Cambridge IGCSE[™]

CANDIDATE NAME					
CENTER NUMBER			CANDIDATE NUMBER		

MATHEMATICS (US)

0444/21

Paper 2 (Extended)

May/June 2022

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.

$$A = \pi r l$$

Surface area, A, of sphere of radius r.

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

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

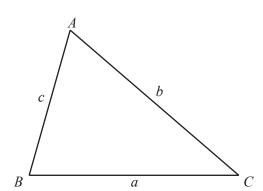
$$V = \frac{1}{3}Ah$$

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

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

Volume, V, of sphere of radius r.

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



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

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

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

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1	write down a prime number between 30 and 40.		
2	Work out $3^4 - 2^3$.		[1]
			[1]
3	Jason starts a run at 10.05 am and finishes at 1.02 pm.		
	Work out the time Jason takes to complete the run.	h min	[1]
4	Kirsty changes \$384 into pounds (£) when £1 = $$1.20$.		
	Work out the amount Kirsty receives.	£	[2]
5	Write 180 as a product of its prime factors.		
			[2]

6 Work out
$$\frac{3}{7} - \frac{2}{21}$$
.

Give your answer as a fraction in its simplest form.

$$s = \frac{1}{2}at^2$$

(a) Work out the value of s when a = 0.9 and t = 4.

$$s = \dots [1]$$

(b) Solve for *t*.

$$t = \dots [2]$$

8 Factor completely.

$$14xy - 7y^2$$

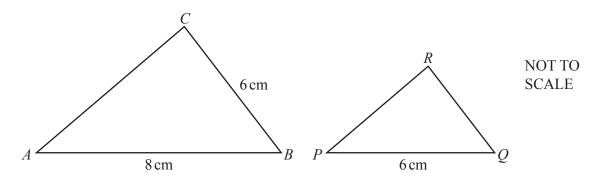
5

9		22,	17,	12,	7,	2,			
	(a)	Find the ne	xt term of t	he seque	nce.				
									[1]
	(b)	Find the <i>n</i> tl	n term of th	e sequen	ce.				
									[2]
10	Tho	interior on a	los of a non	tagan ar	o in the re	utio 1	: 5 : 5 : 7 : 9		
10		the size of			e iii tiie ia	1110 4	. 3 . 3 . 7 . 9	•	
	1 1110	i tile size of	ine largest o	iligic.					
									[3]
									[-]
11	Woı	k out 2×10^{-1}	$0^{100} - 2 \times 10^{100}$) ⁹⁸ , givi	ng your a	nswer	in scientific no	otation.	
									[2]

12	A train passes through a station at a speed of 72 km/h. The length of the station is 100 m. The train takes 7 seconds to completely pass through the station.
	Work out the length of the train.
13	
14	$4^{x} = \frac{1}{64}$ Find the value of x.
	$x = \dots $ [1]

7

15



Triangle ABC is mathematically similar to triangle PQR.

(a) Work out QR.

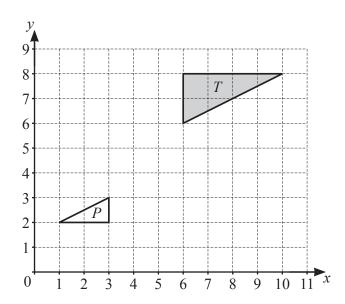
QR =	 cm	[2]
2	 	

(b) The two triangles are the cross-sections of two mathematically similar prisms. The surface area of the larger prism is 640 cm².

Work out the surface area of the smaller prism.

..... cm² [2]

16

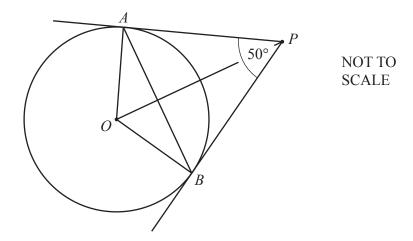


Describe fully the **single** transformation that maps triangle *T* onto triangle *P*.

