UNIT 14 EXERCISES 1-5

SOLVE FOR X

2001 1. The sum of two numbers is S. Suppose 3 is added to each number and then each of the resulting numbers is doubled. What is the sum of the final two numbers?

(A) $2S+3$ **(B)** $3S+2$ **(C)** $3S+6$ **(D)** $2S+6$ **(E)** $2S+12$

2004B 1. At each basketball practice last week, Jenny made twice as many free throws as she made at the previous practice. At her fifth practice she made 48 free throws. How many free throws did she make at the first practice?

(A) 3 **(B)** 6 **(C)** 9 **(D)** 12 **(E)** 15

2012B

2002A 2. Cindy was asked by her teacher to subtract 3 from a certain number and then divide the result by 9. Instead, she subtracted 9 and then divided the result by 3, giving an answer of 43. What would her answer have been had she worked the problem correctly?

(A) 15 **(B)** 34 **(C)** 43 **(D)** 51 **(E)** 138

2005A 2. The equations $2x+7=3$ and $bx-10=-2$ have the same solution for x. What is the value of b?

(A) -8 **(B)** -4 **(C)** -2 **(D)** 4 **(E)** 8

2006A 2. Define $x \otimes y = x^3 - y$. What is $h \otimes (h \otimes h)$?

(A) $-h$ **(B)** 0 **(C)** h **(D)** $2h$ **(E)** h^3

2006B 2. For real numbers x and y, define $x \spadesuit y = (x+y)(x-y)$. What is $3 \spadesuit (4 \spadesuit 5)$?

(A) -72 **(B)** -27 **(C)** -24 **(D)** 24 **(E)** 72

2017A 2. The sum of two nonzero real numbers is 4 times their product. What is the sum of the reciprocals of the two numbers?

(A) 1 **(B)** 2 **(C)** 4 **(D)** 8 **(E)** 12

2017B

2. Real numbers x, y, and z satisfy the inequalities

$$0 < x < 1, \qquad -1 < y < 0, \qquad \text{and} \qquad 1 < z < 2.$$

Which of the following numbers is necessarily positive?

(A) $y + x^2$ **(B)** $y + xz$ **(C)** $y + y^2$ **(D)** $y + 2y^2$ **(E)** $y + z$

2007A

3. The larger of two consecutive odd integers is three times the smaller. What is their sum?

(A) 4 **(B)** 8 **(C)** 12 **(D)** 16 **(E)** 20

2011A

3. A small bottle of shampoo can hold 35 milliliters of shampoo, whereas a large bottle can hold 500 milliliters of shampoo. Jasmine wants to buy the minimum number of small bottles necessary to completely fill a large bottle. How many bottles must she buy?

(A) 11 **(B)** 12 **(C)** 13 **(D)** 14 **(E)** 15

2011B

3. LeRoy and Bernardo went on a week-long trip together and agreed to share the costs equally. Over the week, each of them paid for various joint expenses such as gasoline and car rental. At the end of the trip it turned out that LeRoy had paid A dollars and Bernardo had paid B dollars, where $A < B$. How many dollars must LeRoy give to Bernardo so that they share the costs equally?

(A) $\frac{A+B}{2}$ **(B)** $\frac{A-B}{2}$ **(C)** $\frac{B-A}{2}$ **(D)** $B - A$ **(E)** $A + B$

2015B

3. Isaac has written down one integer two times and another integer three times. The sum of the five numbers is 100, and one of the numbers is 28. What is the other number?

(A) 8 **(B)** 11 **(C)** 14 **(D)** 15 **(E)** 18

2016A

3. The remainder function can be defined for all real numbers x and y with $y \neq 0$ by

$$\text{rem}(x, y) = x - y \left\lfloor \frac{x}{y} \right\rfloor,$$

where $\left\lfloor \frac{x}{y} \right\rfloor$ denotes the greatest integer less than or equal to $\frac{x}{y}$. What is the value of $\text{rem}\left(\frac{3}{8}, -\frac{2}{5}\right)$?

(A) $-\frac{3}{8}$ **(B)** $-\frac{1}{40}$ **(C)** 0 **(D)** $\frac{3}{8}$ **(E)** $\frac{31}{40}$

2017B

3. Suppose that x and y are nonzero real numbers such that

$$\frac{3x + y}{x - 3y} = -2.$$

What is the value of

$$\frac{x + 3y}{3x - y}?$$

(A) -3 **(B)** -1 **(C)** 1 **(D)** 2 **(E)** 3

2011B

4. In multiplying two positive integers a and b, Ron reversed the digits of the two-digit number a. His erroneous product was 161. What is the correct value of the product of a and b?

(A) 116 **(B)** 161 **(C)** 204 **(D)** 214 **(E)** 224

2000

5. If $|x - 2| = p$, where $x < 2$, then $x - p =$

(A) -2 **(B)** 2 **(C)** $2 - 2p$ **(D)** $2p - 2$ **(E)** $|2p - 2|$

2012B

2004A