91031M

910315

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

1

SUPERVISOR'S USE ONLY

Te Pāngarau me te Tauanga, Kaupae 1, 2015

91031M Te whakahāngai whakaaro āhuahanga whaitake hei whakaoti rapanga

9.30 i te ata Rāhina 9 Whiringa-ā-rangi 2015
Whiwhinga: Whā

Paetae	Kaiaka	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 mēnā e rite ana te Tau Ākonga ā-Motu (NSN) kei runga i tō puka whakauru ki te tau kei runga i tēnei whārangi.

Me whakamātau koe i ngā tūmahi KATOA kei roto i tēnei pukapuka.

Whakaaturia ngā mahinga KATOA.

Mēna ka hiahia whārangi atu anō mō ō tuhinga, whakamahia ngā whārangi wātea kei muri o tēnei pukapuka, ka āta tohu ai i ngā tau tūmahi.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–19 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

ME HOATU RAWA KOE I TĒNEI PUKAPUKA KI TE KAIWHAKAHAERE Ā TE MUTUNGA O TE WHAKAMĀTAUTAU.

TAPEKE

MĀ TE KAIMĀKA ANAKE

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TŪMAHI TUATAHI

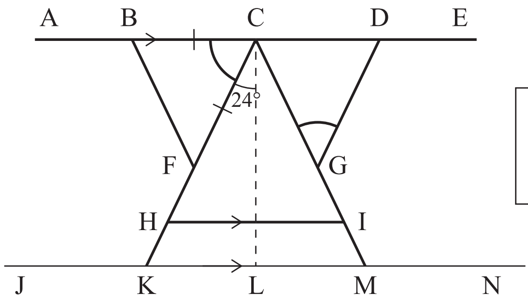
(a) E rua ngā taumata huapae o te iringa kaka e whakairihia ai ngā kākahu ki runga e ai ki ngā rārangi AE me HI kei te hoahoa i raro.

E whakarara ana a AE ki te HI me te whakarara anō ki te papa JN.

He hangarite te iringa kaka ki te rārangi CL.

BC = CF

Ko te koki KCL = 24°



KĀORE i tuhi ā-āwhatatia tēnei hoahoa

(i) Whiriwhiria te rahi o te koki BCF.

Whakamahia te whakaaro āhuahanga mārama hei parahau i tāu tuhinga.

(ii) Whiriwhiria te rahi o te koki DGC.

Whakamahia te whakaaro āhuahanga mārama hei parahau i tāu tuhinga.

(iii) Ko te teitei o AE i runga atu i te papa ko te 1.2 m.

E kī ana a Pippa ko te roa KL he 0.53 m.

Whakaaturia mai kei te tika ia.

(iv) E hia te roa o CK?

(v) E rua hautoru a CH i te CK.

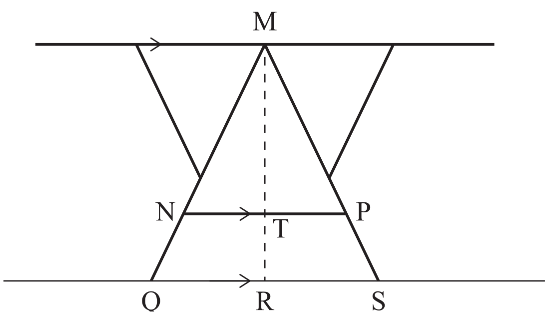
Whiriwhiria te roa HI.

Whakamahia te whakaaro āhuahanga mārama hei parahau i tāu tuhinga.

(b) Mō tētahi atu iringa kaka:

MN : NQ = a : b

Whakatauritea te horahanga o ngā tapatoru MNP me MQS.



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QUESTION ONE

(a) A clothes drying rack has two horizontal levels on which the clothes can be hung as shown by lines AE and HI on the diagram below.

AE is parallel to HI and parallel to the ground JN.

The rack is symmetrical around the line CL.

