1 Here is a representation of four quanta of energy, q, distributed among three molecules: q|q|qq. How many ways can the four units of energy end up with one in first molecule, one in the second molecule, and two in the third molecule?

A 1
B q = 4
C q! = 4! = 4*3*2*1 = 24

2 Here is a representation of four units of energy, q, distributed among m = 3 molecules: q|q|qq. How many different ways can the two partitions, |, be assigned to achieve the arrangement q|q|qq?

A 1
B (m - 1)! = (3 - 1)! = 2*1 = 2
C m! = 3! = 3*2*1 = 6

3 Here is a representation of four units of energy, q, distributed among m = 3 molecules: q|q|qq. How many different arrangements of the six objects in the diagram are there, ignoring that q and | are different?

A m + q = 7
B (m - 1)*q = 6
C (q + m - 1)! = 6! = 6*5*4*3*2*1 = 720

4 How many ways (distinct or not) can the arrangement q|q|qq of four quanta among three molecules be made?

A q! * m! = 2! * 2! = 4
B q! * (m - 1)! = 4! * (3 - 1)! = 24 * 2 = 48
C (q + m)! = (4 + 3)! = 7! = 5040

5 Two arrangements of q = 4 quanta among m = 3 molecules are q|q|qq and qqq||q. Which relation is true about the number of *unique* ways, We(q, m), that q quanta can be distributed among m molecules?

A We(q, m) = q! * m!
B We(q, m) = (q + m - 1)!
C We(q, m) * q! * (m - 1)! = (q + m - 1)!

6 We(q, m) = (q + m - 1)!/(q! * (m - 1)!) is the number of unique ways that q quanta can be distributed among m molecules. How many ways can two quanta be distributed among three molecules?

A 3
B 6
C 9

7 $We(q, m) = (q + m - 1)!/(q! * (m - 1)!)$ is the number of unique ways that q quanta can be distributed among m molecules. How many ways can three quanta be distributed among three molecules?

A 10
B 16
C 20