Surname	Centre Number	Candidate Number
Other Names		0

GCSE – NEW

3310U40-1

A16-3310U40-1

MATHEMATICS – NUMERACY
UNIT 2: CALCULATOR-ALLOWED
INTERMEDIATE TIER

FRIDAY, 4 NOVEMBER 2016 – MORNING

1 hour 45 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 continuation page at the back of the booklet, taking care to number the question(s) correctly.

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

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 **5***(a)*, 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.	**4**	
2.	**11**	
3.	**6**	
4.	**6**	
5.	**10**	
6.	**6**	
7.	**5**	
8.	**6**	
9.	**14**	
10.	**12**	
Total	**80**	

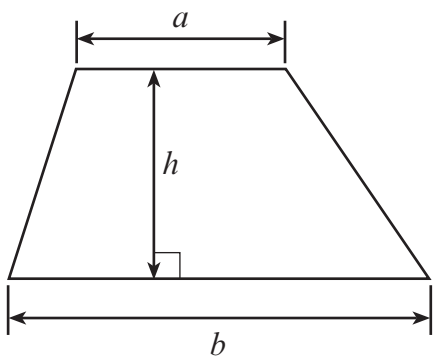
3310U401
01

NOV163310U40101

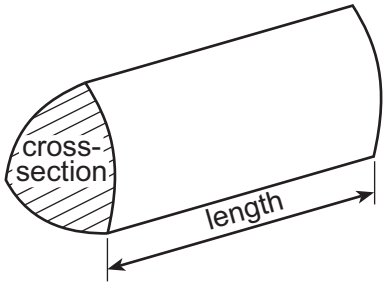
© WJEC CBAC Ltd.

Formula List – Intermediate Tier

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



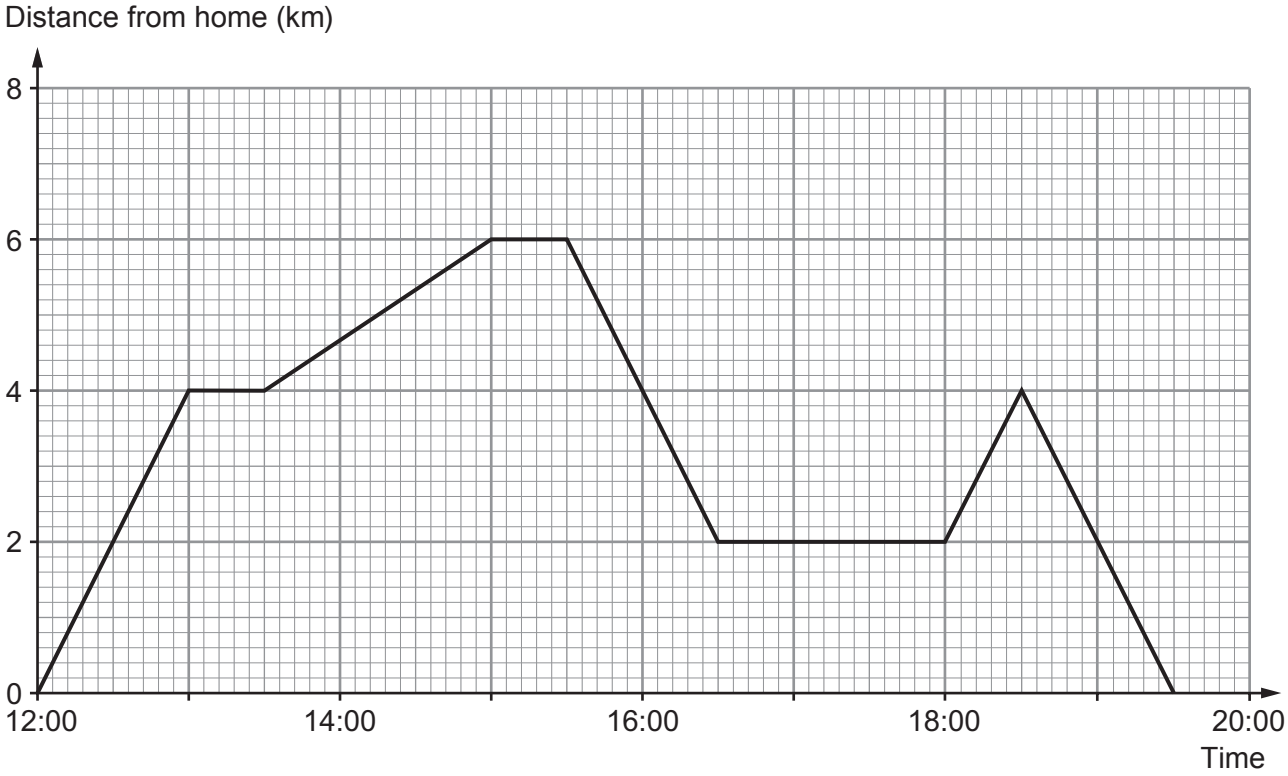
Volume of prism = area of cross-section × length