BC = CF

Angle KCL = 24°

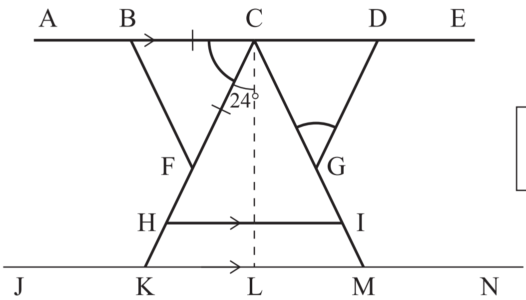


Diagram is NOT to scale

(i) Find the size of angle BCF.

Justify your answer with clear geometric reasoning.

(ii) Find the size of angle DGC.

Justify your answer with clear geometric reasoning.

(iii) The height of AE above the ground is 1.2 m.

Pippa says the length KL is 0.53 m.

Show that she is correct.

(iv) What is the length of CK?

(v) CH is two-thirds of CK.

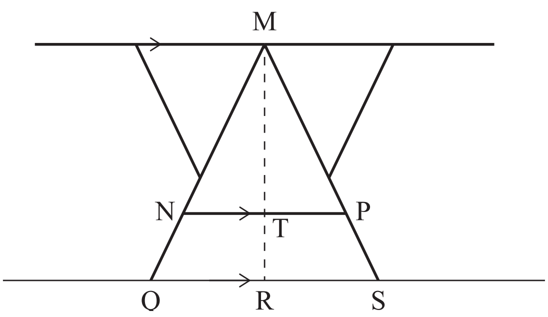
Find the length of HI.

Justify your answer with clear geometric reasoning.

(b) For another clothes drying rack:

MN : NQ = a : b

Compare the area of triangles MNP and MQS.



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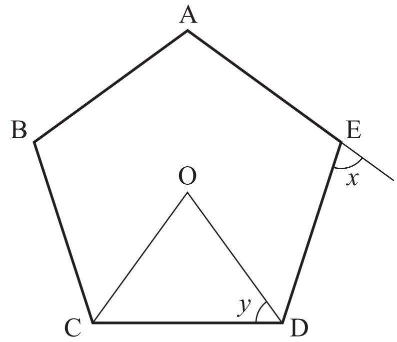
MĀ TE KAIMĀKA ANAKE

TŪMAHI TUARUA

(a) He taparima rite te ABCDE, ko te pū ko O.



(i) Whiriwhiria te uara o x ka whakamārama i tō tuhinga.

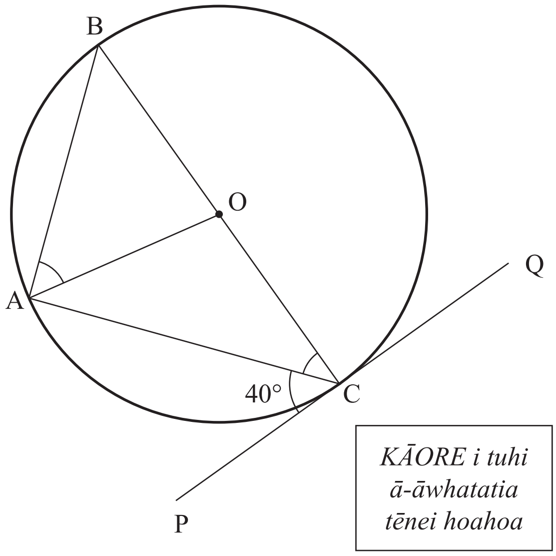
(ii) Whiriwhiria te uara o y.

Whakamahia te whakaaro āhuahanga mārama hei parahau i tāu tuhinga.

(b) He pūwāhi a A, B me C i te paenga o tētahi porowhita, ko te pū ko O. He whitianga a BOC.

He pātapa a QCP ki te porowhita.

Ko te koki ACP = 40°.



