

	Cambridge <b>O Level</b>	Cambridge International Examinations Cambridge Ordinary Level	
	CANDIDATE NAME		
v	CENTRE NUMBER		NUMBER
́н	MATHEMATIC	CS (SYLLABUS D)	4024/12
2 4 7	Paper 1		October/November 2015 2 hours
4 0	Candidates an	swer on the Question Paper.	
7 ω	Additional Mat	erials: Geometrical instruments	
ω			

## READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.Write in dark blue or black pen.You may use a 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.

If working is needed for any question it must be shown in the space below that question. Omission of essential working will result in loss of marks.

### ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

The number of marks is given in brackets [] at the end of each question or part question. The total of the marks for this paper is 80.

This document consists of 20 printed pages.





## **ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER**

1 (a) Evaluate  $0.03 \times 0.3$ .

**(b)** Evaluate 5 - 2(3 - 1.4).

*Answer* ......[1]

2 (a) A trader buys 7 items for \$4.10 each and 5 items for \$6.40 each. He sells all of them for \$10 each.

Calculate his profit.

(b) Find the simple interest on \$450 for 5 years at 4% per annum.

Answer \$ ......[1]

3 *y* varies directly as the square root of x.

Given that y = 18 when x = 9, find y when x = 4.

4

(a) Find  $f(-\frac{2}{5})$ .

(b) Find  $f^{-1}(x)$ .

f(x) = 1 + 4x



5 (a) Write the number 0.050 462 correct to 3 significant figures.

(b) By writing each number correct to 1 significant figure, estimate the value of

 $\frac{8.94 \times 0.201}{28.8}.$ 

6 Evaluate  $3\begin{pmatrix} 0 & 3 \\ -3 & 1 \end{pmatrix} - 2\begin{pmatrix} 1 & 5 \\ -4 & -1 \end{pmatrix}$ .

Answer

[2]



7 (a) In the diagram, seven small triangles are shaded.

Shade two more small triangles, so that the diagram will then have rotational symmetry of order 3.



[1]

[1]

(b) In the diagram, ten small hexagons are shaded.

Shade one more small hexagon, so that the diagram will then have exactly one line of symmetry.



8 *a*, *b*, *c*, *d* and *e* are five numbers, such that

$$d < a < c$$
$$a < e < c$$
$$a < b < e$$

Arrange these numbers in order, starting with the smallest.



- 9 At an athletics event, Dave and Ed each threw a javelin. Dave threw 60m, correct to the nearest 10 metres. Ed threw 61m, correct to the nearest metre.
  - (a) Write down the lower bound for the distance thrown by Dave.

Answer ...... m [1]

(b) Calculate the greatest possible difference between the distance thrown by Dave and the distance thrown by Ed.

Answer ..... m [1]

10 (a) Express the number 0.000 004 5 in standard form.

**(b)** 

 $p = 6 \times 10^8$   $q = 4 \times 10^7$ 

Expressing each answer in standard form, find

(i)  $p \times q$ ,

(ii) p - q.



			7	Study The Smarter W
11	(a)	Evaluate $\left(\frac{3}{2}\right)^0$ .		·
	(b)	Evaluate $\left(\frac{3}{2}\right)^{-1}$ .		Answer[1]
	(c)	Simplify $(9x^3)^2$ .		<i>Answer</i> [1]
				Answer[1]

12 (a) Express 198 as the product of its prime factors.

**(b)**  $M = 2^2 \times 3 \times 5^2$   $N = 2^3 \times 3^2 \times 7$ 

(i) Find the largest number that divides exactly into M and N.

*Answer* ......[1]

(ii) Find the smallest value of k, such that  $M \times k$  is a cube number.





These two quadrilaterals are congruent. The lengths are in millimetres.

Find the values of *x*, *y* and *z*.

Answer	<i>x</i> =
	<i>y</i> =
	<i>z</i> =[3]

- 14 Meeraa went on a journey from *P* to *Q* to *R*. The first part of the journey, from *P* to *Q*, took 4 hours to travel 80km.
  - (a) Find the average speed for the journey from P to Q.

*Answer* ..... km/h [1]

(b) In the second part of the journey, from Q to R, she travelled 45 km. Her average speed for both parts of the whole journey from P to Q to R was 25 km/h.

Find the time taken for the second part of the journey, from Q to R.

Answer ..... hour(s) [2]



15 (a) On the Venn diagram, shade the set  $B \cap (A \cup C)'$ .



9

[1]

- **(b)**  $\mathscr{C} = \{ 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 \}$ 
  - $W = \{ x : x \text{ is a multiple of } 2 \}$
  - $H = \{ x : x \text{ is a multiple of } 3 \}$
  - (i) Find  $n(W \cup H)$ .

*Answer* ......[1]

(ii) List the members of  $W \cap H'$ .



# 16 (a) Factorise

(i) 
$$4p^2 - 9q^2$$
,

(ii)  $2n^2 + 5n - 3$ .

**(b)** Express  $\frac{3}{4x} + \frac{2}{3y}$  as a single fraction.

*Answer* ......[1]





In the diagram, *A*, *B*, *C*, *D* and *E* lie on the circle, centre *O*. *AC* is a diameter. The tangent to the circle at *C* meets the line *AB* produced at *T*.

