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Multiples and Factors

Solutions & Answer Key

Full worked solutions, marking scheme & answer key

IGCSE Mathematics

The Panda Math Tutor

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Companion to the *Student Worksheet*

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Note

About this booklet. These are the complete solutions to every question in the *Multiples and Factors — Student Worksheet*. Question numbers match exactly (F1–F6, M1–M6, P1–P6, PF1–PF7, H1–H7, L1–L7, A1–A6, the Mixed Review MR1–MR10, and the examination questions Q1–Q8).
Each solution follows the notes' reasoning pattern — identify what is given, state what is required, choose the method *and say why it fits*, work through it, then check. Depth is scaled to difficulty. Part V collects the common mistakes to watch for, and Part VI is a quick answer key for fast marking.

4 Part IV — Complete Solutions

Note

Each solution follows the same reasoning pattern used in the notes: identify what is given, decide what is required, choose the method *and say why it fits*, work through it, then check. Depth is scaled to difficulty — brief for basic questions, fuller for harder ones.

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4.1 Solutions — Factors

Solution F1

Test each number $1, 2, 3, \ldots$ and record both the divisor and the quotient whenever the division is exact:

$$40 \div 1 = 40, \quad 40 \div 2 = 20, \quad 40 \div 4 = 10, \quad 40 \div 5 = 8.$$

(3, 6, 7 do not divide 40 exactly.) We stop once the two factors in a pair meet.
Factors of 40**:** $1, 2, 4, 5, 8, 10, 20, 40$ (eight factors).

Solution F2

$66 \div 1 = 66$, $66 \div 2 = 33$, $66 \div 3 = 22$, $66 \div 6 = 11$. No other number below $\sqrt{66} \approx 8.1$ divides it.
Factors of 66**:** $1, 2, 3, 6, 11, 22, 33, 66$ (eight factors).

Solution F3

Work upward, pairing divisor with quotient:

$$48 \div 1 = 48, \quad 48 \div 2 = 24, \quad 48 \div 3 = 16, \quad 48 \div 4 = 12, \quad 48 \div 6 = 8.$$

$48 \div 5$ is not exact. The next divisor to try would be 8, but 8 has already appeared as a quotient (paired with 6), so we stop.
Factors of 48**:** $1, 2, 3, 4, 6, 8, 12, 16, 24, 48$ (ten factors).

Solution F4

$90 \div 1 = 90,\ 90 \div 2 = 45,\ 90 \div 3 = 30,\ 90 \div 5 = 18,\ 90 \div 6 = 15,\ 90 \div 9 = 10.$
Factors of 90**:** $1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90$ — that is **twelve** factors.
Twelve is *even*, and the notes tell us that a perfect square has an *odd* number of factors. So 90 is **not** a perfect square. (Indeed $9^2 = 81$ and $10^2 = 100$, so no whole number squares to 90.)

Solution F5

The student made two errors:

- They forgot that 1 and the number itself (32) are *always* factors.
- They missed no other interior factor — but the list must still be completed with 1 and 32.

Checking systematically: $32 \div 1 = 32,\ 32 \div 2 = 16,\ 32 \div 4 = 8$ (and $8 \div ?$ $32 \div 8 = 4$ already paired). So

Factors of 32 : 1, 2, 4, 8, 16, 32.

Common Mistake

The single most common factor mistake is dropping 1 and the number itself. Always open your list with 1 and close it with the number.

Solution F6

Given / required: a whole number in $60 < n < 70$ with an odd number of factors.
Why perfect squares: Factors normally come in *pairs* — if d is a factor then so is the quotient $n \div d$, and these two are different. Each such pair contributes 2 to the factor count, giving an even total. The *only* way to get an odd total is if one factor is paired *with itself*, i.e. $d = n \div d$, which means $d^2 = n$. That happens precisely

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