KĀORE i tuhi ā-āwhatatia tēnei hoahoa

(i) Whiriwhiria te rahi o te koki ACO.

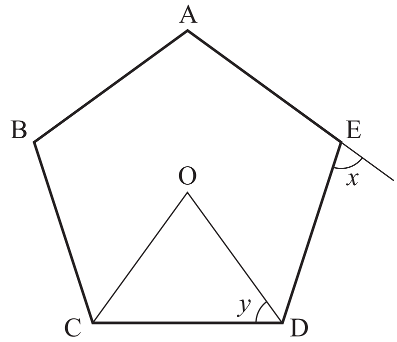
Whakamahia te whakaaro āhuahanga mārama hei parahau i tāu tuhinga.

(ii) Whiriwhiria te rahi o te koki OAB.

Whakamahia te whakaaro āhuahanga mārama hei parahau i tāu tuhinga.

QUESTION TWO

(a) ABCDE is a regular pentagon with centre O.



(i) Find the value of x and explain your answer.

(ii) Find the value of y.

Justify your answer with clear geometric reasoning.

(b) A, B, and C are on the circumference of a circle with centre O. BOC is a diameter.

QCP is a tangent to the circle.

Angle ACP = 40°.

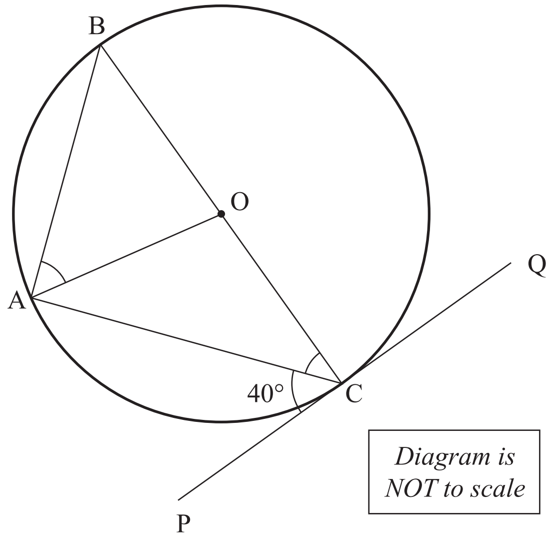


Diagram is NOT to scale

(i) Find the size of angle ACO.

Justify your answer with clear geometric reasoning.

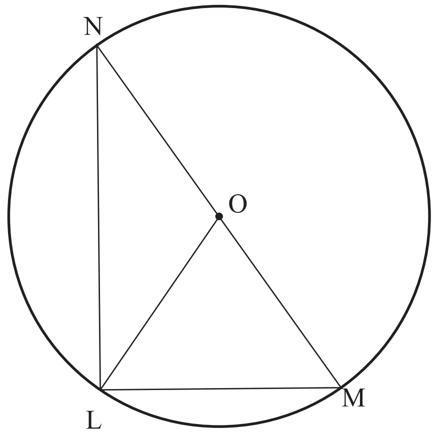
(ii) Find the size of angle OAB.

Justify your answer with clear geometric reasoning.

(iii) He pūwāhi a L, M me N i te paenga o tētahi porowhita, ko te pū ko O. He whitianga a NOM.

Mēnā OL = x cm me LOM = a°, tātaihia te roa o NL e ai ki a x me a.

Whakamahia te whakaaro āhuahanga mārama hei parahau i tāu tuhinga.

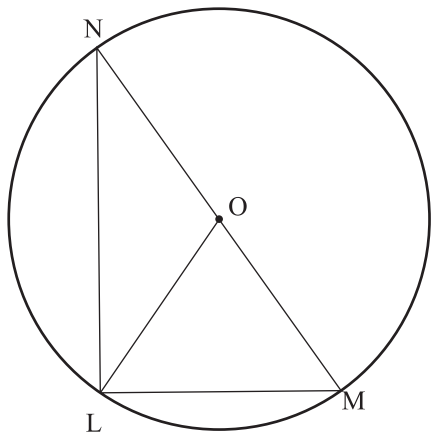


MĀ TE KAIMĀKA ANAKE

(iii) The points L, M, and N lie on the circumference of a circle centre O. NOM is a diameter.

