Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4372189163

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/63**

Paper 6 (Extended) **May/June 2016**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Graphics Calculator

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.
You may use an HB pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer both parts **A** and **B**.
You must show all the relevant working to gain full marks for correct methods, including sketches.
In this paper you will also be assessed on your ability to provide full reasons and communicate your mathematics clearly and precisely.
At the end of the examination, fasten all your work securely together.
The total number of marks for this paper is 40.

This document consists of **12** printed pages.

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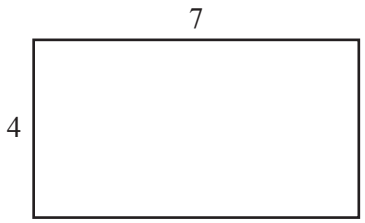
Answer **both** parts **A** and **B**.

A INVESTIGATION AREAS AND PERIMETERS (20 marks)

You are advised to spend no more than 45 minutes on this part.

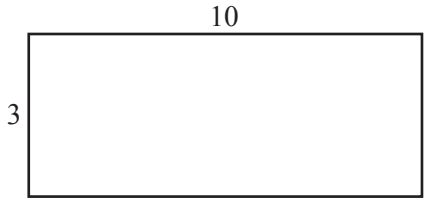
This investigation looks at the connection between the perimeter and area of a rectangle.

All diagrams are not to scale.



The area of this 4 by 7 rectangle is 28 and its perimeter is 22.

1 (a)

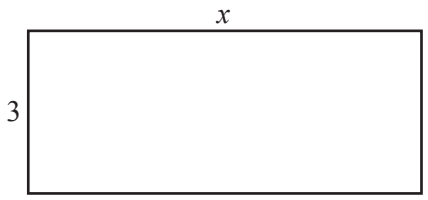


Find the area and perimeter of this rectangle.

Area = ...

Perimeter = ...

(b)



The area and perimeter of this rectangle have the same value.

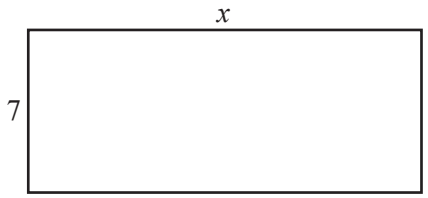
(i) Find x.

.....

(ii) Write down its perimeter.

.....

(c)



(i) Write down an expression for the area of this rectangle.

.....

(ii) Write down an expression for the perimeter of this rectangle.

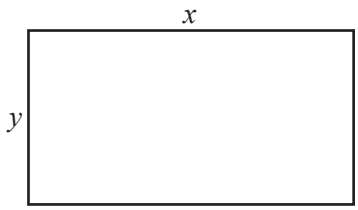
.....

(iii) The area and the perimeter have the same value.

Write down an equation and solve it to find x.

.....

2



(a) For this rectangle, find an expression, in terms of x and y, for

(i) the area,

.....

(ii) the perimeter.

.....

(b) The area and the perimeter have the same value.

Show that $y = \frac{2x}{x-2}$.

3 $y = \dfrac{2x}{x-2}$

(a) Find y when $x = 12$.

.....

(b) Find y when $x = 1$.

.....

(c) Sketch the graph of $y = \dfrac{2x}{x-2}$ for values of x between 0 and 15.

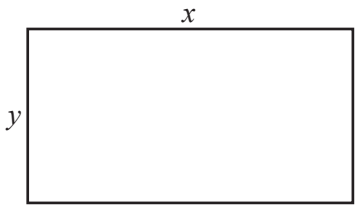


(d) For which values of x is the graph not valid for rectangles with area equal to perimeter? Give your answer as an inequality.

.....

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4



When the area is less than the perimeter, $y < \frac{2x}{x-2}$.

(a) Explain this using your method in **question 2(b)**.
Assume that $x > 2$.

(b) On your sketch in **question 3(c)**, mark **clearly** a point where $y < \frac{2x}{x-2}$ and $x > 2$.
Label this point Q.

