Problem of the Week
Problem A and Solution
Gym Budgets

Problem

Ms Lukezich needs to order sports equipment for the gym. There will be a maximum of 40 students using the equipment at any time. She needs the following equipment:

- one soccer ball for each pair of students
- one parachute for each group of 10 students
- three tennis balls for each group of 4 students

One soccer ball costs \$4. One parachute costs \$25. One tennis ball costs \$2.

How much will it cost to buy all of the required equipment?

Solution

One way to solve this is to figure out the maximum number of groups that could be using each piece of equipment. We will do this by assuming we have 40 students, since that is the maximum number of students using the equipment at any time.

- Since she needs 1 soccer ball for every 2 students, Ms Lukezich needs $40 \div 2 = 20$ soccer balls.

  The soccer balls will cost a total of $20 \times \$4 = \$80$.

- Since she needs 1 parachute for every 10 students, Ms Lukezich needs $40 \div 10 = 4$ parachutes.

  The parachutes will cost a total of $4 \times \$25 = \$100$.

- Since she needs 3 tennis balls for every 4 students, Ms Lukezich needs $40 \div 4 = 10$ sets of 3 tennis balls. Thus, she needs $10 \times 3 = 30$ tennis balls altogether.

  The tennis balls will cost a total of $30 \times \$2 = \$60$.

Therefore, the total cost for the sports equipment is $\$80 + \$100 + \$60 = \$240$.

Alternatively, we could make a table for each piece of equipment to determine how much each will cost. First, we make a table for the soccer balls.

Number of Soccer Balls	Number of Students	Total Cost, in $
1	2	4
2	4	8
3	6	12
4	8	16
5	10	20

We could continue writing out rows in the table until we determine that 20 balls meets the needs of 40 students, for a cost of \$80. Or we might notice at this point that since $40 = 4 \times 10$, then the cost of soccer balls for 40 students is equal to 4 times the cost of soccer balls for 10 students. So the cost for the soccer balls is $4 \times \$20 = \$80$.

Next, we make a table for the parachutes.

Number of Parachutes	Number of Students	Total Cost, in $
1	10	25
2	20	50
3	30	75
4	40	100

So the cost for the parachutes is \$100.

Finally, we make a table for the tennis balls. Note that one set of 3 tennis balls costs $3 \times \$2 = \$6$.

Number of Sets of 3 Tennis Balls	Number of Students	Total Cost, in $
1	4	6
2	8	12
3	12	18
4	16	24
5	20	30

We could continue writing out rows in the table until we determine that 10 sets of tennis balls meets the needs of 40 students for a cost of \$60. Or, we might notice at this point that since $40 = 2 \times 20$, then the cost of the tennis balls for 40 students is equal to 2 times the cost of tennis balls for 20 students. So the cost for the tennis balls is $2 \times \$30 = \$60$.

Once again, we get a total cost of $\$80 + \$100 + \$60 = \$240$ for the sports equipment.