UNIT 15 EXERCISES 1-5

PERCENT

2004A 1. **(E)** Since $20 is 2000 cents, she pays $(0.0145)(2000) = 29$ cents per hour in local taxes.

2005A 1. **(D)** It is given that $0.1x = 2$ and $0.2y = 2$, so $x = 20$ and $y = 10$. Thus $x - y = 10$.

2007A 1. **Answer (C):** Susan pays $(4)(0.75)(20) = 60$ dollars. Pam pays $(5)(0.70)(20) = 70$ dollars, so she pays $70 - 60 = 10$ more dollars than Susan.

2010B 1. **Answer (C):** Makayla spent $45 + 2 \cdot 45 = 135$ minutes, or $\frac{135}{60} = \frac{9}{4}$ hours in meetings. Hence she spent $100 \cdot \frac{9/4}{9} = 25$ percent of her time in meetings.

2018A 1. **Answer (D):** There are currently 36 red balls in the urn. In order for the 36 red balls to represent 72% of the balls in the urn after some blue balls are removed, there must be $36 \div 0.72 = 50$ balls left in the urn. This requires that $100 - 50 = 50$ blue balls be removed.

2005B 2. **(D)** We have

$$\frac{x}{100} \cdot x = 4, \quad \text{so} \quad x^2 = 400.$$

Because $x > 0$, it follows that $x = 20$.

2000 3. **Answer (B):** Since Jenny ate 20% of the jellybeans remaining each day, 80% of the jellybeans are left at the end of each day. If x is the number of jellybeans in the jar originally, then $(0.8)^2 x = 32$. Thus $x = 50$.

2001 3. **(B)** If Kristin's annual income is $x \geq 28{,}000$ dollars, then

$$\frac{p}{100} \cdot 28{,}000 + \frac{p+2}{100} \cdot (x - 28{,}000) = \frac{p + 0.25}{100} \cdot x.$$

Multiplying by 100 and expanding yields

$$28{,}000p + px + 2x - 28{,}000p - 56{,}000 = px + 0.25x.$$

So, $1.75x = \frac{7}{4}x = 56{,}000$ and $x = 32{,}000$.

2009B   3. **Answer (D):** Twenty percent less than 60 is $\frac{4}{5} \cdot 60 = 48$. One-third more than a number n is $\frac{4}{3}n$. Therefore $\frac{4}{3}n = 48$, and the number is 36.

2013A   3. **Answer (E):** Because six tenths of the flowers are pink and two thirds of the pink flowers are carnations, $\frac{6}{10} \cdot \frac{2}{3} = \frac{2}{5}$ of the flowers are pink carnations. Because four tenths of the flowers are red and three fourths of the red flowers are carnations, $\frac{4}{10} \cdot \frac{3}{4} = \frac{3}{10}$ of the flowers are red carnations. Therefore $\frac{2}{5} + \frac{3}{10} = \frac{7}{10} = 70\%$ of the flowers are carnations.

2002A   4. **(B)** The appropriate angle x satisfies

$$90 - x = \frac{1}{4}(180 - x), \quad \text{so} \quad 360 - 4x = 180 - x.$$

Solving for x gives $3x = 180$, so $x = 60$.

2005B   4. **(B)** To earn an A on at least 80% of her quizzes, Lisa needs to receive an A on at least $(0.8)(50) = 40$ quizzes. Thus she must earn an A on at least $40 - 22 = 18$ of the remaining 20. So she can earn a grade lower than an A on at most 2 of the remaining quizzes.

2012B   4. **Answer (B):** Diana's money is worth 500 dollars and Étienne's money is worth $400 \cdot 1.3 = 520$ dollars. Hence the value of Étienne's money is greater than the value of Diana's money by

$$\frac{520 - 500}{500} \cdot 100\% = 4\%.$$

1999

5. (C) If the suggested retail price was P, then the marked price was $0.7P$. Half of this is $0.35P$, so Alice paid 35% of the suggested retail price.

2007A

5. **Answer (D):** After paying the federal taxes, Mr. Public had 80% of his inheritance money left. He paid 10% of that, or 8% of his inheritance, in state taxes. Hence his total tax bill was 28% of his inheritance, and his inheritance was $\$10{,}500/0.28 = \$37{,}500$.

2011A

5. **Answer (A):**

Because N is divisible by 3, 4, and 5, the prime factorization of N must contain one 3, two 2s, and one 5. Furthermore $2^2 \cdot 3 \cdot 5 = 60$ is divisible by every integer less than 7. Therefore the numbers with this property are precisely the positive multiples of 60. The second smallest positive multiple of 60 is 120, and the sum of its digits is 3.

2013A

5. **Answer (B):** The total shared expenses were $105+125+175 = 405$ dollars, so each traveler's fair share was $\frac{1}{3} \cdot 405 = 135$ dollars. Therefore $t = 135 - 105 = 30$ and $d = 135 - 125 = 10$, so $t - d = 30 - 10 = 20$.

<div align="center">OR</div>

Because Dorothy paid 20 dollars more than Tom, Sammy must receive 20 more dollars from Tom than from Dorothy.

2015B

5. **Answer (B):** If the Sharks win the next N games, then they win $\frac{1+N}{3+N} \cdot 100\%$ of the games. Therefore $\frac{1+N}{3+N} \geq \frac{95}{100} = \frac{19}{20}$, so $20 + 20N \geq 57 + 19N$. Therefore $N \geq 37$.

<div align="center">**OR**</div>

If the Tigers win no more games, then their 2 wins should be no more than 5%, or $\frac{1}{20}$, of the games played. So the minimum number of games played must be at least 40, and $N \geq 37$.