 $A\hat{C}B = 62^{\circ}$  and  $A\hat{C}D = 70^{\circ}$ .

(a) Find x.

Answer  $x = \dots [1]$ 

**(b)** Find *y*.

*Answer y* = ......[1]

(c) Find *z*.

Answer  $z = \dots [1]$ 





The sides of the triangle ABC are formed by the straight lines with equations

$$x = 3$$
,  $y = 6$ ,  $y = x + \frac{1}{2}$ .

(a) The region **inside** the triangle is defined by three inequalities.

Write down these three inequalities.

(b) The point (4, k), where k is an integer, lies inside the triangle.

Find the value of *k*.

Answer  $k = \dots$ [1]



**19** All the angles of a polygon are either 155° or 140°. There are twice as many angles of 155° as 140°.

Find the number of sides of the polygon.

*Answer* ......[3]





**20** The masses of 400 goats were measured. The results are shown in the cumulative frequency graph.



[1]

- **21** The diagram shows the positions of three ships A, B and C. It is drawn to a scale of 1 cm to 20 km.
  - (a) Find, by measurement, the bearing of C from A.

- (b) On the diagram construct the locus of points, inside triangle *ABC*, that are
- (i) equidistant from B and C, [1]
  - (ii) equidistant from *AB* and *BC*.
- (c) A ship D is
  - equidistant from *B* and *C*,

and

• equidistant from *AB* and *BC*.

Label the position of D on the diagram and find the actual distance of D from A.

Scale:1 cm to 20 km



*Answer DA* = ..... km [1]



- **22** *P* is the point (1, -3) and *Q* is the point (7, 2).
  - (a) Find the coordinates of the midpoint of PQ.

Answer ( ..... ) [1]

(b) Find the gradient of the line PQ.

- (c) The line, L, with equation 2x 5y = k, passes through the point Q.
  - (i) Find the value of k.

(ii) The line x + Ay = 3 is parallel to L.

Find the value of *A*.

Answer  $A = \dots [1]$ 



- 17
- **23** A fair 4-sided spinner is numbered 1, 2, 3 and 4.
  - (a) Anil spins it once.

He gets his score by doubling the number obtained.

Complete the table to show the probabilities of his scores.

Score	2	4	6	8
Probability				

[1]

- (b) Billie spins it twice. She gets her score by adding the numbers obtained.
  - (i) Complete the possibility diagram.

#### First spin

	+	1	2	3	4
a 1	1	2	3	4	5
Second	2	3	4	5	6
Spiii	3	4	5	6	7
	4				

[1]

(ii) Complete the table showing the probabilities for some of Billie's scores.

Score	> 2	>4	> 6	> 8
Probability	$\frac{15}{16}$			

[1]

(c) Find the probability that Billie scores more than Anil.



					1	8				Study The	e Smarter W
24	The The The	first term of a sequence following terms are fou first six terms are	is 13. nd by al	ternate	ely add	ling 4	and 6	to the prev	ious term.		
			13	17	23	27	33	37			
	(a)	Write down the next tw	o terms	of the	seque	nce.					
								Answer			[1]
	(b)	Write down the value of	of the ter	m tha	t is clo	sest to	999.				
								Answer			[1]
	(c)	Write down the differen	nce betw	veen th	ne valu	es of t	he 91	st and 93rd	terms.		
								Answer			[1]
	(d)	Find the 80th term.									
								Answer			[1]
	(e)	The <i>n</i> th term is 203.									
		Find <i>n</i> .									





The diagram shows the speed-time graph of car A.

(a) Find the acceleration of car A when t = 7.

*Answer* ..... m/s<sup>2</sup> [1]

(b) Find an expression, in terms of k, for the distance moved by car A between t = 0 and t = k, where k > 10.Give your answer in its simplest form.

Answer		m [2]
--------	--	-------

- (c) Car B travels at a constant speed of 12 m/s in the same direction as car A.
  - (i) On the diagram, sketch the speed-time graph of car *B*.
  - (ii) When t = 0, car *B* passes car *A*. When t = k, car *A* overtakes car *B*.

Find the value of *k*.

Answer  $k = \dots [1]$ 

### Question 26 is printed on the next page

[1]



**26** *A*, *B* and *C* are three triangles.

 $T_1, T_2$  and  $T_3$  are three transformations such that  $T_1(A) = B, T_2(A) = C$  and  $T_3(C) = B$ . The vertices of triangle A are (1, 0), (0, 1) and (1, 3).

The matrix that represents  $T_1$  is  $\begin{pmatrix} 2 & 2 \\ 0 & 1 \end{pmatrix}$ .

(a) Find  $\begin{pmatrix} 2 & 2 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 3 \end{pmatrix}$ .

Answer [2]

Answer [1]

(ii) The matrix that represents  $T_3$  is **M**.

**(b)** The matrix that represents  $T_2$  is  $\begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix}$ .

(i) Find the inverse of  $\begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix}$ .

Find M.

Answer

[2]

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