Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTER NUMBER						CANDIDATE NUMBER				

MATHEMATICS (US)   **0444/23**

Paper 2 (Extended)   **October/November 2019**

                                                                              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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, 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.

Cambridge Assessment
International Education

[Turn over

2

Formula List

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

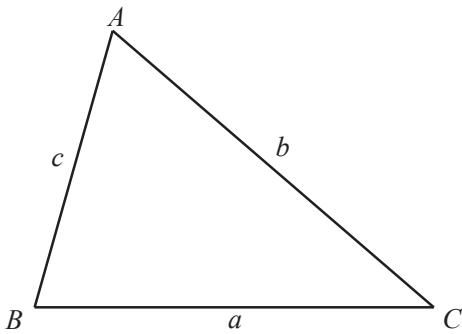Lateral surface area, A, of cylinder of radius r, height h. $\qquad A = 2\pi rh$

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 Write down the temperature that is $7\,°C$ below $-3\,°C$.

.... °C [1]

2 Work out $\quad 32^{\frac{1}{5}}$.

.... [1]

3 Here is a list of numbers.

87	77	57	47	27

From this list, write down

(a) a cube number,

.... [1]

(b) a prime number.

.... [1]

4 Find the greatest common factor (GCF) of 84 and 105.

.... [2]

4

5   **(a)**   Write 1075.98 correct to the nearest hundred.

.... [1]

(b)   Write 0.0018 in scientific notation.

.... [1]

6   Expand and simplify $(x+3)(x+5)$.

.... [2]

7   Find the slope of the line that is perpendicular to the line $2y = 3 + 5x$.

.... [2]

8   When $\sin x° = \dfrac{\sqrt{3}}{2}$, find

(a)   the acute angle $x°$,

.... [1]

(b)   the obtuse angle $x°$.

.... [1]

9 A cuboid measures 5 cm by 7 cm by 9 cm.
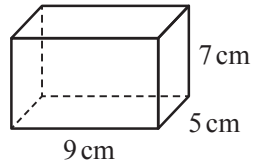
NOT TO
SCALE

Work out the surface area of this cuboid.

.... cm^2 [3]

10 $5n$ is the mean of the three numbers 391, n and $n - 1$.

Find the value of n.

$n =$ .... [3]

11 Factor.

(a) $12x + 15$

.... [1]

(b) $xy - 2x + 3y - 6$

.... [2]

12 A is the point $(-3, -1)$ and B is the point $(9, 4)$.

Find the length of AB.

.... [3]

13 A straight line joins the points $(3k, 6)$ and $(k, -5)$.
The line has a slope of 2.

Find the value of k.

$k =$ .... [3]

14 Find the nth term of each sequence.

(a) $\dfrac{1}{2}, \ \dfrac{1}{4}, \ \dfrac{1}{6}, \ \dfrac{1}{8}, \ \dfrac{1}{10}, \ ...$

.... [1]

(b) $1, \ 5, \ 25, \ 125, \ 625, \ ...$

.... [2]

15 Work out $\dfrac{2}{3} + \dfrac{1}{4} \times \dfrac{2}{3}$.

Give your answer as a fraction in its simplest form.

.... [4]

16 (a) The volume of a cube is $8 \, \text{m}^3$.

Work out the length of a side of the cube.
Give your answer in centimeters.

.... cm [2]

(b) Work out $(5.1 \times 10^{50}) - (5.1 \times 10^{49})$.
Give your answer in scientific notation.

