Pair counting — Up to 25 members

Name: ______________________ Date: ____________

Count the pairs without listing them. Show your working.

1 A league has 7 teams. Every team plays every other team once.

How many matches are played?

Why Each of the 7 meets the other 6, which is $7 \times 6 = 42$. But that counts every pair twice — once from each end — so halve it: $42 \div 2 = 21$ matches. More than one way works here, and the other needs no halving at all: the first meets 6, the second meets 5 it has not met yet, and so on down to 1. Adding $6 + 5 + \ldots + 1$ gives the same 21. This method counts every pair once from the start, so there is nothing to halve at the end.

21

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2 22 offices are connected so that each one can call each of the others directly, and a call from A to B is not the same as a call from B to A.

How many different calls are possible?

Why

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Name: ______________________ Date: ____________

Count the pairs without listing them. Show your working.

3 A league has 9 teams. Every team plays every other team twice — once at home and once away.

How many matches are played?

Why

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4 A league has 6 teams. Every team plays every other team once.

How many matches are played?

Why

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Pair counting · Up to 25 members — Answer key

> **If they are stuck**
> - Pick one of them and count who they meet. Is that true of every one of them?

1. Each of the 7 meets the other 6, which is 7 × 6 = 42. But that counts every pair twice — once from each end — so halve it: 42 ÷ 2 = 21 matches. More than one way works here, and the other needs no halving at all: the first meets 6, the second meets 5 it has not met yet, and so on down to 1. Adding 6 + 5 + ... + 1 gives the same 21. This method counts every pair once from the start, so there is nothing to halve at the end.

2. Each of the 22 meets the other 21, and this time the two directions are different events. So 22 × 21 = 462 calls, with no halving.

3. Each of the 9 meets the other 8, and this time the two directions are different events. So 9 × 8 = 72 matches, with no halving.

4. Each of the 6 meets the other 5, which is 6 × 5 = 30. But that counts every pair twice — once from each end — so halve it: 30 ÷ 2 = 15 matches. More than one way works here, and the other needs no halving at all: the first meets 5, the second meets 4 it has not met yet, and so on down to 1. Adding 5 + 4 + ... + 1 gives the same 15. This method counts every pair once from the start, so there is nothing to halve at the end.