2

90290

902900

NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 2 Mathematics, 2009

90290 Solve straightforward problems involving arithmetic and geometric sequences

Credits: Two
9.30 am Monday 16 November 2009

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

Make sure you have the Formulae Sheet L2-MATHF.

Answer ALL the questions in this booklet.

The questions in this paper are NOT in order of difficulty. Attempt all questions or you may not provide enough evidence to achieve the required standard.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–7 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

For Assessor's use only	**Achievement Criteria**		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Solve straightforward problems involving both arithmetic and geometric sequences.	Solve problems involving sequences.	Explore situations and interpret the results of problems involving sequences.
Overall Level of Performance		

You are advised to spend 30 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE

(a) Wasi sets a goal to compete in a marathon.

He runs each Saturday.

He starts with a 30-minute run on the first Saturday.

He runs 35 minutes on the second Saturday
and 40 minutes on the third Saturday.

He continues to increase the time for which he runs each week by the same amount.

(i) For how long will he run on the 16th Saturday of training?

(ii) By the end of the 16th Saturday of training, what is the **total** time that Wasi will have run during Saturday training?

(b) Sahro also wants to compete in a marathon. She never misses a **day** running.

She starts with a 30-minute run **each day** in the first week.

She increases the time she runs to 35 minutes **each day** in the second week and she increases the time she runs to 40 minutes **each day** in the third week, and so on.

In the final week she runs for a total of 1 155 minutes.

For how many weeks has she now been running?

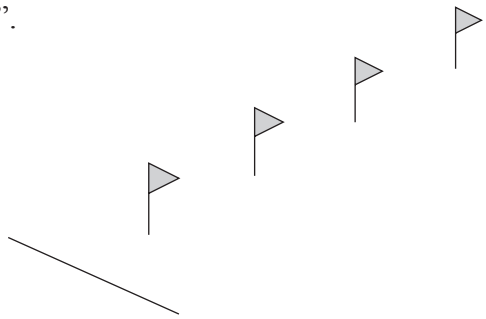
Assessor's use only

(c) Sahro sets up a training exercise she calls "fetch the flag".

She has a number of flags in a straight line.

The first flag is 2 metres from the start line.

The flags are 3 metres apart.



She runs from the start line to the first flag and brings it back to the start line.

She then runs to the second flag and brings it back, and so on until all flags are returned to the start line.

She runs a total distance of 1220 metres.

How many flags does she bring back to the start line?

Assessor's use only

QUESTION TWO

Assessor's use only

(a) Sahro weighs 70 kg at the start of her first long run.

At the end of the first run she weighs 69.65 kg.

She loses 0.5% ($r = 0.995$) of her weight during each long run.

Assuming she does not gain weight between runs, how much does she weigh at the end of her fourth long run?

(b) The cost to build a school gym was estimated at $800 000 at the beginning of 2004.

Costs have increased each year by approximately 4.5% of the previous year's cost. ($r = 1.045$)

Estimate how much the school gym will cost if it was not built until the beginning of 2010?

Assessor's use only

(c) Aroha is drinking energy drink.

She begins by drinking 500 ml.

Every 2 hours she has another drink.

Each time, she drinks 20% less than the amount she drank the previous time.

After how many hours will she first have a drink that is less than 200 ml?

(d) Wasi records the number of sit-ups he does each day.

The first day he does x sit-ups. Each day he does 10 more sit-ups than he did the previous day.

Prove that the total number of sit-ups, T, that Wasi does in n days can be given by

$$T = 5n^2 - 5n + nx$$

Extra paper for continuation of answers if required.
Clearly number the question.

Assessor's use only

Question number