UNIT 14 EXERCISES 1-5

SOLVE FOR X

2001

1. **(E)** Suppose the two numbers are a and b. Then the desired sum is

$$2(a_3) + 2(b+3) = 2(a+b) + 12 = 2S + 12.$$

2004B

1. **(A)** At Jenny's fourth practice she made $\frac{1}{2}(48) = 24$ free throws. At her third practice she made 12, at her second practice she made 6, and at her first practice she made 3.

2012B

1. **Answer (C):** There are $18-2 = 16$ more students than rabbits per classroom. Altogether there are $4 \cdot 16 = 64$ more students than rabbits.

2002A 2. **(A)** Let x be the number she was given. Her calculations produce

$$\frac{x-9}{3} = 43,$$

so

$$x - 9 = 129 \quad \text{and} \quad x = 138.$$

The correct answer is

$$\frac{138-3}{9} = \frac{135}{9} = 15.$$

2005A 2. **(B)** Since $2x + 7 = 3$ we have $x = -2$. Hence

$$-2 = bx - 10 = -2b - 10, \quad \text{so} \quad 2b = -8, \text{ and } b = -4.$$

2006A 2. **(C)** By the definition we have

$$h \otimes (h \otimes h) = h \otimes (h^3 - h) = h^3 - (h^3 - h) = h.$$

2006B 2. **(A)** Because $4 \spadesuit 5 = (4+5)(4-5) = -9$, it follows that

$$3 \spadesuit (4 \spadesuit 5) = 3 \spadesuit (-9) = (3 + (-9))(3 - (-9)) = (-6)(12) = -72.$$

2017A 2. **Answer (C):** Let the two numbers be x and y. Then $x + y = 4xy$. Dividing this equation by xy gives $\frac{1}{y} + \frac{1}{x} = 4$. One such pair of numbers is $x = \frac{1}{3}$, $y = 1$.

2017B

2. **Answer (E):** Adding the inequalities $y > -1$ and $z > 1$ yields $y + z > 0$. The other four choices give negative values if, for example, $x = \frac{1}{8}$, $y = -\frac{1}{4}$, and $z = \frac{3}{2}$.

2007A

3. **Answer (A):** Let the smaller of the integers be x. Then the larger is $x + 2$. So $x + 2 = 3x$, from which $x = 1$. Thus the two integers are 1 and 3, and their sum is 4.

2011A

3. **Answer (C):** Bernardo has paid $B - A$ dollars more than LeRoy. If LeRoy gives Bernardo half of that difference, $\frac{B-A}{2}$, then each will have paid the same amount.

2011B

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2015B

3. **Answer (A):** Let x be the integer Isaac wrote two times, and let y be the integer Isaac wrote three times. Then $2x + 3y = 100$. If $x = 28$, then $3y = 100 - 2 \cdot 28 = 44$, and y cannot be an integer. Therefore $y = 28$ and $2x = 100 - 3 \cdot 28 = 16$, so $x = 8$.

2016A 3. **Answer (B):**

$$\frac{3}{8} - \left(-\frac{2}{5}\right)\left\lfloor \frac{\frac{3}{8}}{-\frac{2}{5}} \right\rfloor = \frac{3}{8} + \frac{2}{5}\left\lfloor -\frac{15}{16} \right\rfloor = \frac{3}{8} + \frac{2}{5}(-1) = -\frac{1}{40}$$

2017B 3. **Answer (D):** The given equation implies that $3x+y=-2(x-3y)$, which is equivalent to $x=y$. Therefore

$$\frac{x+3y}{3x-y} = \frac{4y}{2y} = 2.$$

2011B 4. **Answer (E):** Because $161 = 23 \cdot 7$, the only two digit factor of 161 is 23. The correct product must have been $32 \cdot 7 = 224$.

2000 5. **Answer (C):** Since $x < 2$, it follows that $|x-2| = 2-x$. If $2-x=p$, then $x = 2-p$. Thus $x - p = 2 - 2p$.

2012B 5. **Answer (A):** The sum of two integers is even if they are both even or both odd. The sum of two integers is odd if one is even and one is odd. Only the middle two integers have an odd sum, namely $41 - 26 = 15$. Hence at least one integer must be even. A list satisfying the given conditions in which there is only one even integer is 1, 25, 1, 14, 1, 15.