Maths paper essay

International General Certificate of Secondary Education *9202671358*

CAMBRIDGE INTERNATIONAL MATHEMATICS Paper 4 (Extended) 0607/04

October/November 2010 2 hours 15 minutes Candidates answer on the

Question Paper Additional Materials: Geometrical Instruments Graphics

Calculator 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. Do not use staples, paper clips, highlighters,

glue or correction fluid. You may use a pencil for any diagrams or graphs. DO

NOT WRITE IN ANY BARCODES. Answer all the questions.

Unless instructed otherwise, give your answers exactly or correct to three

significant figures as appropriate. Answers in degrees should be given to one

decimal place. For ? , use your calculator value. You must show all the

relevant working to gain full marks and you will be given marks for correct

methods, including sketches, even if your answer is incorrect. The number of

marks is given in brackets [ ] at the end of each question or part question.

The total number of marks for this paper is 120. For Examiner's Use This

document consists of 18 printed pages and 2 blank pages. IB10

11_0607_04/3RP © UCLES 2010 [Turn over 2 Formula List For the equation

$ax + bx + c = 0$ 2 x= _ b ± b2 _ 4ac 2a A = 2? rh A = ? rl A = 4? r2 V=

Curved surface area, A, of cylinder of radius r, height h. Curved surface area,

A, of cone of radius r, sloping edge l.

Curved surface area, A, of sphere of radius r. Volume, V, of pyramid, base

area A, height h. Volume, V, of cylinder of radius r, height h. Volume, V, of

cone of radius r, height h.

1 3 Ah V = ? r2h V= 1 3 4 3 ? r2h Volume, V, of sphere of radius r. V= ? r3 A

a b c = = sin A sin B sin C c b a2 = b2 + c2 – 2bc cos A Area = 1 2 bc sin A B

C © UCLES 2010 0607/04/O/N/10 3 Answer all the questions. 1 A train from

Picton to Christchurch leaves Picton at 13 00. The length of the journey is

340 km.

(a) The train arrives at Christchurch at 18 21. Show that the average speed is

63. 55 km/h, correct to 2 decimal places. For Examiner's Use [4] (b) One day

the weather is bad and the average speed of 63. 55 km/h is reduced by 15

%.

(i) Calculate the new average speed. Answer(b)(i) (ii) Calculate the new time

of arrival at Christchurch. Give your answer to the nearest minute. km/h [2]

Answer(b)(ii) [3] © UCLES 2010 0607/04/O/N/10 [Turn over 2 (a) (i) Find the

value of 27 ? 36. For Examiner's Use Answer(a)(i) (ii) Write your answer to

part (i) in standard form.

[1] Answer(a)(ii) (b) Find the value of [1] 1 (22) 3 , giving your answer in

standard form. Answer(b) (c) m5 = 2000. Find the value of m. [2] Answer(c)

(d) 5n = 2000.

Find the value of n. [1] Answer(d) [2] © UCLES 2010 0607/04/O/N/10 5 3 (a)

Solve the equation x2 + 2x – 4 = 0. Give your answers correct to 2 decimal

places. For Examiner's Use Answer(a) x = (b) Solve the inequality x2 + 2x –

4 Y 0. or x = [3] Answer(b) [2] © UCLES 2010 0607/04/O/N/10 [Turn over 6 4

5 yFor Examiner's Use 0 x 5 (a) On the diagram above, sketch the lines (i) x

+ y = 5, (ii) y = 1, (iii) y = 2x. (b) Write R in the region where x [0, y [1, y

[2x and x + y Y 5.

[1] [1] [1] [1] © UCLES 2010 0607/04/O/N/10 7 5 The numbers of passengers in 72 taxis arriving at a city centre were recorded. The table shows the results. Number of passengers Frequency (a) Find (i) the range, Answer(a)(i) (ii) the mode, Answer(a)(ii) (iii) the median, Answer(a)(iii) (iv) the mean, Answer(a)(iv) (v) the upper quartile. Answer(a)(v) (b) The probability that a taxi, chosen at random, had n passengers is 3 . 8For Examiner's Use 1 7 2 27 3 19 4 8 5 9 6 2 [1] [1] [1] [1] [1] Find the value of n.

