Problem of the Week
Grade 9 and 10

Chocolate Anyone?
Solution

Problem

In preparation for Valentine's Day, Mr. Gee surveyed his class to determine what types of chocolate bars to buy. He determined the following: 16 students wanted milk chocolate bars, 8 requested dark chocolate bars and 6 wanted white chocolate bars. On visiting the store Mr. Gee discovered that he could purchase the chocolate bars in variety packs to keep his costs down. Variety Pack A costs \$2.70 and contains 2 milk chocolate bars and 1 dark chocolate bar. Variety Pack B costs \$7.65 and contains 4 milk chocolate bars, 2 dark chocolate bars, and 3 white chocolate bars. Variety Pack C costs \$4.55 and contains 2 milk chocolate bars, 1 dark chocolate bar, and 3 white chocolate bars. How many of each variety pack should Mr. Gee purchase in order to obtain exactly the correct number of chocolate bars for the lowest price?

Solution

There are three options to purchase 6 white chocolate bars: purchase 2 Variety Pack B's or purchase 2 Variety Pack C's or purchase 1 Variety Pack B and 1 Variety Pack C.

1. If you purchase 2 Variety Pack B's, you get 2×4 or 8 milk chocolate bars and 2×2 or 4 dark chocolate bars. You will still need $16 - 8$ or 8 milk chocolate bars and $8 - 4$ or 4 dark chocolate bars. You can achieve this by purchasing 4 Variety Pack A's. The cost for this option is:
$$\$2.70 \times 4 + \$7.65 \times 2 = \$10.80 + \$15.30 = \$26.10.$$

2. If you purchase 2 Variety Pack C's, you get 2×2 or 4 milk chocolate bars and 2×1 or 2 dark chocolate bars. You will still need $16 - 4$ or 12 milk chocolate bars and $8 - 2$ or 6 dark chocolate bars. You can achieve this by purchasing 6 Variety Pack A's. The cost for this option is
$$\$2.70 \times 6 + \$4.55 \times 2 = \$16.20 + \$9.10 = \$25.30.$$

3. If you purchase 1 Variety Pack B and 1 Variety Pack C, you get $4 + 2$ or 6 milk chocolate bars and $2 + 1$ or 3 dark chocolate bars. You will still need $16 - 6$ or 10 milk chocolate bars and $8 - 3$ or 5 dark chocolate bars. You can achieve this by purchasing 5 Variety Pack A's. The cost for this option is
$$\$2.70 \times 5 + \$7.65 \times 1 + \$4.55 \times 1 = \$13.50 + \$7.65 + \$4.55 = \$25.70.$$

$\therefore$ Mr. Gee should purchase 6 Variety Pack A's and 2 Variety Pack C's for a total cost of \$25.30.