

See back cover for an English
translation of this cover

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91031M



910315



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Kaupae 1, Te Pāngarau me te Tauanga, 2011

91031 Te whakahāngai whakaaro āhuahanga whaitake hei whakaoti rapanga

9.30i te ata Rāhina 14 Whiringa-ā-rangi 2011
Whiwhinga: Whā

Paetae	Paetae Kaiaka	Paetae Kairangi
Te whakahāngai whakaaro āhuahanga whaitake hei whakaoti rapanga.	Te whakahāngai whakaaro āhuahanga whaitake mā te whakaaro whaipānga hei whakaoti rapanga.	Te whakahāngai whakaaro āhuahanga whaitake mā te whakaaro waitara hōhonu hei whakaoti rapanga.

Tirohia mehemea e ōrite ana te Tau Ākonga ā-Motu (NSN) kei tō pepa whakauru ki te tau kei runga ake nei.

Me whakautu e koe ngā pātai KATOA kei roto i te pukapuka nei.

Whakaaturia ngā mahinga KATOA.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te (ngā) whārangi kei muri i te pukapuka nei, ka āta tohu ai i ngā tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–21 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

HOATU TE PEPA NEI KI TE KAIWHAKAHAERE HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.

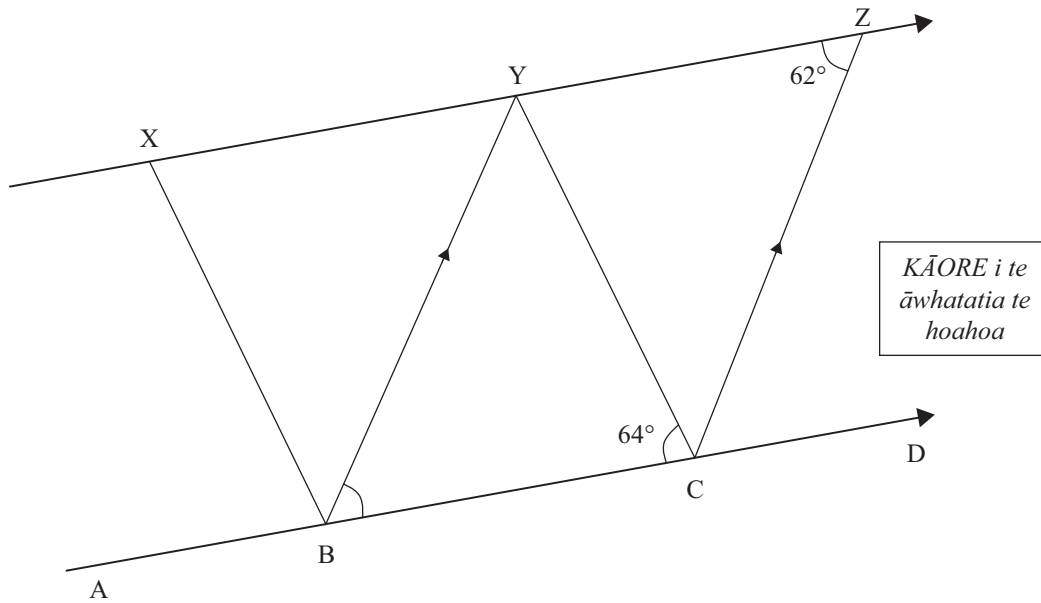
TAPEKE

MĀ TE KAIMĀKA ANAKE

Kia 60 meneti hei whakautu i ngā pātai o tēnei pukapuka.

PĀTAI TUATAHI

- (a) Ka whakamaua ngā rēra maitai ki te taitapa o tētahi rahoraho.
E whakarara ana a XZ ki AD.
E whakarara ana a BY ki CZ.
E whakaatu ana tētahi wāhanga o te rēra ki te hoahoa o raro:



- (i) Kimihia te rahi o te koki YBC.
Homai he pūtake āhuahanga mō ia kaupae o tō otinga.

TĀTAITANGA

PŪTAKE

- (ii) He tapatoru waerite a XYB.

Whakamahia te whakaaro āhuahanga whaitake mō ia kaupae hei whakaatu kāore e taea te whakarara i a XB me YC.

TĀTAITANGA

PŪTAKE

You are advised to spend 60 minutes answering the questions in this booklet.