.... [2]

   [Turn over

17 Ten athletes compete in both the 100 meter race and the triple jump.
Their results are shown in the scatter diagram.
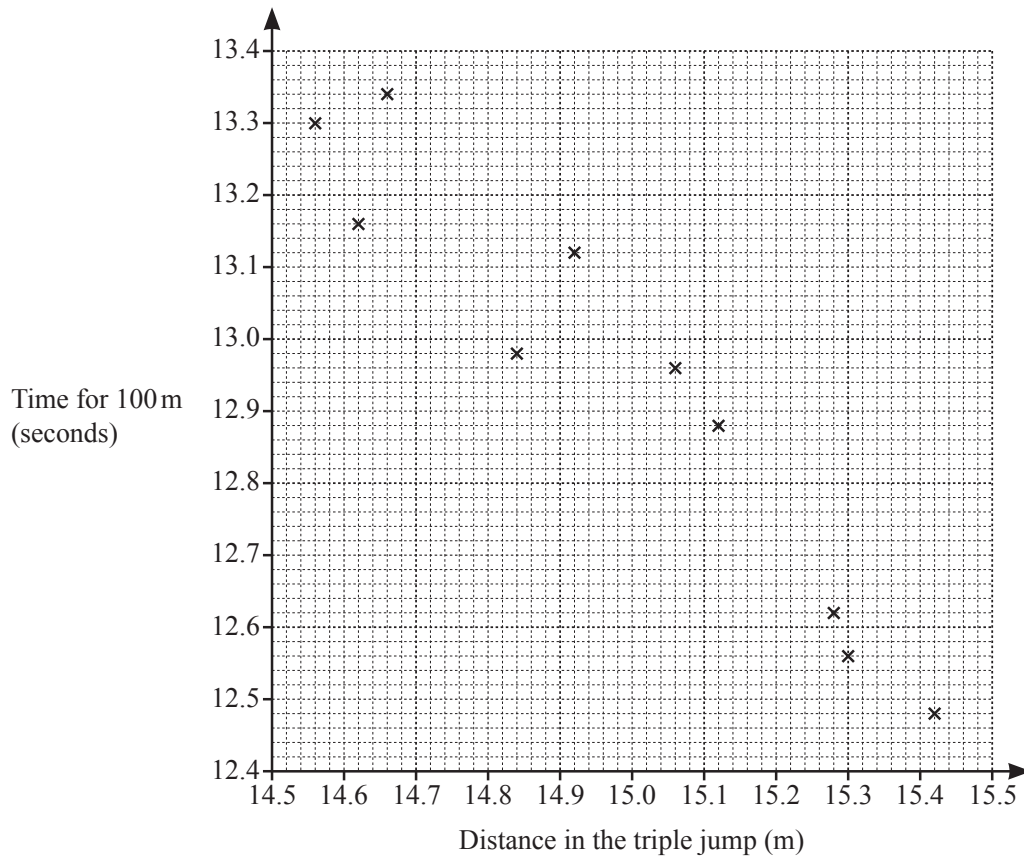
(a) One of these athletes jumps 15.12 m in the triple jump.

Write down his time for the 100 meter race.

.... s [1]

(b) The values for two other athletes are shown in the table.

Distance in the triple jump (m)	14.74	15.2
Time for 100 m (seconds)	13.2	12.76

On the scatter diagram, plot these points. [1]

(c) On the scatter diagram, draw a line of best fit. [1]

(d) What type of correlation is shown in the scatter diagram?

.... [1]

