UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTER
NUMBER

CANDIDATE
NUMBER

MATHEMATICS (US) **0444/23**

Paper 2 (Extended) **October/November 2012**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

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

Answer **all** questions.
CALCULATORS MUST NOT BE USED IN THIS PAPER.
All answers should be given in their simplest form.
If work is needed for any question it must be shown in the space provided.

The number of points is given in parentheses [ ] at the end of each question or part question.
The total of the points for this paper is 70.

This document consists of **13** printed pages and **3** blank pages.

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[Turn over

Formula List

For the equation $ax^2 + bx + c = 0$ $\qquad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Lateral surface area, A, of cylinder of radius r, height h. $\qquad A = 2\pi rh$

Lateral surface area, A, of cone of radius r, sloping edge l. $\qquad A = \pi rl$

Surface area, A, of sphere of radius r. $\qquad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\qquad V = \dfrac{1}{3}Ah$

Volume, V, of cone of radius r, height h. $\qquad V = \dfrac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\qquad V = \dfrac{4}{3}\pi r^3$
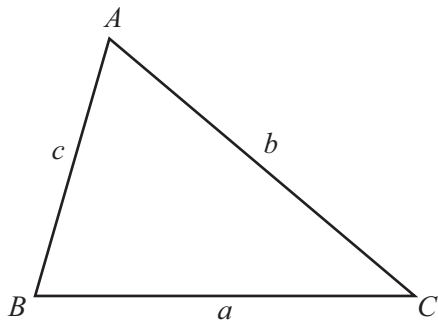
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area} = \frac{1}{2}bc \sin A$$

1 Samantha invests $600 at a rate of 2% per year simple interest.

   Calculate the interest Samantha earns in 8 years.

                                                 Answer $ .... [2]

2 Show that $\left(\dfrac{1}{10}\right)^2 + \left(\dfrac{2}{5}\right)^2 = 0.17$.

   Write down all the steps in your work.

   Answer

                                                                                        [2]

3 Jamie needs 300 g of flour to make 20 cakes.

   How much flour does he need to make 12 cakes?

                                                 Answer .... g [2]

4 Expand the parentheses.
                              $$y(3 - y^3)$$

                                                 Answer .... [2]

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iner's

5 Maria pays $84 rent.
The rent is increased by 5%.

Calculate Maria's new rent.

Answer $ .... [2]

6 Jamie takes 6 minutes to walk 250 meters.

Find Jamie's walking speed in **kilometers per hour.**

Answer .... km/h [2]

7 Evaluate $\dfrac{7.2}{12.75 - 10.95}$.

Answer .... [2]

8 Solve the inequality.

$$-7 \leqslant 2x - 3$$

Answer .... [2]

9 Show that $\left(\dfrac{49}{16}\right)^{-\frac{3}{2}} = \dfrac{64}{343}$.

Write down all the steps in your work.

Answer

[2]

10 Simplify $(256w^{256})^{\frac{1}{4}}$.

Answer .... [2]

11 *A* is the point $(2, -1)$ and $\overrightarrow{AB} = \begin{pmatrix} 8 \\ 6 \end{pmatrix}$.

M is the midpoint of $\overrightarrow{AB}$.

Find the co-ordinates of *M*.

Answer (.............. , ...) [2]

12

Mass of parcel (m kilograms)	$0 < m \leq 0.5$	$0.5 < m \leq 1.5$	$1.5 < m \leq 3$
Frequency	20	18	9

The table above shows information about parcels in a delivery van.

John wants to draw a histogram using this information.
Complete the table below.

Mass of parcel (m kilograms)	$0 < m \leq 0.5$	$0.5 < m \leq 1.5$	$1.5 < m \leq 3$
Frequency density		18	

[2]

13 Lizbeth carries out a survey of vehicles on a street.
Out of 100 vehicles, 85 are cars and 15 are trucks.
20 of the cars are gray and 5 of the trucks are gray.