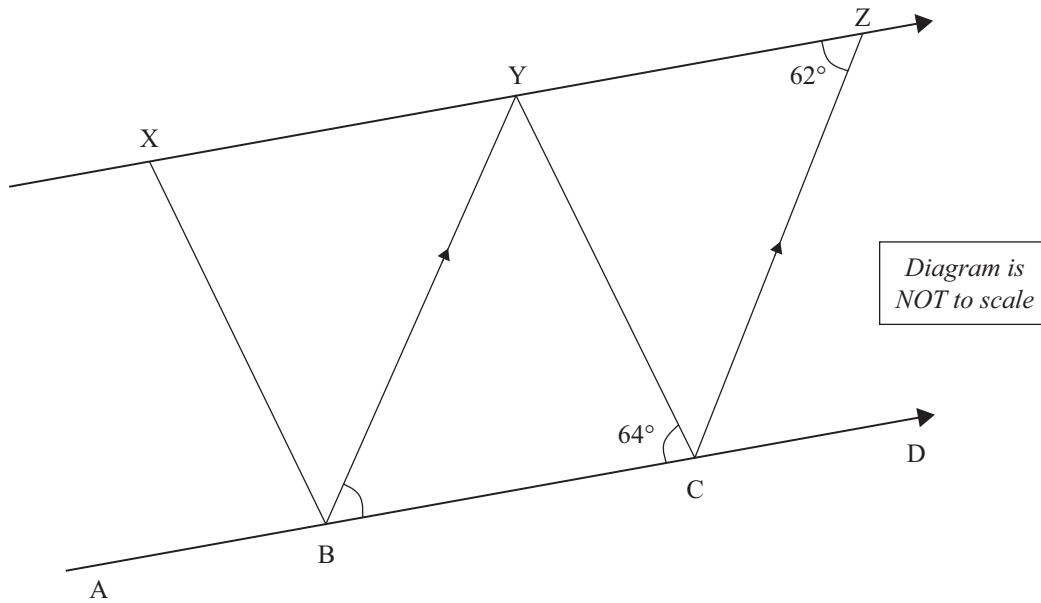
QUESTION ONE

- (a) Metal railings are fitted to the edge of a deck.

XZ is parallel to AD .

BY is parallel to CZ .

One section of railing is shown in the diagram below:



- (i) Find the size of angle YBC .

Give geometric reasons for each step in your solution.

CALCULATION

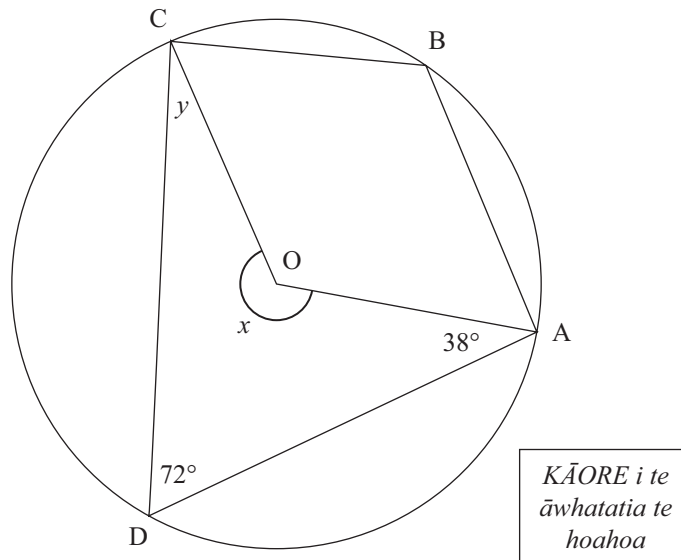
REASON

- (ii) XYB is an isosceles triangle.

Use geometric reasoning for each step to show that XB and YC cannot be parallel.

CALCULATION

REASON



(b) Mō te hoahoa o runga:

(i) Kimihia te rahi o te koki rāwaho COA, x .

Whakamāramahia ō whakaaro whaitake.