If OL = x cm and LOM = a°, calculate the length of NL in terms of x and a.

Justify your answer with clear geometric reasoning.



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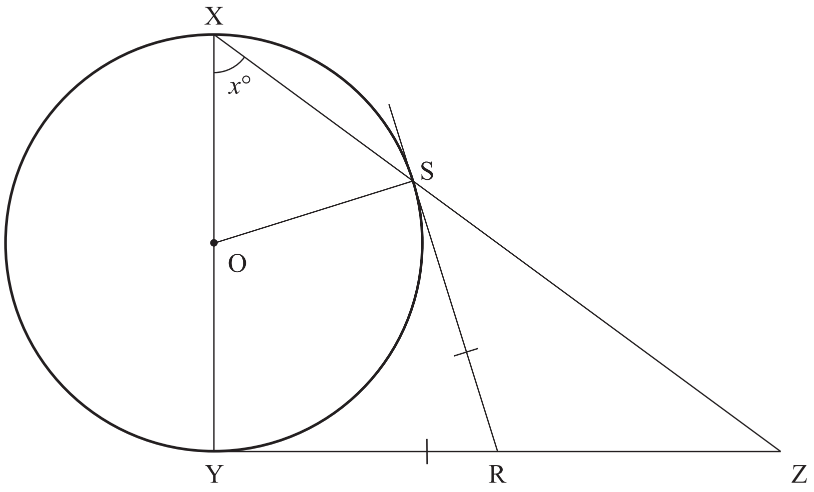
(c)



He pūwāhi a S, X me Y i te paenga o tētahi porowhita, ko te pū ko O.

Ko XY te whitianga o te porowhita.

Ko YZ me SR ngā pātapa ki te porowhita.

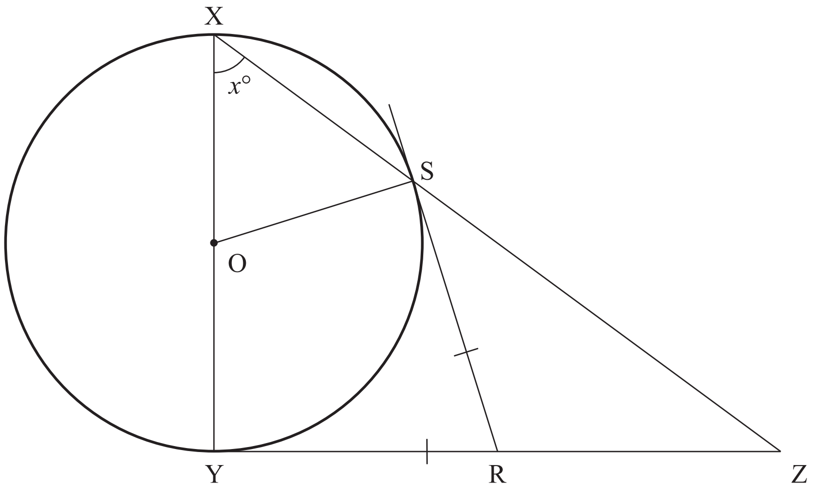
RS = RY

Ko te koki YXZ = $x°$

Hāponotia ko YR = RZ

MĀ TE KAIMĀKA ANAKE

(c)



The points S, X, and Y are on the circumference of a circle centre O.

XY is a diameter of the circle.

YZ and SR are tangents to the circle.