(a) One vehicle is chosen at random.

Find the probability that the vehicle is

(i) a gray car,

Answer(a)(i) .... [1]

(ii) a car or colored gray.

Answer(a)(ii) .... [1]

(b) In another survey on the same street, there are 400 vehicles.

Find the expected number of gray cars in this survey.

Answer(b) .... [1]

14 y varies inversely as the square root of x.
When $x = 9$, $y = 6$.

Find y when $x = 36$.

Answer y = ... [3]

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15 A model of a boat is made to a scale of $1 : 200$.
The surface area of the model is $900 \, \text{cm}^2$.

Calculate the surface area of the boat, giving your answer in square meters.

Answer .... m^2 [3]

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16 Solve for y.

$$A = \pi x^2 - \pi y^2$$

Answer y = ... [3]

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iner's

17 In a cycle shop, *n* cycles are sold for $150 each.
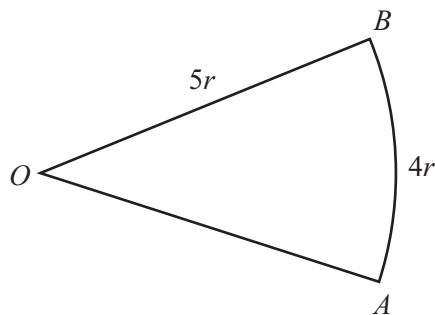The function A(*n*) is the amount received from selling the *n* cycles.

(a) Write down an expression, in terms of *n*, for A(*n*).

Answer(a) A(*n*) = ... [1]

(b) Write down the domain for A(*n*) when the range is {$450, $600, $900, $1050}.

Answer(b) .... [2]

18
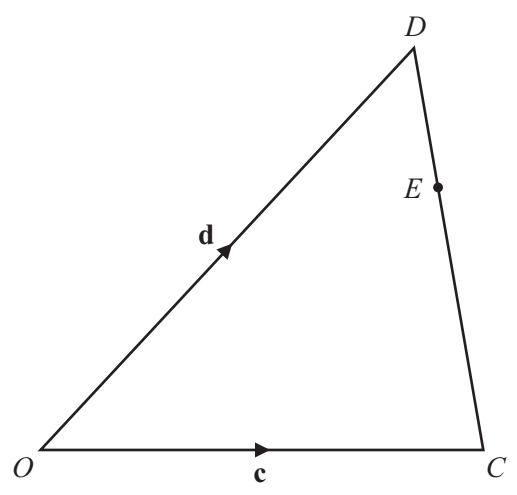

The diagram shows a sector of a circle, center *O*, radius 5*r*.
The length of the arc *AB* is 4*r*.

Find the area of the sector in terms of *r*, giving your answer in its simplest form.

Answer .... [3]

19

NOT TO SCALE

In the diagram, O is the origin.
$\overrightarrow{OC} = \mathbf{c}$ and $\overrightarrow{OD} = \mathbf{d}$.
E is on CD so that $CE = 2ED$.

Find, in terms of $\mathbf{c}$ and $\mathbf{d}$, in their simplest forms,

(a) $\overrightarrow{DE}$,

Answer(a) $\overrightarrow{DE} = $ .... [2]

(b) the position vector of E.

Answer(b) .... [2]

For
iner's

20 Write each of these as a single fraction in its simplest form.

(a) $\dfrac{1}{x-1}+1$

Answer(a) .... [2]

(b) $\dfrac{x+2}{3}-\dfrac{2x-1}{4}+1$

Answer(b) .... [3]

21 Simplify the following.

$$\frac{h^2-h-20}{h^2-25}$$

Answer .... [4]