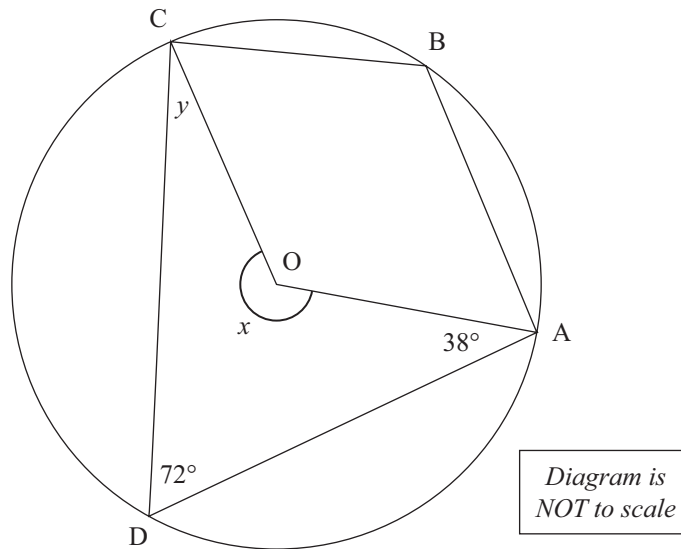
(ii) Kimihia te rahi o te koki DCO, y .

Homai he pūtake āhuahanga mō ia kaupae o tō otinga.

TĀTAITANGA

PŪTAKE

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(b) For the diagram above:

- (i) Find the size of angle reflex COA, x .

Explain your reasoning.

- (ii) Find the size of angle DCO, y .

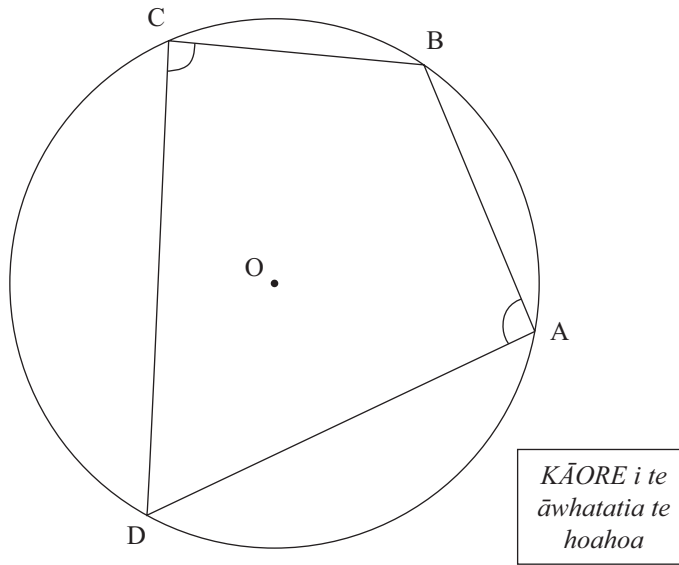
Give geometric reasons for each step in your solution.

CALCULATION

REASON

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- (iii) Mō te hoahoa o raro, **hāponotia** ko te koki C me te koki A = 180° .

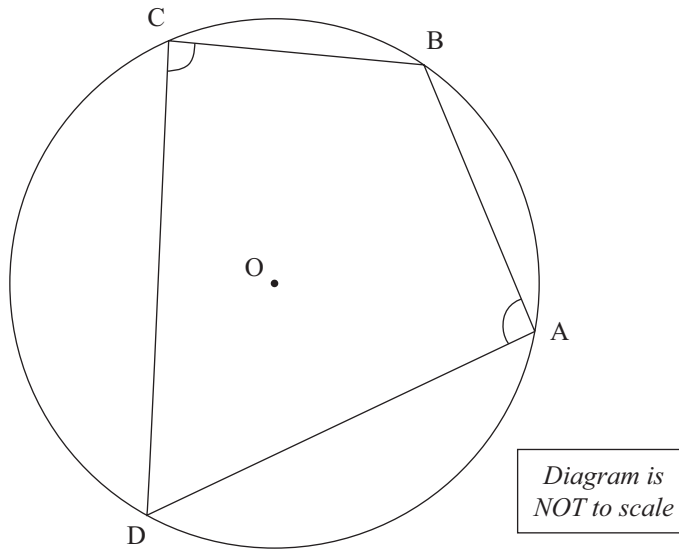


Homai he pūtake āhuahanga mō ia kaupae o tō otinga.

TĀTAITANGA

PŪTAKE

- (iii) For the diagram below, **prove** that $\text{angle } C + \text{angle } A = 180^\circ$.