© WJEC CBAC Ltd.

Examiner only

1. The travel graph below shows a journey Gareth made yesterday.



(a) How far away from home was Gareth at 15:00?
Circle your answer. [1]

0 km 2 km 4 km 6 km 8 km

(b) At what time did Gareth arrive back home?
Circle your answer. [1]

14:00 16:30 18:45 19:15 19:30

(c) Sometime after 5p.m., Gareth headed for the supermarket.
The supermarket was closed when he got there so he headed straight back home.
At what time did Gareth arrive at the supermarket?
Circle your answer. [1]

17:00 17:30 18:00 18:15 18:30 19:00

(d) Gareth did not stop for the whole of the time between 15:00 and 15:30.
What could the travel graph tell you about his journey between these times? [1]

.....

.....

.....

3310U401 03

© WJEC CBAC Ltd.

Examiner only

2. *(a)* 36 000 people took part in a survey to find out their favourite type of TV programme. The pie chart shows the results.

(i) How many people chose *Drama* as their favourite type of TV programme? You must show your working. [3]

.....

.....

.....

.....

(ii) How many more people chose *Sport* rather than *News* as their favourite type of TV programme? You must show your working. [3]

.....

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

(iii) Twice as many women as men chose *Talent shows* as their favourite type of TV programme.
Calculate how many women chose *Talent shows*.
You must show your working. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) 1000 people were asked,

'Should news programmes include details of the weather?
Yes or No?'

70% of the people answered 'yes'.
A pie chart is to be drawn to represent the answers to this question.
What size would the angle be to represent the answer 'yes'? [2]

.....

.....

.....

.....

Angle representing 'yes' is ..... °

3310U401
05

© WJEC CBAC Ltd.

Examiner only

3. Loretta is paid in euros.
She is checking her tax bill for last year.

The tax rates last year were as follows:

- No tax on the first €3500 of earnings
- Earnings in excess of €3500 and up to €10 500: taxed at a rate of 25%
- Earnings above €10 500: taxed at a rate of 35%

Last year, Loretta's total earnings before tax were €34 500.

How much tax did Loretta pay in total?
You must show all your working. [6]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Tax paid = € .....

© WJEC CBAC Ltd.

Examiner only

4. Ewan is going on holiday to India.
He has saved £450 to exchange for Indian rupees.

(a) The exchange rate on the internet last week was £1 = 99.40 rupees.
Had Ewan been going on holiday last week, how many rupees could he have bought?
[2]

.....

.....

.....

(b) Ewan exchanges his money on arrival in India.
The exchange rate is now £1 = 99.72 rupees.

The exchange bureau only has 500 rupee notes.
Ewan wants to buy as many rupees as possible with his £450 savings.

How much of his £450 will Ewan spend buying rupees?
Give your answer correct to the nearest penny.
You must show all your working. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

3310U401
07

© WJEC CBAC Ltd.

Examiner only

5. (a) *In this part of the question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

Railcard for 16 to 25 year olds

£30 for a year

Get $\frac{1}{3}$ **off** all your rail travel

Nerys and Eleri are sisters.
Nerys is 22 years old and Eleri is 27 years old.

