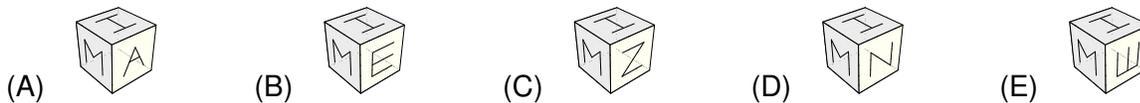
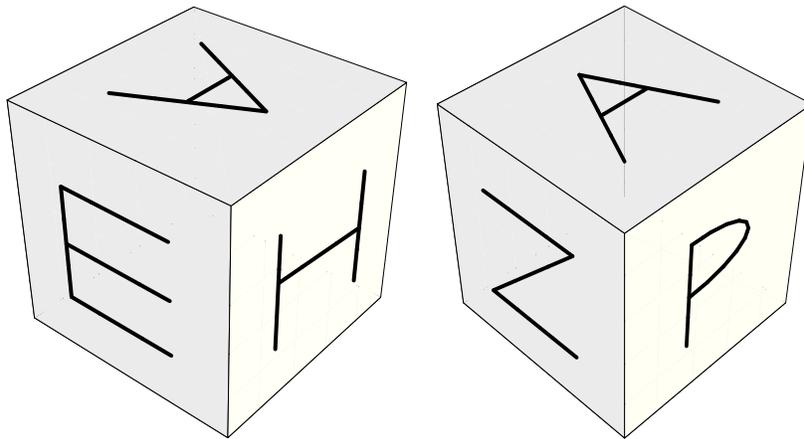


8. Which of these speeds is the *fastest*?
- (A) 43200 feet/hour
 (B) 4 yards/second
 (C) 12 feet/second
 (D) 840 feet/minute
 (E) It is a trick question because they are all exactly the same!
9. A child's block has a different letter of the alphabet on each of its six faces. Shown below are two different views of the same block. Which of the choices could be the same block viewed from yet another angle?



10. For the distinct digits A , B , C , and D , which of the following digits does C represent in the operation $CD \times C = ACB$?
- (A) 2 (B) 4 (C) 6
 (D) 8 (E) none of these
11. Let S be the set of all numbers which are the sum of the squares of three consecutive integers. Then we can say that
- (A) No member of S is divisible by 2
 (B) No member of S is divisible by 3
 (C) No member of S is divisible by 5
 (D) No member of S is divisible by 7
 (E) For any prime number N there is an element of S divisible by N
12. What is the missing digit d in the product
- $$123,456 \times 654,321 = 80,779,8d3,376?$$
- (A) $d = 1$ (B) $d = 2$ (C) $d = 3$ (D) $d = 4$ (E) $d = 5$

13. If you write a real number in decimal form, it may require infinitely many digits or it may terminate after a finite number of digits. Let us call a number *terminating* if its decimal expansion involves only a finite number of digits (or, equivalently, if the digits are all zeroes from some point on). Which of these numbers is terminating?

(A) $\frac{3^9 \cdot 5^6 \cdot 2^{14}}{7^{15}}$ (B) $\frac{2^{14} \cdot 5^5 \cdot 7^{15}}{3^9}$ (C) $\frac{5^6 \cdot 7^{\frac{3}{2}}}{2^{14} \cdot 3^9}$

(D) $\frac{1}{2^{14} \cdot 3^9 \cdot 5^6 \cdot 7^{15}}$ (E) $\frac{3^9 \cdot 7^{15}}{2^{14} \cdot 5^6}$

14. There are two numbers, b and c , such that the formula

$$A = bD^c$$

gives the total surface area A of a cube as a function of the length of its diagonal, D . What is $|b - c|$?

(A) 0 (B) 1 (C) $\sqrt{2} - 1$ (D) $2 - \sqrt{2}$ (E) 3

15. The odds against event A occurring are 4 : 3. The odds in favor of event B occurring are 3 : 5. If the events are independent, what is the probability that at least one of the events occurs?