Give geometric reasons for each step in your solution.

CALCULATION

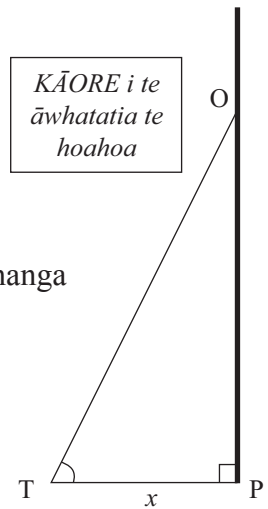
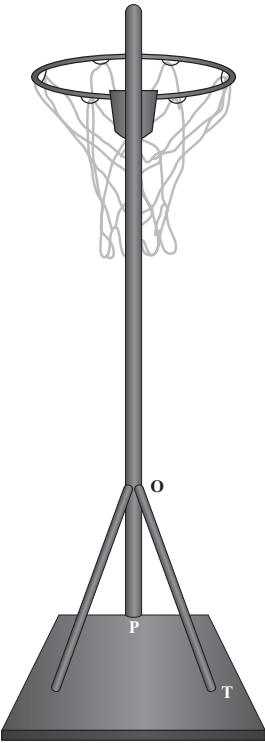
REASON

PĀTAI TUARUA

Kotahi te pou, ā, e rua ngā toko o te pōhi parakitihi a tētahi tamaiti, pērā i te taha mauī nei.

E 90 henemita te roa o ia toko.

Ka hāngai tonu ake ana te pou ki te papa.



- (a) Ka whakaatu te hoahoa kei te taha matau i te tirohanga mai i te taha.

E 90 henemita te roa o OT.

E 70 henemita te roa o OP.

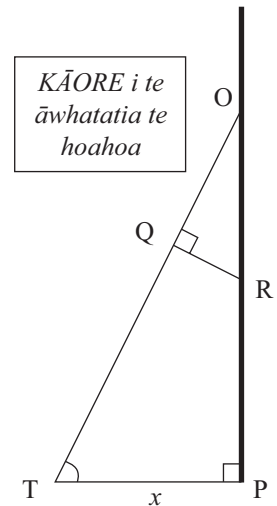
- (i) Kimihia te roa o PT, arā, x , te mamao mai i te pou ki te toko i te papa.

- (ii) Tātaihia te rahi o te koki PTO.

- (iii) Ka tāpirihia tētahi toko, QR, ki Q, arā ko te mamao OQ = 30 henemita.

Tātaihia te mamao o te pūwāhi R ki raro i O.

Whakaaturia ngā mahinga katoa, whakamāramahia hoki ō whakaaro whaitake.

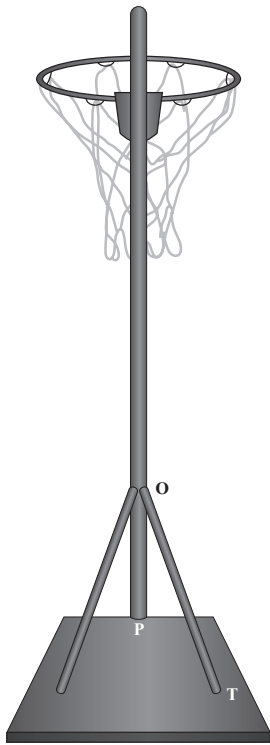


QUESTION TWO

A child's practice goal post has one pole and two supports, as shown on the left.

The two supports are each 90 cm long.

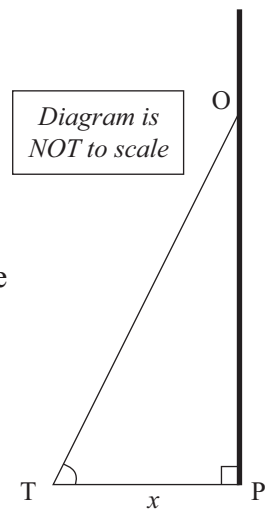
The pole is always perpendicular to the ground.



- (a) The diagram on the right shows the view from the side.

OT is 90 cm long.

OP is 70 cm long.



