

## GCSE MATHS

## Systematic listing and counting

# Worked Solutions

**Q1**

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$$1 \times 18 = 2 \times 9 = 3 \times 6 = 18$$

Stop before reversing pairs.

**Q2**

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$$(1, 8), (2, 7), (3, 6), (4, 5)$$

Increase the smaller integer until the pairs would repeat.

**Q3**

★★

$$12, 14, 24, 42$$

End in 2 or 4, excluding repetition.

**Q4**

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$$(1, 24), (2, 12), (3, 8), (4, 6)$$

List the factor pairs once before reversing them.

$$4 \times 2 = 8$$

Each can be reversed.

**Q5**

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$$(1, 4), (2, 3), (3, 2), (4, 1)$$

The colours distinguish the dice.

**Q6**

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$$3 \times 3 = 9$$

List the three drinks for each size.

**Q7**

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$$5 \times 7 = 35$$

Multiply the independent choices.

**Q8**

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$$3 \times 2 \times 4 = 24$$

Choose one of each item.

**Q9**

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$$4 \times 4 \times 10 = 160$$

Repeated letters leave four options in each place.

**Q10**

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$$6 \times 3 = 18$$

Pair each first leg with each second leg.

**Q11**

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$$4c = 28 \Rightarrow c = 7$$

Divide the total by the number of sizes.

**Q12**

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$$10^4 = 10000$$

Each position has ten independent choices.

**Q13**

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$$5 \times 4 \times 3 = 60$$

One option is removed after each choice.

**Q14**

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$$6 \times 5 \times 4 = 120$$

Order matters, and a runner cannot occupy two places.

**Q15**

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$$8 \times 7/2 = 28$$

Divide ordered choices by two.

**Q16**

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$$7 \times 6/2 = 21$$

Each pair of teams plays one match.

**Q17**

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$$4 \times 3 \times 2 \times 1 = 24$$

Count choices for each position.

**Q18**

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$$9 \times 8 = 72$$

The roles distinguish the order.

**Q19**

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$$2 \times 3 \times 2 = 12$$

Choose the final even digit first, then the other places.

**Q20**

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$$4 \times 4 \times 3 = 48$$

The first digit cannot be zero; the second may be.

**Q21**

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$$10^3 - 9^3 = 1000 - 729 = 271$$

Subtract PINs containing no 7.

**Q22**

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Units digit = 5

A multiple of 5 must end in 5 here.

$$4 \times 3 = 12$$

Choose the hundreds digit, then a different tens digit.

**Q23**

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$$7 \times 6/2 = 21$$

Count every pair.

$$3 \times 2/2 = 3$$

Count pairs of boys.

$$21 - 3 = 18$$

Subtract the unwanted pairs.

**Q24**

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$$3\_ : 3 \times 3 = 9$$

With hundreds digit 3, there are three even endings and three middle digits.

$$4\_ : 2 \times 3 = 6$$

With hundreds digit 4, the last digit is 0 or 2.

$$9 + 6 = 15$$

Add the cases, counting each outcome once.