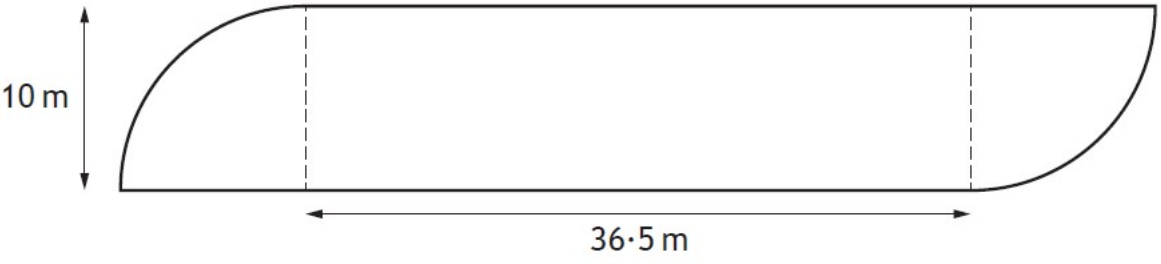2019 P2 Q5

A hotel is having a swimming pool built.

It is in the shape of a rectangle and two quarter circles as shown below.

The swimming pool will have a safety rail fitted around its edge.

- There will be two 125 cm wide gaps to allow access to the pool

- Safety rail is sold in 3 metre lengths

- Each 3 metre length costs £11·49

Calculate the minimum cost of the safety rail for the pool.

5

Ans	40·6 leading to 41×11·49 = 471·09

A new hotel is being planned in Benidorm.

The pool will have a walkway around three sides.

The walkway will be 1·5 m wide.

This is shown in the diagram.
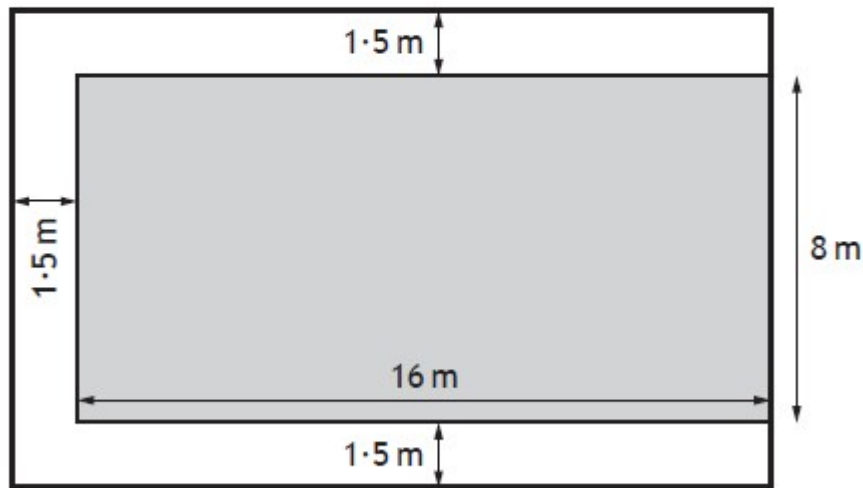
(a) Calculate the total area of the walkway. 2

The walkway will be covered in tiles.

16 tiles are needed to cover 1 square metre.

The tiles are sold in boxes of 50.

Each box costs 71·95 euro.

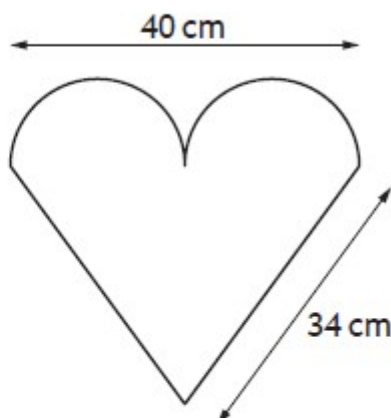(b) Calculate the cost of the tiles needed for the walkway. 2

Ans	(a) 64.5 m² (b) £1510.95

Uddingston Grammar School

Ribbon has to be placed around the outside of the love heart cake shown below.

