UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTER NUMBER

CANDIDATE NUMBER

MATHEMATICS (US)　　　　　　　　　　　　　　　　　　**0444/21**

Paper 2 (Extended)　　　　　　　　　　　　　　　　**October/November 2013**

　　　　　　　　　　　　　　　　　　　　　　　　　　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 **12** printed pages.

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International Examinations

[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. $\qquad V = \dfrac{4}{3}\pi r^3$
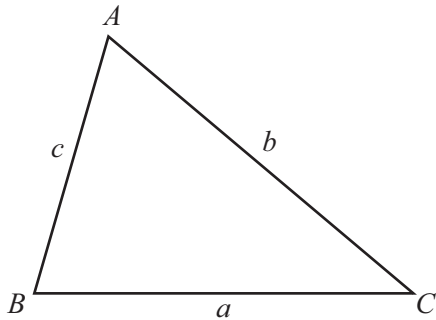
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

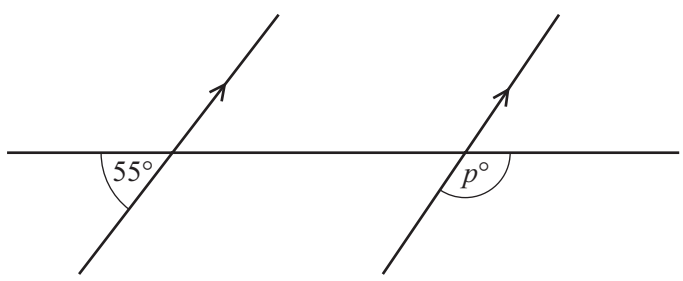$$a^2 = b^2 + c^2 - 2bc \cos A$$

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

1 Work out 72 cents as a percentage of 90 cents.

Answer .... % [1]

2 Work out $\dfrac{1.2 - 0.7}{1.1 - 0.9}$.

Answer .... [2]

3

NOT TO
SCALE

Find the value of *p*.

Answer p = ... [2]

4 Work out 17% of 40 kg.

Answer .... kg [2]

[Turn over

*For
miner's*

5 Solve the equation.

$$5 - 2x = 3x - 19$$

Answer x = ... [2]

6

$$\boxed{S}\ \ \boxed{P}\ \ \boxed{A}\ \ \boxed{C}\ \ \boxed{E}\ \ \boxed{S}$$

One of the 6 letters is taken at random.

(a) Write down the probability that the letter is S.

Answer(a) .... [1]

(b) The letter is replaced and again a letter is taken at random.
This is repeated 600 times.

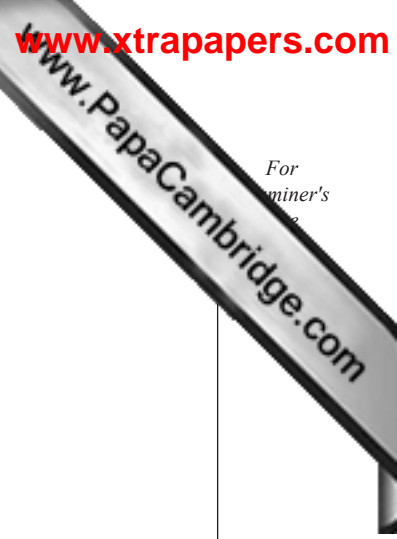How many times would you expect the letter to be S?

Answer(b) .... [1]

7 Work out $1.1 \times 10^{13} - 2 \times 10^{12}$.
Give your answer in scientific notation.

Answer .... [2]

8 Write down the amplitude and the period of the function $f(x) = 3\sin 3x$.

Answer amplitude = ...

period = ... [2]

9 Emily invests $\$x$ at a rate of 4% per year simple interest.
After 5 years she has $26 interest.

Find the value of x.

Answer x = ... [3]

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10 Find the nth term in each of the following sequences.

(a) $\dfrac{1}{3}, \quad \dfrac{2}{4}, \quad \dfrac{3}{5}, \quad \dfrac{4}{6}, \quad \dfrac{5}{7}, \quad \text{......}$

Answer(a) .... [1]

(b) 0, 3, 8, 15, 24, ...

Answer(b) .... [2]

---

11 Solve for b.

$$c = \sqrt{a^2 + b^2}$$

Answer b = ... [3]

---

12 The surface area of a child's model car is $200 \, \text{cm}^2$.
The surface area of the full size car is $32 \, \text{m}^2$.