The two sisters live in Holyhead.
Their aunt lives in Milford Haven.
They travel by train to visit their aunt 3 times a year.

Nerys buys a 16-25 Railcard to use for these journeys.
They buy single rail tickets for each journey.
The cost of a **single** rail ticket from Holyhead to Milford Haven is £84.50.
The journey home from Milford Haven also costs £84.50 per ticket.

In a year, how much less does Nerys pay than Eleri for the journeys to Milford Haven and back?
You must show all your working. [5 + 2 OCW]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

(b) Cristiano is 22 years old.
He sometimes travels from Rhyl to Llandudno Junction by train.
The cost of a single rail ticket from Rhyl to Llandudno Junction is £7.80.

Nerys advises Cristiano to buy a Railcard.
Cristiano says,

> It is not worth paying £30 for the Railcard.

How many times in a year would Cristiano have to travel to make it worthwhile for him to buy a Railcard? [3]

3310U401 09

© WJEC CBAC Ltd.

Examiner only

6.

(a) The total area of all the woodlands in Wales is **303 000 hectares**.

Individual woodlands that have an area of 2000 hectares or more make up 76% of the total area of all the woodlands in Wales.

Complete the following statement.

'Woodlands with areas of **less than** 2000 hectares in Wales cover a total area of

..... hectares.' [3]

.....

.....

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

(b) The price of softwood changes each year.
The price has increased by 6% per annum for each of the last **5 years**.
Before this, the price had decreased by 2% per annum.
Seven years ago the price of softwood was £34 per m^3.

Calculate the current price of softwood. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Current price of softwood is £ ..... per m^3

© WJEC CBAC Ltd.

Examiner only

7. *(a)* The Headteacher of Ysgol Bro Gwyn investigates building a new bike shed.

Bike sheds are built on a rectangular base of width x metres and length y metres.

(i) Which is the correct expression for the perimeter of the bike shed?
Circle your answer. [1]

xy metres xy square metres $x + y$ metres $2x + y$ metres $2x + 2y$ metres

.....

.....

(ii) The Headteacher is given a formula for working out the number of bikes, b, that can be stored in a bike shed that has a base of width x metres and length y metres.

He is told the formula only works when
- x and y are whole numbers
- x is greater than 3
- y is greater than 5

The formula is as follows:

$$b = \frac{6xy}{5}$$

- According to the formula, how many bikes can be stored in a bike shed 5 metres wide and 8 metres long?
Circle your answer. [1]

3 7 42 48 240

.....

.....

- A bike shed x metres wide and y metres long can hold b bikes.
According to the details the Headteacher has been given, what is the formula for calculating the length, y metres?
Circle your answer. [1]

$y = \frac{b-5}{6x}$ $x = \frac{6b}{5y}$ $y = \frac{b+5}{6x}$ $y = \frac{5b}{6x}$ $y = \frac{6x}{5b}$

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

(b) The Headteacher decides to place signs around the school site to stop pupils using their bikes on grassed areas.

He introduces a new sign to pupils in the school newsletter.
The size of the sign in the newsletter is shown below.

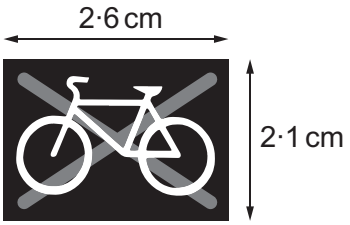


Diagram not drawn to scale

A mathematically similar new sign is placed near the side of the playing field.

Diagram not drawn to scale

It is 33·6 cm high.
How wide is this sign? [2]

.....

.....

.....

.....

.....

.....

Width is ..... cm

© WJEC CBAC Ltd.

Examiner only

8. The wire window guard shown below is to be made.

Diagram not drawn to scale

The length of the sides of each small wire square shown is 3·3 cm.

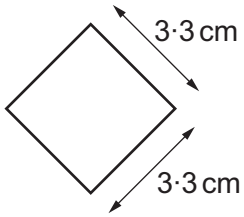


Diagram not drawn to scale

Llinos considers the length of the diagonal of each small square.

