

AQA – Exponentials and logarithms – A2 Mathematics P3

1. [June/2021/Paper_7357/3/No.7](#)

A building has a leaking roof and, while it is raining, water drips into a 12 litre bucket.

When the rain stops, the bucket is one third full.

Water continues to drip into the bucket from a puddle on the roof.

In the first minute after the rain stops, 30 millilitres of water drips into the bucket.

In each subsequent minute, the amount of water that drips into the bucket reduces by 2%.

During the n th minute after the rain stops, the volume of water that drips into the bucket is W_n millilitres.

(a) Find W_2

[1 mark]

(b) Explain why

$$W_n = A \times 0.98^{n-1}$$

and state the value of A .

[2 marks]

(c) Find the increase in the water in the bucket 15 minutes after the rain stops.

Give your answer to the nearest millilitre.

[2 marks]

(d) Assuming it does not start to rain again, find the maximum amount of water in the bucket.

[3 marks]

(e) After several hours the water has stopped dripping.

Give **two** reasons why the amount of water in the bucket is not as much as the answer found in part (d).

[2 marks]