22
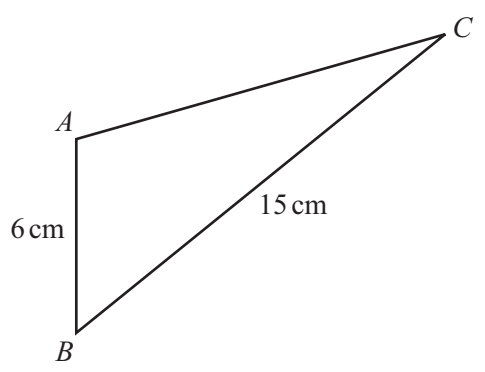
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SCALE

(a) In triangle *ABC*, *AB* = 6 cm, *BC* = 15 cm and sin *C* = 0.2 .
Find the value of sin *A*.

Answer(a) .... [2]

(b) Find angle *BAC*, which is obtuse.

Answer(b) Angle *BAC* = ... [2]

Question 23 is printed on the next page.

For
iner's

23 $\qquad$ f(x) = 3x + 5 $\qquad$ g(x) = 4x − 1

(a) Find the value of g(g(3)).

Answer(a) .... [2]

(b) Find f(g(x)), giving your answer in its simplest form.

*Answer(b)*f(g(x)) = ... [2]

(c) Solve the equation.

$$f^{-1}(x) = 11$$

Answer(c) x = ... [1]

24

NOT TO
SCALE

2 cm

3 cm

6 cm
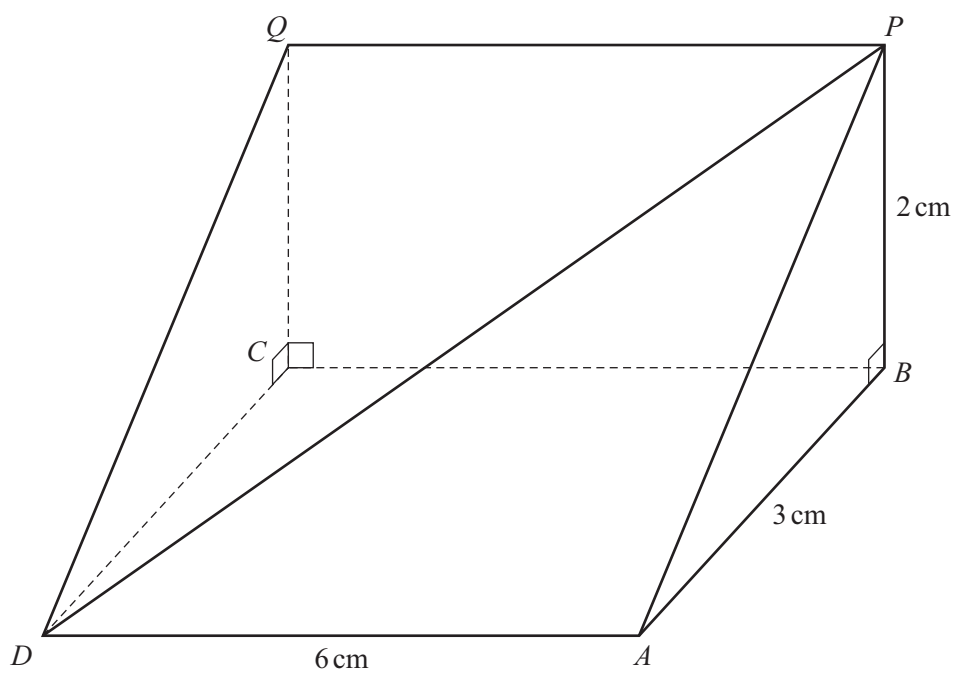
The diagram shows a triangular prism.
ABCD is a horizontal rectangle with *DA* = 6 cm and *AB* = 3 cm.
BCQP is a vertical rectangle and *BP* = 2 cm.

Find

(a) the length of *DP*,

Answer(a) DP = ... cm [3]

(b) the total surface area of the prism in the form $p + q\sqrt{13}$.

Answer(b) .... cm^2 [3]

14

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15

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