(A) $\frac{5}{14}$ (B) $\frac{9}{14}$ (C) $\frac{15}{56}$

(D) $\frac{41}{56}$ (E) none of these

16. The area of a square with side of length x is one-third of the area of a square with side of length $x + y$. Which is true of the number $c = \frac{x}{y}$?

(A) $1 \leq c \leq 2$ (B) $2 \leq c \leq 3$ (C) $3 \leq c \leq 4$

(D) $4 \leq c \leq 5$ (E) none of these

17. For how many integer values of n is the expression $\frac{3n + 21}{n + 5}$ an integer?

(A) none (B) 6 (C) 8

(D) 10 (E) infinitely many

18. Six coins are drawn, without replacement, from a bag that contains 2 pennies, 4 nickels, and 6 dimes. Each coin has an equally likely chance of being chosen and there are 924 ways that six coins can be drawn. What is the probability that the value of the six drawn coins is at least fifty cents?

(A) $\frac{22}{924}$ (B) $\frac{36}{924}$ (C) $\frac{127}{924}$

(D) $\frac{540}{924}$ (E) none of these

19. In the game *Buzz*, a circle of people take turns counting upwards: "1, 2, 3, 4, ..." but whenever they get to a number which is either a *multiple* of 7 or which has at least one digit which is a 7, they say "buzz" instead of the number. If a group of people played the game perfectly, starting at 1 and ending at 200, how many times would they say "buzz"?

(A) 60 (B) 61 (C) 63 (D) 65 (E) 68

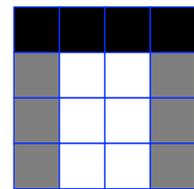
20. A square is inscribed in a circle. This square is also circumscribed about a smaller, concentric circle. What is the ratio of the area of the inner circle to the area between the two circles?
- (A) $\frac{1}{4}$ (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{1}{2}$

(D) $\frac{1}{1}$ (E) none of these

21. An ATM (an automated banking machine) is able to distribute five dollar bills, ten dollar bills and twenty dollar bills. By mistake, an employee puts twenty dollar bills in the five dollar bill slot. As a result, some people get more money out of the machine than they *should* when they make a withdrawal. Which of these amounts could possibly be the amount of money that the bank lost due to this mistake?

(A) \$9223 (B) \$101 (C) \$99 (D) \$315 (E) \$522

22. Suppose we have a 4×4 grid of squares and each square can either be white, grey or black. For any given square, there are seven squares that are in the same row and/or column as that square (including the square itself). Call these seven squares “the neighborhood” of that square. Suppose also that when you touch any square, then every white square in its neighborhood becomes grey, any grey square in its neighborhood becomes black, and any black square in its neighborhood becomes white. So, for instance, if we begin with a grid which is all white and touch the top left corner and then touch the top right corner, the result will look like the figure shown to the right.



The question is, if you begin with a completely white grid and then touch the 12 border squares once each but the four center squares *twice* each, what will the final result be?

- (A) (B) (C) (D) (E)

23. How many triples (a, b, c) of real numbers (not necessarily distinct) satisfy the equations

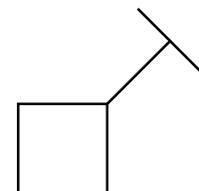
$$ab = c \quad ac = b \quad \text{and} \quad bc = a?$$

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

24. The points $(1, 3)$ and $(7, 11)$ are vertices of a square at opposite ends of a diagonal of the square. Find the coordinates of the other vertex of the square that has $x > 1$.

(A) $(6, \frac{11}{2})$ (B) $(\frac{20}{3}, 5)$ (C) $(12, 1)$
 (D) $(8, 4)$ (E) none of these

25. The figure shows a “giraffe” made out of five identical line segments. By repositioning just one of those line segments it is possible to reproduce a congruent geometric figure, the same “giraffe” shape flipped and rotated in the plane. Which of the line segments should be moved to achieve this?



(A) rear leg (B) back (C) front leg (D) neck (E) head

2010 Answers / Level 1 Test

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