Surname	Centre Number	Candidate Number
First name(s)		0



GCSE

3310U60-1



THURSDAY, 4 NOVEMBER 2021 - MORNING

MATHEMATICS – NUMERACY UNIT 2: CALCULATOR-ALLOWED HIGHER TIER

1 hour 35 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 additional page at the back of the booklet. Question numbers must be given for the work written on the additional page.

Take π as 3·14 or use the π button on your calculator.

Question Maximum Mark Awarded 1. 3 2. 7 3. 8 4. 7 5. 10 6. 13 7. 11 8. 4 9. 7	For Examiner's use only							
2. 7 3. 8 4. 7 5. 10 6. 13 7. 11 8. 4 9. 7	Question							
3. 8 4. 7 5. 10 6. 13 7. 11 8. 4 9. 7	1.	3						
4. 7 5. 10 6. 13 7. 11 8. 4 9. 7	2.	7						
5. 10 6. 13 7. 11 8. 4 9. 7	3.	8						
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7. 11 8. 4 9. 7	5.	10						
8. 4 9. 7	6.	13						
9. 7	7.	11						
	8.	4						
Total 70	9.	7						
lotal	Total	70						

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.

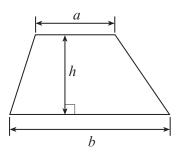
The number of marks is given in brackets at the end of each question or part-question.

In question **4**, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

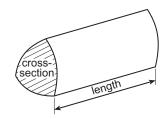


Formula List - Higher Tier

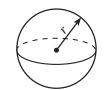
Area of trapezium = $\frac{1}{2}(a+b)h$



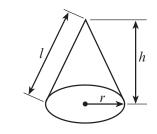
Volume of prism = area of cross-section × length



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 = $\pi r l$

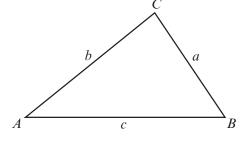


In any triangle ABC

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)

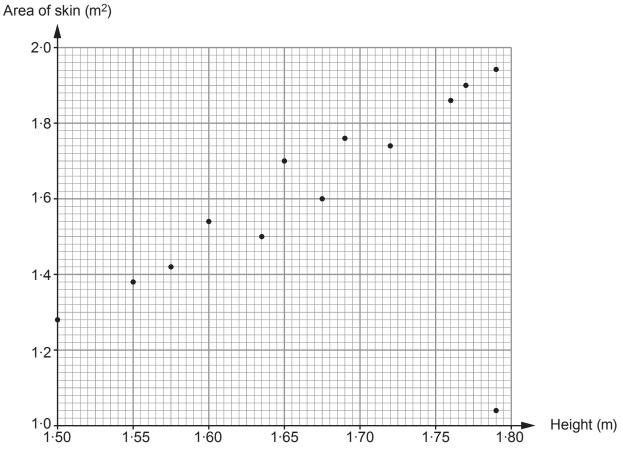
AER, as a decimal, is calculated using the formula $\left(1+\frac{i}{n}\right)^n-1$, where i is the nominal interest rate per annum as a decimal and n is the number of compounding periods per annum.



In a science lesson, 13 students calculated an estimate of the area of their skin.

The results are shown on the scatter diagram below.

1.



Bryn is 1.50 m t	taii.
------------------	-------

Abigail is 18% taller than Bryn. Find Abigail's calculated estimate of the area of her skin. [3]

Abigail's estimate of the area of her skin is m²



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2.	She	reco	ords	Mrs her d isplay	data	in g	roup	s of	equ	al w	idth.						at	ask.		
Fred	quen	су																		
50																				
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0	D D		5			10		1	5		2	0		25	5	30		35	Time (seco	nds)
	(a)	Oı	n Mo	onday	y, ho	w m	any :	stud	ents	s sta	rted	the	task	(?		 	 			[2]
	(b)	ln	whie	ch gr	oup	is th	ne me	ediar	n tin	ne ta	aken	to s	tart	the t	ask?					[2]



(c)	Mrs Griffin had set a target that students should start the task within 30 seconds. Was the target met? You must give a reason for your answer. [1]	0
	You must give a reason for your answer. [1] Yes No Can't tell	J
(d)	On Tuesday, the same students started the same task again. 25% of them started the task within 10 seconds. Is this an improvement on the number of students who started the task within 10 seconds.	S
	on Monday? You must show all your working. [2]	
	Yes No	
•••••		



