Big Ten ACT Practice – Equation Modeling

1. The Fahrenheit temperature (F) can be approximated by doubling the Celsius temperature (C) and then adding 32. Which of the following expresses this conversion?
   A. \( F \approx \frac{1}{2}C + 32 \)
   B. \( F \approx \frac{1}{2}(C + 32) \)
   C. \( F \approx 2C + 32 \)
   D. \( F \approx 2(C + 32) \)
   E. \( F \approx C^2 + 32 \)

2. When Jeff starts a math assignment, he spends minutes getting out his book and a sheet of paper, sharpening his pencil, looking up the assignment in his assignment notebook, and turning to the correct page in his book. The equation \( t = 10p + 5 \) models the time, \( t \) minutes, Jeff budgets for a math assignment with \( p \) problems. Which of the following statements is necessarily true according to Jeff’s model?
   F. He budgets 15 minutes per problem.
   G. He budgets 10 minutes per problem.
   H. He budgets 5 minutes per problem.
   J. He budgets 10 min per problem for the hard and 5 min per problem for the easy
   K. He budgets a 5-min break after each prob

3. Mark rode his bike, mostly uphill, to visit Bill. The trip to Bill’s house took \( t \) minutes. Returning home, mostly downhill, Mark was able to travel at an average speed three times that of his trip to Bill’s. Which of the following is an expression for the total number of minutes Mark bicycled on the entire trip?
   A. \( \frac{t}{3} \)
   B. \( \frac{4t}{3} \)
   C. \( t + \frac{1}{3} \)
   D. \( 3t \)
   E. \( 4t \)

4. Due to inflation, a car that formerly sold for $25,000 now sells for 10% more. Which of the following calculations gives the current cost, in dollars, of the car?
   F. \( 25,000 + 10 \)
   G. \( 25,000 + 25,000(0.01) \)
   H. \( 25,000 + 25,000(0.10) \)
   J. \( 25,000 + 25,000(10) \)
   K. \( 25,000(0.10) \)

5. A company rents moving vans for a rental fee of $25.00 per day with an additional charge of $0.30 per mile that the van is driven. Which of the following expressions represents the cost, in dollars, of renting a van for \( 1 \) day and driving it \( m \) miles?
   A. \( 0.30m + 25 \)
   B. \( 25m + 30 \)
   C. \( 30m + 25 \)
   D. \( 25.30m \)
   E. \( 55m \)

6. Joe bought a 24-inch-long candle. It burns at a steady rate of 0.52 inches every hour. Which of the following is a relationship between the length, \( L \), in inches, of the candle and the time, \( t \), in hours, the candle has burned?
   F. \( L = 24 - 0.52t \)
   G. \( L = 24 + 0.52t \)
   H. \( L = 0.52t \)
   J. \( L = 23.48t \)
   K. \( L = 76t \)

7. An earring manufacturing company has fixed costs of $20,000 per month and production costs of $0.60 per pair of earrings it makes. If the company produces \( x \) pairs of earrings in a month, which of the following expressions represents the total of the company’s monthly costs?
   A. \( $20,000x \)
   B. \( $20,000 + x \)
   C. \( $20,000x + $0.60 \)
   D. \( $20,000 + $0.60x \)
   E. \( ($20,000 + $0.60)x \)

8. A city utility department charges residential customers $2.50 per 1,000 gallons of water and $16.00 per month for trash pickup. Which of the following expressions gives a residential customer’s total monthly charges, in dollars, for use of \( g \) thousand gallons of water and trash pickup?
   F. \( 2.50g + 16.00 \)
   G. \( 2.50g + 1,016.00 \)
   H. \( 16.00g + 2.50 \)
   J. \( 18.50g \)
   K. \( 2,500.00g + 16.00 \)