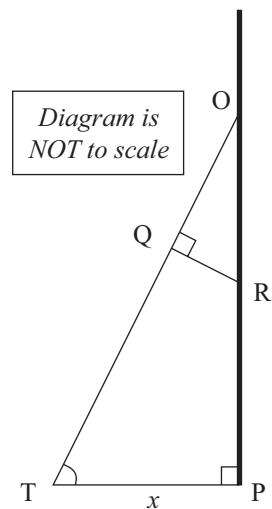
- (i) Find the length of PT, x , the distance between the pole and a support along the ground.

- (ii) Calculate the size of angle PTO.

- (iii) A support bar, QR, is added at Q, where OQ = 30 cm.

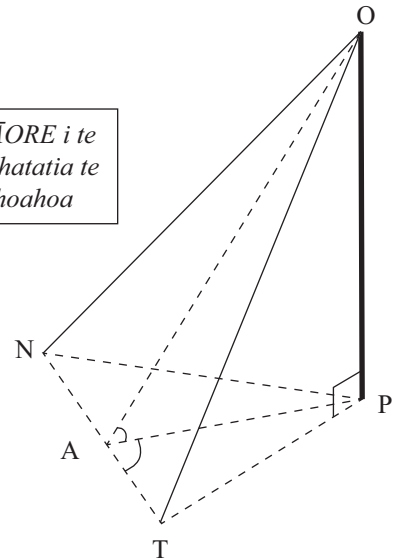
Calculate the distance of the point R below O.

Show your working and explain your reasoning.



- (b) He roanga rerekē anō mō OP ki tō tētahi pou.
 E whakaatu ana ki raro tētahi hoahoa ahu-3 o te pou.
 E 90 henemita te roa o OT me ON.
 E 40 henemita te roa o PT, PN me NT.
 Kei te pūwaenga o NT a pūwāhi A.

*KĀORE i te
 āwhatatia te
 hoahoa*



- (ii) Tātaihia te rahi o te koki TAP.
Whakamāramahia ō whakaaro whaitake.

- (ii) Tātaihia te roa o AP.

- (iii) Tātaihia te koki OAP.
Āta whakaaturia ngā mahinga katoa.

- (b) Another goal post has a different length for OP.

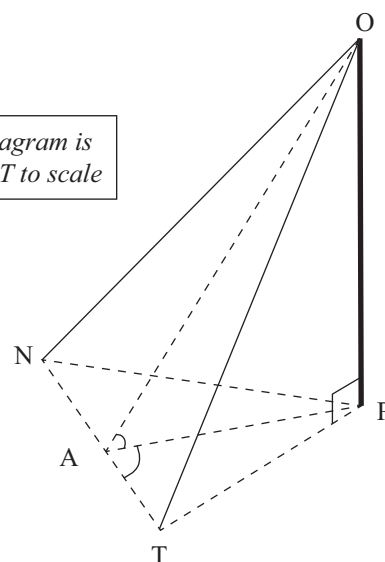
A 3-D sketch of the goal post is given below.

OT and ON are both 90 cm long.

PT, PN and NT are all 40 cm long.

Point A is halfway along NT.

Diagram is
NOT to scale



- (i) Calculate the size of angle TAP.

Explain your reasoning.

- (ii) Calculate the length of AP.

- (iii) Calculate the angle OAP.

Show your working clearly.

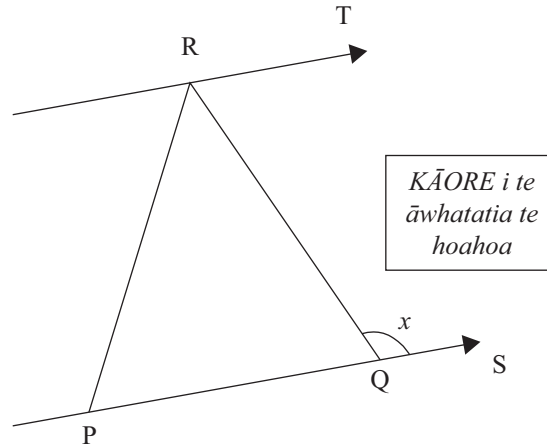
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PĀTAI TUATORU

(a) He ōrite te roa o PR me QR.

Ko te koki RQS ko x .

E whakarara ana a RT ki PS.



(i) Mēnā he 110° a x , kimihia te rahi o te koki PRQ.

Homai ngā pūtake āhuahanga.