17 Find the radius of a sphere of volume $\frac{9}{2}\pi \text{ cm}^3$.

cn	ı [3]
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18



The diagram shows a circle, center O. PA and PB are tangents to the circle at the points A and B. Angle $APB = 50^{\circ}$.

(a) Write down the mathematical name for triangle *PAB*.

E 4 7

(b) Work out.

(i) Angle *PAB*

Angle
$$PAB = \dots [1]$$

(ii) Angle *OAB*

Angle
$$OAB = \dots$$
 [1]

(c) Write down a pair of triangles that are congruent.

and [1

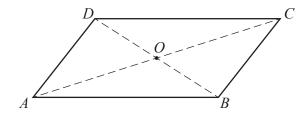
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19	(a)	A vertex of a s	guare-based i	pyramid is	vertically	above the	center of t	the base
1/	,	11 VOITON OI U D	quaic basea i	Dyrumina 15	v CI ti Cuii y	uoove me	CCIIICI OI I	me ouse

Write down the number of planes of symmetry for this pyramid.

																																																											ı	Γ	1		
•	٠	۰	٠	٠	 •	•	٠	٠	•	•	۰	٠	•	۰	٠	•	۰	٠	•	•	۰	٠	•	•	۰	٠	•	۰	٠	•	•	۰	٠	•	•	۰	٠	•	•	۰	٠	•	۰	٠	•	•	•	۰	٠	•	•	٠	•	•	۰	٠	•		ı		4	_	

(b)



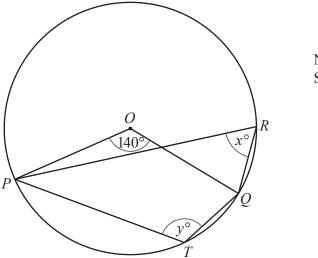
NOT TO SCALE

ABCD is a parallelogram and its diagonals meet at O.

Describe fully the **single** transformation that maps the parallelogram onto itself but with the points *A*, *B*, *C* and *D* in different positions.

Г	

20



NOT TO SCALE

P, T, Q and R are points on a circle, center O. Angle $POQ = 140^{\circ}$.

(a) Work out the value of x and give a geometrical reason for your answer.

x =	 because

(b) Work out the value of y.

$$y = \dots [1]$$

21 Solve.

$$\frac{t}{3t-2} = \frac{3}{5}$$

$$t =$$
 [3]

22 Solve.

$$2\sqrt{x} + 1 = 7 - \sqrt{x}$$

$$x = \dots [2]$$

23 Factor completely.

$$1 - q - a + aq$$

24 Simplify fully $(216y^{216})$	$\frac{2}{3}$	
---	---------------	--

	[2]
--	-----

25
$$x^2 + 8x + 10 = (x+p)^2 + q$$

(a) Find the value of p and the value of q.

(b) Solve.
$$x^2 + 8x + 10 = 30$$

$$x =$$
 or $x =$ [2]

26 w varies directly as the square root of y. y varies inversely as x. When x = 4, y = 16 and w = 8.

Find w in terms of x.

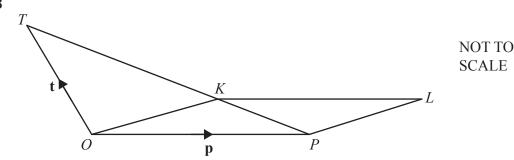
$$w = \dots$$
 [3]

27 Simplify.

$$\frac{x-3}{x^2-2x-3}$$

.....[2]

28



The diagram shows a triangle *OPT* and a parallelogram *OPLK*. The position vector of P is \mathbf{p} and the position vector of T is \mathbf{t} . K is on PT so that PK : KT = 1 : 2.

Find in terms of **p** and **t**,

(a) \overrightarrow{PK} ,

$$\overrightarrow{PK} = \dots$$
 [2]

(b) the position vector of L, giving your answer in its simplest form.

.....[ː

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