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\vdash	Terra Rose cu	ırrency exchange	
	Buying currency	Notes available	
	£1 buys \$1.36 (US dollars)	\$5, \$10, \$20, \$50, \$100	
	ys is going on holiday to the USA for 13 has saved a total of £500 to buy US do		
Ner	ys takes $\frac{13}{20}$ of her savings to buy US d	ollars from Terra Rose currency exchange.	
She	e wants to buy as many dollars as possib	ole.	
Ner	ys plans to use all her remaining money	to buy euros.	
Hov	v many dollars will Nerys buy? v much money, correct to the nearest pe must show all your working.	enny, will she have left to buy euros?	[
• • • • • • • •			
•••••			



	Examiner only
Nerys will buy \$	
She will have £left to buy euros.	
One will have 2 left to buy euros.	



4.		s question, you will be assessed on the quality of your org racy in writing.	anisation, communication and
	Elwy Each	n makes 10 full jugs of fresh lemonade. jug is cylindrical with internal measurements as follows:	
	•	height 28 cm, base radius 5 cm.	
	Elwy of ler	n's drinking glasses each hold a serving of 170 cm ³ nonade.	
	He s	erves 80 people lemonade.	
	How left o	many full jugs of lemonade does Elwyn have	Diagram not drawn to scale
		nust show all your working.	[5 + 2 OCW]
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- 5. Mr Read is building a shelter against his house.
 - (a) The length of the shelter is 6 m.

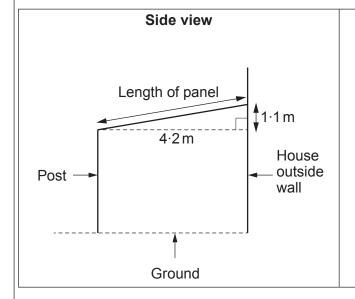
He has drawn a sketch of the side view of the shelter, as shown below.

Mr Read has started to place some panels on his roof.

When fitted to the roof, each panel needs to slightly overlap the next panel.

The plan view of placing the first 3 panels is also shown below.





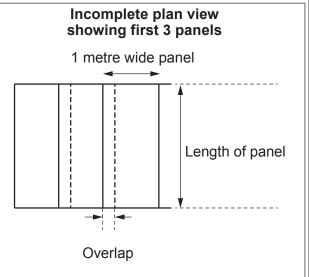


Diagram not drawn to scale

The shelter roof panels are 1 metre wide and can be bought in different lengths.

Length of panel	4·1 m	4·2 m	4·3 m	4·4 m	4·5 m	4·6 m
Cost per panel	£21	£22	£23	£24	£25	£26

Mr Read bought the cheapest suitable panels to build his shelter roof.

Y	Calculate the coordinate of th	ost of all of the v all your work	e panels Mr king.	Read bou	ght.		[6]
• • • • • • • • • • • • • • • • • • • •						 	



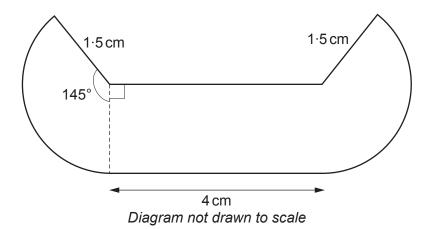
		Ex
		•••••
(b)	Angle between the roof and the outside wall of the house	
	1·1 m	
	4·2 m	
	Diagram not drawn to scale	
Calcul Give y	ate the size of the angle between the shelter roof and the outside wall of the hou our answer correct to 3 significant figures.	ıse. [4]



- 6. Hannah is opening her own gym. She has designed a logo that will be on her own brand of sports clothing. She will sell the sports clothing in the gym.
 - (a) The design of the symmetrical logo is shown below. It consists of:

The logo will be stitched onto all the sports clothing.

- two sectors of circles, both of radius 1.5 cm,
- a straight line of length 4 cm connecting the centres of the two sectors,
- a parallel straight line of length 4 cm connecting the lower vertices of the sectors.



