

Computational and Algorithmic Thinking

CAT Sample Problems
Upper Primary

Part A: Question 1

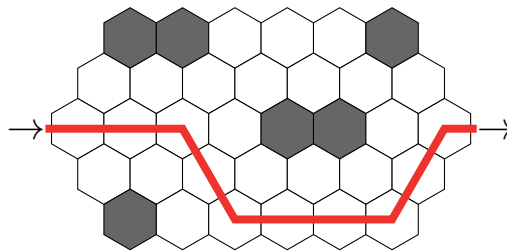
Answer the question by a single choice from A to E.
This question is worth 3 marks.

1. Drop Bears

Juliet has to walk through a forest. In the maps below, there is a tree in every hexagon. The tree in a shaded hexagon is known to have had a drop bear in it recently. She will not walk under a tree with a drop bear, and she will not walk under a neighbouring tree either, in case the drop bear has moved.

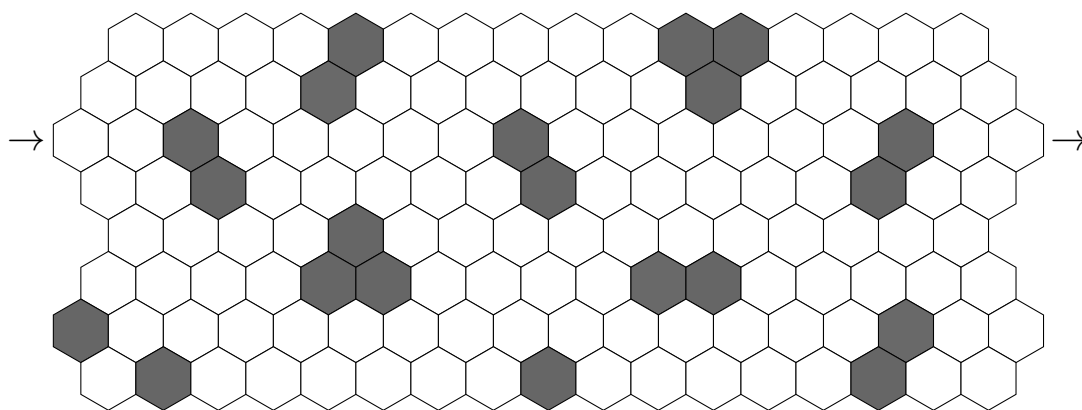
Example

Juliet enters the forest from the left and leaves to the right, as shown by the →s.



Her only possible route is shown in red. She will walk under 10 trees.

Juliet has been given the map below.



Juliet does not walk under trees in the shaded hexagons, or under trees in neighbouring hexagons. And she doesn't walk under any tree twice. There is only one route she can take.

How many trees will she walk under?

- (A) 27 (B) 28 (C) 29 (D) 30 (E) 31

Part B: Question 7

This question has three parts, each of which is worth 2 marks.
Each part should be answered by a number in the range 0–999.

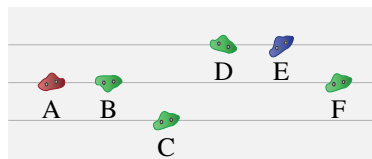
7. Climbing Wall Challenge

You are taking part in the climbing wall challenge. One event is the Horizontal Traverse in which you only use handholds. From your practise you know that:

- you can reach the next handhold or the one after, but no further,
- each increase in height will take an extra 2 seconds per level,
- each decrease in height will take an extra 1 second per level.

You wish to find the route that takes the least amount of extra time possible.

Example



To move from A to F:
 using handholds A B D F would take an extra $0 + 2 + 1 = 3$ seconds,
 using handholds A C E F would take an extra $1 + 4 + 1 = 6$ seconds.
 The least amount of extra time needed is 3 seconds.

For each of the traverses below, what is the least amount of extra time (in seconds) needed?

