



# Cambridge IGCSE™

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**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.

## Formula List

For the equation

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Lateral surface area,  $A$ , of cylinder of radius  $r$ , height  $h$ .

$$A = 2\pi rh$$

Lateral surface area,  $A$ , of cone of radius  $r$ , sloping edge  $l$ .

$$A = \pi rl$$

Surface area,  $A$ , of sphere of radius  $r$ .

$$A = 4\pi r^2$$

Volume,  $V$ , of pyramid, base area  $A$ , height  $h$ .

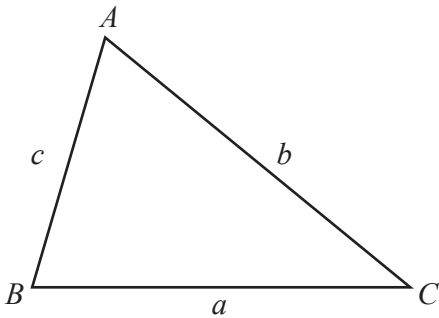
$$V = \frac{1}{3}Ah$$

Volume,  $V$ , of cone of radius  $r$ , height  $h$ .

$$V = \frac{1}{3}\pi r^2 h$$

Volume,  $V$ , of sphere of radius  $r$ .

$$V = \frac{4}{3}\pi r^3$$



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

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

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

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

..... [1]

- 2 Find  $\sqrt{0.25}$ .

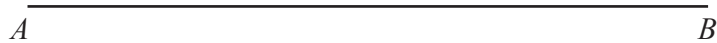
..... [1]

- 3 In triangle  $ABC$ ,  $BC = 7.6$  cm and  $AC = 6.2$  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.

$$a^2 \div a^6$$

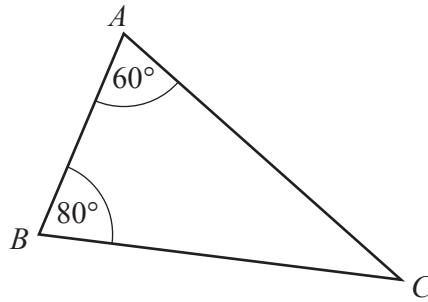
..... [1]

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

Work out how many dollars she receives.

\$ ..... [1]

6



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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  $457\,000\text{ cm}^2$  into  $\text{m}^2$ .

..... $\text{m}^2$  [1]

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

Find the value of  $a$  and the value of  $b$ .

$a = \dots\dots\dots$

$b = \dots\dots\dots$  [2]

9 Work out  $1\frac{1}{7} \times 2\frac{1}{10}$ .

Give your answer as a mixed number in its simplest form.

$\dots\dots\dots$  [3]

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

$$\begin{aligned} 3x - 8y &= 22 \\ x + 4y &= 4 \end{aligned}$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$  [3]

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  $27 \text{ cm}^3$ .  
 A mathematically similar paperweight has height 4 cm.

Calculate the volume of this paperweight.

.....  $\text{cm}^3$  [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.

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

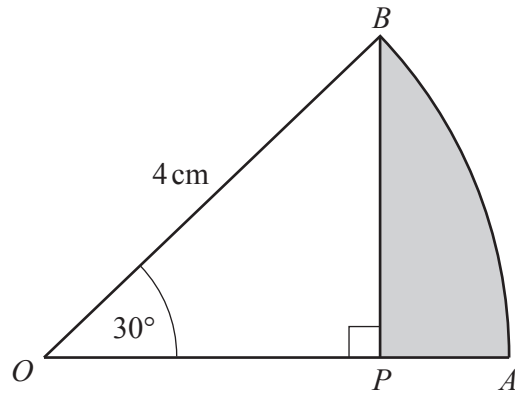
..... [2]

21  $y$  varies inversely as the square root of  $x$ .

When  $x = 25$ ,  $y = 7$ .

Find  $y$  in terms of  $x$ .

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



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

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

Find the value of  $a$  and the value of  $b$ .

$a = \dots\dots\dots$

$b = \dots\dots\dots$  [3]

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

Find the value of  $c$  and the value of  $d$ .

$c = \dots\dots\dots$

$d = \dots\dots\dots$  [3]

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

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

[3]

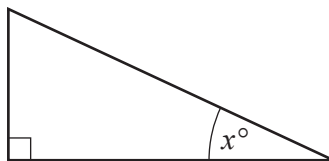
**Questions 24 and 25 are printed on the next page.**

24 Simplify.

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

..... [4]

25



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

(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]

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