40 cm

34 cm

The top of the cake is in the shape of an isosceles triangle with two identical semi-circles.

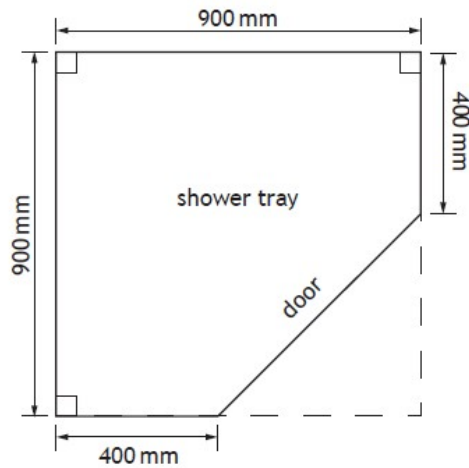The ribbon needs to be the length of the perimeter of the top of the cake plus an extra 2·8 cm.

Calculate the length of ribbon needed for the cake.

Take $\pi = 3 \cdot 14$.

3

| Ans | 133.6 cm |

Uddingston Grammar School

Zuzanna is remodelling her shower room.

She considers two designs.

The first design has a pentagonal shower tray.

The door will be fitted on the side of the tray as shown.

(a) Calculate the length of the side where the door will go.

(b) Calculate the area of the pentagonal shower tray.

The second design that Zuzanna is considering is the offset quadrant shower tray shown below.
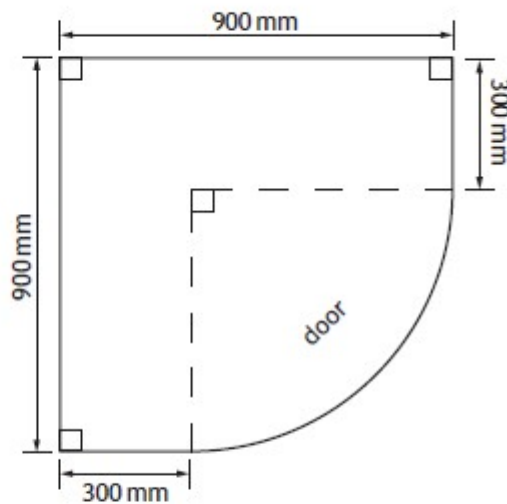
The offset quadrant design has quarter of a circle forming part of the edge.

(c) Zuzanna will choose the design that gives the greater area.

Which design will Zuzanna choose, the pentagonal or the offset quadrant shower tray?
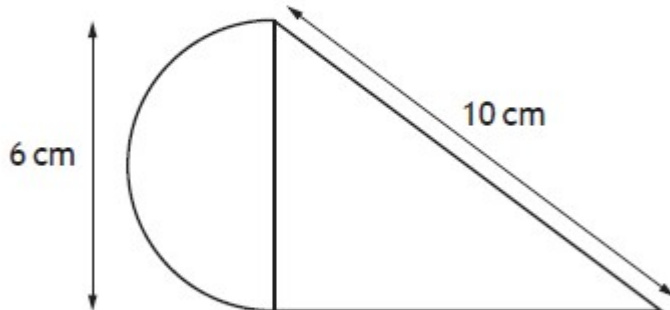
Use your working to justify your answer.

2

3

| Ans | (a) 707 (b) 685000 (mm²) (c) Zuzanna should pick the offset quadrant (since 732743 mm² > 685000 mm₂) |

Uddingston Grammar School

A new design is discussed for a glue dispenser.

It is to be made from two plates of plastic.

