QUESTION ONE
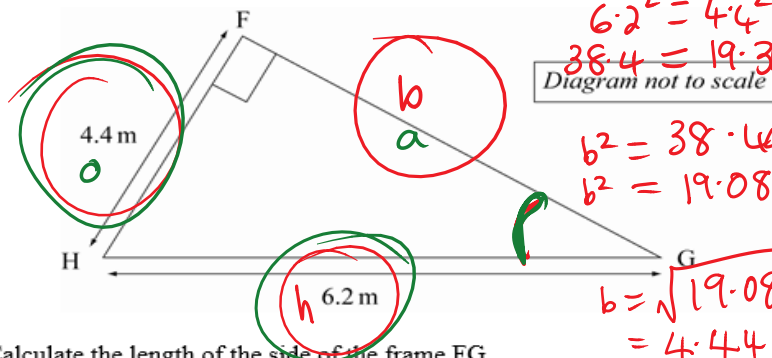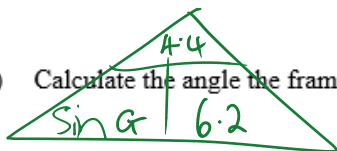
(a) The triangle FGH is part of the frame for a climbing net.

HF=4.4m and the distance along the ground, HG=6.2m

Handwritten:
$$h^2 = a^2 + b^2$$
$$6.2^2 = 4.4^2 + b^2$$
$$38.4 = 19.36 + b^2$$
$$b^2 = 38.44 - 19.36$$
$$b^2 = 19.08$$
$$b = \sqrt{19.08}$$
$$= 4.44 \text{ m } 2dp$$
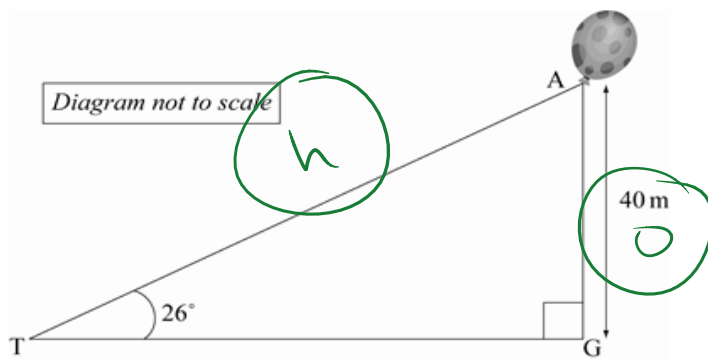or 4.4m 1dp.

Diagram labels: F, 4.4 m, b, a, H, 6.2 m, G, Diagram not to scale

(i) Calculate the length of the side of the frame FG.

(ii) Calculate the angle the frame makes with the ground at FGH.

Handwritten:
4.4
Sin G | 6.2
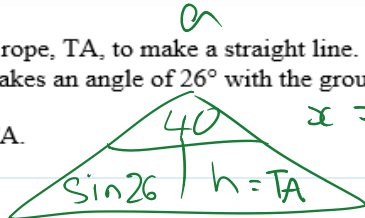$$\sin G = \frac{4.4}{6.2} \qquad G = \sin^{-1}\frac{4.4}{6.2} = 45.2°$$

(b) A balloon, A, is tied to the ground by the rope labelled TA.

Diagram labels: Diagram not to scale, A, 40 m, 26°, T, G

Handwritten on diagram: h

The wind is strong and causes the rope, TA, to make a straight line. The balloon is 40 m above the ground. The rope TA makes an angle of 26° with the ground.

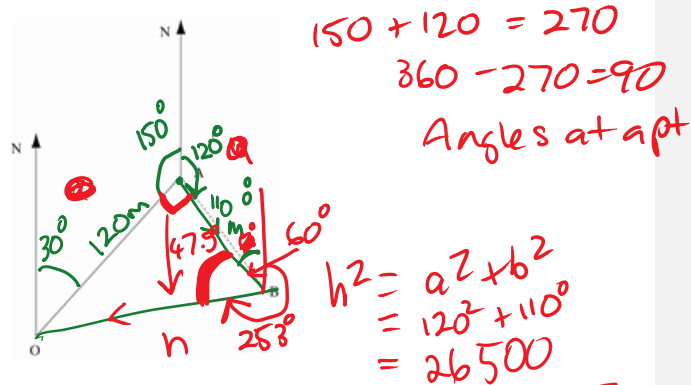Calculate the length of the rope, TA.

Handwritten:
40
Sin 26 | h=TA
$$x = \frac{40}{\sin 26} = 91.24$$
$$= 91.2m$$
1dp

(c) An orienteering course is planned from point O. The first leg to a point marked A is 120 m on a bearing of 030°. The second leg begins at A and ends at point B. B is on a bearing of 120° and 110 m from A.

