

MATHCOUNTS[®] Problem of the Week Archive

Family Vacation – June 4, 2018

Problems & Solutions

The summer has unofficially begun for many families around the country, so here are a few problems related to Miranda's family vacation.

When packing for the trip Miranda didn't want to bring a lot of extra clothes, so she packed 4 shirts, 2 pairs of shorts and 1 skirt (all of which coordinate). If an outfit consists of a shirt and a pair of shorts or a skirt, how many distinct outfits did Miranda pack?

Since an outfit consists of a shirt and either a pair of shorts or a skirt, the number of distinct outfits Miranda packed is $4(2 + 1) = 12$ outfits

Miranda's family owns an SUV and a hybrid car. The SUV's gas mileage rate is 18 miles per gallon of gas, while the hybrid's gas mileage rate is 40 miles per gallon of gas. If the round trip is 720 miles and gas costs \$3.89 per gallon, how much money, in dollars, will the family save by driving the hybrid car instead of the SUV?

If Miranda's family drives the SUV, they will spend $(720/18)(3.89) = \$155.60$ on gas. If they drive their hybrid car, they will spend $(720/40)(3.89) = \$70.02$ on gas. By driving the hybrid car instead of the SUV they will save $155.60 - 70.02 = \$85.58$.

The car they are driving has four seats, which is perfect since Miranda is traveling with her parents and her brother. If one of Miranda's parents must be in the driver's seat and there are no restrictions on who can sit in the other three seats, how many distinct seating arrangements are possible?

For each seating arrangement, there are 2 options for who will sit in the driver's seat, 3 options for the front passenger seat, 2 options for the rear seat on the driver's side, and 1 option for the rear seat on the passenger's side. The total number of distinct seating arrangements is $2 \times 3 \times 2 \times 1 = 12$ arrangements.

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