Each plate is in the shape of a right angled triangle and a semi-circle as shown.
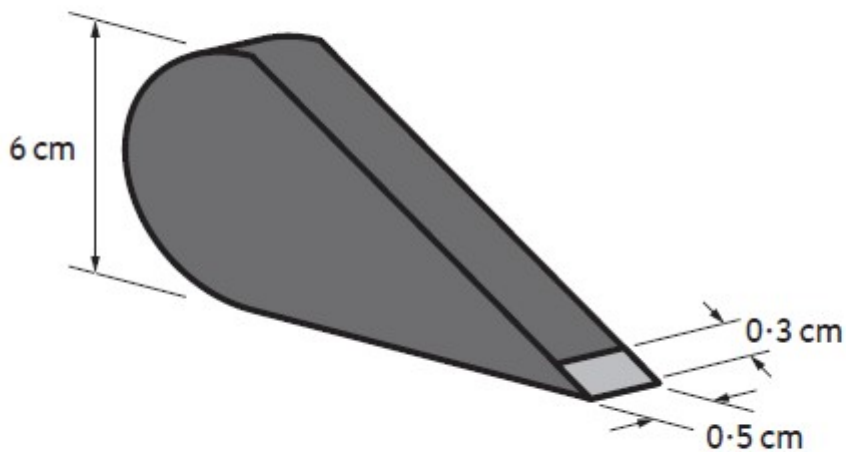

(a) Calculate the perimeter of each plate.

Use $\pi = 3\cdot14$.

4

A rectangular piece of plastic $0\cdot5$ cm wide is bent and wrapped around the perimeter of the two plates to join them together.

The rectangular piece of plastic will be $0\cdot3$ cm shorter than the perimeter of the shape to allow the glue to flow.

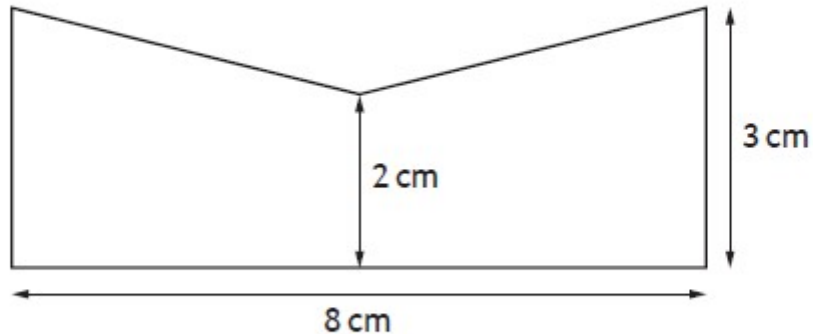(b) Calculate the area of the rectangular piece of plastic required to hold the plates together.

2

Ans   (a) 27·42 (cm) (b) 13·56 (cm2)

Uddingston Grammar School

Aneesa makes enamelled badges.

Each badge is made from metal.

The shape of the badge is shown below.

(a) Calculate the area of the front of each badge.

2

The front of each badge is covered with enamel.

The enamel that Aneesa buys costs £90 for one pack.

One pack will cover $180 \, cm^2$.

She makes as many badges as possible from one pack.

The metal that she uses costs £3 for each badge.

To make a profit, Aneesa adds an extra £17 to the cost of each badge.

(b) Calculate her selling price for each badge.

3

Ans	(a) 20 (cm²) (b) (£)30

Uddingston Grammar School

A picture is glued onto a piece of card as shown.

