

1b. Find the total amount paid for the car.

[2 marks]

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1c. Find the interest paid on the loan.

[2 marks]

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Give your answers to this question correct to two decimal places.

Gen invests \$2400 in a savings account that pays interest at a rate of 4% per year, compounded annually. She leaves the money in her account for 10 years, and she does not invest or withdraw any money during this time.

2a. Calculate the value of her savings after 10 years. [2 marks]

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2b. The rate of inflation during this 10 year period is 1.5% per year. [3 marks]

Calculate the real value of her savings after 10 years.

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3b. Yejin has just turned 28 years old. She currently has no retirement savings. She wants to save part of her salary each month into her annuity fund.

[3 marks]

Calculate the amount Yejin needs to save each month, to meet her retirement goal.

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Paul wants to buy a car. He needs to take out a loan for \$7000. The car salesman offers him a loan with an interest rate of 8%, compounded annually. Paul considers two options to repay the loan.

Option 1: Pay \$200 each month, until the loan is fully repaid

Option 2: Make 24 equal monthly payments.

Use option 1 to calculate

4a. the number of months it will take for Paul to repay the loan.

[3 marks]

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4b. the total amount that Paul has to pay.

[2 marks]

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Use option 2 to calculate

4c. the amount Paul pays each month.

[2 marks]

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4d. the total amount that Paul has to pay.

[2 marks]

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Give a reason why Paul might choose

4e. option 1.

[1 mark]

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4f. option 2.

[1 mark]

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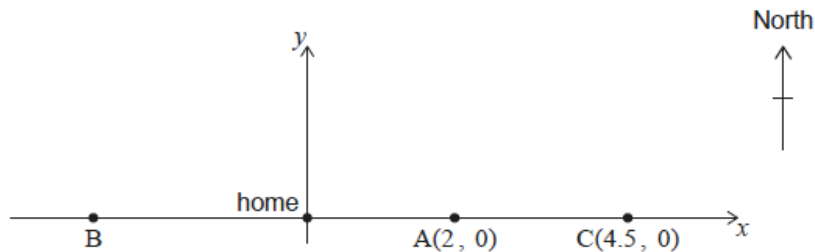
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Kristi's house is located on a long straight road which traverses east-west. The road can be modelled by the equation $y = 0$, and her home is located at the origin $(0, 0)$.

She is training for a marathon by running from her home to a point on the road and then returning to her home by bus.

- The first day Kristi runs 2 kilometres east to point $A(2, 0)$.
- The second day Kristi runs west to point B .
- The third day Kristi runs 4.5 kilometres east to point $C(4.5, 0)$.

This information is represented in the following diagram.



Each day Kristi increases the distance she runs. The point she reaches each day can be represented by an x -coordinate. These x -coordinates form a geometric sequence.

5a. Show that the common ratio, r , is -1.5 .

[2 marks]

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On the 6th day, Kristi runs to point F.

5b. Find the location of point F.

[2 marks]

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5c. Find the total distance Kristi runs during the first 7 days of training.

[3 marks]

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In the first month of a reforestation program, the town of Neerim plants 85 trees. Each subsequent month the number of trees planted will increase by an additional 30 trees.

The number of trees to be planted in each of the first three months are shown in the following table.

Month	Trees planted
1	85
2	115
3	145

6a. Find the number of trees to be planted in the 15th month.

[3 marks]

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6b. Find the total number of trees to be planted in the first 15 months. [2 marks]

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6c. Find the mean number of trees planted per month during the first 15 months. [2 marks]

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On 1 December 2022, Laviola invests 800 euros (EUR) into a savings account which pays a nominal annual interest rate of 7.5% compounded monthly. At the end of each month, Laviola deposits an additional EUR 500 into the savings account.

At the end of k months, Laviola will have saved enough money to withdraw EUR 10 000.

7a. Find the smallest possible value of k , for $k \in \mathbb{Z}^+$. *[4 marks]*

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7b. For this value of k , find the interest earned in the savings account. *[3 marks]*

Express your answer correct to the nearest EUR.

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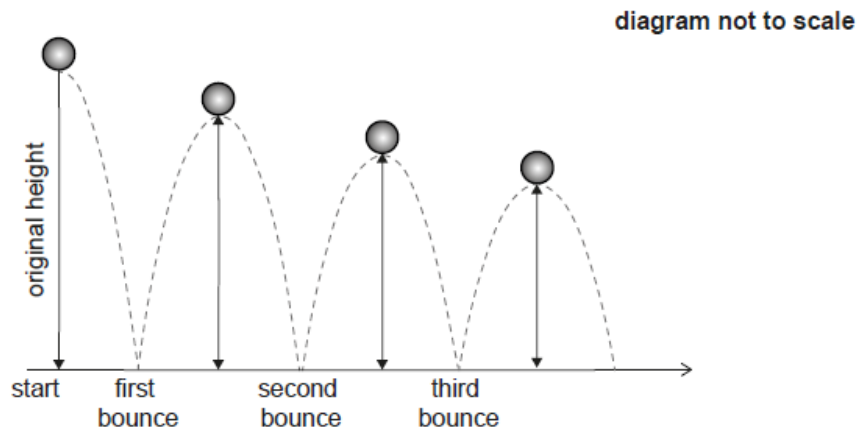
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A ball is dropped from a height of 1.8 metres and bounces on the ground. The maximum height reached by the ball, after each bounce, is 85% of the previous maximum height.



