

Combinations and Permutations Quiz Solutions

$$1. C(29, 7) = \frac{29!}{7! \cdot (29-7)!} = \frac{29!}{7! \cdot 22!} = \frac{29 \cdot 28 \cdot 27 \cdot 26 \cdot 25 \cdot 24 \cdot 23 \cdot 22}{7!} = \frac{7866331200}{5040} = 1560780$$

$$2. 16^6 = 16777216 \text{ combinations. } P(16, 6) = \frac{16!}{(16-6)!} = 16 \cdot 15 \cdot 14 \cdot 13 \cdot 12 \cdot 11 = 5765760$$

$$\text{without repeats (permutations). } \left(\frac{16}{6}\right) = \frac{16!}{6!10!} = \frac{5765760}{6!} = 8008.$$

$$3. \left(\frac{30}{5}\right) \cdot \left(\frac{25}{5}\right) \cdot \left(\frac{20}{5}\right) \cdot \left(\frac{15}{5}\right) = 352510500237255360 \text{ ways to form the 4 teams.}$$

$$\left(\frac{5}{1}\right) \cdot \left(\frac{25}{4}\right) \cdot \left(\frac{4}{1}\right) \cdot \left(\frac{21}{4}\right) \cdot \left(\frac{3}{1}\right) \cdot \left(\frac{17}{4}\right) \cdot \left(\frac{2}{1}\right) \cdot \left(\frac{13}{4}\right) = 15460335891000000 \text{ ways to form the 4 teams with a designer in each team.}$$

Note: The number 352510500237255360 can be read as “Three hundred fifty-two quadrillion, five hundred ten trillion, five hundred billion, two hundred thirty-seven million, two hundred fifty-five thousand, three hundred sixty”