- The picture is a rectangle with dimensions 4 cm by 5 cm.
- The rectangular card has an area 2·8 times greater than the area of the picture.
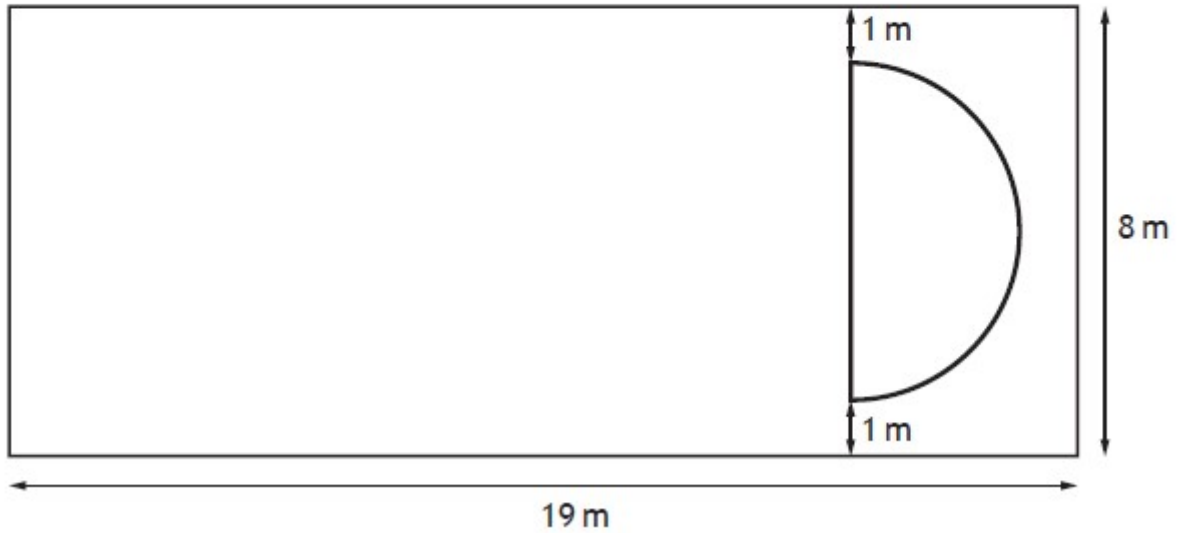- One of the dimensions of the piece of card is 7 cm.

Calculate the other dimension of the piece of card.

3

Ans | 8 (cm)

Uddingston Grammar School

A new playground is planned for Aberbeath Primary School.

It will be a rectangle measuring 19 metres by 8 metres.

A semi-circular sandpit will be built within the playground as shown

The playground, excluding the sandpit, is to be covered in rubber tiles.

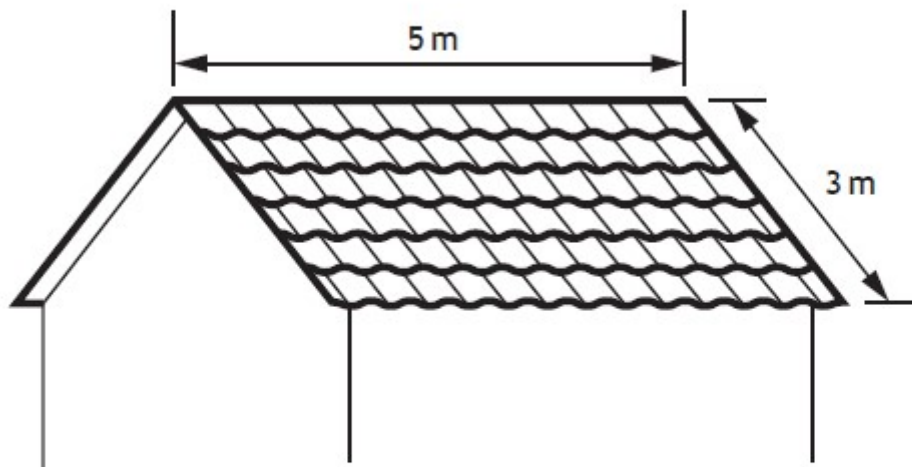Calculate the area to be covered by the rubber tiles.

Take $\pi = 3 \cdot 14$.

Give your answer to 3 significant figures.

4

Ans Ans: 138 m²

Uddingston Grammar School

Mrs Smith has decided to get the roof of her extension re-slated.

She contacts a local roofing contractor to get an estimate.

Each side of the roof has dimensions 5 m by 3 m as shown.

The builder gives her a quote for the replacement slates.

He uses the following method to work out his estimate:

- calculate the area of one side
- double this (total area)
- double again (overlapping slates)
- multiply by 16 (to get the number of slates required)
- add on 15% (for cuts and breakages).

