Surname	Centre Number	Candidate Number
Other Names		0



GCSE - NEW

3300U50-1



MATHEMATICS UNIT 1: NON-CALCULATOR HIGHER TIER

TUESDAY, 8 NOVEMBER 2016 – MORNING

1 hour 45 minutes

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination. A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space use the continuation pages at the back of the booklet, taking care to number the questions correctly. Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

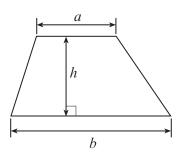
In question **6**, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

For Examiner's use only						
Question	Maximum Mark	Mark Awarded				
1.	3					
2.	7					
3.	6					
4.	4					
5.	4					
6.	7					
7.	6					
8.	4					
9.	2					
10.	3					
11.	5					
12.	3					
13.	4					
14.	5					
15.	5					
16.	4					
17.	5					
18.	3					
Total	80					

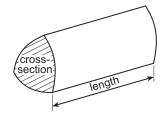


Formula List - Higher Tier

Area of trapezium = $\frac{1}{2}(a+b)h$

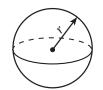


Volume of prism = area of cross-section × length



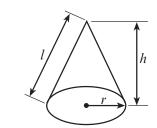
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl

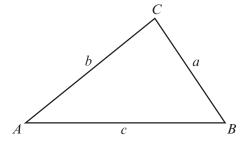


In any triangle ABC

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

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

Area of triangle = $\frac{1}{2}ab \sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \ne 0$ are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Annual Equivalent Rate (AER)

AER, as a decimal, is calculated using the formula $\left(1+\frac{i}{n}\right)^n-1$, where i is the nominal interest rate per annum as a decimal and n is the number of compounding periods per annum.



1.	A fair	six-sided dice an	d a fair coin are th	nrown together on	ce.		
	Circle	e the correct answ	ver for each of the	following stateme	ents.		
	(a)	The number of p	ossible outcomes	is			[1]
		2	6	8	12	24.	
	(b)	The probability of	of getting a 4 on th	e dice and a tail o	on the coin is		[1]
		1 8	<u>1</u> 12	1/2	<u>1</u>	1 24 ·	
	(c)	The probability of	of getting a multip	le of 3 on the dice	e and a head on tl	he coin is	[1]
		<u>1</u> 8	<u>1</u> 12	1/2	<u>1</u>	<u>1</u>	
	•••••						
	•••••						· · · · · · ·
	•••••						

3300U501

Examiner only

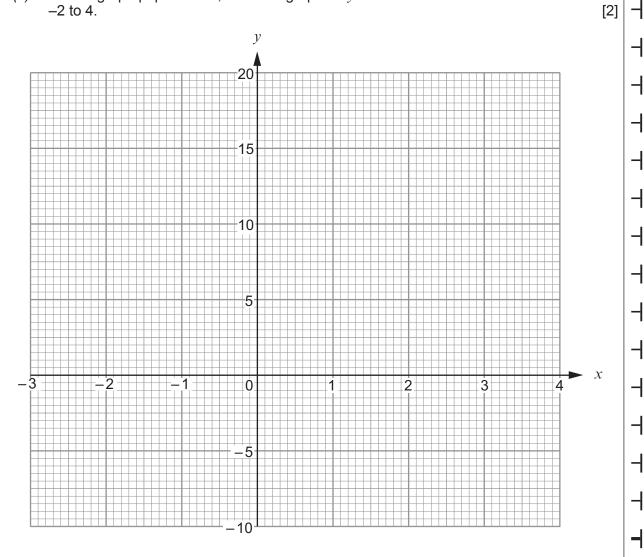
[2]

2. (a) The table below shows some of the values of $y = 2x^2 - 5x - 1$ for values of x from -2 to 4.

Complete the table by finding the value of y for x = -1 and for x = 2.

Х	-2	-1	0	1	2	3	4
$y = 2x^2 - 5x - 1$	17		-1	-4		2	11

(b) On the graph paper below, draw the graph of $y = 2x^2 - 5x - 1$ for values of x from -2 to 4.



(c) Draw the line y = 5 on the graph paper.

> Write down the values of x where the line y = 5 cuts the curve $y = 2x^2 - 5x - 1$. Give your answers correct to 1 decimal place.

