

## Cambridge International Examinations

Cambridge International General Certificate of Secondary Education

CANDIDATE NAME				
CENTRE NUMBER		CANDIDATE NUMBER		
MATHEMATICS		0580/42		
Paper 4 (Extended	d)	October/November 2016		
		2 hours 30 minutes		
Candidates answe	er on the Question Paper.			
Additional Materia	ls: Electronic calculator Tracing paper (optional)	Geometrical instruments		

## 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 an HB 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 below that question.

Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For  $\pi$ , use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.

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 130.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of 20 printed pages.



1 (a) (i) Each year the value of a car decreases by 15% of its value at the beginning of that year. Alberto buys a car for \$18000.

Calculate the value of Alberto's car after 3 years.

100% - 15% = 85% 18000 × (0.85)

1054.25 .. [2]

(ii) Belinda bought a car one year ago. The value of this car has decreased by 15% to \$14025.

Calculate how much Belinda paid for the car.

100%-15%=85% 85% = 14025 14025 ×100

16500 \$ ... .....[3]

(b) Chris invested some money at a rate of 5% per year compound interest. After 2 years the value of this investment is \$286.65.

Calculate how much Chris invested.

 $(1.05)^2 = 286.65$ = 286.65 = 260 1.05



(c) Dani invested \$200 and after 2 years the value of this investment is \$224.72.Calculate the rate of interest per year when the interest is

(i) simple,  

$$200 \times r \times 2 = 24.72$$

$$I = 24.72 \times 100$$

$$200 \times 2$$
(ii) compound.  

$$200 \times (1 + \frac{i}{100})^{2} = 224.72$$

$$I + \frac{i}{100} = \sqrt{224.72}$$

$$i = (\sqrt{1.1236} - 1) \times 100$$

$$6 = \frac{5}{100}$$

2 (a) Complete the table of values for  $y = \frac{x^3}{3} - x^2 + 1$ .

x	-1.5	-1	-0.5	0	0.5	1	1.5	2	2.5	3	]
у	-2.38	-0.33	0.71	I	0.79	0.33	-0.13	-0.33	-0.04	l	
											[2]

**(b)** Draw the graph of 
$$y = \frac{x^3}{3} - x^2 + 1$$
 for  $-1.5 \le x \le 3$ .

The first 3 points have been plotted for you.



(c) Using your graph, solve the equations.

(i) 
$$\frac{x^3}{3} - x^2 + 1 = 0$$
  
 $y = 0$   
(ii)  $\frac{x^3}{3} - x^2 + x + 1 = 0$   
 $\frac{3\sqrt{3}}{3} - 3\sqrt{2} + 1 = -3C$   
 $y = -3C$   
 $x = -0.9$  or  $x = 1.4$  or  $x = 2.55$  [3]  
 $y = -3C$   
 $x = -0.9$   
 $y = -3C$   
 $x = -0.9$   
 $x = -0.9$  or  $x = -0.9$  [2]

(d) Two tangents to the graph of  $y = \frac{x^3}{3} - x^2 + 1$  can be drawn parallel to the x-axis.

(i) Write down the equation of each of these tangents.



(ii) For  $0 \le x \le 3$ , write down the smallest possible value of y.





 $BD^{2} = (312)^{2} + (180)^{2} - 2(312)(180)(cos(78.75))$  $BD^2 = 107831.455$ BD = 328.3770014



(d) The bearing of D from A is  $030^{\circ}$ .

Find the bearing of

- (i) B from A, 30+33.75+45
- (ii) A from B.



180-108.75 = 71.25<sup>°</sup> 288.75 360-71.25 = 288.75<sup>°</sup>

## 4 200 people run 10 km.

The table shows some information about the times, *t* minutes, taken to run the 10 km.

Time ( <i>t</i> minutes)	$30 < t \leq 40$	$40 < t \le 45$	$45 < t \le 50$	$50 < t \leq$	$55  55 < t \le 6$	$0  60 < t \le 80$		
Frequency	8	22	95	55	14	6		
(a) Howard takes 40 minutes to run the 10 km. Calculate his average speed in kilometres per hour.								
$\frac{10}{2/3} = 15$ 15 km/h [2]								
(b) Calcula X (mid - point	te an estimate o $33$	f the mean time 42.	5 4	7.5	52.5	57.5	70	
Fxx	280	93	5 45	2.5	2887.5	805	420	
$ \int \frac{1}{10^{10}} \int \frac{1}{10^{10}} = \frac{9840}{100} = \frac{9840}{200} = \frac{19840}{100} = \frac{19840}{10$								

## (c) Complete the histogram to show the information in the table.



Time ( <i>t</i> minutes)	$t \leq 40$	<i>t</i> ≤ 45	<i>t</i> ≤ 50	<i>t</i> ≤ 55	$t \leq 60$	<i>t</i> ≤ 80
Cumulative frequency	8	30	125	180	194	200

(d) (i) Use the frequency table opposite to complete the cumulative frequency table.

(ii) Draw a cumulative frequency diagram to show the information in the table above.



