NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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 2–11 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.

TOTAL

ASSESSOR'S USE ONLY

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

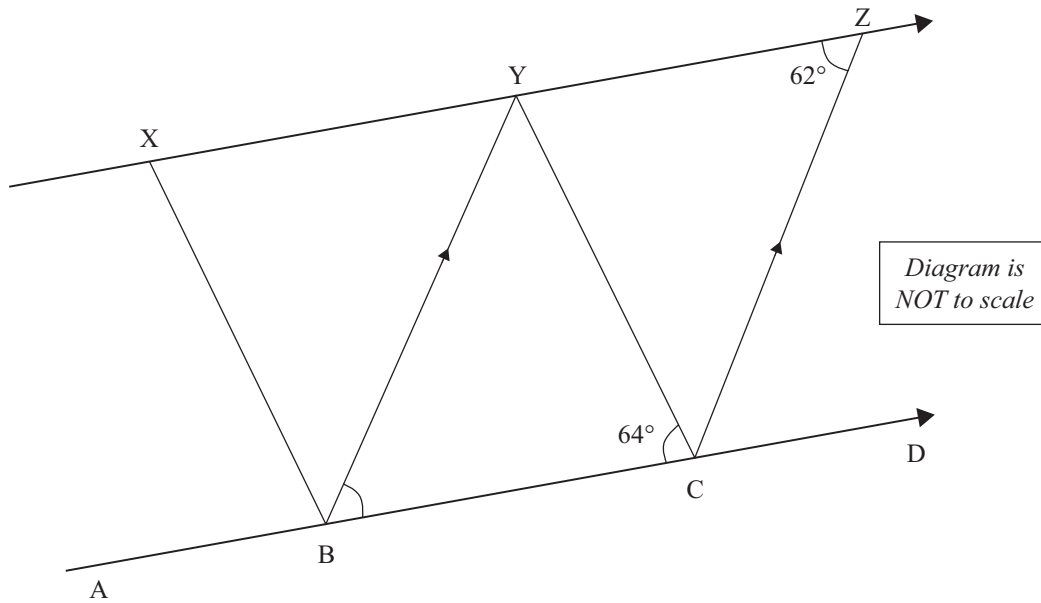## QUESTION ONE

(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:

Diagram is NOT to scale

(i)   Find the size of angle YBC.

Give geometric reasons for each step in your solution.

CALCULATION   REASON

_____   _____

_____   _____
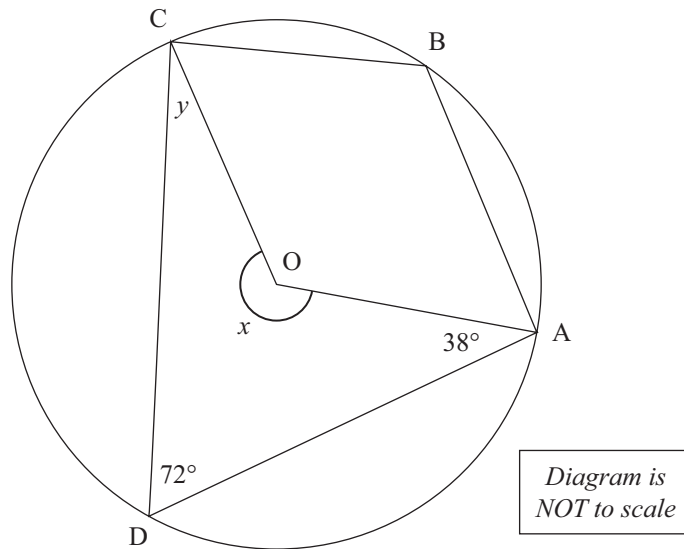
_____   _____

(ii)   XYB is an isosceles triangle.

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

CALCULATION   REASON

_____   _____

_____   _____

_____   _____

_____   _____

C

B

y

O

x

38°   A

72°

Diagram is NOT to scale

D

(b)   For the diagram above:

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

Explain your reasoning.

_____

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

Give geometric reasons for each step in your solution.

CALCULATION   REASON

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(iii)   For the diagram below, **prove** that angle C + angle A = 180°.

C

B

O.

