Geometry and Trig

1)

(i) (a) A farmer wants to construct a new fence across a field. The plan is shown below. The new fence is indicated by a dotted line.

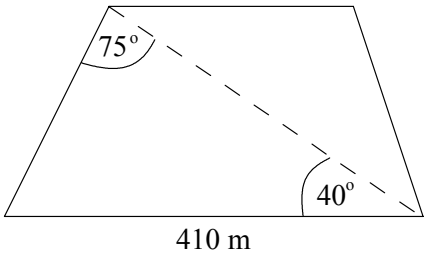


Diagram not to scale

Calculate the length of the fence. *[5 marks]*

(b) The fence creates two sections of land. Find the area of the smaller section of land ABC, given the additional information shown below.

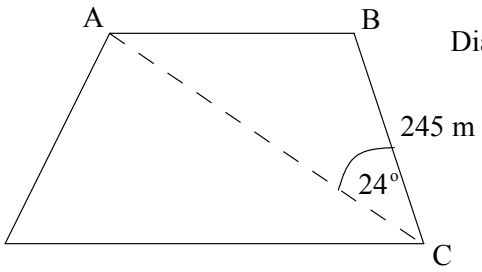


Diagram not to scale

[3 marks]

(ii) Find the volume of the following prism.

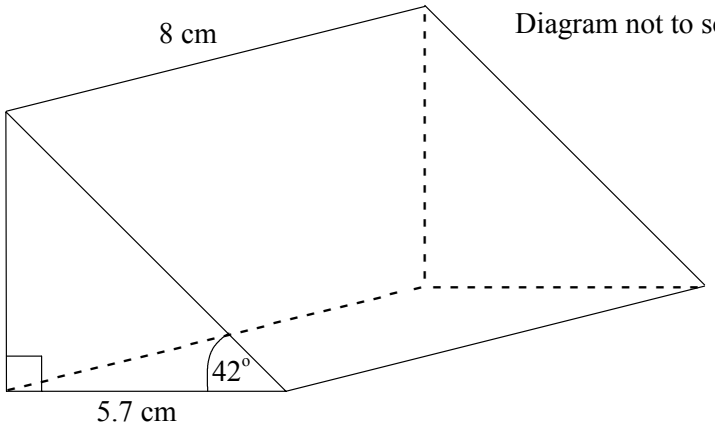


Diagram not to scale

[4 marks]

2)

(a) A gardener has to pave a rectangular area 15.4 metres long and 5.5 metres wide using rectangular bricks. The bricks are 22 cm long and 11 cm wide.

(i) Calculate the total area to be paved. Give your answer in cm^2.

(ii) Write down the area of each brick.

(iii) Find how many bricks are required to pave the total area. *[6 marks]*

(b) The gardener decides to have a triangular lawn ABC, instead of paving, in the middle of the rectangular area, as shown in the diagram below.

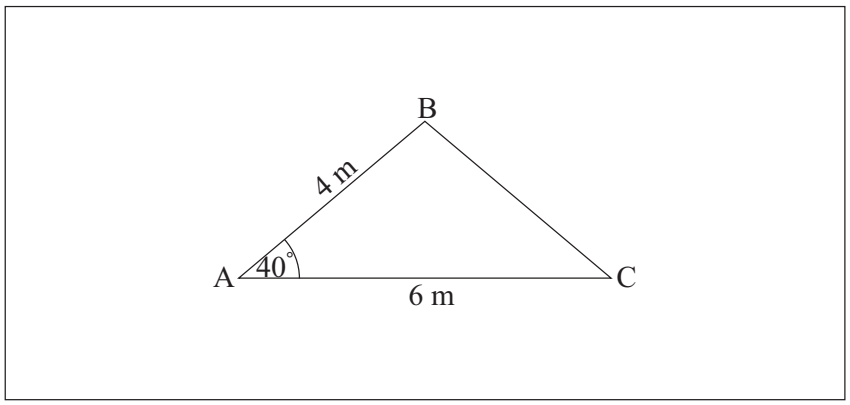


diagram not to scale

The distance AB is 4 metres, AC is 6 metres and angle BAC is 40°.

(i) Find the length of BC.

(ii) Hence write down the perimeter of the triangular lawn.

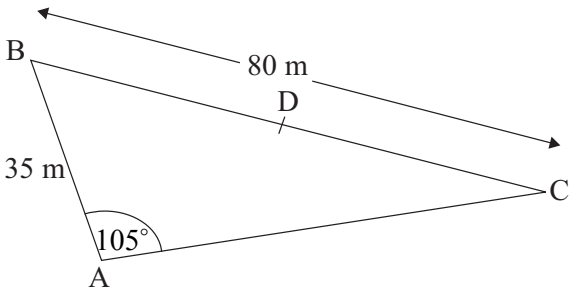
(iii) Calculate the area of the lawn.

(iv) Find the percentage of the rectangular area which is to be lawn. *[9 marks]*

3)

A farmer has a triangular field, ABC, as shown in the diagram.
AB = 35 m, BC = 80 m and $B\hat{A}C = 105°$, and D is the midpoint of BC.

diagram not to scale



(a) Find the size of $B\hat{C}A$. *[3 marks]*

(b) Calculate the length of AD. *[5 marks]*

The farmer wants to build a fence around ABD.

(c) Calculate the total length of the fence. *[2 marks]*

(d) The farmer pays 802.50 USD for the fence. Find the cost per metre. *[2 marks]*

(e) Calculate the area of the triangle ABD. *[3 marks]*

(f) A layer of earth 3 cm thick is removed from ABD. Find the volume removed in cubic metres. *[3 marks]*

4)

[Maximum mark: 14]

The quadrilateral ABCD shown below represents a sandbox. AB and BC have the same length. AD is 9 m long and CD is 4.2 m long. Angles ADC and ABC are 95° and 130° respectively.

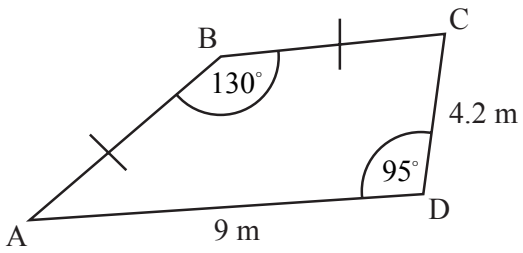


diagram not to scale

(a) Find the length of AC. *[3 marks]*

(b) (i) Write down the size of angle BCA.

(ii) Calculate the length of AB. *[4 marks]*

(c) Show that the area of the sandbox is 31.1 m^2 correct to 3 s.f. *[4 marks]*

The sandbox is a prism. Its edges are 40 cm high. The sand occupies one third of the volume of the sandbox.

(d) Calculate the volume of sand in the sandbox. *[3 marks]*