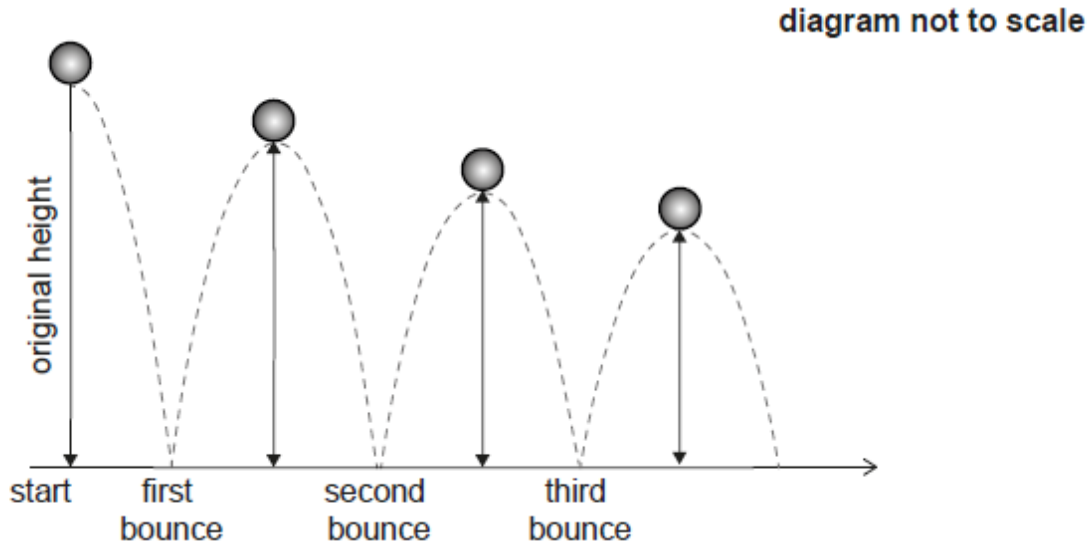


Geometric [46 marks]

1a. [2 marks]

A ball is dropped from a height of 1.8 metres and bounces on the ground. The maximum height reached by the ball, after each bounce, is 85% of the previous maximum height.



Show that the maximum height reached by the ball after it has bounced for the sixth time is 68 cm, to the nearest cm.

1b. [2 marks]

Find the number of times, after the first bounce, that the maximum height reached is greater than 10 cm.

1c. [3 marks]

Find the total **vertical** distance travelled by the ball from the point at which it is dropped until the fourth bounce.

2a. [2 marks]

The admissions team at a new university are trying to predict the number of student applications they will receive each year.

Let n be the number of years that the university has been open. The admissions team collect the following data for the first two years.

Year, n	Number of applications received in year n
1	12 300
2	12 669

Calculate the percentage increase in applications from the first year to the second year.

2b. [1 mark]

It is assumed that the number of students that apply to the university each year will follow a geometric sequence, u_n .

Write down the common ratio of the sequence.

2c. [1 mark]

Find an expression for u_n .

2d. [2 marks]

Find the number of student applications the university expects to receive when $n = 11$. Express your answer to the nearest integer.

3a. [2 marks]

Mia baked a very large apple pie that she cuts into slices to share with her friends. The smallest slice is cut first. The volume of each successive slice of pie forms a geometric sequence.

The second smallest slice has a volume of 30 cm^3 . The fifth smallest slice has a volume of 240 cm^3 .

Find the common ratio of the sequence.

3b. [2 marks]

Find the volume of the smallest slice of pie.

3c. [2 marks]

The apple pie has a volume of $61\,425 \text{ cm}^3$.

Find the total number of slices Mia can cut from this pie.

4a. [2 marks]

A geometric sequence has a first term of $\frac{8}{3}$ and a fourth term of 9.

Find the common ratio.

4b. [1 mark]

Write down the second term of this sequence.

6. [3 marks]

The first three terms of a geometric sequence are $\ln x^{16}$, $\ln x^8$, $\ln x^4$, for $x > 0$.

Find the common ratio.

7. [1 mark]

Consider the geometric sequence $u_1 = 18$, $u_2 = 9$, $u_3 = 4.5$,

Write down the common ratio of the sequence.