TĀTAITANGA

PŪTAKE

(ii) Hāponotia kei te ōrite te koki PRT me te koki RQS mō ngā uara katoa o x .

Whakamāramahia kia mārama, kia arorau hoki ō whakaaro āhuahanga.

TĀTAITANGA

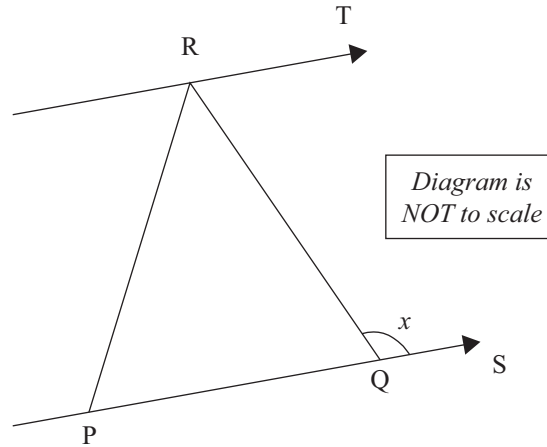
PŪTAKE

QUESTION THREE

- (a) PR and QR are the same length.

Angle RQS is x .

RT is parallel to PS.



- (i) If
- x
- is
- 110°
- , find the size of angle PRQ.

Give geometric reasons.

CALCULATION

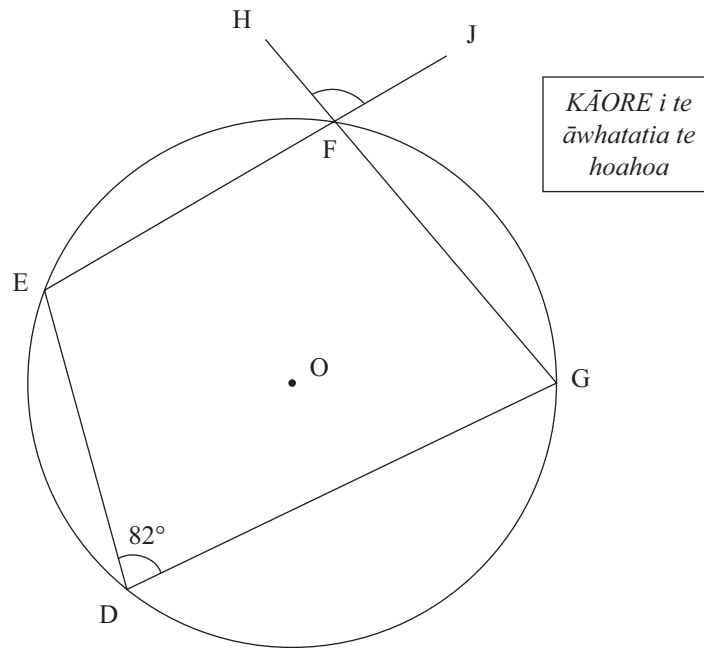
REASON

- (ii) Prove that angle PRT and angle RQS are equal for all values of
- x
- .

Explain your geometric reasoning clearly and logically.

CALCULATION

REASON



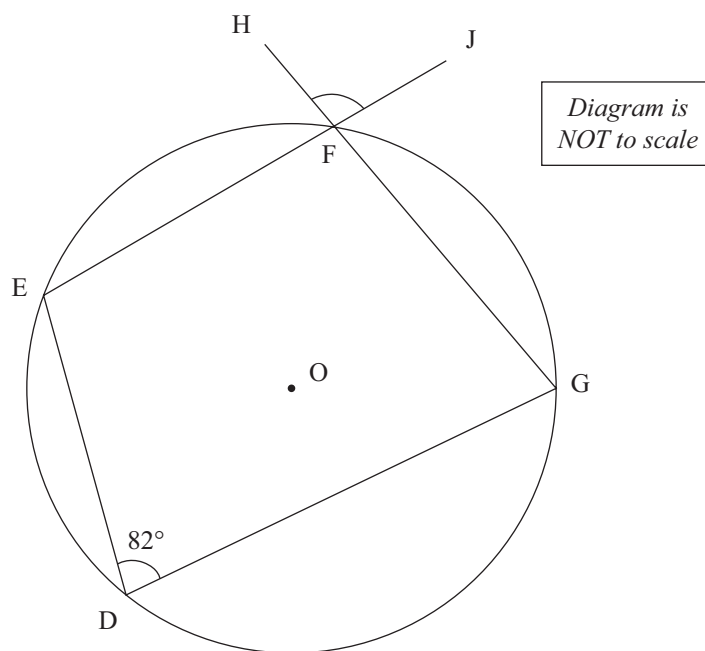
- (b) He tapawhā o tētahi porowhita rāwaho a EFGD me te koki $EDG = 82^\circ$.
Ko O te pū o te porowhita.