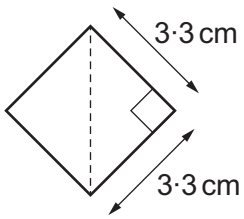


Diagram not drawn to scale

She says,

The height of the window guard is equal to 9·5 diagonals of the square.
The width of the window guard is equal to 11 diagonals of the square.

© WJEC CBAC Ltd.

Examiner only

(a) Calculate the length of the diagonal of a small square.
Give your answer correct to 1 decimal place. [3]

(b) Calculate the area of the **window guard**.
You must show all your working. [3]

© WJEC CBAC Ltd.

Examiner only

9. Gwenda enjoys road running.

(a) She keeps a record of her run each day this week.

Day	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
Distance	4·6 km	5·4 km	2·2 km	6·2 km	7·2 km	2·2 km	3·4 km
Time	26 mins	31 mins	12 mins	35 mins	40 mins	14 mins	22 mins

Last week, her average speed for the week was 9·6 kilometres per hour.
Calculate Gwenda's percentage improvement in her average speed from last week to this week.
You must show all your working. [6]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Percentage improvement is ..... %

© WJEC CBAC Ltd.

Examiner only

(b) The diagram shows the cross-section of one part of her run.

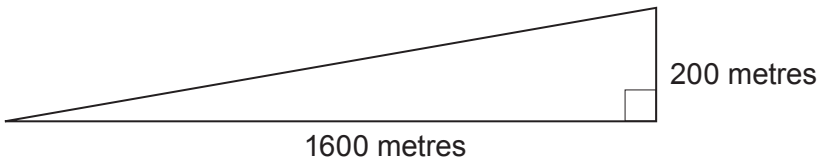


Diagram not drawn to scale

Calculate the angle of elevation of the road. [3]

.....

.....

.....

(c)

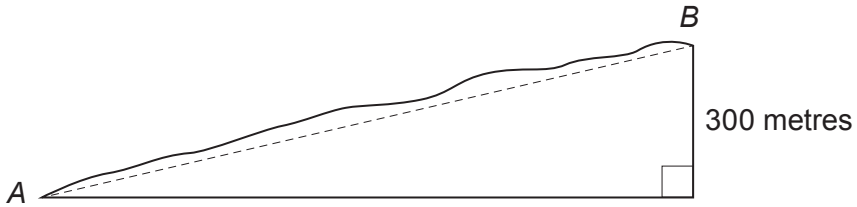


Diagram not drawn to scale

Gwenda runs on another section of uneven road from *A* to *B*.
The rise in this section of the road is 300 metres.
The angle of elevation of *B* from *A* is 10°.

(i) Calculate an estimate of how far Gwenda has run.
State any assumption you have made. [4]

.....

.....

.....

.....

Assumption: .....

.....

(ii) What is the impact of your assumption on your answer? [1]

.....

.....

© WJEC CBAC Ltd.

Examiner only

10. Rhodri has carried out an experiment to measure the diameters of 20 spherical dust particles, in microns.

Here are his results.

Diameter, d (microns)	Frequency
$1 \leqslant d < 2$	2
$2 \leqslant d < 4$	6
$4 \leqslant d < 5$	8
$5 \leqslant d < 9$	4

(a) (i) Calculate an estimate of the mean diameter of a dust particle. [4]

.....

.....

.....

.....

.....

.....

(ii) Rhodri measures the diameters of another 25 dust particles.

Rhodri is told,

'The ratio of dust particles with diameters less than 4 microns to those with diameters greater than or equal to 4 microns is 7 : 8.'

He finds this fact is true when he considers all 45 dust particles.

How many of the extra 25 dust particles have a diameter of less than 4 microns? You must show your working. [3]

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

Examiner only

(b) Rhodri studies a cylindrical cell under his microscope.
The height of the cell is 2 microns.
The circumference of the cell is 5 microns.

Calculate the volume of the cell he sees under the microscope.
Give your answer in microns^3, correct to 1 significant figure. [5]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Volume is ..... microns^3

END OF PAPER

© WJEC CBAC Ltd.

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

© WJEC CBAC Ltd.