -3 C. -2 D. 3 E. 0

3. If  $x > 0$ , then  $x^{1/2}$  is equivalent to:

- A. one-half x B. 2 times x C. x squared D. the square root of x

22. (#21 continued) How many hits in a row would William have to hit to have a batting average of exactly 0.300?  
~~A. 3 B. 4 C. 7 D. 9 E. 11~~

23. What is the quotient of  $\frac{12x^3 + 20x^2}{12x - 4}$ ?  
 A.  $x^2 + \frac{4}{3}x - \frac{4}{9} + \frac{4}{27x-9}$   
 B.  $x^2 + 2x + \frac{2}{3} + \frac{2}{9x-3}$   
 C.  $x^2 + \frac{4}{3}x + \frac{4}{9} + \frac{4}{27x-9}$   
 D.  $x^2 + 2x - \frac{2}{3} + \frac{-2}{9x-3}$   
 E.  $x^2 - \frac{4}{3}x - \frac{4}{9} + \frac{4}{27x-9}$

24. Which of the following is the solution to  $50 = 40e^{0.027t}$ ?  
 A.  $\frac{\ln(1.25)}{0.027}$   
 B.  $0.027 \ln(1.25)$   
 C.  $\ln\left(\frac{1.25}{0.027}\right)$   
 D.  $1.25 \ln(0.027)$   
 E.  $\ln\left(\frac{0.027}{1.25}\right)$

25. What is the value of h in the equation  $9^{3h} = 41$ , to the nearest hundredth?  
 A. 0.56 B. 0.61 C. 0.88 D. 1.41 E. 1.72

26. Consider the functions  $f(x)$ ,  $g(x)$  and  $h(x)$ .  
 $f(x) = x^3 - 9x^2 - 4x + 2$   
 $g(x) = -2x^3 + 5x^2 + 2x - 1$   
 $h(x) = -x^2 + x + 5$

Place a check mark in the appropriate box within the table that describes the end behavior of each function as  $x \rightarrow \infty$ . Select the letters where you would normally place a check mark.

	$f(x)$	$g(x)$	$h(x)$
Increasing	A	C	E
Decreasing	B	D	F

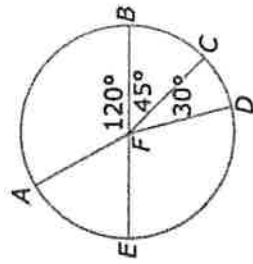
27. Which equations are equivalent to  $81^{x+4} = 9^{5x}$ ? **Select All.**  
 A.  $9^{x+6} = 9^{5x}$   
 B.  $3^{4x+4} = 3^{10x}$   
 C.  $9^{2x+8} = 9^{5x}$   
 D.  $3^{4x+16} = 3^{10x}$   
 E.  $9^{x+4} = 9^{5x}$   
 F.  $3^{x+8} = 3^{5x+2}$

*Dupe*

28. DeShawn is in his fifth year of employment as a patrol officer for Metro Police. His salary for his first year of employment was \$47,000. Each year after the first, his salary increased by 4% each year. Approximately how much did DeShawn make over his first five years of service?  
 A. \$10,184  
 B. \$245,184  
 C. \$237,506  
 D. \$261,345  
 E. \$254,567

29. Which of the following is a circle with radius 7 and center (-3,4)?  
 A.  $(x - 3)^2 + (y + 4)^2 = 7$   
 B.  $(x + 3)^2 + (y - 4)^2 = 7$   
 C.  $(x - 3)^2 + (y + 4)^2 = 49$   
 D.  $(x + 3)^2 + (y - 4)^2 = 49$   
 E.  $x^2 + y^2 = 7$

30. Point C lies on  $\overline{AB}$ . A is at (2,4) and B is at (10,16). If the ratio of the length  $\overline{AC}$  to the length of  $\overline{CB}$  is 3:1, what is the y-coordinate of point C?  
 A. 9 B. 13 C. 6 D. 7 E. 11



The circle with center F is divided into sectors. In circle F,  $\overline{EB}$  is a diameter. The length of  $\overline{FB}$  is 3cm.

31. What is the arc length of  $\widehat{AED}$ ?  
 A. 8.6 B. 9.1 C. 7.6 D. 10.7 E. 5.4
32. In the same circle, what is the area of the sector formed by  $\angle EFC$ ?  
 A. 8.1 B. 9.8 C. 7.9 D. 10.6 E. 5.6

*Dupe*

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33. A marketing director for a major grocery store is conducting a survey to determine whether a salad bar should be added to the produce section of the store. Which of these random sampling methods would create the most accurate sample survey of the store's customers?  
 A. asking customers who are shopping in the produce section  
 B. asking customers who are shopping in the snack aisle  
 C. asking customers as they enter the store  
 D. asking people who shop at other stores

34. Assuming an exponential function fits this data, about how many coins would be returned after the 10<sup>th</sup> trial?  
 A. 16    B. 6    C. 4    D. 2    E. 1

A box containing 1,000 coins is shaken, and the coins are emptied onto a table. Only the coins that land heads up are returned to the box, and then the process is repeated. The accompanying table shows the number of trials and the number of coins returned to the box after each trial.