(handwritten)
150 + 120 = 270
360 − 270 = 90
Angles at a pt

$h^2 = a^2 + b^2$
$= 120^2 + 110^2$
$= 26500$

(i) Calculate the distance from O to B giving reasons for each step.

(handwritten)
$h = \sqrt{26500}$
$= 162.8 \, m$ 1d.p.

(ii) Calculate the bearing of the starting point O from the finish B.
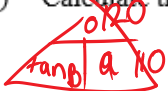
(handwritten)
$B = \tan^{-1} \dfrac{120}{110} = 47.5°$

47.5 + 60 = 107.5°
360 − 107.5 = 252.5°

(d) A shed in the playground has a roof that is 3.6 m long.
0.4 m of the roof overhangs the wall. The roof is at an angle of 40° to the horizontal.
If the walls of the shed are 3.8 m high how far above the ground is the highest point on the roof and the width of the shed.
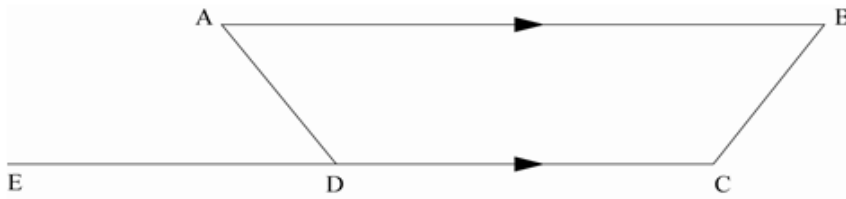
(diagram)
3.6 m
0.4 m
40°
Diagram not to scale
3.8 m
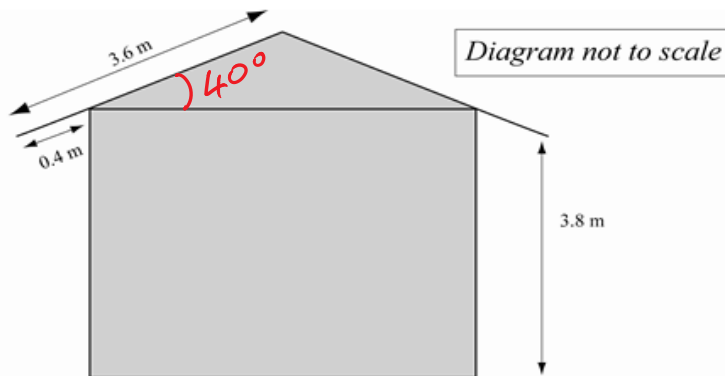
(i) Calculate the height of the shed.
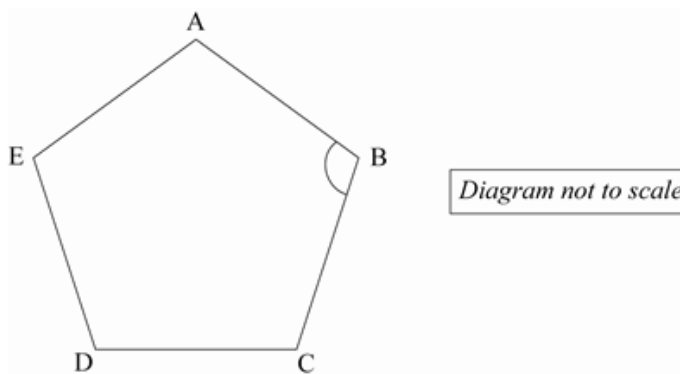
(ii) Calculate the width of the shed.

QUESTION TWO

(a) ABCD is an isosceles trapezium. Angle CBA = 78°. AD = BC.

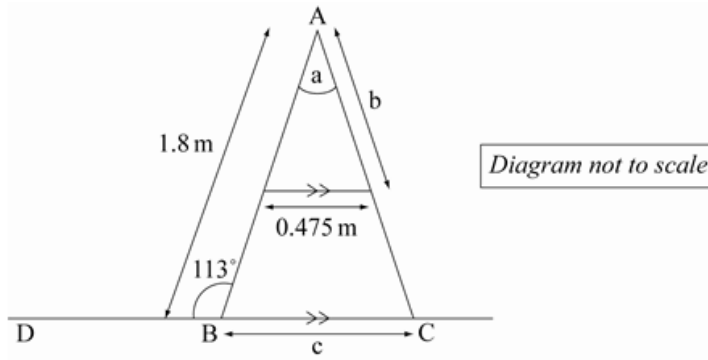Calculate the size of angle EDA giving reasons for each step of your answer.

(b) ABCDE is a regular pentagon.

Diagram not to scale

(i) Calculate the size of angle ABC giving reasons for each step.

(ii) If many objects of the same shape fit together to form a pattern, without leaving any spaces, the shape is said to **tessellate**.