Find the scale of the model in the form $1:n$.

Answer $1:$ .... [3]

[Turn over

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miner's

13
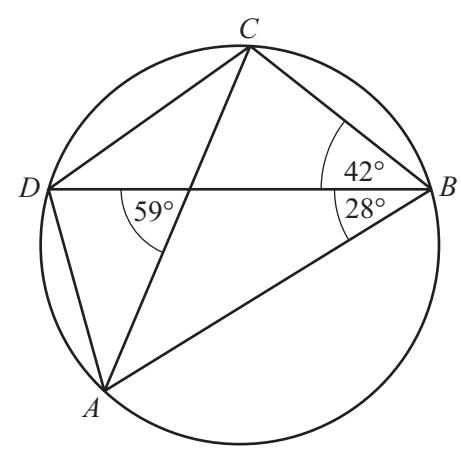
NOT TO
SCALE

A, *B*, *C* and *D* lie on the circle.

Find

(a) angle *ADC*,

Answer(a) Angle *ADC* = ... [1]

(b) angle *ACB*.

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

14 **(a)** $3^x = \sqrt[4]{3^5}$

Find the value of *x*.

Answer(a) *x* = ... [1]

(b) Simplify $\left(32y^{15}\right)^{\frac{2}{5}}$.

Answer(b) .... [2]

15 Write as a single fraction in simplest form.

$$3 - \frac{t+2}{t-1}$$

Answer .... [3]

16 Work out, giving each answer as a fraction in lowest terms.

(a) $\frac{3}{4} - \frac{1}{12}$

Answer(a) .... [2]

(b) $2\frac{1}{2} \times \frac{4}{25}$

Answer(b) .... [2]

[Turn over

17
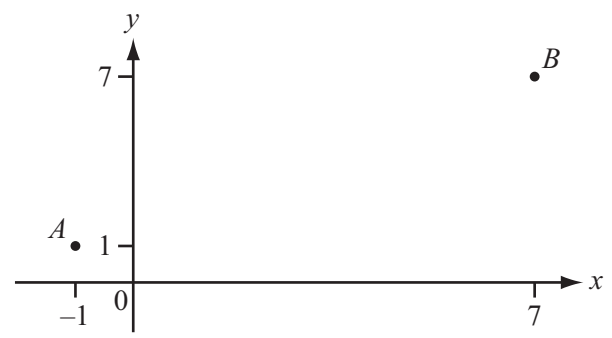
NOT TO
SCALE

A is the point (–1, 1) and *B* is the point (7, 7).

(a) Write $\overrightarrow{AB}$ as a column vector.

Answer(a) $\overrightarrow{AB}$ = $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) Find $|\overrightarrow{AB}|$.

Answer(b) $|\overrightarrow{AB}|$ = ... [2]

(c) $\overrightarrow{AC} = 2\overrightarrow{AB}$.

Write down the co-ordinates of *C*.

Answer(c) (................ , ...) [1]

18 Factor completely.

(a) $a + b + at + bt$

Answer(a) .... [2]

(b) $x^2 – 2x – 24$

Answer(b) .... [2]

