eClassroom

GCSE Mathematics

Systematic Listing

Worked Solutions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation — Worked Solutions

[Fluency] Question 1

Fix each coin result and list the die outcomes:

H1, H2, H3, H4, H5, H6

T1, T2, T3, T4, T5, T6

$\therefore$ **12 outcomes in total.**

[Fluency] Question 2

Order matters $\rightarrow$ list all ordered pairs of different flavours:

VC, VS, CV, CS, SV, SC

$\therefore$ **6 possible choices**

[Fluency] Question 3

(a) PINs starting with 1: 12, 13, 14

(b) Each of 4 digits can be first, then 3 remain for second position: $4 \times 3 = 12$

$\therefore$ **(a) 12, 13, 14 (b) 12 PINs**

[Fluency] Question 4

Use the multiplication principle: choices are independent.

Total = $4 \times 3 \times 2$

$\therefore$ **24 different meal deals**

[Fluency] Question 5

Fix first digit, then vary second (repeats allowed):

33, 35, 37, 53, 55, 57, 73, 75, 77

$\therefore$ **9 two-digit numbers: 33, 35, 37, 53, 55, 57, 73, 75, 77**

[Reasoning] Question 6

(a) 9 outcomes: (1,1)(1,2)(1,3)(2,1)(2,2)(2,3)(3,1)(3,2)(3,3)

(b) Outcomes summing to 5: (2,3) and (3,2) $\rightarrow$ 2 outcomes

$\therefore$ **(a) 9 outcomes listed (b) P(sum=5) = 2/9**

[Reasoning] Question 7

Systematically list all pairs (order doesn't matter):

∴ **AB, AC, AD, BC, BD, CD (6 pairs)**

[Reasoning] Question 8

4 different letters → number of arrangements = 4!

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

∴ **24 arrangements**

[Problem Solving] Question 9

(a) All permutations of 2, 4, 7: 247, 274, 427, 472, 724, 742

(b) A number is divisible by 3 if its digit sum is divisible by 3.

Digit sum = 2 + 4 + 7 = 13. 13 is not divisible by 3,

so **none** of the 6 numbers are divisible by 3.

∴ **(a) 247, 274, 427, 472, 724, 742 (b) None (digit sum = 13)**

[Problem Solving] Question 10

Label the counters R_1, R_2, B, G.

(a) Pairs: $\{R_1,R_2\}$, $\{R_1,B\}$, $\{R_1,G\}$, $\{R_2,B\}$, $\{R_2,G\}$, $\{B,G\}$ – 6 pairs

(b) Only $\{R_1, R_2\}$ gives same colour → 1 out of 6

∴ **(a) 6 pairs listed (b) P(same colour) = 1/6**

Section B — Higher — Worked Solutions

[Fluency] Question 1

5 choices for 1st digit, 4 for 2nd, 3 for 3rd, 2 for 4th (no repeats):

$5 \times 4 \times 3 \times 2 = {}^{5}P_{4}$

∴ **120 four-digit numbers**

[Fluency] Question 2

5 people can be arranged in any order: $5! = 5 \times 4 \times 3 \times 2 \times 1$

∴ **120 arrangements**

[Fluency] Question 3

Order doesn't matter → use combinations:

$C(7, 3) = 7! \div (3! \times 4!) = (7 \times 6 \times 5) \div (3 \times 2 \times 1) = 210 \div 6$

∴ **35 committees**

[Reasoning] Question 4

A is fixed in position 1. The remaining 4 people fill positions 2, 3, 4, 5:

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

Reason: each position is filled independently with remaining people.

∴ **24 arrangements**

[Reasoning] Question 5

Letters (with repetition): $26^3 = 17\,576$

Digits (with repetition): $10^2 = 100$

Total = 17 576 × 100 = 1 757 600

∴ **1.76×10^6 passwords (3 s.f.)**

[Reasoning] Question 6

(a) Each match involves 2 teams chosen from 6:

$C(6, 2) = (6 \times 5) \div (2 \times 1) = 15$

(b) Each match is an unordered pair of teams. Choosing 2 from n teams gives C(n, 2) unordered pairs → exactly one match per pair. ✓

∴ **(a) 15 matches (b) see working**

[Problem Solving] Question 7

Total teams of 3 from 7 people: C(7,3) = 35

Teams with no girls (all boys): C(4,3) = 4

At least 1 girl: 35 – 4 = 31

∴ **31 teams**

[Problem Solving] Question 8

First digit: 9 choices (1–9, not 0)

Each remaining digit: 10 choices (0–9, repeats allowed)

Total = 9 × 10 × 10 × 10 × 10 = 9×10^4

∴ **90 000 codes**

[Problem Solving] Question 9

(a) Choose 2 women from 5: C(5,2) = 10

Choose 2 men from 6: C(6,2) = 15

Total = 10 × 15 = 150 ✓

(b) Total committees of 4 from 11: C(11,4) = 330

P(exactly 2 women) = 150 ÷ 330 = 5/11

∴ **(a) shown ✓ (b) P = 5/11**

[Problem Solving] Question 10

(a) Lines from pairs of 8 points: C(8,2) = 28

(b) Triangles from groups of 3 points: C(8,3) = 56

(c) General formula: C(n,3) = n(n–1)(n–2) ÷ 6

∴ **(a) 28 lines (b) 56 triangles (c) C(n, 3) = n(n–1)(n–2) ÷ 6**