A

Diagram is NOT to scale

D
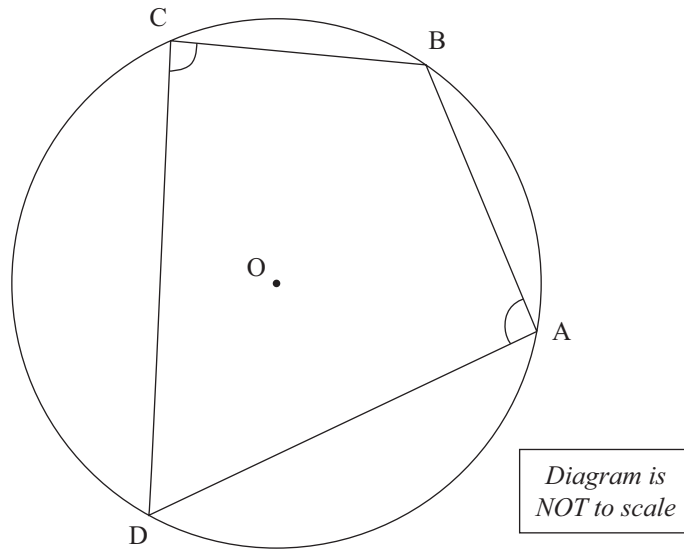
Give geometric reasons for each step in your solution.
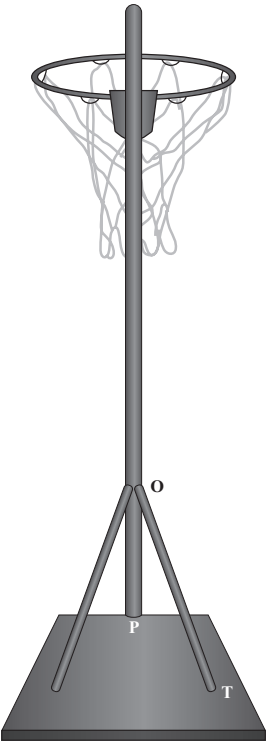
CALCULATION   REASON

QUESTION TWO

A child's practice goal post has one pole and two supports, as shown on the left.
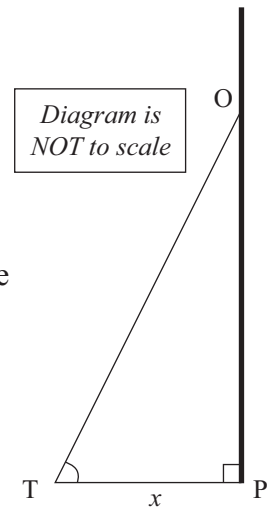
The two supports are each 90 cm long.

The pole is always perpendicular to the ground.

Diagram is NOT to scale

(a) The diagram on the right shows the view from the side.
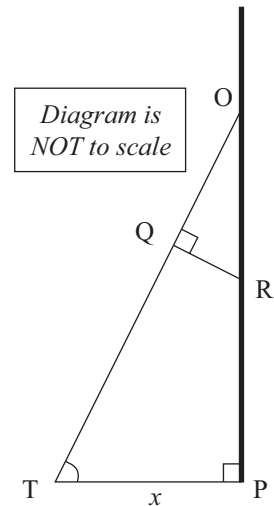
OT is 90 cm long.

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.

Diagram is NOT to scale

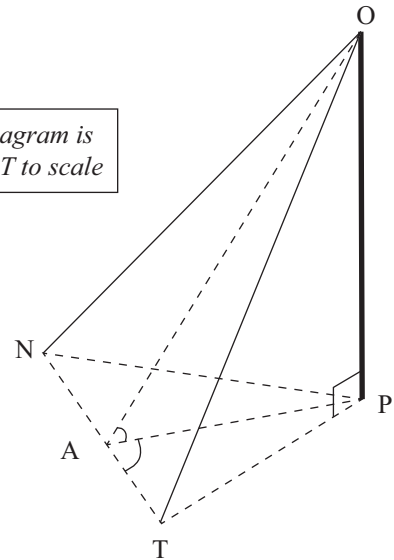(b) Another goal post has a different length for OP.

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

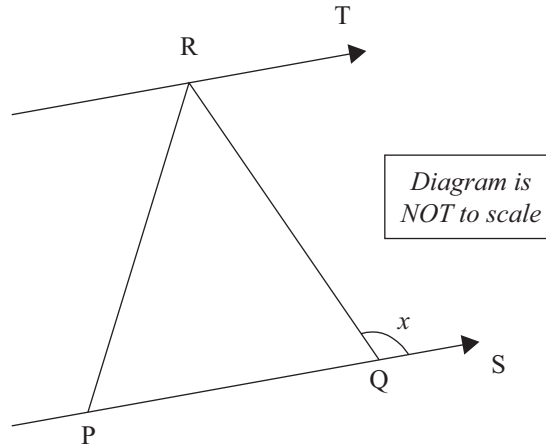(i) Calculate the size of angle TAP.

Explain your reasoning.

(ii) Calculate the length of AP.

(iii) Calculate the angle OAP.

