Surname	Centre number	Candidate number
First name(s)		0

GCSE

3320U10-1

Mathematics and Numeracy (Double Award)
Unit 1: Financial Mathematics and Other Applications of Numeracy
Higher Tier

1 hour 45 minutes

SAMPLE ASSESSMENT MATERIALS

Additional materials

The use of a calculator will be required for 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 provided at the top of this page.

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

If you need more space, use the additional page(s) at the back of this booklet. Number the question(s) correctly.

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

Information for candidates

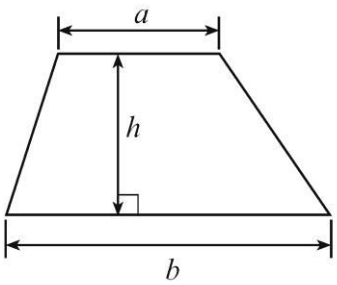
The number of marks is given in brackets at the end of each question or part-question.

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

For examiner's use only		
Question	**Maximum mark**	**Mark awarded**
1.	3	
2.	5	
3.	5	
4.	7	
5.	3	
6.	7	
7.	6	
8.	7	
9.	10	
10.	9	
11.	5	
12.	5	
13.	8	
Total	**80**	

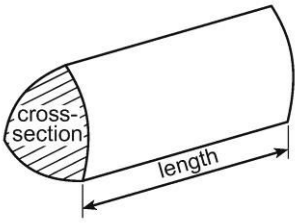
Formula List – Unit 1 Higher Tier

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



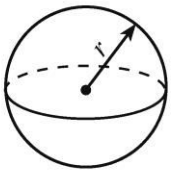
Volume of an Object with a Uniform Cross-section (e.g. Prism, Cylinder)

Volume = area of cross section × length



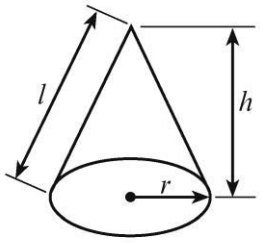
Volume of a sphere $= \frac{4}{3}\pi r^3$

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



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

Curved surface area of a cone $= \pi rl$



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.

Answer **all** questions.

Examiner only

1. The Physical Education (PE) department in Ysgol Ddwysaint wants to test the following hypothesis:

'Most pupils in Year 11 spend less than $2^1/_2$ hours per week doing exercise.'

(a) Part of the questionnaire they will give to pupils in Year 11 asks the following question:

How many hours do you spend exercising?

0 to 1	2 to 3	4 to 5	6 to 7
☐	☐	☐	☐

Give two reasons why the question is not suitable. [2]

Reason 1:

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Reason 2:

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(b) The PE department plans to give out the questionnaire to Year 11 pupils studying GCSE Physical Education and Health.

Give **one** criticism of this plan. [1]

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2. Mr Bevan used 660 kWh of electricity during September, October and November last year. [5]
For the same 3-month period this year, he assumes his usage of electricity will not change.

Examiner only

Mr Bevan has the following information about electricity charges this year.

- The standing charge is £15 **per month**
- Electricity costs 29p per kWh
- VAT at 5% is payable on the total of the standing charge and the cost of the electricity used.

Calculate how much Mr Bevan's electricity bill will be for the 3-month period of September to November this year.

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3. Hisako bought a number of shirts to sell in her shop during the summer. [5]

Examiner only

The shirts cost Hisako £14 each to buy.

During the summer, Hisako sold each shirt at a price that was 35% more than what she paid for them.
At the end of summer, Hisako puts the shirts she has left on sale.
In the sale, she reduces the selling price by one fifth of the original selling price.

How much profit will Hisako make on each shirt that she sells in the sale?

