# Math Question Generation — Output

This document contains two generated math questions with answer options, explanations, and an illustrative diagram.

@title Combinatorics — Campus Gear Choices  
@description Count combinations of independent choices (backpack × bottle).  
  
@question At Greenfield High each student selects \*\*one backpack\*\* and \*\*one water bottle\*\*.   
The backpack colors available are Green, Gray, Blue.   
The water bottle types available are Insulated, Glass, Plastic, Copper.   
How many different backpack–bottle combinations are possible?  
  
@instruction Select the single best answer.  
@difficulty easy  
@Order 1  
  
@option 7  
@option 9  
@option 11  
@option 14  
@@option 12  
@explanation Each combination is formed by choosing one backpack (3 choices)   
and one bottle (4 choices). Total combinations = 3×4=12.  
  
@subject Quantitative Math  
@unit Data Analysis & Probability  
@topic Counting & Arrangement Problems  
@plusmarks 1

@title Packed Spheres — Box Dimensions  
@description Determine the dimensions of a rectangular box tightly packed with identical spheres arranged in a rectangular grid (top view).  
  
@question A rectangular box contains 8 identical spheres arranged in 2 rows and 4 columns (each sphere touches its neighbors). Each sphere has radius \(2\) centimeters. Which of the following is closest to the internal dimensions (in centimeters) of the rectangular box (height × width × length)?  
  
@instruction Choose the option that lists the box dimensions in centimeters.  
@difficulty moderate  
@Order 2  
  
@option \(4 \times 16 \times 43\)  
@option \(4 \times 14 \times 48\)  
@@option \(4 \times 16 \times 48\)  
@option \(5 \times 16 \times 48\)  
@option \(4 \times 18 \times 48\)  
@explanation Each sphere has diameter \(d=2r=2\times2=4\) cm. For a 2-by-4 tight grid: Height=4 cm, Width=16 cm, Length=48 cm. So dimensions = \(4 \times 16 \times 48\).  
  
@subject Quantitative Math  
@unit Geometry and Measurement  
@topic Solid Figures (Volume of Cubes)  
@plusmarks 1

Diagram:

