



# Cambridge IGCSE™

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**MATHEMATICS (US)**

**0444/23**

Paper 2 (Extended)

**October/November 2021**

**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.



## 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  $h$ .  $A = 2\pi rh$

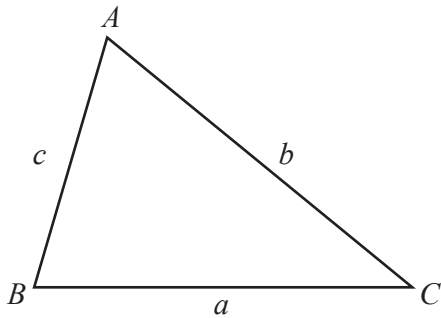
Lateral surface area,  $A$ , of cone of radius  $r$ , sloping edge  $l$ .  $A = \pi rl$

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



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

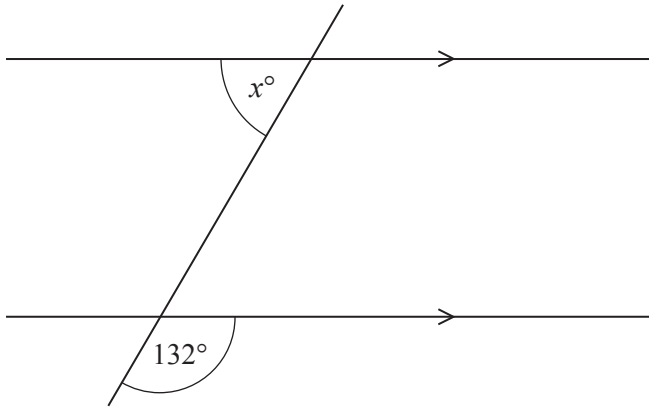
$$a^2 = b^2 + c^2 - 2bc \cos A$$

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

1 Write 25 g as a percentage of 125 g.

..... % [1]

2



NOT TO SCALE

The diagram shows two parallel lines intersecting a straight line.

Find the value of  $x$ .

$x =$  ..... [2]

3

- 11    13    15    17    19

From this list, write down the number that is both a prime number and a factor of 78.

..... [1]

4 (a)    =    ≠    >    <

Put a ring around each of the symbols that make this statement correct.

0.5 ..... 5% [1]

(b) Insert one pair of parentheses to make this statement correct.

$7 - 3 - 1 + 2 = 7$  [1]

- 5 Nina changes 350 euros into dollars when the exchange rate is 1 euro = \$1.10 .

Work out the amount Nina receives.

\$ ..... [1]

- 6 Marek buys a computer for \$400.  
He sells it at a loss of 15%.

Work out the selling price of this computer.

\$ ..... [2]

- 7 Simplify.

$$32g^{32} \div 4g^4$$

..... [2]

- 8 Beatrice walks 8 km at a speed of 4 km/h and then 9 km at a speed of 3 km/h.

Work out Beatrice's average speed for the whole journey.

..... km/h [3]

9 Simplify  $\sqrt{50}$ .

..... [1]

10 These are the first four terms of a sequence.

3    -1    -5    -9

(a) Find the next term in this sequence.

..... [1]

(b) Find the  $n$ th term.

..... [2]

11  $P = M(g^2 + h^2)$

(a) Find the value of  $P$  when  $M = 100$ ,  $g = 3$ , and  $h = 2$ .

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

(b) Rearrange the formula to write  $g$  in terms of  $P$ ,  $M$ , and  $h$ .

$g =$  ..... [3]

- 12 Work out  $\frac{11}{12} + \frac{3}{4}$ .  
Give your answer as a mixed number in its simplest form.

..... [3]

- 13 Work out  $0.04^2$ .  
Give your answer in scientific notation.

..... [2]

14 (a) Evaluate  $3^4$ .

..... [1]

(b)  $(4 + \sqrt{5})^2 = p + q\sqrt{5}$

Find the value of  $p$  and the value of  $q$ .

$p =$  .....

$q =$  ..... [2]

15 The cost of a train journey is increased by 20% to a new cost of \$84.

Work out the original cost of the train journey.

\$ ..... [2]

16 Jo and Mo share \$26.

Jo receives \$10 more than Mo.

Find the ratio Jo's money : Mo's money.

Give your answer in its simplest form.

..... : ..... [3]

8

17 Each interior angle of a regular polygon is  $177^\circ$ .

Calculate the number of sides of this polygon.

..... [2]

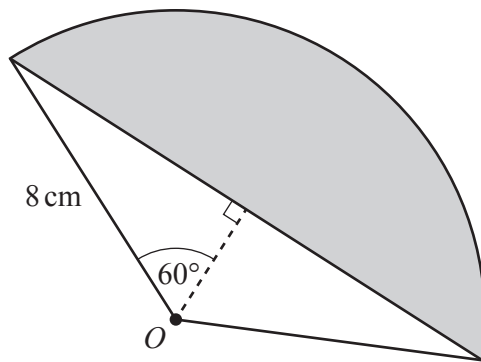
18 Find the equation of the straight line that passes through the points  $(2, -2)$  and  $(3, 10)$ .

Give your answer in the form  $y = mx + b$ .

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



19

NOT TO  
SCALE

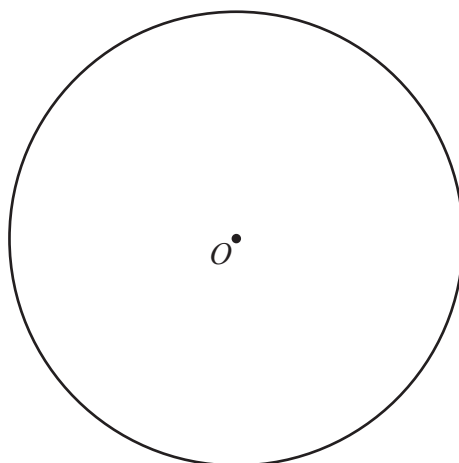
The diagram shows a sector of a circle, center  $O$ , radius 8 cm.  
The perimeter of the shaded segment is  $(a\sqrt{3} + b\pi)$  cm .

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

$a = \dots\dots\dots$

$b = \dots\dots\dots$  [4]

20



$P$

The diagram shows a circle, center  $O$ .

**Using compass and straight edge only**, construct a tangent line from the point  $P$  to the circle. [3]

21 Simplify fully.

$$(243y^{10})^{\frac{3}{5}}$$

..... [2]

22  $x$  varies inversely as the square root of  $u$ .  
When  $u = 9$ ,  $x = 2$ .

Find  $u$  when  $x = 12$ .

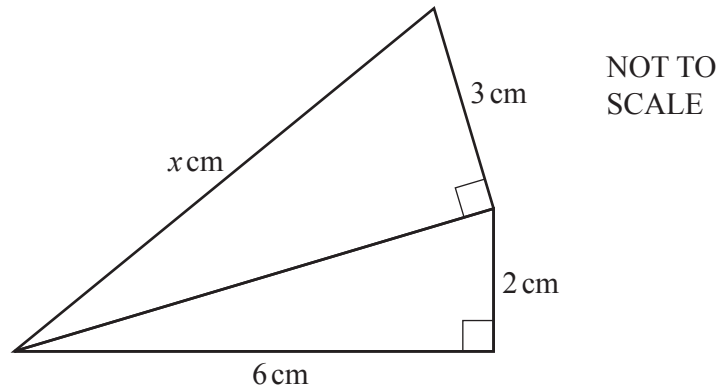
$u =$  ..... [3]

23 Find the least common multiple of  $6x^2$  and  $9x^3$ .

..... [2]

11

24 (a)



Work out the value of  $x$ .

$$x = \dots\dots\dots [3]$$

- (b) A vertical pole of height 12 m stands on horizontal ground.  
The angle of elevation of the top of the pole from a point  $P$  on the ground is  $30^\circ$ .

Work out the distance from  $P$  to the foot of the pole.  
Give your answer in radical form.

$$\dots\dots\dots \text{ m } [3]$$

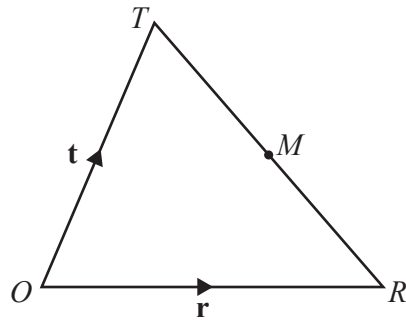
25 Simplify.

$$\frac{3x^2 - 18x}{ax - 6a + 2cx - 12c}$$

$$\dots\dots\dots [4]$$

**Questions 26 and 27 are printed on the next page.**

26



NOT TO SCALE

$ORT$  is a triangle and  $M$  is the midpoint of  $TR$ .  
 $O$  is the origin,  $\overrightarrow{OR} = \mathbf{r}$  and  $\overrightarrow{OT} = \mathbf{t}$ .

Find, in terms of  $\mathbf{r}$  and  $\mathbf{t}$ , in its simplest form,

(a)  $\overrightarrow{TR}$ ,

..... [1]

(b) the position vector of  $M$ .

..... [2]

27 Solve  $x^{-\frac{1}{3}} = 2$ .

$x =$  ..... [2]

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