Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTER NUMBER						CANDIDATE NUMBER				

MATHEMATICS (US) **0444/23**

Paper 2 (Extended) **October/November 2020**

1 hour 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, center number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.
- You may use tracing paper.
- You must show all necessary work clearly.
- All answers should be given in their simplest form.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in parentheses [ ].

This document has **12** pages. Blank pages are indicated.

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Formula List

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

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

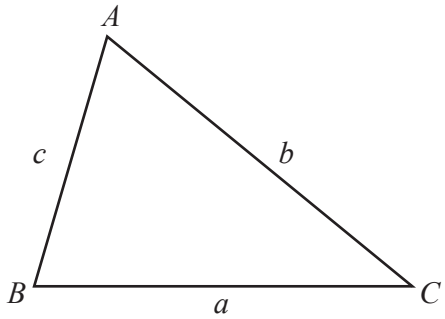
Lateral surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

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

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

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

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

1 Write down the cube number that is greater than 50 but less than 100.

..... [1]

2 Find $\sqrt{0.25}$.

..... [1]

3 In triangle ABC, $BC = 7.6\,\text{cm}$ and $AC = 6.2\,\text{cm}$.

Using a compass and ruler only, construct triangle ABC.
Leave in your construction arcs.
The side AB has been drawn for you.

[2]

4 Simplify.

$a^2 \div a^6$

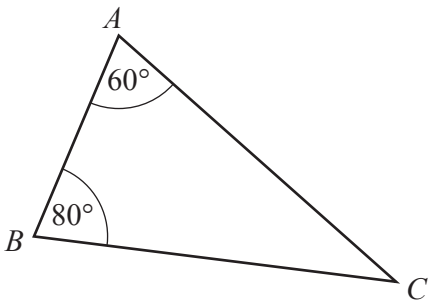
..... [1]

5 Megan changes 20 pounds (£) into dollars when the exchange rate is £1 = $1.20 .

Work out how many dollars she receives.

$ ..... [1]

6



NOT TO SCALE

The diagram shows triangle *ABC*.
The triangle is reflected in the line *BC* to give a quadrilateral *ABDC*.

(a) Write down the mathematical name of the quadrilateral *ABDC*.

..... [1]

(b) Find angle *ACD*.

Angle *ACD* = ... [2]

7 Change 457 000 cm^2 into m^2.

.....m^2 [1]

8 $\left(2\sqrt{2}+3\right)^2 = a\sqrt{2}+b$

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [2]

9 Work out $1\frac{1}{7} \times 2\frac{1}{10}$.
Give your answer as a mixed number in its simplest form.

..... [3]

10 Solve the system of linear equations.
You must show all your working.

$$3x - 8y = 22$$
$$x + 4y = 4$$

$x =$ .....

$y =$ ..... [3]

[Turn over

11 A bag contains 7 red disks and 5 green disks.

(a) Helen takes one disk at random, records the color, and replaces it in the bag. She does this 120 times.

Find how many times she expects to take a green disk.

..... [2]

(b) Helen adds 9 red disks and some green disks to the disks already in the bag. The probability of taking a red disk is now $\frac{2}{3}$.

Find the number of green disks that Helen added to the bag.

..... [2]

12 A straight line, l, has equation $y = 5x + 12$.

(a) Write down the slope of line l.

..... [1]

(b) Find the coordinates of the point where line l crosses the x-axis.

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

(c) A line perpendicular to line l has slope k.

Find the value of k.

$k =$ ..... [1]

13 Brad goes to bed at 21 25.
He is in bed until 07 08 the next day.

Work out the length of time that Brad is in bed.

..... h ..... min [1]

14 $N = 2^4 \times 3 \times 7^5$

$PN = K$, where P is an integer and K is a square number.

Find the smallest value of P.

$P =$ ..... [2]

15 $m = 2p + \sqrt{\frac{x}{y}}$

Solve for x.

$x =$ ..... [3]

16 A paperweight has height 3 cm and volume 27 cm^3.
A mathematically similar paperweight has height 4 cm.

Calculate the volume of this paperweight.

..... cm^3 [3]

17 Adil and Brian are paid the same wage.
Adil is given a 10% pay decrease and his new wage is $180.
Brian is given a 10% pay increase.

Work out Brian's new wage.

$ ..... [3]

18 **(a)** Simplify. $(4xy^2)^3$

..... [2]

(b) $25 = 125^k$

Find the value of k.

$k =$ ..... [1]

19 Robert makes model cars.
The cost, C(n), in dollars, of making n cars is given by the function $C(n) = 20 + 15n$.

(a) In one week, he makes at least 1 car and at most 5 cars.

Write down the domain and range of C(n).

Domain = ...

Range = ... [2]

(b) By selling n cars, Robert receives \$22n.

Find the smallest number of cars he must sell to make a profit.

..... [3]

20 Factor.

$3x + 8y - 6ax - 16ay$

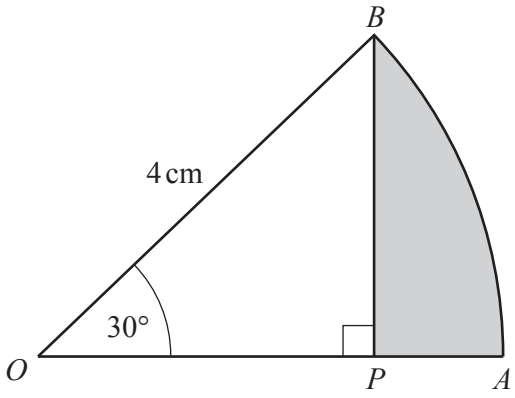
..... [2]

21 y varies inversely as the square root of x.
When $x = 25$, $y = 7$.

Find y in terms of x.

$y =$ ..... [2]

22



NOT TO SCALE

OAB is the sector of a circle, center O.
$OB = 4$ cm and angle $AOB = 30°$.
BP is perpendicular to OA.

(a) $AP = a + b\sqrt{3}$

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [3]

(b) The area of the shaded region is $c\pi + d\sqrt{3}$.

Find the value of c and the value of d.

$c =$ .....

$d =$ ..... [3]

23 The table shows information about the times, t seconds, taken by each of 100 students to solve a puzzle.

Time (t seconds)	$0 < t \leqslant 20$	$20 < t \leqslant 30$	$30 < t \leqslant 60$
Frequency	20	30	50

(a) Calculate an estimate of the mean time.

..... s [4]

(b) Emmanuel draws a histogram to show this information.
The table shows the heights, in cm, of some of the bars for this histogram.

Complete the table.

Time (t seconds)	$0 < t \leqslant 20$	$20 < t \leqslant 30$	$30 < t \leqslant 60$
Height of bar (cm)	3		

[3]

Questions 24 and 25 are printed on the next page.

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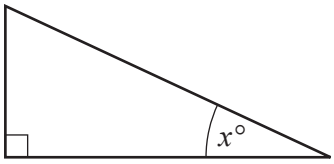
24 Simplify.

$$\frac{x^2-25}{x^2-17x+60}$$

..... [4]

25



NOT TO SCALE

$$\sin x^\circ = \frac{3}{5}$$

(a) Find the value of $\cos x^\circ$.

..... [2]

(b) Use your answer to **part (a)** to find the value of $\cos(180-x)^\circ$.

..... [1]