1. One billion seconds after birth, what was the age (in years) of a person on his/her previous birthday?

   A) 27 B) 31 C) 48 D) 69 E) none of these

2. If $a = 2^2 \cdot 3 \cdot 5^3$ and 21 000 is the least common multiple of a and b, then what is the smallest positive integer that b can be?

   A) 14 B) 56 C) 75 D) 168 E) 21 000

3. Suppose that f and g are linear functions with $f(3) = 10$, $g(3) = 15$, and $(f+g)(5) = 20$. Then $(f+g)(1) =$

   A) 5 B) 25 C) 30 D) 45 E) Not enough information is given

4. Find the area of the quadrilateral whose vertices are at $(0,0)$, $(1,8)$, $(3,2)$, and $(6,5)$.

   A) 18.5 B) 20 C) 21.5 D) 23 E) 26

5. If 7^{2t+1} is written in the form ka^t, where k and a are positive constants, then $k + a =$

   A) 14 B) 28 C) 42 D) 56 E) 70

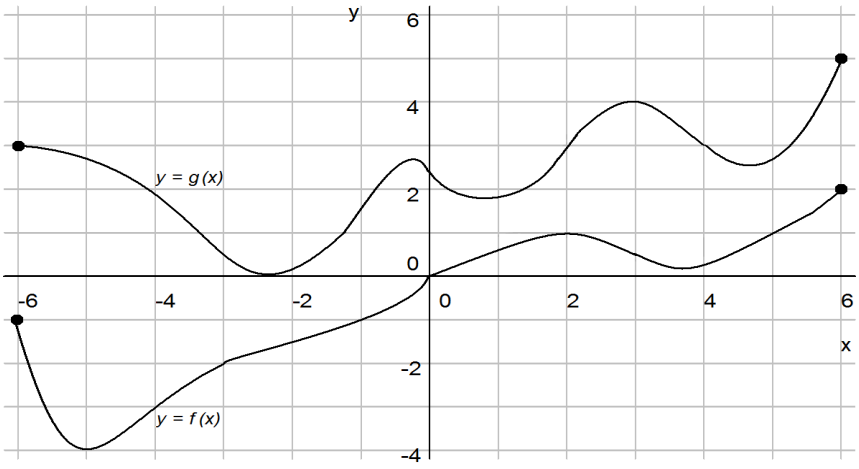
6. The graphs of $y = f(x)$ and $y = g(x)$ are each straight lines, and these two lines are perpendicular, intersecting at the point $(3,4)$. If $f(5) = 11$, then $g(2) =$

   A) $\frac{47}{11}$ B) $\frac{9}{2}$ C) $\frac{23}{5}$ D) $\frac{13}{3}$ E) $\frac{30}{7}$

7. The set of points in the plane for which the distance from a fixed point is one-half the distance from a fixed line (not containing the fixed point) is

   A) a line B) a parabola C) an ellipse D) a hyperbola E) .none of these

   Questions 8-10 refer to the functions f and g, whose graphs are shown below and whose common domain is $[-6, 6]$.



8. How many solutions does the equation $g(x) = f(x) + 3$ have?

   A) 0 B) 2 C) 3 D) 5 E) 6

9. How many solutions does the equation $g(f(x)) = 1$ have?

   A) 0 B) 1 C) 2 D) 4 E) 6

10. The longest interval contained in the domain of $\sqrt{3-g(x)}$ has length

A) 3 B) 4 C) 6 D) 8 E) 9

11. $3x+5y=1$ is the equation of a line tangent to a circle with center at $(5,4)$. What is the radius of the circle?

A) $4\sqrt{2}$ B) $3\sqrt{5}$ C) 5 D) 6 E) none of these

12. A cube is all white. Two sides are selected at random and painted red. What is the probability that the two red sides have a common edge?

A) $\frac{5}{6}$ B) $\frac{4}{5}$ C) $\frac{3}{4}$ D) $\frac{2}{3}$ E) $\frac{1}{2}$

13. Let $0 \le x \le 1$. $1-\cos\left(\sin^{-1}\sqrt{x}\right)$

A) x B) x^2 C) $\sqrt{x}$ D) $\frac{x}{2-x}$ E) $1-\sqrt{1-x}$

14. If r represents the time for a population experiencing exponential growth to double, then what is the time needed for the population to triple?

A) $\frac{3}{2}r$ B) $r^{3/2}$ C) $\frac{r\ln 3}{\ln 2}$ D) $\frac{3\ln r}{\ln 2}$ E) $r\ln\frac{3}{2}$

15. If the $x-$intercepts of a parabola are $\left(2\pm\sqrt{3},0\right)$ and the point $(0,10)$ is on the parabola, then which of the following points is on the parabola?

A) $(1,-30)$ B) $(2,-50)$ C) $(3,-20)$ D) $(4,20)$ E) $(5,50)$

16. The smallest angle of a triangle with sides of length 3, 5, and 6 is

A) $\sin^{-1}\left(\frac{2\sqrt{14}}{15}\right)$ B) $\sin^{-1}\left(\frac{13}{15}\right)$ C) $\tan^{-1}\left(\frac{\sqrt{13}}{15}\right)$

D) $\cos^{-1}\left(\frac{14}{15}\right)$ E) $\cos^{-1}\left(\frac{3\sqrt{7}}{15}\right)$

17. Find the sum of the real solutions for the equation $8^{3x+1}=4^{x^2-2}$.

A) -4 B) 0 C) 3 D) 4.5 E) 6

18. Approximately how high would a stack of 10! pennies be?

A) 3000 ft B) 3 miles C) 30 miles D) 300 miles E) 3000 miles

19. A collection of 53 coins has value \$ 7.05 and consists entirely of nickels, dimes, and quarters. Which of the following could not be the number of nickels in the collection?

A) 1 B) 11 C) 19 D) 25 E) 31

20. A car is traveling at a constant speed of 65 mph along a road parallel to a railroad track. The car overtakes a mile long train (traveling in the same direction) traveling at a constant speed of 60 mph. How long does it take from the time the car passes the rear of the train until it passes the engine at the head of the train?

A) 6 min B) 10 min C) 12 min D) 13 min E) 20 min

Answers

1.	B	11.	E
2.	B	12.	B
3.	C	13.	E
4.	D	14.	C
5.	D	15.	C
6.	E	16.	A
7.	C	17.	D
8.	E	18.	B
9.	D	19.	B
10.	D	20.	C