

REASONING

9ER15

First name _____

Last name _____

School _____

Class _____

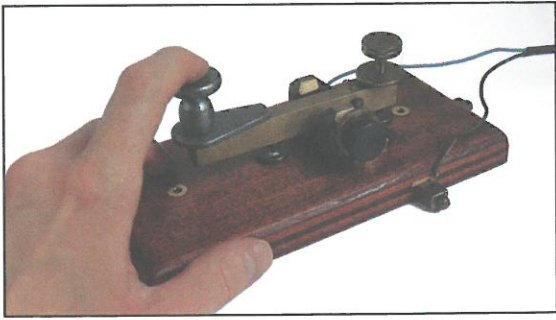
Date of birth ○○ ○○ ○○○○

Date of test ○○ ○○ (2)(0)(1)(5)

Total score (maximum 20)



1

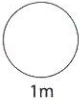


International Morse code:
each ● takes 1 unit of time
each — takes 3 units of time
each 'in-between' takes 1 unit of time.

The code for **J** is ● — — —

How many units of time does it take?

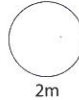
(Remember the in-between units!)



Three letters have different codes.

Each of these codes takes **5** units of time.

What are the **three codes**?



Every letter in the English alphabet has a different code.

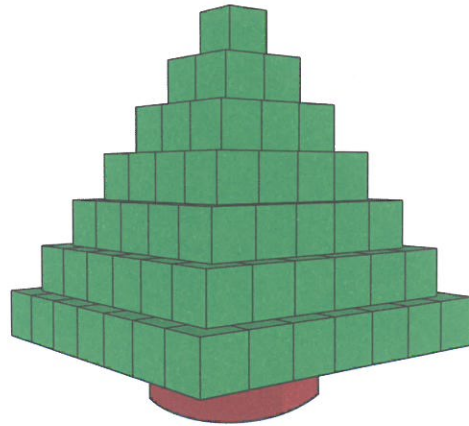
Explain why each of these codes **must** have an **odd** number of units of time.



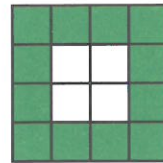
A large, empty rectangular area enclosed by a red border, intended for the student's explanation.

2 This 'Christmas tree' is made from cubes that are all the same size.

They are arranged in **seven layers** to form a solid square-based pyramid.




In each layer, the cubes around the perimeter are green and the others are white, e.g.




layer four

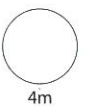
Altogether, how many **white cubes** are there?

Show how you know.









3 In a hurdle race, each runner jumps over hurdles.




400 metre race: ten hurdles altogether		
Start to the first hurdle	Distance between each pair of hurdles	Last hurdle to the end
45m	35m	40m

Nia wants to have ten hurdles in a 625 metre race.

625 metre race: ten hurdles altogether		
Start to the first hurdle	Distance between each pair of hurdles	Last hurdle to the end
45m	?	40m

What should the distance between each pair of hurdles be?



m

4m

TOTAL
8m

4



My 13th birthday was on a Friday.
My 14th birthday was on a Saturday.

There are **365** days in a year (or 366 in a leap year).

How does that explain why your birthday is usually **1 day later** each year?

2m

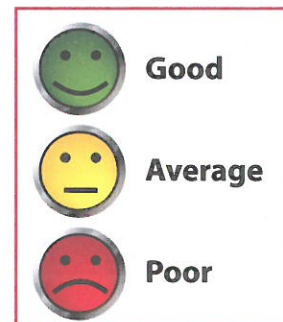
5

In a survey in a restaurant:

two-thirds of the people said the food was good, and
one-quarter of people said it was average.

Five people said the food was poor.

How many people took part in the survey?

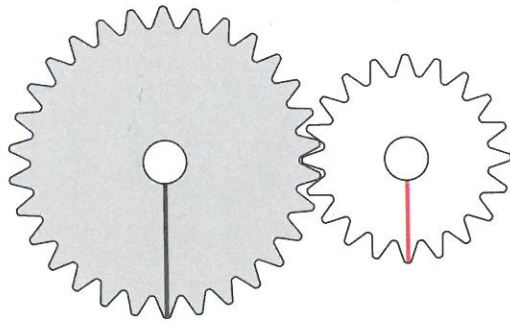


2m

6 Here are two cogs.

The bigger cog has **30 teeth**.

The smaller cog has **20 teeth**.



The bigger cog turns **180 degrees clockwise**.

Give reasons why the line on the smaller cog must now be in this position.

