UNIT 14 EXERCISES 11-15

SYSTEM OF EQUATIONS

1999

11. **(A)** The locker labeling requires $137.94/0.02 = 6897$ digits. Lockers 1 through 9 require 9 digits, lockers 10 through 99 require $2 \cdot 90 = 180$ digits, and lockers 100 through 999 require $3 \cdot 900 = 2700$ digits. Hence the remaining lockers require $6897 - 2700 - 180 - 9 = 4008$ digits, so there must be $4008/4 = 1002$ more lockers, each using four digits. In all, there are $1002+999 = 2001$ student lockers.

2006A 14. **(C)** If a debt of D dollars can be resolved in this way, then integers p and g must exist with

$$D = 300p + 210g = 30(10p + 7g).$$

As a consequence, D must be a multiple of 30, so no positive debt of less than \$30 can be resolved. A debt of \$30 can be resolved since

$$30 = 300(-2) + 210(3).$$

This is done by giving 3 goats and receiving 2 pigs.

2006B 14. **(D)** The total cost of the peanut butter and jam is $N(4B + 5J) = 253$ cents, so N and $4B + 5J$ are factors of $253 = 11 \cdot 23$. Because $N > 1$, the possible values of N are 11, 23, and 253. If $N = 253$, then $4B + 5J = 1$, which is impossible since B and J are positive integers. If $N = 23$, then $4B + 5J = 11$, which also has no solutions in positive integers. Hence $N = 11$ and $4B + 5J = 23$, which has the unique positive integer solution $B = 2$ and $J = 3$. So the cost of the jam is $11(3)(5¢) = \$1.65$.