Calcu	late t	ne perimeter of the logo.	[4]
•••••			
•••••			

•••••			
(b)	(i)	Calculate the area of the logo shown in part (a).	[3]
	•••••		



(ii) An enlarged version of the logo will be painted on the front wall of the gym. All the lengths on this logo will be 200 times as long as the lengths in her or design.	riginal
Use your answer to (i) to calculate the area of the logo painted on the front v the gym. Give your answer in \mbox{m}^2 .	vall of [3]
For the opening week, Hannah reduces the prices of her clothing range by 20%. On the last day of the opening week, she reduces prices by a further 10%.	
Opening week offer: 20% off all clothing Last day promotion: all prices reduced by a further 10%	
On the last day of the opening week, Hannah has a sports top priced at £9.72. Calculate the original price of the sports top before the two reductions in price.	[3]



7. From its base on the Isle of Anglesey, an aircraft has to collect emergency hospital equipment from Birmingham to deliver to Cardiff.

Details of the journey are shown in the diagram below.



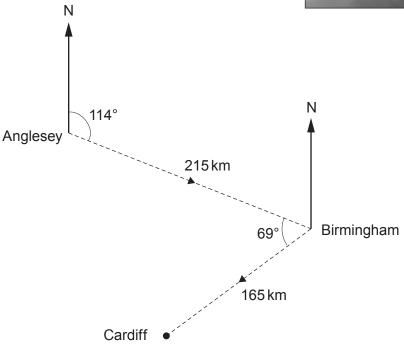


Diagram not drawn to scale

(a)	our answer.	ine ancrait ny	IIOIII BIITIIIIIGI	iaiii to Cardiii	t .	[1]
	069°	135°	225°	235°	291°	

(b) From Cardiff, the aircraft flies directly back to its base on Anglesey.

(1)	Calculate the average speed of the aircraft from Cardiff to Anglesey. Give your answer in km/h.	[5]
		•••••



(ii) Calculate the bearing of the return journey from Cardiff to Anglesey.	[5



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8. Melissa wants to buy a new car. The car she'd like to buy is priced at £17 000. Melissa needs to take out a loan to buy the car.



Melissa is considering taking out a loan of £17 000 from her bank. The bank will charge her interest on the loan, at a rate of 0.25% per month.

Melissa wants to calculate the monthly payments required to pay off the loan. The formula she will use is:

Monthly payment =
$$\frac{r \times L}{1 - (1 + r)^{-n}}$$

where,
r is the monthly interest rate written as a decimal,
L is the loan amount, and
n is the number of months required to pay off the loan.
Calculate the difference in the monthly payments if the lo

Calculate the difference in the monthly payments if the loan is taken out over 4 years rather than 5 years. [4]



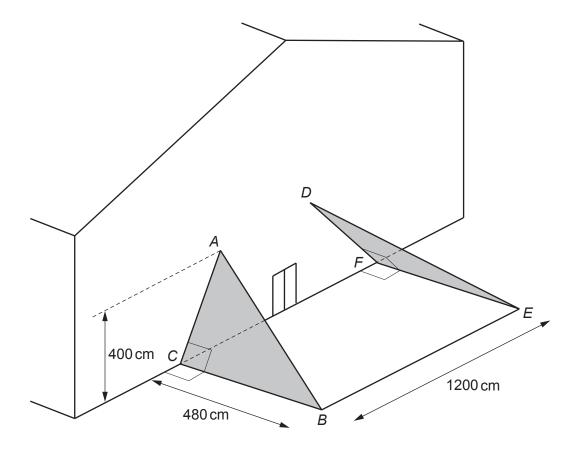
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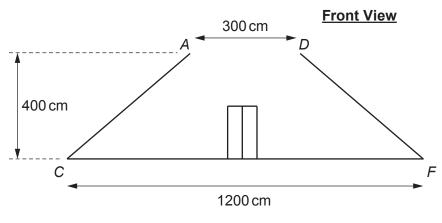


9. The entrance to a new hotel is to have two equal-sized sloping glass panels, symmetrically placed on either side of the main doors.

The glass panels, ABC and DEF, will be in the shape of right-angled triangles.

The diagrams below show some of the dimensions.





Diagrams not drawn to scale



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a)	Calculate the length of AB. [5]
)	Metal edging strips are needed along the edges <i>AB</i> and <i>DE</i> . The metal edging strips come in 45 cm lengths and can be cut to any length.
	What is the minimum number of edging strips needed to cover the two edges AB and DE? [2]



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