The cost of each slate is 97 pence.

He rounds his estimate to the nearest hundred pounds.

The builder tells Mrs Smith he will "throw in" any additional materials for free.

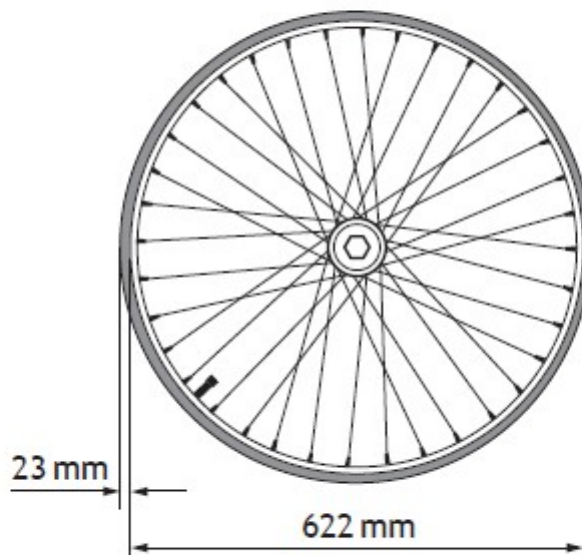(a) How much is the estimate for replacement slates?

3

Ans	£1100

Uddingston Grammar School

Patryk has a bicycle trip computer.

To calibrate the computer he must enter the circumference of the front tyre of his bicycle.

The diameter of the rim is 622 millimetres and the depth of the tyre is 23 millimetres as shown in the diagram below.

(b) What value should Patryk enter into his bicycle trip computer?

Round your answer to the nearest millimetre.

3

Ans	2099 (mm)

Publicity material is to be designed for a theatre show that is being sponsored by a local company.

All the publicity material must feature the company logo.

The company logo is in the shape of a triangle.

The designer is to produce a small "flyer" and a large poster.

The designer produces a sketch for the flyer as shown.

Central
Theatre
Summer
Show

22 cm

8 cm

7 cm

16 cm
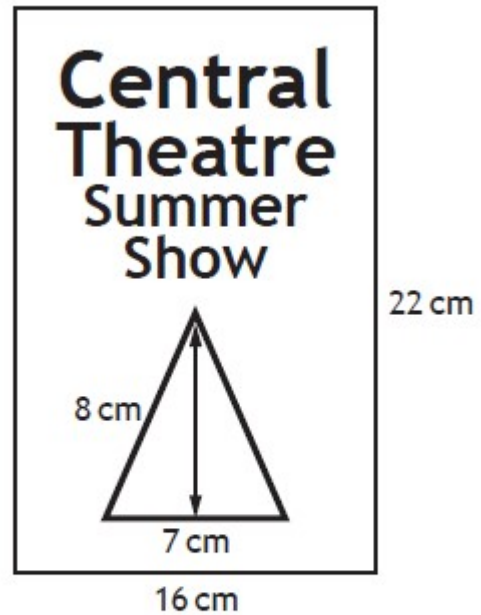
(a) The ratio of the dimensions in the poster to those in the flyer is 7:2.

Calculate the dimensions of the logo as it will appear on the poster.

2

(b) The design brief specifies that the company logo must be between 9% and 12% of the area of any publicity material.

Does this design fit these specifications?

4

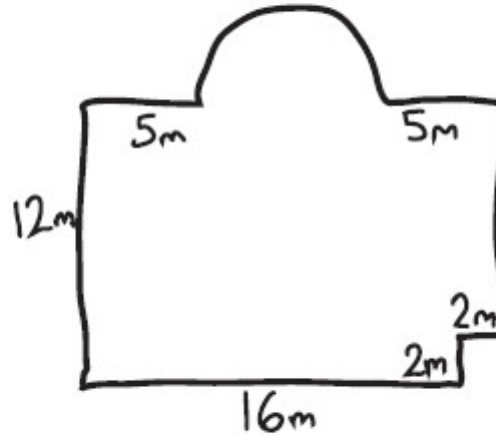| Ans	(a) 24·5cm by 28cm (b) No, logo is 8% which is less than the necessary 9%

Uddingston Grammar School

A hotel is redecorating their function room which includes a semi-circular stage area.

