Year 10 | Olympiad Mathematics

IGCSE-pathway diagnostic assessment • Non-routine mathematical reasoning

Student name: _____ Date: _____

Suggested time: 55 minutes. Show working and explain your reasoning. This is an independent diagnostic, not an official examination paper.

1. A positive integer leaves remainder 2 when divided by 3 and remainder 3 when divided by 5. Find the smallest such integer greater than 20. Explain your method. [7 marks]

2. How many three-digit numbers have strictly increasing digits from left to right? Explain why the first digit cannot be zero. [7 marks]

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3. Prove that the sum of three consecutive integers is divisible by 3. [6 marks]

4. A 4 × 4 square grid is made of unit squares. Count all squares of every size and explain your counting strategy. [6 marks]

5. Five friends each shake hands once with every other friend. How many handshakes occur? Generalise to n friends. [7 marks]

6. A rectangle has perimeter 30 cm and integer side lengths. Which dimensions give the largest area? Justify. [7 marks]

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Parent / Tutor Guide | Olympiad Mathematics

Keep this section separate from the student during the assessment. The marks are diagnostic prompts, not an official IGCSE mark scheme.

Suggested responses and assessment notes

1. (7 marks) 23: 23 mod 3 = 2 and 23 mod 5 = 3.

2. (7 marks) Choose any three digits from 1–9: C(9,3) = 84; if zero were selected it would be first and not form a three-digit number.

3. (6 marks) Let integers be n-1, n, n+1; sum 3n.

4. (6 marks) 16 + 9 + 4 + 1 = 30.

5. (7 marks) 10; general formula n(n-1)/2.

6. (7 marks) 7 cm by 8 cm gives 56 cm^2; fixed sum 15 maximises product with closest integers.

What to observe

Look for subject knowledge, accuracy, use of appropriate terminology, clarity of reasoning, interpretation of command words, and ability to justify or evaluate when asked.

Suggested diagnostic approach

Record which questions were attempted independently, which required prompts, and whether difficulties arose from concepts, literacy, calculations or time management. Plan follow-up teaching around recurring misconceptions.

Curriculum note

This is a general Year 10 IGCSE-oriented diagnostic. It is not endorsed by Cambridge, Pearson Edexcel or the IB. Topic order and examination demands differ by board and school; adjust to the student's actual specification.

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