

## SIT190 - KNIGHT - WEEKS 10-11

TRIMESTER 1, 2024

### INTEGRATION

Due to an excessive amount of rain, the village dam is filling at a rate of  $30(11 + 3t)$  litres an hour ( $t \geq 0$ ). The mayor is planning to evacuate the village before the dam overflows, flooding the valley.

The amount of water currently in the dam is 3 090 000 litres and the mayor wants to know how many hours it will take for the dam to be completely full.

The dam is 60 metres long, 20 metres wide and 10 metres deep.

You can assume that the villagers are not using any of the dam water and there is no water loss through evaporation.

- (1) What is the maximum capacity of the dam in litres? (Hint: 1000 litres = 1 cubic metre)
- (2) Find the function that gives the number of litres in the dam at time  $t$  hours.
- (3) The village mayor wants to have the town evacuated before the dam is full. At what time  $t$  would the dam be full?

### SUBMISSION

In order to complete this task, you must submit the following:

- The capacity of the dam in litres with all working.
- The function that gives the amount of water in the dam (in litres) at time  $t$  showing all working.
- The time  $t$  when the dam will reach capacity showing all working.



## HINTS

- Remember to work in litres (1000 litres =  $1\text{ m}^3$ )
- Draw on your algebra skills eg. Simplify the quadratic before you solve for  $t$ .

**Sneak Peek**

## 1. SNEAK PEEK



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If you have completed this week's Distinction tasks, you may be interested in attempting the High Distinction task. We give you a brief peek at what that task involves:

- Apply integration to a different domain: probability.

**Note:** The Sneak Peek is **not** part of the Distinction On-Track task.