They plan to lay a hardwood floor.

A sketch of the floor plan of the room is shown below.

(a) Calculate the area of the floor in the hotel's function room.

Use $\pi = 3\cdot14$.

(b) Hardwood flooring comes in packs of 4m² and is sold at £67·95 per pack.

Calculate the cost for the hotel to floor their function room.

4

2

| Ans | (a) 237·12m² (b) £4077 |

Uddingston Grammar School

Cameron wants to resurface his drive.

He has a choice of 3 surfaces.

SURFACE TYPE 1: TARMAC
A tarmac drive should last for 30 years.

Tarmac costs £2 per square foot to lay.

(1 square metre = 10·76 square feet)

SURFACE TYPE 2: GRAVEL CHIPS
A gravel drive should last for 10 years.

Gravel needs to be laid to a depth of 5 cm.

Each 50 kg bag will cover 1 square metre to a depth of 5 cm.
Each 50 kg bag costs £8·29
Each 850 kg bag costs £125·99

The gravel needs a weedproof membrane to be laid underneath.
Membrane to cover the drive costs £14·31.

SURFACE TYPE 3: CONCRETE SLABS
A concrete slab drive should last for 25 years.

Concrete slabs:
40 cm by 40 cm ----------- £2·12 each
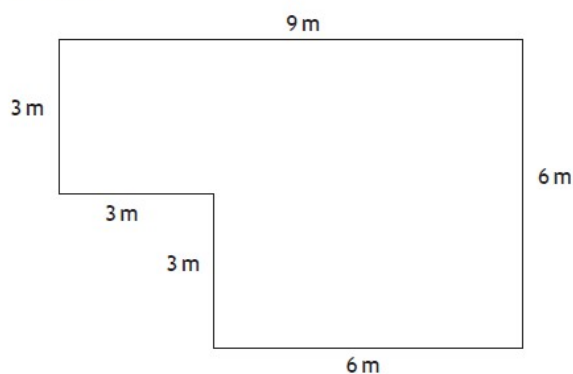Slabs can be cut to size

Slabs require 4 cm depth of hardcore to be laid underneath.
1 cubic metre = 2 tonnes hardcore.
Hardcore costs £18 per tonne bag.

2 bags of mortar at £35·99 per bag.

Cameron makes a sketch of his drive to help him to calculate the cost of each type of surface.

(a) Calculate the minimum total cost for each surface type.

(b) Which is the most cost effective?

9

3

Ans	(a) Tarmac: £968·40, Gravel: £357·48, Slabs: £741·82 (b) Slabs cheapest per year, or gravel cheaper initially etc

Uddingston Grammar School

A landscape gardener is designing a garden.