8a. Show that the maximum height reached by the ball after it has bounced [2 marks] for the sixth time is 68 cm, to the nearest cm.

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8b. Find the number of times, after the first bounce, that the maximum [2 marks] height reached is greater than 10 cm.

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8c. Find the total **vertical** distance travelled by the ball from the point at which it is dropped until the fourth bounce. [3 marks]

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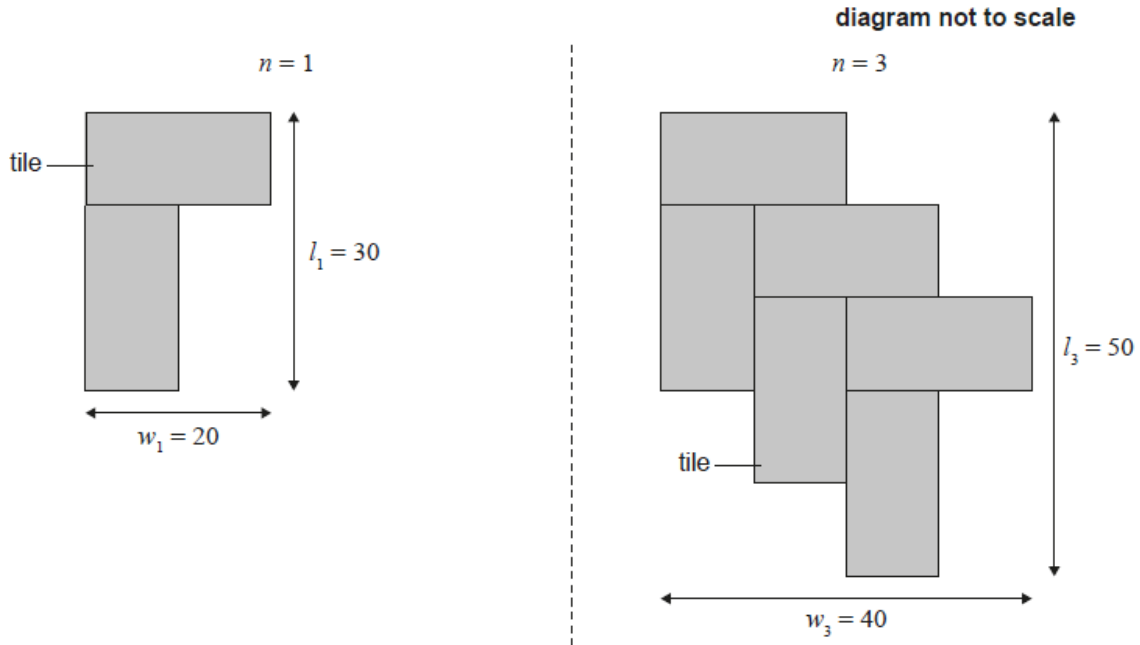
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Eddie decides to construct a path across his rectangular grass lawn using pairs of tiles.

Each tile is 10 cm wide and 20 cm long. The following diagrams show the path after Eddie has laid one pair and three pairs of tiles. This pattern continues until Eddie reaches the other side of his lawn. When n pairs of tiles are laid, the path has a width of w_n centimetres and a length of l_n centimetres.

The following diagrams show this pattern for one pair of tiles and for three pairs of tiles, where the white space around each diagram represents Eddie's lawn.



The following table shows the values of w_n and l_n for the first three values of n .

Number of pairs of tiles, n	Width of lawn crossed by path, w_n (cm)	Length of lawn crossed by path, l_n (cm)
1	20	30
2	a	b
3	40	50

Find the value of

9a. a .

[1 mark]

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9b. b .

[1 mark]

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Write down an expression in terms of n for

9c. w_n .

[2 marks]

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9d. l_n .

[1 mark]

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10b. remaining in the bag at the end of the first day.

[1 mark]

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10c. Calculate the number of days that Scott can feed his dog with one bag of food. [2 marks]

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In 2021, Scott spent \$625 on dog food. Scott expects that the amount he spends on dog food will increase at an annual rate of 6.4%.

10d. Determine the amount that Scott expects to spend on dog food in 2025. [3 marks]
Round your answer to the nearest dollar.

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10e.

[1 mark]

Calculate the value of $\sum_{n=1}^{10} (625 \times 1.064^{(n-1)})$.

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10f. Describe what the value in part (d)(i) represents in this context.

[2 marks]

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10g. Comment on the appropriateness of modelling this scenario with a geometric sequence.

[1 mark]

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