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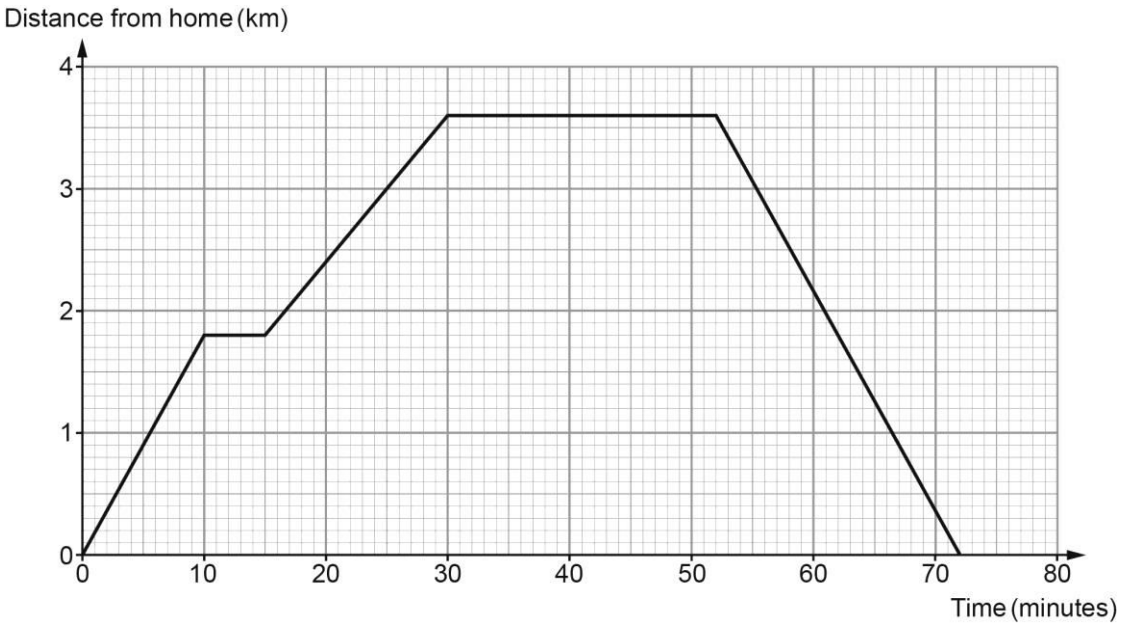
Examiner only

4. Nerys travelled by bike along a straight road to visit her friend.
The travel graph below shows Nerys's journey.
On the way to her friend's house, she stopped at a shop.
She stayed at her friend's house for some time. Then, she travelled home.



(a) How far had Nerys travelled in total after an hour? [2]

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(b) Nerys started her journey at 10:00. [2]
At what time did she return home?

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Examiner only

(c) Nerys's bike has a computer that displays data about her journey.
When the bike is moving, it measures distance travelled and time taken.
What average speed did the computer show at the end of Nerys's journey?

Give your answer in kilometres per hour. [3]

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5. Sian and Kim are saving to buy an electric guitar that they will share.
The guitar they want to buy costs £385.

Sian and Kim will pay for the guitar in the ratio 5 : 6 respectively.
They will each save over the next 4 weeks.
Sian will put an equal amount of money aside per week.
Kim will also put an equal amount of money aside per week.

Calculate how much money Sian and Kim will need to save per week to pay for the guitar. [3]

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Sian will save £ …… per week

Kim will save £ …… per week

Examiner only

6. *In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

Hefin is going on holiday to France.
The conversion rate at his local exchange shop is £1 = €1.19.
The exchange shop only has €20 notes and €50 notes.
Hefin would like to spend as close to £450 as possible when buying euros.

Calculate:

- how many euros Hefin will get when spending as close to £450 as possible
- how much he pays for his euros.

You must show all your working. [5 + 2 OCW]

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Hefin will get ……. euros

This will cost him £ ……..

Examiner only

7. Muhammad earns £58 000 before income tax.

One of the income tax bands states:

- Higher rate of 40% is payable on income above £50 000.

(a) Calculate how much tax Muhammad pays at the higher rate. [2]

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(b) Muhammad pays a total of £10 500 in income tax each year. [4]

The other tax bands state:

- No income tax is payable below the personal allowance
- Basic rate of 20% is payable on income above the personal allowance and up to £50 000

Calculate the value of the personal allowance.

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Value of the personal allowance is £ ……

Examiner only

8. Isabelle has created a flowerbed in the shape of a trapezoidal prism.
The plan view of the flowerbed is shown in the diagram below.

