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90292

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Level 2 Mathematics, 2005

90292 Solve straightforward trigonometric equations

Credits: Two
2.00 pm Thursday 24 November 2005

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 2–7 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 trigonometric equations. ☐	Solve trigonometric equations. ☐	Solve multi-step trigonometric problems. ☐
Overall Level of Performance ☐		

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

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TRIGONOMETRIC EQUATIONS

Show **ALL** working.

QUESTION ONE

Solve the following trigonometric equations:

(a) $\sin\theta = -0.6, \quad 0^\circ \le \theta \le 360^\circ$

(b) $\cos\theta - 1 = -0.3, \quad 0^\circ \le \theta \le 360^\circ$

(c) $2\tan\theta = 3.4, \quad 0 \le \theta \le 2\pi$

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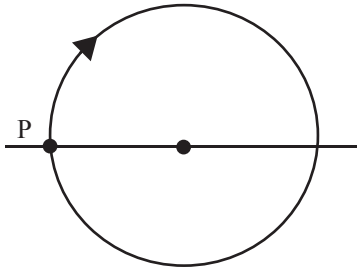
QUESTION TWO

Solve the trigonometric equation:

$\tan(\theta + 70^\circ) = -0.3, \quad -180^\circ \leq \theta \leq 180^\circ$

QUESTION THREE

The axle (centre) of the paddle wheel of a moving paddle steamer is at the level of the water.
The paddle wheel is rotating clockwise at a constant speed.
P is a point on the circumference of the wheel.
The height, h cm, of P above the surface of the water at time t seconds is given by the equation



$$h = 120 \sin \frac{\pi t}{5}$$

After how many seconds will the mark first be 40 cm **above** the water level?

QUESTION FOUR

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The voltage V volts of an electrical supply is given by

$V = 240 \sin 100 \pi t$

at time t seconds.

What is the shortest time that elapses between the maximum and minimum voltages produced by the electrical supply?

QUESTION FIVE

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In a boiler, steam is released when the temperature, T°C, of the water, reaches 100°C.

The hot water is then gradually replaced by cold water.

The temperature of the water in the boiler t minutes after the first time steam is released, is modelled by $T = 60 + 40\cos\frac{\pi t}{24}$.

When the water temperature drops to 55°C, it is safe to re-enter the room.

When the water temperature increases to 80°C, the boiler room must be cleared.

What is the maximum length of time it would be safe to be in the room for any continuous period?

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

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Question number

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

Assessor's use only

Question number