Answer(b) (c) (i) A taxi was chosen at random. Calculate the probability that it had 5 passengers. Give your answer as a fraction, in its lowest terms. [2] Answer(c)(i) [2] (ii) Later, when 360 taxis have arrived at the city centre, how many would be expected to have 5 passengers? Answer(c)(ii) [1] © UCLES 2010 0607/04/O/N/10 [Turn over 8 6 (a) Potatoes cost $t per kilogram and carrots cost $(3t – 1) per kilogram. The total cost of 20 kg of potatoes and 8 kg of carrots is $42. 60.

Find the value t. For Examiner's UseAnswer(a) (b) Peas cost $y per kilogram and beans cost $(y + 2) per kilogram. Anna spends $15 on peas and $9 on beans. The total mass of the peas and the beans is 8 kg. (i) Write an equation in terms of y and show that it simplifies to $4y^2 – 4y – 15 = 0$. [3] [4] (ii) Factorise the expression $4y^2 – 4y – 15$.

Answer(b)(ii) (iii) Find the cost of 1 kg of peas. [2] Answer(b)(iii) $ [1] © UCLES 2010 0607/04/O/N/10 9 7 f(x) = sinx° g(x) = 2sinx° h(x) = 3sin(4x)° k(x) = sin(x + 60)° For Examiner's Use (a) Write down the domain of f(x). Answer(a) (b) Write down the amplitude and period of h(x). [1] Answer(b)Amplitude = Period = [2] (c) Describe fully a single transformation

that maps the graph of y = f(x) onto the graph of (i) y = g(x), [3] (ii) y = k(x).

[2] © UCLES 2010 0607/04/O/N/10 [Turn over 10 8 6 5 4 3 U 2 1 –6 –5 –4 –3 –

2 –1 0 –1 –2 –3 –4 –5 –6 1 2 3 4 T x y For Examiner's Use 5 6 (a) On the grid,

(i) draw the translation of triangle T by (? 36) , [2] [2] (ii) draw the reflection

of triangle T in the line y = – x.

(b) Describe fully the single transformation that maps triangle T onto triangle

U. [3] (c) Write down the inverse of the transformation in part (a)(i). [2] ©

UCLES 2010 0607/04/O/N/10 1 9 U A For Examiner's Use B C U = {prime

numbers less than 20} A = {factors of 12} B = {factors of 70} C = {factors

of 91} (a) List the 8 elements of set U. (1 is not a prime number.) Answer(a)

{ (b) Write all the elements of U in the correct parts of the Venn diagram

above. (c) List the elements of (B ? C)'.

Answer(c) { (d) Write down the value of n((B ? C) ? A'). Answer(d) (e) On the

Venn diagram, shade the region B ? A' ? C '. [1] [1] } [1] } [1] [3] © UCLES

2010 0607/04/O/N/10 [Turn over 12 10 (a) A For Examiner's Use B X NOT TO

SCALE D C A, B, C and D lie on a circle. AC and BD intersect at X. i) Explain

why triangles ABX and DCX are similar.

[3] (ii) BX = 2 cm, CX = 4 cm and the area of triangle ABX is 4. 5 cm2.

Calculate the area of triangle DCX. Answer(a)(ii) cm2 [2] © UCLES 2010

0607/04/O/N/10 13 (b) S 32° R 50° 8 cm NOT TO SCALE For Examiner's Use Y

Q P PQRS is a cyclic quadrilateral. Angle RSQ = 32° and angle PRQ = 50°.

(i) Find angle PSQ. Answer(b)(i) (ii) Calculate angle PQR. Answer(b)(ii) (iii) PR

and QS intersect at right angles at Y and QR = 8 cm. Calculate the length of

RY.