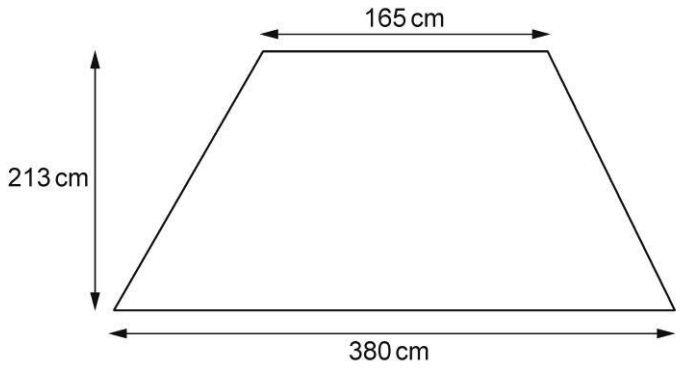

Diagram not drawn to scale

Isabelle is going to buy enough compost to fill the flowerbed to a uniform depth of 30 cm.

(a) Calculate the volume of compost Isabelle will need. [4]
Give your answer in **litres**.

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Examiner only

(b) The price of a 50-litre bag of compost has changed 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 for 2 years.
Seven years ago, the price of a 50-litre bag of compost was £8.

Calculate the price of a 50-litre bag of compost this year. [3]

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Examiner only

9. The table below shows some facts, found on the internet, about the Principality stadium in Cardiff.

1206603729 May 22, 2020	Principality stadium in Cardiff 
Volume	1 500 000 m^3
Capacity	74 500 people
Cost to build	£152 million
Area of the stadium	4×10^4 m^2
Area of the pitch	9.48×10^3 m^2

(a) (i) The stadium has a volume of 1 500 000 m^3. [1]
Write this number in standard form.

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(ii) The pitch at the Principality stadium makes up part of the area of the stadium. [2]

Calculate the area of the pitch as a percentage of the area of the stadium.

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(iii) The stadium cost £152 million to build. [3]
This was 43% greater than the planned cost.

Calculate the planned cost to build the stadium.

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Planned cost was £ ……. million

Examiner only

(b) The pitch at the Principality stadium measures 120 m by 79 m.
Both measurements are correct to the nearest 0.5 m.

Calculate the greatest possible perimeter of the pitch. [2]

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(c) Before a rugby match at the stadium, the manager decides to hand out 8 food vouchers among the first 200 people queueing at one of the stadium gates.

The manager decides to use a systematic sampling method to select who receives these 8 vouchers.
The manager randomly selects the 20th person in the queue to receive the first voucher.

Use the table below to give the positions in the queue of the 8 people who would receive vouchers. [2]

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Voucher	1	2	3	4	5	6	7	8
Position in the queue	20th	…….	…….	…….	…….	…….	…….	…….

Examiner only

10. Hatkins is a company that builds new houses.

(a) Hatkins employs painters to paint new houses once they are built.
In one house, 4 painters take 7 hours to paint some rooms that have a total wall and ceiling area of 85 m^2.

In a different house, some rooms have a total wall and ceiling area of 125 m^2.
Hatkins has allocated 5 hours for these rooms to be painted.

(i) Calculate the least number of painters needed. [4]
You must show all your working.

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(ii) What assumption have you made in answering part (a)(i)? [1]

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Examiner only

(b) The table below shows the number of staff Hatkins employs in different job types.

Job type	Painters	Bricklayers	Plumbers	Electricians
Number of staff	15	40	21	29

Hatkins is going to create a committee of 20 of its staff that will organise social and team-building activities.

Use a stratified sampling method to calculate the number of staff from each job type that Hatkins should have on the committee.

You must show all your working. [4]

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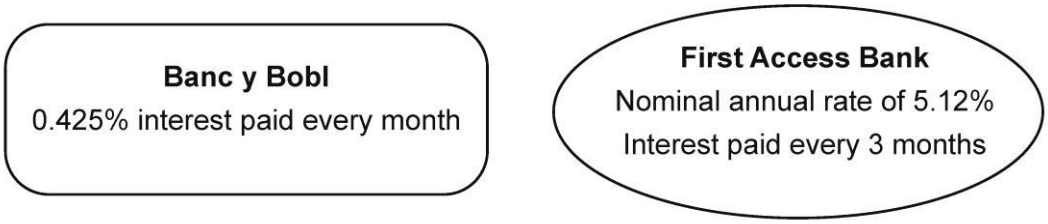
Job type	Painters	Bricklayers	Plumbers	Electricians
Number of staff on the committee	……	……	……	……

Examiner only

11. Mari wants to invest some money in a savings account.
Mari's two local banks offer savings accounts.
Details of the two accounts are shown below.