The rectangular garden has dimensions 15 metres by 10 metres.
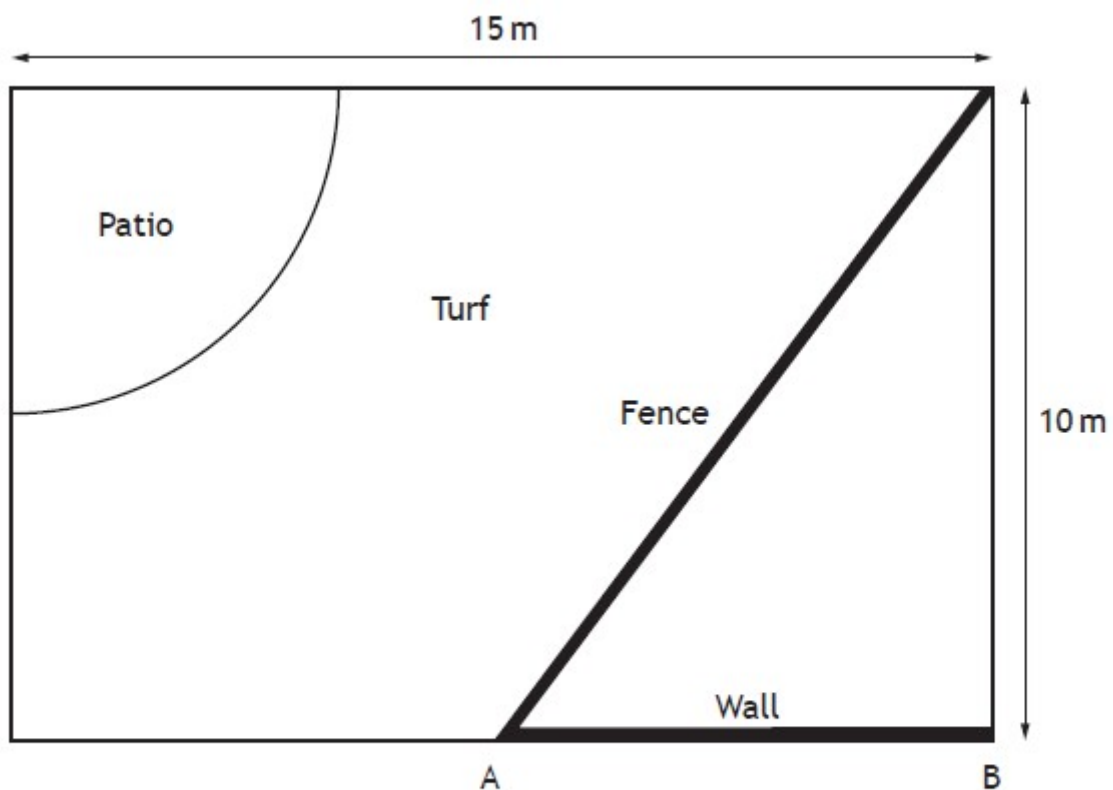
He plans to build a triangular flower bed.

To separate the flower bed from the lawn, he uses a low fence.

The fence is made of 5 sections, each 2·8 metres long.

A patio in the shape of a quarter circle with a radius of 5 metres is to be created in the corner.

The rest of the garden is to be laid as turf.

A sketch of the garden is shown below.

(a) Calculate the length of the wall, AB.

3

(b) Turf is sold in 5 m² rolls costing £14·95 per roll.
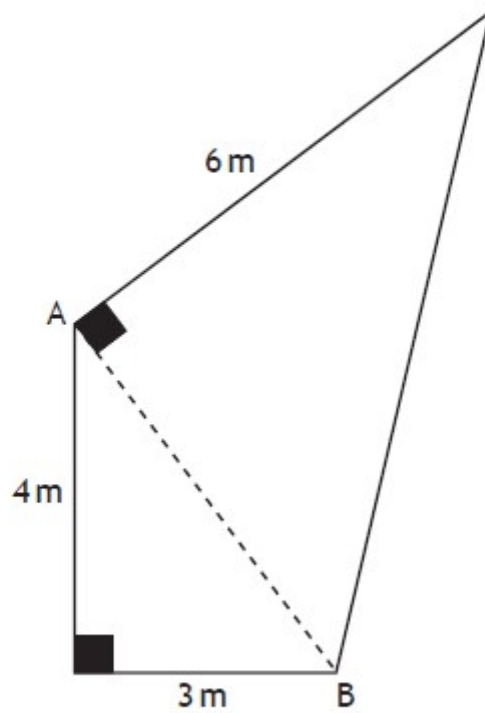
Calculate the cost of buying turf for this garden.

6

Ans   (a) 9·8 metres (b) £254·15

Uddingston Grammar School

A new sail is being designed for a yacht as shown below.

It consists of two right angled triangles.

(a) Calculate the length of AB.

1

(b) Calculate the total area of the sail.

2

Ans   (a) 5 (m) (b) 21 m²