RS = RY

Angle YXZ = $x°$

Prove that YR = RZ

MĀ TE KAIMĀKA ANAKE

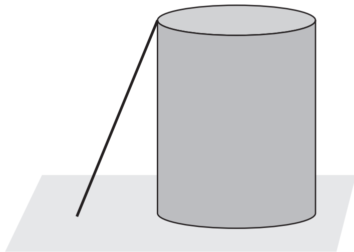
TŪMAHI TUATORU

(a) (i) Kei te hiahia tētahi kaipāmu ki te piki i tētahi arawhata ki te tirotiro i te wai i roto i te taika.

Ka whakamahia e ia tētahi arawhata he 3 mita te roa ka whakatika i te arawhata kia pā a runga ki te taha whakarunga o te taika.

He 2.9 mita te taha whakarunga o te taika mai i te papa.

Ko tana hiahia kia iti ake i te 80° te koki o te arawhata ki te papa.



KĀORE i tuhi ā-āwhatatia tēnei hoahoa

He roa anō te arawhata mō tēnei whakaritenga?

(ii) E hia te tawhiti o te take o tēnei arawhata mai i te pū o te taika?

Me kī kei te noho te taika ki runga i te papa tautika.

(iii) Ki te whakatū i te kaipāmu te arawhata ki te 80° ki te papa, e hia te rahi o te arawhata kei runga ake i te taika?

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QUESTION THREE

(a) (i) A farmer wants to climb a ladder to check the water in a tank.

He uses a 3 metre ladder and places it so that the top of the ladder just reaches the top of the tank.

The top of the tank is 2.9 metres from the ground.

He wants the angle of the ladder to the ground to be less than 80°.

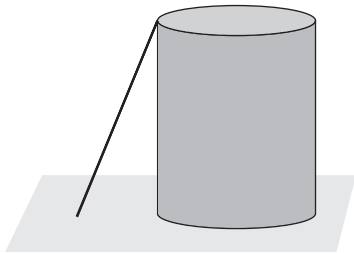


Diagram is NOT to scale

Is the ladder long enough to meet this requirement?

(ii) How far is the foot of this ladder from the base of the tank?

Assume that the tank is sitting on level ground.

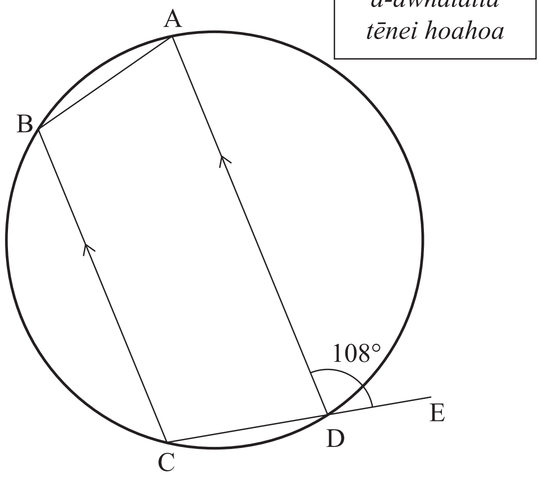
(iii) If the farmer places the ladder at 80° to the ground, how much of the ladder is above the top of the tank?

MĀ TE KAIMĀKA ANAKE

(b) (i) E rua ngā taha o te taparara kei te whakarara.

He taparara waerite a ABCD me ana akitu kei te paenga o tētahi porowhita.

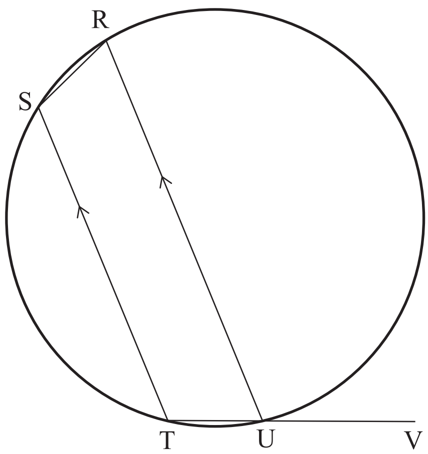
Ko te koki EDA = 108°.