[2]

Values of x are and

(d) Circle the equation below whose solutions are the values you have given in (c). [1]

$$2x^2 - 5x - 1 = 0$$

$$2x^2 - 5x - 6 = 0$$

$$2x^2 - 5x - 1 = 0$$
 $2x^2 - 5x - 6 = 0$ $2x^2 - 5x - 5 = 0$

$$2x^2 - x - 1 = 0$$

$$2x^2 - x - 1 = 0 \qquad 2x^2 - 5x + 4 = 0$$

A re	gular polygon has exterior angles of 45°.	Exam onl
(a)	How many sides does this polygon have? [2]	⊢
		$ \dashv$
•••••		-
		-
(b)	Each side of this regular polygon is 7 cm. A sketch of two sides, <i>AB</i> and <i>BC</i> , of the polygon is shown below.	-
	Transfer of the class, TB and Be, of the polygon is shown solow.	$ \dashv $
	/ c	$ \dashv$
		-
		-
	7 cm 45°	\dashv
	A B	\dashv
	Diagram not drawn to scale	\dashv
	Using only a ruler and a pair of compasses, construct an accurate drawing that shows these two sides of the polygon. The point <i>A</i> has been given.	-
	You must show your construction arcs. [4]	
		-
		-
		-
		-
		-
		-
	A •	
		$ $
		-



4.	(a)	Make m the subject of the formula $y = 6m + 7$.	[2]
	(b)	Factorise $6x^2 - 12x$.	[2]
5.	Find	in standard form, the value of each of the following.	
, .		$\frac{7.5 \times 10^6}{5000}$	[2]
	***********		•••••••
	/b)	$(2.3 \times 10^3) + (6.4 \times 10^4)$	
	(<i>D</i>)	(2.3 × 10) + (0.4 × 10)	[2]
	•••••		•••••••



© WJEC CBAC Ltd.

(3300U50-1)

Turn over.

ô.	In this question you will be assessed on the quality of your organisation, communication and accuracy in writing.
	Each side of a square is of length $(2x + 3y)$ cm. The perimeter of the square is 62 cm. $(2x + 3y)$ cm
	Each side of a regular octagon is of length $(x + 2y)$ cm. The perimeter of the octagon is 72 cm. $(x + 2y)$ cm
	Use an algebraic method to find the value of x and the value of y . [5 + 2 OCW]
	<i>x</i> = <i>y</i> =



7. Alwyn often drives from Bangor to Cardiff.

He always chooses one of two routes for these journeys.

He either travels through Rhayader or through Hereford.

The probability that he travels through Rhayader is 0.7.

Sometimes he decides to stop for a break during his journey.

His decision is independent of the route he takes.

The probability that he travels through Rhayader and stops for a break is 0.42.

(a) Complete the following tree diagram.

[4]

Route Stops for a break

Yes

No

Yes

Hereford

(b)	Calculate break.	the	probability	that	Alwyn	travels	through	Hereford	but	does	not	stop	for	a 21
	Di Odik.												L	_1

No

.....



-	William has n marbles. Lois had 4 times as many marbles as William, but she has now lost 23 of them.	
	Lois still has more marbles than William.	
	Write down an inequality in terms of n to show the above information. Use your inequality to find the least number of marbles that William may have.	[4]



- **9.** Circle the correct answer for each of the following statements.
 - (a) $9^{-\frac{1}{2}}$ is equal to
 - -3
- $-\frac{1}{3}$
- $\frac{1}{4\frac{1}{2}}$
- $-4\frac{1}{2}$
- <u>1</u>
- [1]

- (b) $8^{\frac{2}{3}}$ is equal to
 - $5\frac{1}{3}$
- 4
- 6
- $8\frac{2}{3}$
- 16 24
- [1]

10. The radius of a hemisphere and the radius of a cylinder are equal. The hemisphere and cylinder have equal volumes

The hemisphere and cylinder have equal volumes.

Calculate the ratio of the height of the cylinder to the radius of the cylinder.

[3]

height of cylinder : radius of cylinder



	find an expression	proportional to x , and	and y + whom A	. ,	[0]
a)	ind an expression	ior y in terms or x,			[3]
•••••					
b)	use the expression	you found in (a) to co	omplete the followi	ing table.	[2]
	X	3	0·25		
				4	_
	y	4		<u>1</u> 5	
				1	_



© WJEC CBAC Ltd.