Show your working clearly.

QUESTION THREE

(a)   PR and QR are the same length.

Angle RQS is x.

RT is parallel to PS.

R .... T

*Diagram is
NOT to scale*

x

Q   S

P

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

Give geometric reasons.

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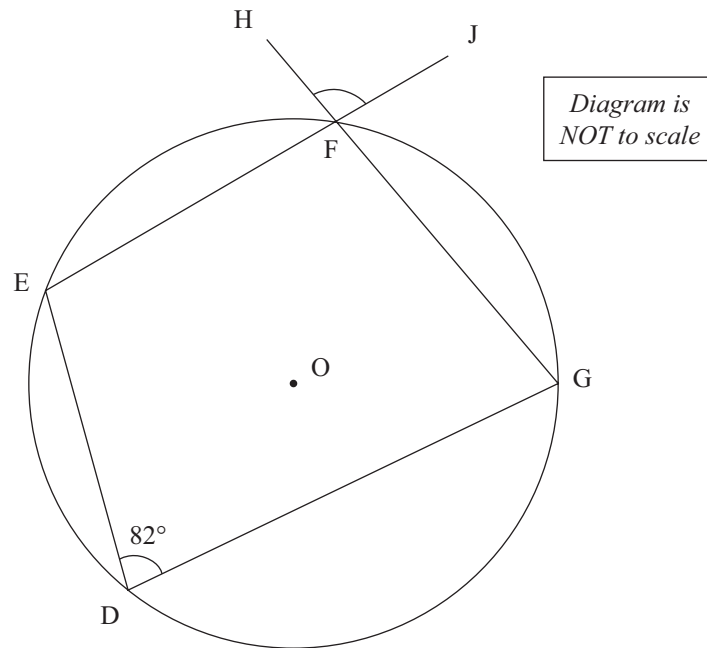
(ii) Prove that angle PRT and angle RQS are equal for all values of x.

Explain your geometric reasoning clearly and logically.

CALCULATION   REASON

Diagram is
NOT to scale

(b) EFGD is a **cyclic** quadrilateral with angle EDG = 82°.

O is the centre of the circle.

Find the size of angle HFJ.

Explain your geometric reasoning clearly and logically.

CALCULATION   REASON

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Diagram is
NOT to scale
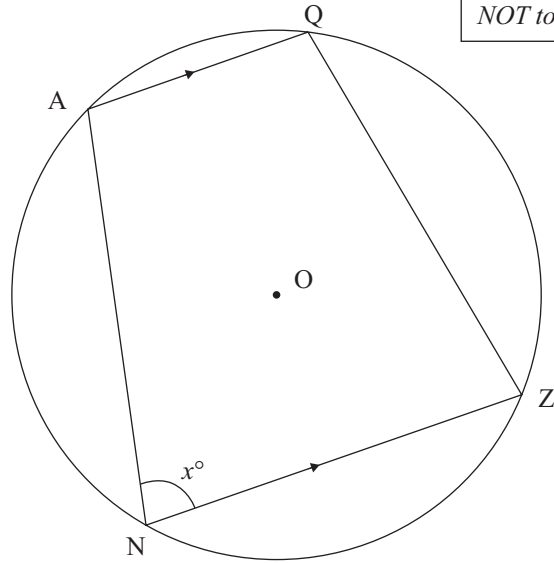
(c) (i)   The points A, Q, Z, N lie on the circumference of a circle centre O.

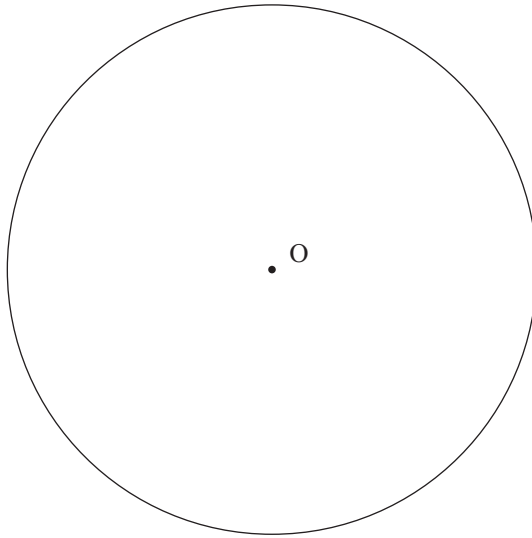AQ is parallel to NZ.

Find the size of angle NZQ, in terms of x.

Explain your geometric reasoning clearly and logically.

CALCULATION   REASON

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(ii)   What angle properties does a **cyclic parallelogram** have?

Explain your answer with geometric reasoning.

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

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