

Arithmetic [86 marks]

1a. [1 mark]

The Osaka Tigers basketball team play in a multilevel stadium.



The most expensive tickets are in the first row. The ticket price, in Yen (¥), for each row forms an arithmetic sequence. Prices for the first three rows are shown in the following table.

Ticket pricing per game	
1st row	6800 Yen
2nd row	6550 Yen
3rd row	6300 Yen

Write down the value of the common difference, d

1b. [2 marks]

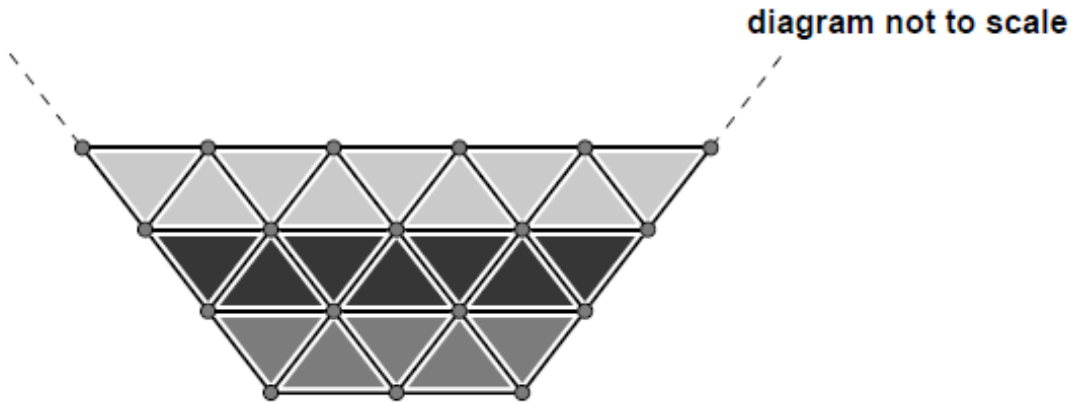
Calculate the price of a ticket in the 16th row.

1c. [3 marks]

Find the total cost of buying 2 tickets in each of the first 16 rows.

5a. [3 marks]

Maegan designs a decorative glass face for a new Fine Arts Centre. The glass face is made up of small triangular panes. The **first** three levels of the glass face are illustrated in the following diagram.



The 1st level, at the bottom of the glass face, has 5 triangular panes. The 2nd level has 7 triangular panes, and the 3rd level has 9 triangular panes. Each additional level has 2 more triangular panes than the level below it.

Find the number of triangular panes in the 12th level.

5b. [3 marks]

Show that the total number of triangular panes, S_n , in the first n levels is given by:

$$S_n = n^2 + 4n.$$

5c. [2 marks]

Hence, find the total number of panes in a glass face with 18 levels.

5d. [3 marks]

Maegan has 1000 triangular panes to build the decorative glass face and does not want it to have any incomplete levels.

Find the maximum number of **complete** levels that Maegan can build.

5e. [4 marks]

Each triangular pane has an area of 1.84 m^2 .

Find the **total** area of the decorative glass face, if the maximum number of complete levels were built. Express your area to the nearest m^2 .

6a. [2 marks]

Sergei is training to be a weightlifter. Each day he trains at the local gym by lifting a metal bar that has heavy weights attached. He carries out successive lifts. After each lift, the same amount of weight is **added** to the bar to increase the weight to be lifted.

The weights of each of Sergei's lifts form an arithmetic sequence.

Sergei's friend, Yuri, records the weight of each lift. Unfortunately, last Monday, Yuri misplaced all but two of the recordings of Sergei's lifts.

On that day, Sergei lifted 21 kg on the third lift and 46 kg on the eighth lift.

For that day find how much weight was added after each lift.

6b. [2 marks]

For that day find the weight of Sergei's first lift.

6c. [2 marks]

On that day, Sergei made 12 successive lifts. Find the total combined weight of these lifts.

8a. [2 marks]

In an arithmetic sequence, the first term is 8 and the second term is 5.

Find the common difference.

8b. [2 marks]

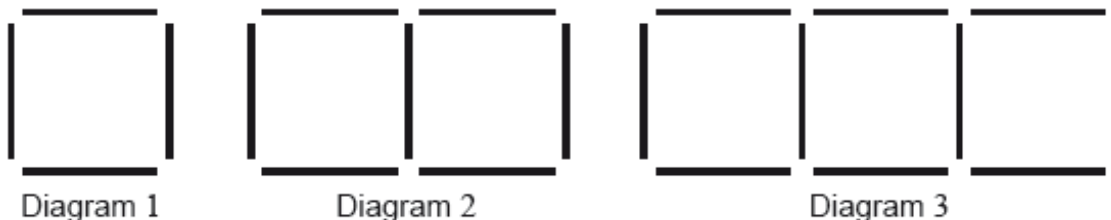
Find the tenth term.

8c. [2 marks]

Find the sum of the first ten terms.

9a. [3 marks]

Tomás is playing with sticks and he forms the first three diagrams of a pattern. These diagrams are shown below.



Tomás continues forming diagrams following this pattern.

Diagram n is formed with 52 sticks. Find the value of n .

9b. [3 marks]

Tomás forms a total of 24 diagrams.

Find the total number of sticks used by Tomás for all 24 diagrams.