Trial	0	1	3	4	6
Coins Returned	1,000	610	220	132	46

35. Which of these are ~~factors~~ <sup>zeros</sup> of  $x^4 + 3x^3 - 4x^2 - 12x$ ? (Choose 4)  
 A. -5    B. -4    C. -3    D. -2    E. -1    F. 0    G. 1    H. 2

36. Let  $f(x) = 5x^2 - 36$ . What is the remainder when dividing by  $x - 6$ ?  
 A. 144    B. 89    C. -6    D. -36    E. 16

37. Factor  $2a^4 - 5a^2b^2 - 3b^4$ .  
 A.  $(2a^2 + b^2)(a^2 + 3b^2)$     B.  $(2a^2 + b^2)(a^2 - 3b^2)$   
 C.  $(2a^2 - b^2)(a^2 + 3b^2)$     D.  $(2a^2 + b^2)(a^2 + 3b^2)$

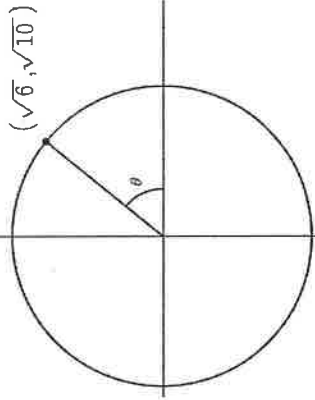
38. Solve  $-4e^{x-3} = 7$ .  
 A. 0.34    B. -0.76    C. 1.24    D. 6.13    E. No Solution

39. What is being constructed below?



- A. Angle Bisector    B. Parallel Line  
 C. Perpendicular Bisector    D. Parallelogram

40. What is the sine of the angle pictured below?



- A.  $\frac{\sqrt{10}}{6}$     B.  $\frac{\sqrt{6}}{4}$     C.  $\frac{\sqrt{6}}{10}$     D.  $\frac{\sqrt{10}}{4}$     E.  $\frac{\sqrt{7}}{6}$

Dupe

Dupe

Dupe

Dupe

Dupe

41. You are trying to figure out how long will it take to fill up a gas tank at the gas station. What do you need to know to answer this question? (Select All)  
 A. The size of the gas tank    B. The price per gallon of gas  
 C. The rate at which the gas enters the tank  
 D. The color of the vehicle  
 E. The amount of gas in the tank prior to filling up

42. A circular pool has a surface area of 254.47 square yards. Which best represents the diameter of the pool?  
 A. 9    B. 10    C. 11    D. 12    E. 18

43. Given the circular pool in the previous problem, which of the following could be the length of a chord of the circle? (Select All)  
 A. 1    B. 6    C. 8    D. 9    E. 12    F. 15    E. 18

44. In a region of the Caribbean Sea, daily water temperatures are normally distributed with a mean of 77.9 and a standard deviation of 2.4. What is the probability a randomly selected daily temperature is less than 73.1?  
 A. 97.5%    B. 95%    C. 5%    D. 2.5%    E. 1.25%

45. Given (1, 3) and (16, 13) are the endpoints of a line. Which point separates the line into a 3:2 ratio?  
 A. (9, 6)    B. (10,9)    C. (7, 7)    D. (10, 7)    E. (9, 8)

46. A cylindrical can holding sausages has a radius of 5cm and a height of 4cm. The can contains 10 cylindrical sausages, each having a radius of 1.5cm and a height of 3.85cm. What is the volume inside the can not taken up by the sausages?  
 A. 42 cm<sup>3</sup>    B. 314 cm<sup>3</sup>    C. 207 cm<sup>3</sup>    D. 23 cm<sup>3</sup>    E. 112 cm<sup>3</sup>

47.  $\frac{h(x)}{x-3}$  produces a remainder of 2. Which is true?  
 A.  $h(2) = 3$     B.  $h(3) = 2$     C.  $h(-3) = -2$   
 D.  $h(2) = -3$     E.  $h(-2) = 3$     F.  $h(-3) = 2$

48. Which of the following equations is perpendicular to  $4x + 3y = 12$ ? (Select One)  
 A.  $y = \frac{3}{4}x - 7$   
 B.  $y = \frac{4}{3}x - 5$   
 C.  $y = -\frac{3}{4}x + 6$   
 D.  $y = -\frac{4}{3}x + 4$

49. The terminal side of angle  $\theta$  intersects the point  $(\frac{6}{7}, \frac{\sqrt{13}}{7})$  on the unit circle. What is the  $\sin\theta$ ,  $\cos\theta$ , and  $\tan\theta$ ? Place a checkmark in each column. (Select the 3 corresponding letters)

	$\sin\theta$	$\cos\theta$	$\tan\theta$
$\frac{6}{7}$	A	B	C
$\frac{\sqrt{13}}{7}$	D	E	F
$\frac{7}{6}$	G	H	I
$\frac{\sqrt{13}}{6}$	J	K	L

50. A circle of radius 11cm has one fifth of its area colored pink. How much area, in cm, was colored pink?  
 A. 45    B. 81    C. 67    D. 380    E. 76

*Due*