19 The diagram shows a solid hemisphere.
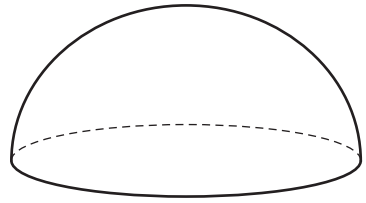
The **total** surface area of this hemisphere is $243\,\pi$.
The volume of the hemisphere is $k\,\pi$.
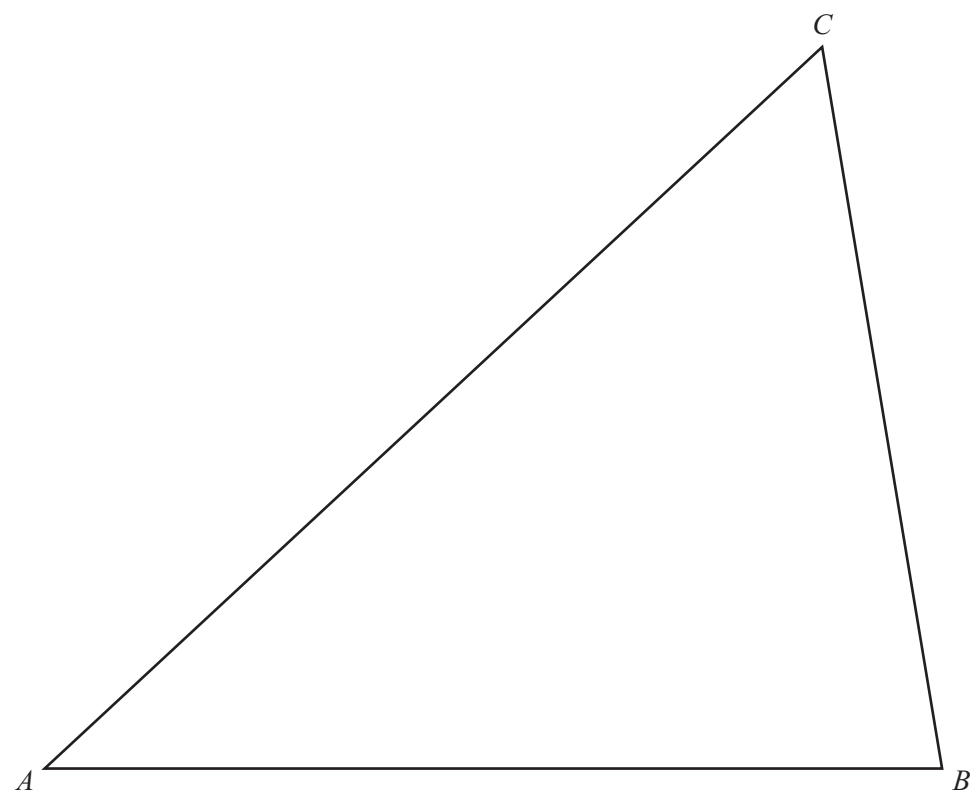
Find the value of k.

Answer k = ... [4]

20 **(a)** Convert $72\,$km/h into meters per second.

Answer(a) .... m/s [2]

(b) A train of length $120\,$m is traveling at $72\,$km/h.
It passes under a bridge of width $20\,$m.

Find the time taken for the whole train to pass under the bridge.
Give your answer in seconds.

Answer(b) .... s [2]

[Turn over

21

C

A   B

In this question, use a straight edge and compass only and show your construction arcs.
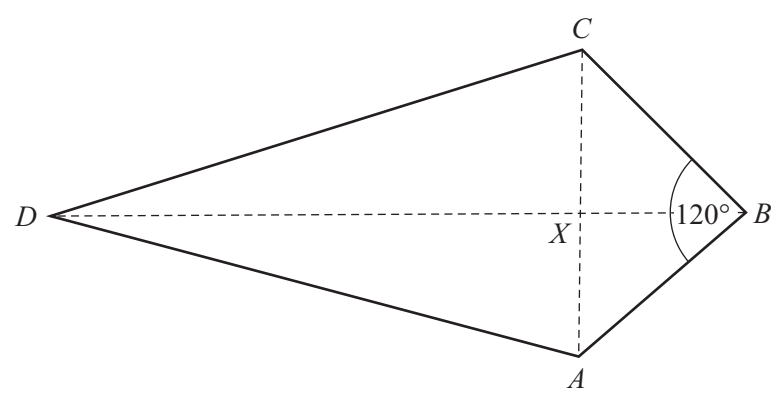
Construct accurately

(a) the bisector of angle *B*, [2]

(b) the perpendicular bisector of *BC*. [2]

22

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SCALE

ABCD is a kite.
The diagonals *AC* and *BD* intersect at *X*.
AC = 12 cm, *BD* = 25 cm and angle *ABC* = 120°.

(a) Work out the area of the kite.

Answer(a) .... cm^2 [2]

(b) Find the length of *BX* in simplest form.

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

Question 23 is printed on the next page.

[Turn over

23 There are 11 cars in a car park.
4 of the cars are red.

(a) Alex chooses two cars at random.

Find the probability that one car is red and one car is not red.

Answer(a) .... [3]

(b) Beth chooses cars at random from the 11 cars until a red car is chosen.

Find the probability that her 3rd choice is the first red car chosen.

Answer(b) .... [2]