Kimihia te rahi o te koki HFJ.

Whakamāramahia kia mārama, kia arorau hoki ō whakaaro āhuahanga.

TĀTAITANGA

PŪTAKE



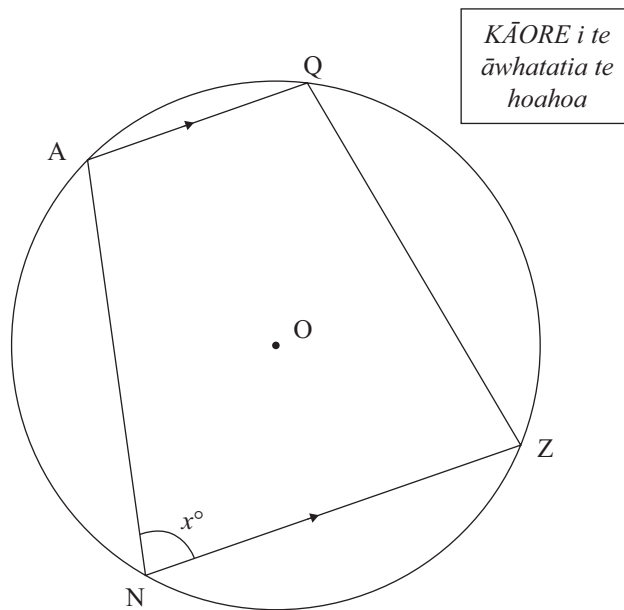
- (b) EFGD is a **cyclic** quadrilateral with angle $EDG = 82^\circ$.
O is the centre of the circle.

Find the size of angle HFJ.

Explain your geometric reasoning clearly and logically.

CALCULATION

REASON



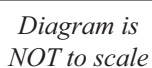
- (c) (i) E pā ana ngā pūwāhi A, Q, Z me N ki te paenga o tētahi porowhita ko te pū O. E whakarara ana a AQ ki NZ.

Kimihia te rahi o te koki NZQ e pā ana ki x .

Whakamāramahia kia mārama, kia arorau hoki ō whakaaro āhuahanga.

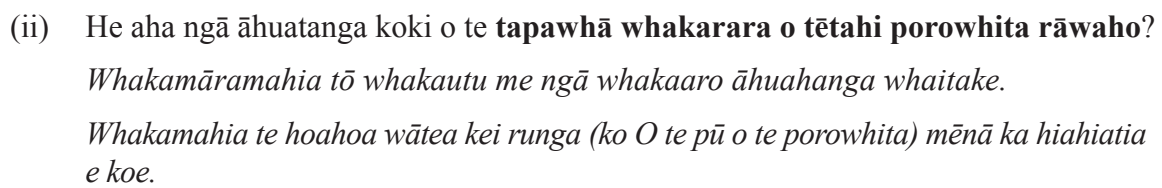
TĀTAITANGA

PŪTAKE



- Explain your geometric reasoning clearly and logically.*

REASON





Use the blank diagram above (where O is the centre of the circle) if you wish.

**He puka anō mēnā ka hiahiatia.
Tuhia te (ngā) tau pātai mēnā ka whai wāhi ki konei.**

TAU
PĀTAI

MĀ TE
KAIMĀKA
ANAKE

Extra paper if required.
Write the question number(s) if applicable.

QUESTION
NUMBER

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English translation of the wording on the front cover

Level 1 Mathematics and Statistics, 2011

91031 Apply geometric reasoning in solving problems

9.30 am Monday 14 November 2011

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Apply geometric reasoning in solving problems.	Apply geometric reasoning, using relational thinking, in solving problems.	Apply geometric reasoning, using extended abstract thinking, in solving problems.

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

You should attempt 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 2–21 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.

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