Whiriwhiria te rahi o te koki ECB.

Whakamahia te whakaaro āhuahanga mārama hei parahau i tāu tuhinga.

(ii) Ko te RSTU he taparara noa me ana akitu kei te paenga o tētahi porowhita.



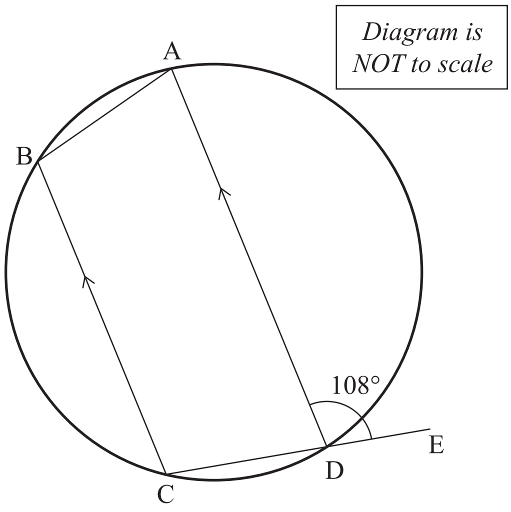
Whakatauhia ngā meka āhuahanga mō RSTU ka hāpono kei te tika ēnei mō aua momo taparara katoa.

Whakamahia te whakaaro āhuahanga mārama hei parahau i tāu tuhinga.

(b) (i) A trapezium has two sides that are parallel.

ABCD is an isosceles trapezium with its vertices on the circumference of a circle.

Angle EDA = 108°.



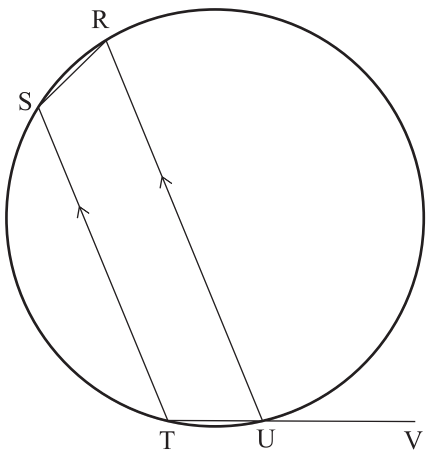
Find the size of angle ECB.

Justify your answer with clear geometric reasoning.

(ii) RSTU is any trapezium with its vertices on the circumference of a circle.

Determine any geometrical facts about RSTU and prove that these are true for all such trapeziums.

Justify your answers with clear geometric reasoning.



MĀ TE KAIMĀKA ANAKE

(c) He 40 km te hautū i tētahi wakarererangi ki te ahunga o te 310° mai i te papa rererangi A ki te papa rererangi B.

Kātahi ka huri ka rere mō te 45 km whakateraki ki te papa rererangi C.

Kātahi ka rere tika atu te wakarererangi ki te papa rererangi D, he 135 km whakateraki mai i tana pūwāhi tīmatanga i te papa rererangi A.

Mō te wāhanga whakamutunga o te ara rere o te wakarererangi, e hia te tawhiti me rere ia, ā, he aha te ahunga o te wāhanga whakamutunga o te ara rere?

(c) An aeroplane is flown 40 km on a bearing of 310° from airstrip A to airstrip B.

It then turns and flies 45 km due north to airstrip C.

The plane then heads directly to airstrip D, which is 135 km due north of its starting point at airstrip A.

For the final leg of the flight path of the plane, how far does it need to fly, and what is the bearing of the final leg of the flight path?

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He whārangi anō ki te hiahiatia.
Tuhia te (ngā) tau tūmahi mēnā e tika ana.

TAU TŪMAHI

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, 2015

91031 Apply geometric reasoning in solving problems

9.30 a.m. Monday 9 November 2015
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 2–19 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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