(iii) Use your diagram to find



[Turn over

[1]

- 5 The probability that a plant will produce flowers is  $\frac{7}{8}$ . The flowers are either red or yellow. If the plant produces flowers, the probability that the flowers are red is  $\frac{3}{4}$ .
  - (a) (i) Complete the tree diagram by writing a probability beside each branch.



[2]

(ii) Calculate the probability that a plant, chosen at random, will produce red flowers.

7/8 × 3/4

21/ .....[2]

Two plants are chosen at random. (iii)

FxR and FxR Calculate the probability that both will produce red flowers.

 $(8 \times 3/4)^2$ 



(b) Alphonse buys 200 of these plants.

Calculate the number of plants that are expected to produce flowers.

200x 1/8

(c) Gabriel has 1575 plants with red flowers.

Estimate the total number of plants that Gabriel has.









1.32

(=

 $cm^{3}[2]$ 

.. cm [2]

The diagram shows two sweets.

The cuboid has length 1.5 cm, width 1.1 cm and height 0.8 cm. The cylinder has height 0.8 cm and the same volume as the cuboid.

1.5×1.1×0.8

(i) Calculate the volume of the cuboid.

Calculate the radius of the cylinder. (ii)  $1 \times \Gamma^2 \times 0.8 = 1.32$ 

0.725

(iii)	Calculate the difference	between the s	urface areas of th	e two sweets.
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Cubold +21112 2×11×0.725×0.8  $2 \times \pi \times (0.725)^{2}$ = 6.946846755 x0.8) x2 ence = 0.513 $cm^{2}[5]$ 

(b) A bag of sweets contains *x* orange sweets and *y* lemon sweets. Each orange sweet costs 2 cents and each lemon sweet costs 3 cents.

The cost of a bag of sweets is less than 24 cents. There are at least 9 sweets in each bag. There are at least 2 lemon sweets in each bag.

(i) One of the inequalities that shows this information is 2x + 3y < 24.

Write down the other two inequalities.



(ii) On the grid, by shading the unwanted regions, show the region which satisfies the three inequalities.



(iii) Find the lowest cost of a bag of sweets.Write down the value of x and the value of y that give this cost.





(a) \$1=3.67 dirhams

Calculate the value, in dollars, of 200 dirhams. Give your answer correct to 2 decimal places.





(b) (i) Write as a single fraction, in its simplest form.







(ii) One day in 2014, 1 euro was worth x rand. One year later, 1 euro was worth (x + 1) rand.

Winston changed 1000 rand into euros in both years. In 2014 he received 4.50 euros more than in 2015.

Write an equation in terms of x and show that it simplifies to

$$9x^2 + 9x - 2000 = 0.$$

$$\frac{1000}{2t} - \frac{1000}{2t+1} = 4.5$$

$$\frac{1000}{2(x+1)} = 4.5$$

$$1000 = 4.5 (2^{2}+x)$$

(iii) Use the quadratic formula to solve the equation  $9x^2 + 9x - 2000 = 0$ . Show all your working and give your answers correct to 2 decimal places.



x = 14.42 or x = -15.42

(iv) Calculate the number of euros Winston received in 2014. Give your answer correct to 2 decimal places.

1euro = 14.42 rund -14.42

69.35 euros [2]

1000 -14.42

8 (a)



*A*, *B*, *C* and *D* lie on the circle, centre *O*. *DAE* is a straight line.

Find the value of *u* and the value of *v*.

**(b)** 



NOT TO SCALE

*u* = .....

*v* = .....

The diagram shows a circle, centre O, radius 8 cm. GH is a chord of length 10 cm.

Calculate the length of the perpendicular from O to GH.





80

**60** [2]

(c) K, L, M and N lie on the circle. KM and LN intersect at X. KL = 9.7 cm, KX = 4.8 cm, LX = 7.8 cm and NX = 2.5 cm.

Calculate MN.

Scalet = 1.92 .7 - 1.92





17

[Turn over

9 (a) 
$$y = \frac{3}{x} + 2, x \neq 0$$
  
(i) Find the value of y when  $x = -6$ .  
 $x = -6$   
 $y = \frac{-3}{-6} + 2 = 1.5$   
 $y = \frac{-1.5}{-5}$  [1]  
(ii) Find x in terms of y.  
 $y = \frac{3}{-2} + 2$   
 $y - 2 = \frac{3}{-2}$   
 $x = \frac{-3}{-2}$  [3]  
(b)  $g(x) = 2^{-x}$   $h(x) = 2^{x}$   
(i) Find g(5).  
 $g(S) = 2 - 5$   
 $(i)$  Find hhh(2).  
 $h(2) = 2^{2} = 4$   
 $h(2) = 2^{4} = 16$   
 $h(16) = 2^{16}$   
 $= 65536$   
 $(i)$   $Sig = 2^{-5}$   
 $(i)$   $Sig = 2^{-5}$   
 $(i)$   $Sig = 2^{-5}$   
 $(i)$   $(i)$ 

(iii) Find x when g(x) = h(3).

 $\begin{array}{l} 2-\infty=2^{3}\\ 2-2^{3}=\infty\end{array}$ 





(iv) Find x when  $g^{-1}(x) = -1$ .



Question 10 is printed on the next page.

10 The perimeter of each of the three shapes is 60 cm.

Find x in each part.