18
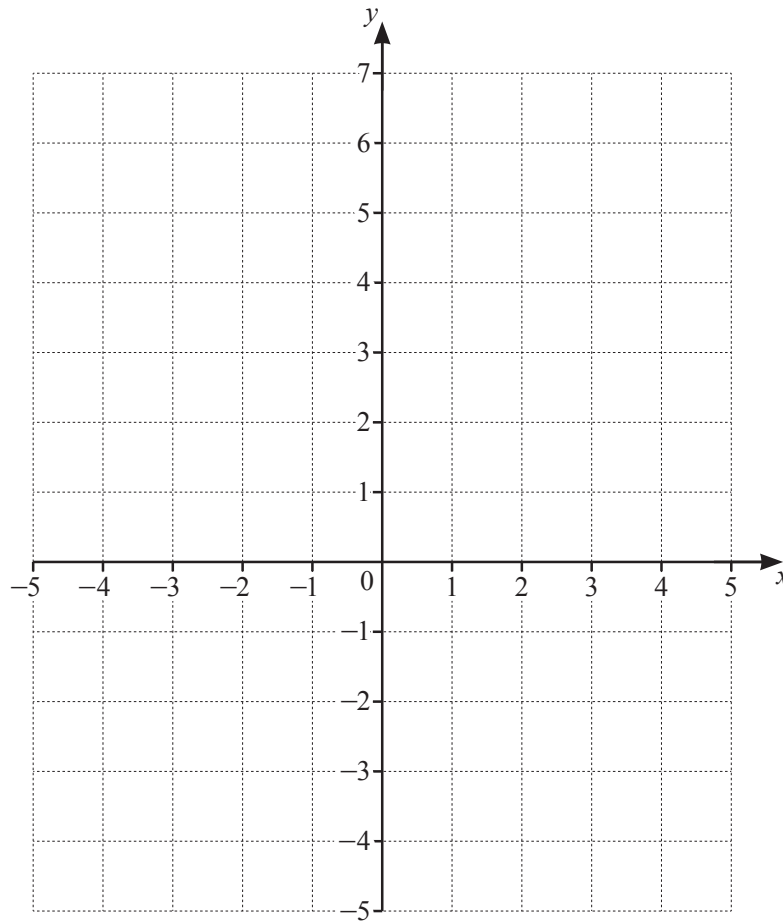
By shading the **unwanted** regions on the grid, draw and label the region R that satisfies the following inequalities.

$$-2 < x \leqslant 3 \qquad\qquad y \leqslant x + 3$$

[4]

19 (a) Solve.
$$\sqrt[4]{x} + 1 = 3$$

$x =$ .... [2]

(b) Write $y^2 + 6y + 1$ in the form $(y + a)^2 + b$.

.... [2]

20 t varies inversely as x^2.
When $x = 2$, $t = 50$.

(a) Find t in terms of x.

$t =$ .... [2]

(b) When $t = 2$, find the positive value of x.

$x =$ .... [2]

21 (a) The time taken, $T(n)$ minutes, to complete n questions in a test is given by

$T(n) = 5 + 3n$.

In the test there are 4 questions and each person taking the test completes at least 2 questions.

Find the domain and range of $T(n)$.

Domain = { .... }

Range = { .... } [2]

(b) $\text{f}(x) = x^2$ $\text{g}(x) = \dfrac{x^2}{3}$

Describe fully the **single** transformation that maps the graph of $y = \text{f}(x)$ onto the graph of $y = \text{g}(x)$.

....

.... [3]

22 A container is made from a cylinder and a cone, each of radius 5 cm.
  The height of the cylinder is 12 cm and the height of the cone is 6 cm.

6 cm

12 cm

NOT TO
SCALE

←5 cm→
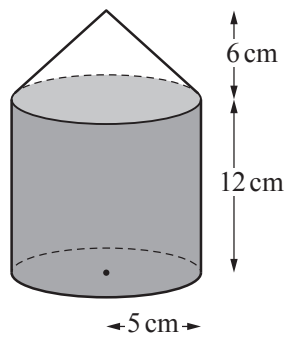
The cylinder is filled completely with water.
The container is turned upside down as shown below.

NOT TO
SCALE

d
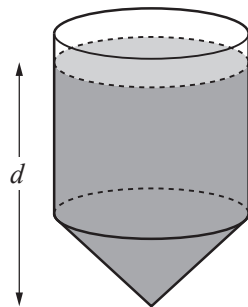
Find the exact depth, *d*, of the water.

d = ... cm [5]

Question 23 is printed on the next page.

23 The time, *t* minutes, it takes each of 50 students to travel to school is recorded.
The table shows the results.

Time (*t* minutes)	$0 < t \leqslant 10$	$10 < t \leqslant 15$	$15 < t \leqslant 20$	$20 < t \leqslant 40$
Frequency	7	19	16	8

(a) Write down the modal class.

.... $< t \leqslant$ .... min [1]

(b) On the grid, complete the histogram to show the information in the table.

[3]