

Lunar New Year maths for IB Maths SL and HL

IB Math Revision · IB Maths SL and HL (AA and AI) · Student sheet

Name _____

Class _____

Date _____

No GDC needed.

Starter (5 minutes)

1. Find the remainder when 2030 is divided by 12.
2. Find the lowest common multiple of 10 and 12.
3. Find the 10th term of the arithmetic sequence 3, 15, 27, ...
4. Today is a Wednesday. What day of the week will it be in 100 days?

Main activity (35 minutes)

Task A: The 12-year cycle

Number the 12 animals of the cycle 1 to 12 in the traditional order (Rat, Ox, Tiger, Rabbit, Dragon, Snake, Horse, Goat, Monkey, Rooster, Dog, Pig). In this activity, the lunar year that begins in calendar year Y has animal number $((Y - 4) \bmod 12) + 1$, where 'mod 12' means the remainder on dividing by 12.

- a. Find the animal number for the lunar year that begins in 2031.
- b. The calendar years from 2001 to 2100 with animal number 1 form an arithmetic sequence. Find its first term, last term and number of terms.
- c. Find the sum of those years.

Task B: Two cycles together

A 10-year cycle (labels 1 to 10) runs alongside the 12-year cycle (animals 1 to 12). In this model, both are at 1 in year 0, and each moves on by one every year.

- a. After how many years does the pair (label 1, animal 1) first come back?
- b. How many different (label, animal) pairs occur in one full cycle?
- c. There are $10 \times 12 = 120$ possible pairs, but only 60 occur. Show that (label 1, animal 2) never occurs by counting the years in one cycle that give it.

Task C: Clock and calendar arithmetic

Work with remainders.

- a. Find the remainder when 7^{2026} is divided by 12.
- b. Find the remainder when $1 + 2 + 3 + \dots + 100$ is divided by 12.
- c. Find the smallest positive number that leaves remainder 3 when divided by 12 and remainder 2 when divided by 5.

Extension

1. Find the smallest number greater than 1 that leaves remainder 1 when divided by 7, by 10 and by 12.
2. Prove that if n is not divisible by 2 or 3, then n^2 leaves remainder 1 when divided by 12.