(3300U50-1)

12.	Express	$\frac{3x}{3x+2}$	$-\frac{2x}{2x+7}$	as a single fraction in its simplest form.	[3]



13.	The points P, Q and R lie on the circumference of a circle, centre O.
	PQ is a diameter of the circle.

The straight line *ARB* is a tangent to the circle.

 $\overrightarrow{QRB} = x$, where x is measured in degrees.

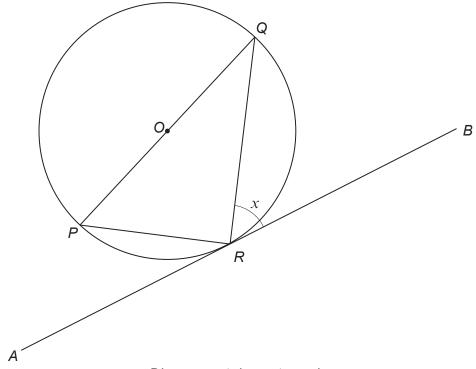


Diagram not drawn to scale

You must give a reason for each step of your solution.	[4]

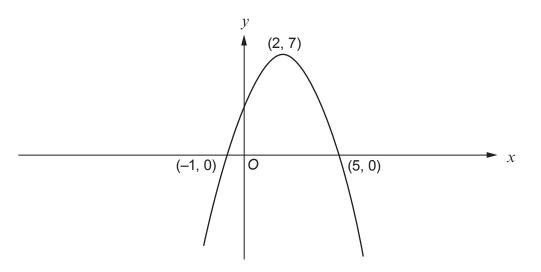


Aled h Two o The th The th	has three concrete slabs. If the slabs are square, with each side of length x metres. Whird slab is rectangular and measures 1 metre by $(x + 1)$ metres. There concrete slabs cover an area of 7m^2 .	
(a)	Show that $2x^2 + x - 6 = 0$.]
(b)	Solve the equation to find the length of each side of the square slabs. You must justify any decisions that you make.	[



Examiner only

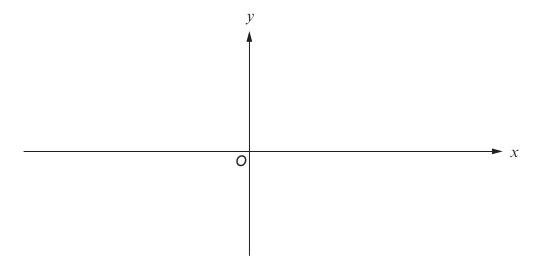
The diagram shows a sketch of the graph y = f(x). The graph passes through the points (–1, 0) and (5, 0) and its highest point is at (2, 7). **15**. *(a)*



Sketch the graph of y = f(x - 3) on the axes below. You must indicate

the coordinates of the points of intersection of the graph with the x-axis the coordinates of the highest or lowest point.

[3]



Examiner only Using the axes below, **sketch** the graph of $y = \cos x + 1$ for values of x from 0° to 360°. [2] (b) 0



16. Triangle \overrightarrow{ABC} is an isosceles triangle with $\overrightarrow{ABC} = \overrightarrow{ACB}$.

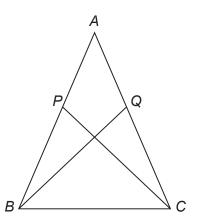


Diagram not drawn to scale

P and Q are points on AB and AC respectively such that AP = AQ.

Prove that triangle <i>ABQ</i> is congruent to triangle <i>ACP</i> . You must give reasons for each step of your proof. [ABA]	[4]



Examiner
Lxaiiiiici
only

17.	Simplify
-----	----------

$$\frac{\left(5\sqrt{3}\right)^2 - \frac{2\sqrt{18}}{\sqrt{2}}}{\sqrt{32} \times \sqrt{2}}$$

and state whether your answer is rational or irrational.	[5]
	······································
	······································



	20	
18.	A game played at a children's party involves throwing a ball into a bucket. Each child tries to get the ball into the bucket in the least number of throws. On each attempt, the probability that Sofia gets the ball into the bucket is 0·8. Each attempt is independent of any previous attempt.	TExamin only
	Show that she is 5 times more likely to get the ball into the bucket on her first attempt than to have her first successful throw on her second attempt.	
	You must show all your working. [3]	

END OF PAPER



© WJEC CBAC Ltd.

(3300U50-1)





Question number	Additional page, if required. Write the question number(s) in the left-hand margin.	Examine only
		······
		······