By comparing AERs, decide which bank Mari should choose to receive the most interest per annum.

[5]

You must show all your working.

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Mari should invest her money in……..

Examiner only

12. Matthew is buying a new car, priced at £22 000.

He has some money to pay as a deposit, and then he will be taking out a loan from his bank to pay the balance.

The details of his finance agreement are shown below.

Deposit	£5000
Loan amount	£17 000
Loan period	7 years
Annual Percentage Rate (APR)	7.5%

Matthew will be making monthly repayments to pay back the loan in 7 years.
The formula for calculating the monthly repayment on a loan is

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

where:

- M is the amount of each monthly repayment
- L is the loan needed
- r is the **monthly** interest rate as a decimal
- n is the number of **months** taken to pay back the loan.

(a) Calculate Matthew's monthly repayment on the loan. [3]
Give your answer correct to the nearest penny.

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Matthew's monthly repayment is £ ……correct to the nearest penny.

(b) If Matthew took out the loan over 6 years, his monthly repayments would be £293.93.

Calculate the saving Matthew would make on the total amount paid for the car if he took out the loan for 6 years rather than 7 years. [2]

Examiner only

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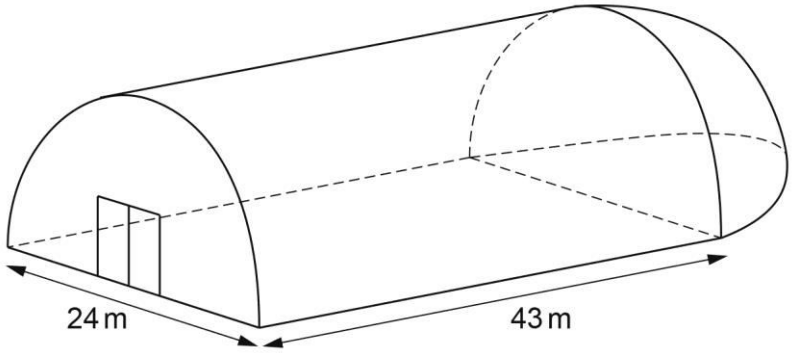
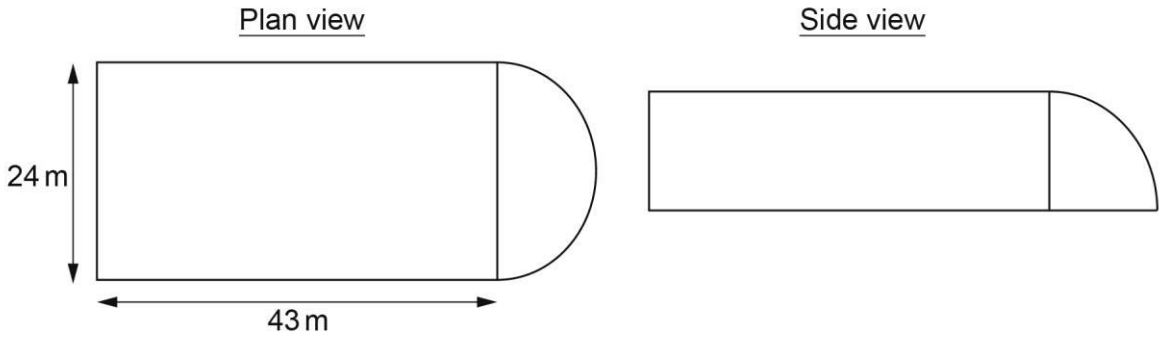
Examiner only

13. Based on A17 Num U2H Qu9c
A building used for storage is shown below.

The building is in the form of half a cylinder, with half a hemisphere attached at one end.





Diagrams not drawn to scale

All the exterior surfaces of the building, including the doors are to be painted.

The measurements on the diagram are given **correct to the nearest metre**.
The paint comes in tins that cover an area of 40 m^2, **correct to the nearest m^2**.

Calculate the minimum number of tins that would guarantee having enough paint to cover these exterior surfaces. [8]

Examiner only

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END OF QUESTIONS

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

Examiner only