



NEW ZEALAND QUALIFICATIONS AUTHORITY
 MANA TOHU MĀTAURANGA O AOTEAROA



National Certificate of Educational Achievement
 TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 2 Mathematics, 2006

90292 Solve straightforward trigonometric equations

Credits: Two

2.00 pm Wednesday 29 November 2006

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 a copy of Formulae Sheet L2-MATHF.

You should answer ALL the questions in this booklet.

Show ALL working.

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 2–6 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 trigonometric equations. | <input checked="" type="checkbox"/> | Solve trigonometric equations. | <input type="checkbox"/> |
| | | Solve multi-step trigonometric problems. | <input type="checkbox"/> |
| Overall Level of Performance | | <input type="text" value="A"/> | |

You are advised to spend 25 minutes answering the questions in this booklet.

QUESTION ONE

Solve the following trigonometric equations.

(a) $\tan x = 0.5$, $0^\circ \leq x \leq 360^\circ$

$$x = 26.57 \text{ (2dp)}$$

$$x = 206.57 \text{ (2dp)}$$

A

(b) $\sin x + 1 = 0.8$, $0^\circ \leq x \leq 360^\circ$

$$x = 191.54 \text{ (2dp)}$$

$$x = 348.46 \text{ (2dp)}$$

A

(c) $3\cos x = 1.8$, $0 \leq x \leq 2\pi$

$$x = 0.9273 \text{ (4dp)}$$

$$x = 5.36 \text{ (2dp)}$$

A

QUESTION TWO

Solve $\tan 2x = 4$, $0 \leq x \leq 2\pi$

$$x = 0.6629 \text{ (4dp)}$$

$$x = \cancel{2.23} \text{ (2dp)} \quad \text{0.7854 (4dp)}$$

$$x = 2.23 \text{ (2dp)}$$

N

Common wrong answer

Qn2: Did not achieve M as:

0.7854 was a very common wrong answer.

Many students only had 0.6629 and 2.23 and were not aware of the need for 4 answers.

This student could have used Qn2 as replacement for Qn1a if they had not already reached Achieved.

QUESTION THREE

Ashleigh is being pushed on a swing by her aunt.

The horizontal distance in metres, d , of the swing from Ashleigh's aunt is given by the equation:

$$d = -1.2 \cos t + 1.2$$

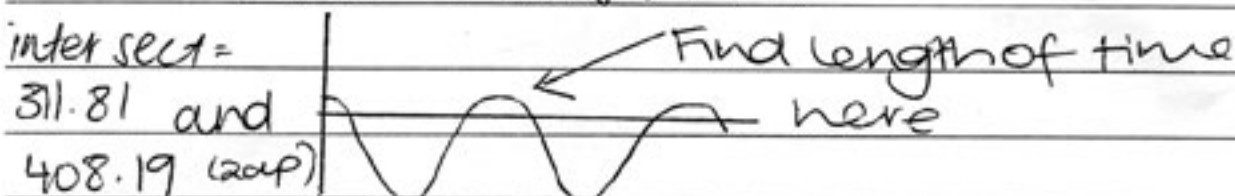
where t is the time, in seconds, after the swing is released.

How much time is the swing **more than 2 m** from her aunt in any one motion of the swing?



Assessor's
use only

$$> 2 \text{ m} = 1.2 \cos t + 1.2$$



$$t = 408.19 - 311.81$$

$$t = 96.38 \text{ seconds} //$$

QUESTION FOUR

Sarah and Scott are road bike training.

They begin their training together, at the same time and place.

The distance between Sarah and Scott varies constantly in a regular manner.

The distance that Sarah is ahead of Scott at any time, t , can be modelled by the function

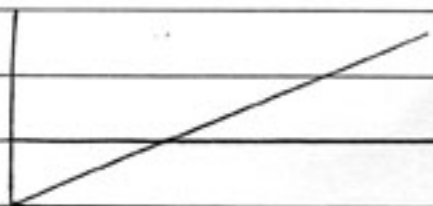
$$D = 5 \sin \frac{\pi t}{30}$$

where D is the distance in metres of Scott from Sarah, and t is in minutes.



After how many minutes will Sarah first be **more than 2 metres** ahead of Scott?

$$> 2 = 5 \sin \frac{\pi t}{30}$$



$$x = 3.93$$

Correct answer
rounded in
Student explanation
but acceptable

$t =$ approximately 4 minutes is when Sarah will first be more than 2 metres ahead of Scott.

Qn 3.

not M. as:

This student completed the question in degrees which renders ~~an~~ ~~also~~ a meaningless answer.

Students need to think about the meaningfulness of their answer as 1½ minutes is a long time to be suspended beyond 2m or a swing motion.

—//—

~~Student~~ ~~answered~~ ~~215~~'s

—//—

Excellence question
not attempted.