[2] [1] Answer(b)(iii) cm [2] (iv) Write down the size of the radius of the circle that can be drawn through Q, R and Y. Answer(b)(iv) cm [1] © UCLES 2010 0607/04/O/N/10 [Turn over 14 11 During one week a cafe records the number of hot drinks (x) and cold drinks (y) it sells each day. The table shows the results. Day Number of hot drinks (x) Number of cold drinks (y) Mon 55 30 Tues 29 46 Wed 40 35 Thurs 45 27 Fri 65 20 Sat 80 15 Sun 60 25 For Examiner's Use (a) Complete the scatter diagram by plotting the points for Friday, Saturday and Sunday. The first four points have been plotted for you. y 60 50 Number of cold drinks 40 30 20 10 0 x 10 20 30 40 50 60 70 80 Number of hot drinks [2] (b) Describe any correlation between x and y.

1] (c) (i) Find the equation of the line of regression, giving y in terms of x. Answer(c)(i) y = (ii) 50 hot drinks are sold on one day in the following week. How many cold drinks would you expect to be sold on this day? [2] Answer(c)(ii) [2] © UCLES 2010 0607/04/O/N/10 15 12 In triangle ABC, AB = 10 cm, BC = 6 cm and angle BAC = 30°. (a) Calculate the sine of angle ACB.

Give your answer correct to 4 decimal places. For Examiner's Use Answer(a) (b) To draw triangle ABC accurately, the line AB and an angle 30° have been drawn. [3] A 30° B (i) On the diagram, mark the two possible positions of C, so that BC = 6 cm. Label them C1 and C2. ii) Use your answer to part (a) to calculate the sizes of angle AC1B and angle AC2B. Give your answers correct to 1 decimal place.

[2] Answer(b)(ii) angle AC1B = angle AC2B = (iii) Calculate the size of angle C1BC2. [2] Answer(b)(iii) angle C1BC2= [1] © UCLES 2010 0607/04/O/N/10 [Turn over 16 13 For Examiner's Use NOT TO SCALE O 25 cm A P 10 cm Q

The diagram shows a water trough in the shape of a prism. The cross-section is a semicircle, centre O, radius 25 cm. The length of the trough is 3 metres.

(a) Calculate the area of the semicircle. B 3m Answer(a) (b) Calculate the volume of the trough, giving your answer in cm3. m2 [2] Answer(b) cm3 [2] © UCLES 2010 0607/04/O/N/10 17 (c) The diagram also shows water in the trough. The depth PQ is 10 cm.

AB is horizontal and OPQ is vertical. (i) Calculate angle AOB. For Examiner's Use Answer(c)(i) (ii) Calculate the area of triangle AOB. [3] Answer(c)(ii) (iii) Calculate the area of the sector AOB. cm2 [2] Answer(c)(iii) (iv) Calculate the shaded area APBQ. cm2 [2] Answer(c)(iv) (v) Calculate the volume of water in the trough.

Give your answer in litres. cm2 [1] Answer(c)(v) litres [2] © UCLES 2010 0607/04/O/N/10 [Turn over 18 14 y 1. 5 For Examiner's Use –20 0 x 20 –0. 5 2 +1 x 2 + 2x + 6 –20 Y x Y 20. [3] f(x) = (a) On the axes above, sketch the graph of y = f(x) for (Note that –0.

5 Y y Y 1. 5) (b) Find the co-ordinates of the local maximum point. Answer(b) ((c) Find the range of f(x). Answer(c) (d) The graph has one asymptote. Write down the equation of this asymptote.

Answer(d) (e) Solve the equation x 2 +1 x + 2x + 6 2 ,) [2] [3] [1] = x +5 5 . Answer(e) x = [2] © UCLES 2010 0607/04/O/N/10 19 BLANK PAGE © UCLES 2010 0607/04/O/N/10 20 BLANK PAGE Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made

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