Explain whether or not a regular pentagon will tessellate, giving reasons for your answer.
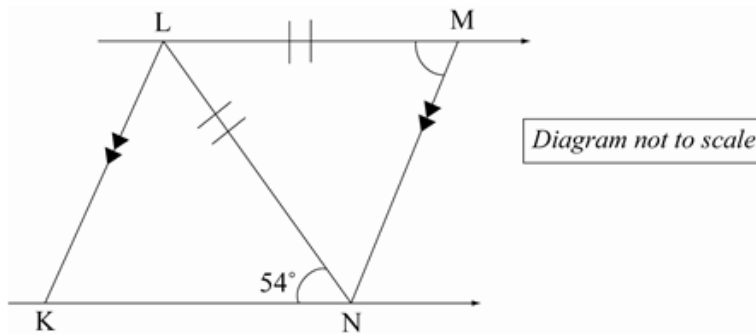
(c)   A ladder has two legs AB and AC. Each leg is 1.8m long. Angle ABD = 113°

Diagram not to scale

(i)   Calculate the size of angle BAC, explaining the reason for each step of your answer.

(ii)   Express b in terms of c.

(iii) Calculate the length of c.
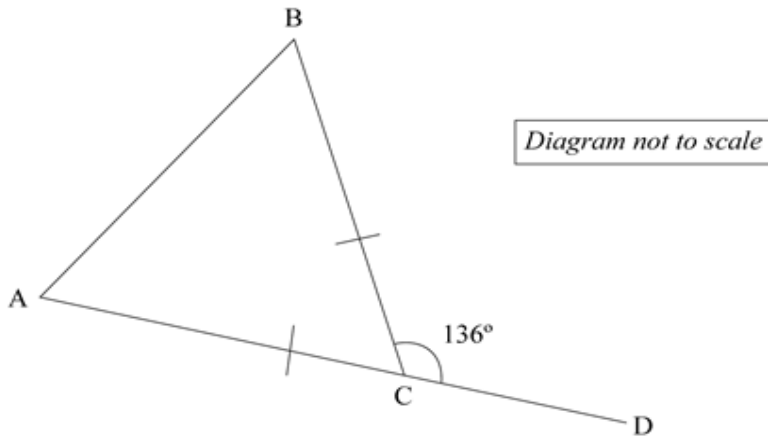
QUESTION THREE: PARALLEL LINES AND CIRCLES

(a)   The diagram shows part of a climbing frame.

Diagram not to scale

LM = LN.
KL is parallel to NM.
LM is parallel to KN.
Angle LNK = 54°.
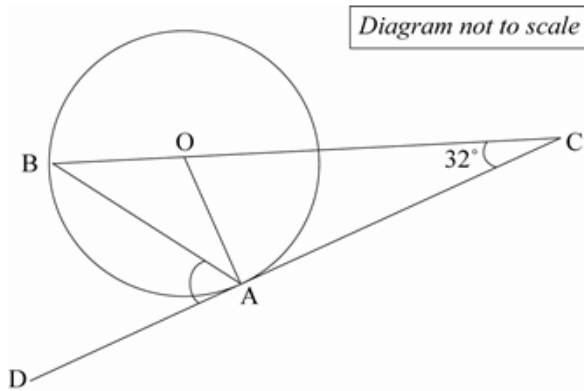
Calculate the size of angle LMN, explaining the reason for each step of your answer.

(b)   AC = BC.
      Angle BCD = 136°.

Diagram not to scale

Calculate the size of angle BAC giving reasons for each step.

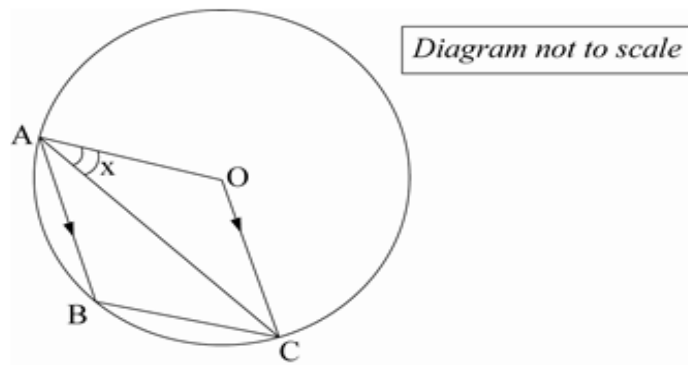(c)   DAC is a tangent. O is the centre of the circle.

Diagram not to scale

Calculate the size of angle DAB, explaining the reason for each step of your answer.

(d)   A, B, and C are points on the circumference of the circle.

O is the centre of the circle.
AB is parallel to OC.
Angle CAO $= x°$.

Diagram not to scale

Calculate the size of angle ACB in terms of x.