2014
Leap Frog Relay Grades 9-10
Part II

No calculators allowed
Correct Answer = 4, Incorrect Answer = −1, Blank = 0

11. The sum of the first 2014 positive odd integers is subtracted from the sum of the first 2014 positive even integers. What is the result?

(a) 1

(b) 0

(c) 4028

(d) 2013

(e) None of these

12. The Magic Fairy changed a 5 dollar bill in Lenny's pocket to a 20 dollar bill, tripling the amount of money he had. How much money does Lenny have now?

(a) $22.50

(b) $23.50

(c) $24.50

(d) $25.50

(e) None of these

13. Solve the equation for x.

$$\frac{1}{2x} + \frac{3}{4x} + \frac{5}{6x} = 7.$$

(a) $x = \dfrac{31}{84}$

(b) $x = \dfrac{29}{84}$

(c) $x = \dfrac{27}{84}$

(d) $x = \dfrac{25}{84}$

(e) None of these

14. The pair of lines $2x + by = 7$ and $ax + 5y = 6$ are parallel. What is the value of the product ab?

(a) $ab = 10$

(b) $ab = 9$

(c) $ab = 8$

(d) $ab = 7$

(e) None of these

15. A rectangle has three vertices $A(-10, 5), B(0, 0), C(6, 12)$. What are the coordinates of the fourth vertex $D(x, y)$ of the rectangle $ABCD$?

(a) $(x, y) = (-3, 16)$

(b) $(x, y) = (-4, 16)$

(c) $(x, y) = (-3, 17)$

(d) $(x, y) = (-4, 17)$

(e) None of these

16. Lenny has a coin jar of pennies and nickels in a ratio Pennies:Nickles = 3:2. Lenny's friend Marty gives Lenny the 50 pennies he (Marty) has in his pocket to add to Lenny's coin jar. As a result the ratio Pennies:Nickels increases to 5:3. How many coins (pennies plus nickels) does Lenny have in his coin jar now?

(a) 600 coins

(b) 700 coins

(c) 800 coins.

(d) 900 coins

(e) None of these

17. Two cubes (length = width = height) have respective volumes V_1 and V_2 that satisfy $V_1/V_2 = 10$. Let S_1 and S_2 be the respective surface areas of the cubes—so, S_1 corresponds to V_1 and S_2 corresponds to V_2. Determine the ratio of surface areas S_1/S_2.

(a) $S_1/S_2 = \sqrt[3]{150}$

(b) $S_1/S_2 = \sqrt[3]{10}$

(c) $S_1/S_2 = \sqrt[3]{200}$

(d) $S_1/S_2 = \sqrt[3]{100}$

(e) None of these

18. If the pattern of digits 12345432123454321... is repeated indefinitely, what will be the 2014th digit?

(a) 1

(b) 2

(c) 3

(d) 4

(e) None of these

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19. The digit sum of a number is the sum of its decimal digits. For example, the digit sum of the number 3206 is $3 + 2 + 0 + 6 = 11$. Determine the digit sum of the number $(10^{2014} + 1)^4$.

(a) 10

(b) 12

(c) 14

(d) 16

(e) None of these

20. The two pictured circles, with respective radii 1 and 2, are mutually tangent to each other and tangent to the lines $\overleftrightarrow{AC}$ and $\overleftrightarrow{AE}$ at the indicated points. What is the length AC?
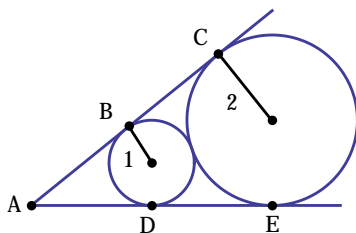
(a) $AC = 5\sqrt{2}$

(b) $AC = 2\sqrt{5}$

(c) $AC = 2\sqrt{10}$

(d) $AC = \sqrt{11}$

(e) None of these