(c) Check that the co-ordinates of your point Q give a rectangle in which the area is less than the perimeter.

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5 Investigate if it is possible to find a cube where the volume is numerically equal to its total surface area.

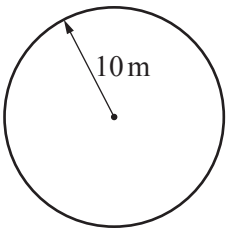
B MODELLING HOW MUCH GRASS CAN THE GOAT EAT? (20 marks)

You are advised to spend no more than 45 minutes on this part.

A farmer owns a goat and a large field with lots of grass in it.

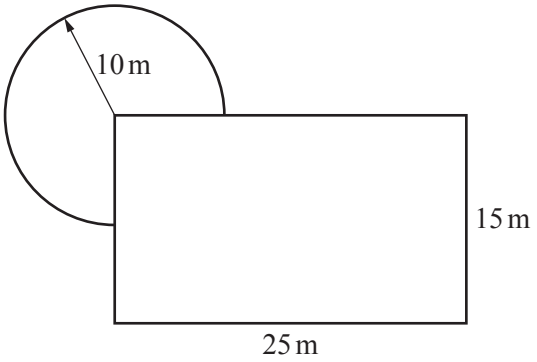
1 The farmer ties the goat to a point in the field with a rope that is 10 m long.

Find the area of grass that the goat can eat.



.....

2 **(a)** With the same 10 m rope, she ties the goat to an outside corner of a barn of length 25 m and width 15 m.

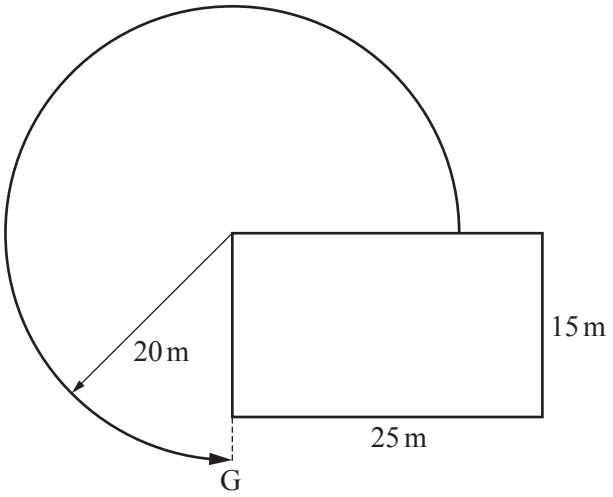


NOT TO SCALE

Find the area of grass that the goat can eat.

.....

(b) With a 20 m rope she ties the goat to the same corner of the barn.



NOT TO SCALE

Explain what happens when the goat continues past point G.

3 With the original 10 m rope, she ties the goat to an outside corner of a barn of length 15 m and width 8 m.

(a) Draw a sketch to show the shape of the area of grass the goat can now eat.

(b) Show that the area of grass the goat can eat is approximately 239 m^2.

4 The farmer now uses a rope that is x metres long.
The barn is of length 15 m and width 8 m.

(a) The goat can eat an area of grass the same **shape** as that in **question 2(a)**.

(i) Complete the inequality for x.

..... $< x <$ .....

(ii) Write down a model for the area, A m^2.

$A =$ .....

(b) The goat can eat an area of grass in a shape of the same form as that in **question 3(a)**.

(i) Complete the inequality for x.

..... $< x <$ .....

(ii) Find a model for this area, A m^2.

$A =$ .....

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(c) (i) When $15 < x < 23$, find a model for the area of grass, $A\,\text{m}^2$, that the goat can eat.

$A =$ .....

(ii) The goat needs to reach $700\,\text{m}^2$ of grass.

Use your model to find the length of the rope.

.....

Question 4(d) is printed on the next page.

(d) The goat needs to reach $500\,m^2$ of grass.

Find the length of the rope.

.....

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